UNIVERSAL
LIBRARY

OU_166974

UNIVERSAL
LIBRARY

OSMANIA UNIVERSITY LIBRARY

Call No. 657.4/S74C Accession No. G16131

Author Specthrie, S. W.

Title Basic cost accounting. 1950

This book should be returned on or before the date last marked below.

BASIC COST ACCOUNTING

BY

SAMUEL WALDO SPECTHRIE, M.B.A., C.P.A.

PROFESSOR OF ACCOUNTING

ROOSEVELT COLLEGE

NEW YORK

PRENTICE-HALL, INC.

1950

PRENTICE-HALL ACCOUNTING SERIES
H. A. Finney, Editor

COPYRIGHT, 1950, BY
PRENTICE-HALL, INC.
70 Fifth Avenue, New York

ALL RIGHTS RESERVED. NO PART OF THIS BOOK MAY BE REPRODUCED IN ANY FORM, BY MIMEOGRAPH OR ANY OTHER MEANS, WITHOUT PERMISSION IN WRITING FROM THE PUBLISHERS.

PRINTED IN THE UNITED STATES OF AMERICA

TO MY WIFE

MARY KLEINERMAN SPECTHRIE

THIS VOLUME IS AFFECTIONATELY DEDICATED

Preface

Basic Cost Accounting is intended as a text for students of accounting and business who wish to learn the principles, procedures, and executive uses of manufacturing cost accounting. Among the phases of manufacturing cost accounting covered in the text are:

1. Job-lot cost accounting.
2. Process cost accounting.
3. Operational cost accounting.
4. Cost accounting with the use of standards.
5. Cost accounting for residuals, by-products, and joint products.
6. The use of cost accounting data in formulating business policy.

Each chapter is a full treatment of its considered topic and presents not only the cost principles involved but also the procedures used in their practical application. Especially stressed in the text is the fact that cost accounting procedure is flexible and not only can but should be directed toward developing the particular facts in which the management is interested.

The homework material, which includes a job-lot practice set, fifty-eight problems, and two hundred thirteen questions, is sufficient in scope, volume, and gradation to give the student adequate practice in applying the principles and procedures explained in the text. Many of the problems and questions are taken or adapted from those given in C. P. A. examinations.

Each chapter includes two sets of problems and questions. The purpose of the *Additional Work* sets of problems and questions is to subject the material of the course to:

1. *Continuous review*—through the media of problems and questions on fundamental principles presented throughout the course.

2. *Graduated development*—through the presentation in successive chapters of increasingly difficult problems on the more important cost accounting principles and procedures.

3. *Practical integration*—through the media of problems and questions the solutions to which require successful application of the principles covered in two, three, or more chapters.

The purely clerical work incidental to the study of the material of the text is minimized by:

1. A workbook containing forms which materially decrease the time required to solve the assigned problems.
2. The omission of pennies in the practice set and problem amounts.
3. As few transactions in a practice set or problem as is consistent with familiarizing the student with the essential accounting procedures.

Among my colleagues at the Roosevelt College School of Commerce who taught the manuscript in mimeograph form were William Braker, Harold Minkus, Irving Tenner, and Enos Rayson. For the many improvements in the text which are owing to their valuable criticism, the author is truly grateful.

Appreciation is also expressed for the many hours of patient clerical work on the manuscript by my secretaries, Miss Evelyn Voolach and Miss Shirlee Weindruch.

For constant encouragement in the work of writing the text and for making available the classes in which the material was taught in mimeograph form, I am indebted to Dean Lowell Huelster of the School of Commerce of Roosevelt College, Chicago, Illinois.

SAMUEL WALDO SPECTHRIE

Chicago, Illinois.

Contents

CHAPTER

1. MANUFACTURING COSTS 1

Comparison of merchant's and manufacturer's product cost. Material. Labor. Factory burden. Prime, conversion, and factory cost. Inventories of a manufacturing business. Steps in the manufacturing process. Journal entries reflecting the steps in manufacturing. Accounts reflecting the steps in manufacturing. The manufacturing statement.

2. THE NATURE AND USES OF COST ACCOUNTING . . . 10

What cost accounting deals with. The costing points. The labor operation as the costing point. The part and final product as costing points. The manufacturing stage as the costing point. The service as the costing point. The kind and number of costing points to be used. Uses of cost accounting data. Use of the cost data for purposes of sales control. Use of the cost data for purposes of administrative control. Use of the cost data for purposes of production control. Kinds of cost systems.

3. OUTLINE OF THE JOB-LOT COST PLAN 20

Key forms of the job-lot cost system. The job cost sheet. The materials requisition. The labor time ticket. Charging the job sheets for factory burden. Completion of a production order. Diagram of the interlocking job cost plan. Mechanics of job-lot cost accounting.

4. COST ACCOUNTING FOR MATERIAL 33

Material; meaning of term. Material cost elements. Stores control. Theory of a book inventory for materials. Form of the materials ledger account. Last-in, first-out method of pricing inventory issues. Evaluation of the FIFO method of handling material issues. Evaluation of the LIFO method of pricing inventory issues. Average cost as a method of pricing inventory issues. Control of the material inventories through minimum-maximum quantities. Considerations in determining minimum-maximum quantities. Mechanics of a book materials inventory plan. Handling of the materials invoices. Handling the materials requisitions. The materials requisition journal. Materials requisitions handling chart.

5. COST ACCOUNTING FOR LABOR 50

Labor; meaning of term. Direct and indirect labor. Accounting for labor. The labor time ticket. Handling the labor time tickets. Deductions from wages and salaries. Form of the payroll records. Journalization of the payroll record data. Application of factory burden; direct-labor-hour rate method. Charging the additional cost of overtime labor.

CHAPTER PAGE

6. FACTORY BURDEN—NATURE; ACCUMULATION; MEASUREMENT; DISTRIBUTION METHODS 62

Definition. Nature of factory burden. Accumulation of factory burden. Measuring factory capacity and its consumption. Methods of distributing the factory burden cost among the job orders. Rate per direct labor hour. Per cent of direct labor. Per cent of prime cost.

7. THE NORMAL BURDEN RATE 75

Actual factory cost; meaning of term. Defects of an actual burden rate. Fixed nature of factory burden cost. Fluctuating nature of factory activity. Effect of fluctuating factory activity on the burden rate. Impairment of usefulness of unit cost data. Attitude of the accountant toward the fluctuating burden rate. Attitude of the engineer toward the fluctuating burden rate. Advantages of using a normal burden rate. Calculation of the normal burden rate. Estimating the normal burden amount. Estimating the normal number of direct labor hours. Entries to record burden applied at normal rates. Nature of the Factory Burden–Applied account. Distinction between Factory Burden—Actual, In-Process, and Applied accounts.

8. DEPARTMENTAL FACTORY BURDEN RATES 89

The blanket burden rate. The departmental burden rates. When are departmental burden rates necessary? Problems involved in the use of departmental burden rates. Accumulating the departmental burden amounts. Joint burden costs; bases for their proration. Procedure in the proration of joint burden costs. Minimizing joint burden costs. Producing and service departments. Proration of service department costs. Accumulating the direct labor hours of each department. Applying departmental burden to the job cost sheets. Machine-hour burden rates. Machine-hour conversion rates. Machine-hour sold rates. Per cent of direct-labor-cost departmental burden rates.

9. THE CONTROL OF FACTORY BURDEN AMOUNT 105

Steps in the control of factory burden amount. Behavior of the factory expenses. Factors in the behavior of a factory expense. The variable budget of factory expenses. The necessary burden "at level." Comparison of the actual and necessary factory expense amounts. Investigation of the expense variations. The necessary burden at level as the basis for the predetermined burden rate. Normal rate charges burden to cost as a variable expense. Measuring the level of departmental activity.

10. UNDERABSORBED AND OVERABSORBED FACTORY BURDEN 118

Differences between actual and applied factory burden. Factors entering into under- or overabsorbed burden. Expense excess or saving. Idle-time cost or overtime profit. Analysis of the under- or overabsorbed burden. Computation of the necessary burden at intermediate levels. Analysis by burden item into expense and volume factors. Limitations on the accuracy of the computed expense and volume variations. Analysis of under- or overabsorbed

CHAPTER PAGE

UNDERABSORBED AND OVERABSORBED FACTORY BURDEN (*Continued*)

burden if a variable budget is not prepared. Final disposition of under- or overabsorbed burden. Interim handling of underabsorbed and overabsorbed burden. Supplementary burden rate. Blanket or departmental burden rates.

11. COMPLETION AND SALE OF THE PRODUCT 134

Entry to record completion of a job order. The finished goods journal. Entries to record sales and cost of sales. Form of sales record in a manufacturing business. Unit production cost file. Book inventory of finished goods. Mechanics of a book finished goods inventory.

12. THE FINANCIAL STATEMENTS AND CLOSING ENTRIES . 145

Condition of the ledger prior to closing. Periodic statements of a manufacturing business. The cost of goods made and sold statement. Profit and loss statement. Balance sheet. Cross-referencing the financial statements. Closing entries. Ruling of the nominal accounts. Ruling of the balance sheet accounts. Trial balance after closing. Frequency of closing the books.

13. PROCESS COST ACCOUNTING 157

Job-lot costing. Process industries. Process cost accounting. The problems and procedures in process cost accounting. Description of the business. Accumulation of the direct conversion costs. Apportioning the service department costs. Total conversion cost; per-unit total conversion cost. Charges for materials and supplies. Data on production and transfers. Recording the inventory transfers; computing the production costs. Shrinkage loss; its absorption in the process costs. Alternative method of developing per-unit process costs. Inventories, cost of sales, and proof of production cost under the alternative method of developing per-unit process costs. Standard rates for service divisions; unabsorbed service expense. Inter-use of service departments.

14. OPERATIONAL COST ACCOUNTING—THE BASIC PLAN . 177

Job-lot and process cost accounting not always applicable. The operational cost plan; main characteristics. Definition of terms. The procedure in operational cost accounting. The problems in operational cost accounting. Cost accounting for piece-part material costs. Cost accounting for outside operation costs. Cost accounting for labor operation costs. Completing the piece part and assembly cost sheets. Frequency of the cost test runs. Test runs must be made under representative operating conditions. More detailed costs developed under operational costing. Better cost information available under operational costing. Further merits of operational cost accounting.

15. OPERATIONAL COST ACCOUNTING—FURTHER PROCEDURES 192

Notices of changes in manufacturing procedure. Spoilage costs. Keeping the book inventories. Spot-check physical counts to supplement the book inventories. Taking and pricing a physical inventory.

CHAPTER PAGE

15. OPERATIONAL COST ACCOUNTING—FURTHER PROCEDURES (*Continued*)

Pricing the book inventories for use in interim statements. Variation between the actual production cost outlays and the value of the production at the test run costs. Finished goods and cost of sales accounts under operational costs. Significance of the variations from test run cost. Disposition of the variations from test run cost.

16. COST STANDARDS 210

Responsibility for increase or decrease in material or labor costs. Inadequacies of the usual per-unit cost data. Making the costs completely usable by factory management. Cost standards; standard costs. Arriving at the standard costs. Determining the required piece parts and labor operations. Piece-part and assembly drawings. Production layout sheets. Setting the labor operation quantity standards. Setting the operation labor and burden-quantity standards. Performance level of the quantity standards. Variations from the quantity standards. Revisions of the quantity standards. Development of the price standards. Variations from the price standards. Revisions of the price standards. The variable burden budget as a cost standard. The standard cost card. The expense of the cost standards. Cost standards under varying operating conditions.

17. COST ACCOUNTING WITH THE USE OF COST STANDARDS 229

General. The inventory accounts in operations with cost standards. Material purchases; material price variation. Material issues; material quantity variations. Labor costs; labor price and quantity variations. Direct labor hours record; burden quantity variation. Actual factory burden costs. Expense and volume variations from standard burden. Price variations due to substitutions. Quantity variations represented by irreparable spoilage. Completion of goods. Sales and cost of goods sold. Appearance of the ledger accounts. Taking and pricing the physical inventories. Adjusting the book to the physical closing inventories. Analysis of the quantity variations. Analysis of the price variations. Disposition of the variations. The unprorated variations on the financial statements. Changes in the cost standards. Operating with cost standards in process businesses. Operating with cost standards in job-lot businesses. Cost accounting with standards based on principle of exceptions.

18. COST ACCOUNTING FOR RESIDUALS AND BY-PRODUCTS 263

Waste and scrap residuals. Scope of the accounting for waste and scrap. Charging the expense of removing waste residuals. Crediting the net proceeds from the sale of scrap. By-products; kinds and distinguishing features. Cost accounting for by-products made to utilize residuals. Cost accounting for by-products made to utilize excess factory capacity.

19. COST ACCOUNTING FOR JOINT PRODUCTS 272

Definition and examples of joint products. The basic problem in joint product cost accounting. Common costs prorated on the basis of physical factors. Proration on basis of separate product values at

CHAPTER PAGE

19. COST ACCOUNTING FOR JOINT PRODUCTS (*Continued*)

break-off point. Proration on basis of joint-product sales price after separate processing. Proration on basis of estimated cost to produce separately. Proration on basis of contribution to the fixed and variable costs. Inadequacies of joint-product costs based on common cost prorations. Charging for joint-product base materials at current market values. Accounting procedures must not inflate the profits. Composite purchases a kind of joint-cost problem.

20. USING THE COST ACCOUNTING IN FORMULATING THE BUSINESS POLICIES 286

Introductory. Whether to make or to buy an article. Decreasing costs as a factor in the production and sales program. The elements which the sales price should cover. Depreciation expense in the manufacturing costs.

INDEX 295

CHAPTER 1

Manufacturing Costs

1. Comparison of merchant's and manufacturer's product cost.

The merchandising function is essentially that of buying goods in large quantities and selling them in small quantities. Since the merchant sells the identical goods that he buys, product cost to him consists essentially of the purchase amount.

The function of manufacturing is to process various purchased items into new products. Sometimes the change in product form wrought by the fabricating is large; sometimes it is relatively slight. In any event, the manufacturer does not sell the identical article he buys. Product cost to the manufacturer is, then, not purchase amount, but purchase amount plus fabricating expense. It comprises three distinct cost elements:

1. Direct material.
2. Direct labor.
3. Factory burden.

The nature of each of these elements will be briefly considered.

2. Material.

By *material* is meant the substances from which the products are made. It may be substance in a raw state, as in the case of the logs used by a sawmill, or substance in a manufactured state, as in the instance of the tires used by an automobile plant. It is characterized by having been *purchased*, not made, by the plant to which it is material.

Direct material comprises those material costs which are conveniently allocable to specific lots of production. By "conveniently allocable" is meant not only that it is possible to identify the material cost with a specific lot of production but that the expense of doing so is not too large for the value involved. A board used to repair the factory roof is not direct material, because it is *impossible* to identify it with the manufacture of any specific lot of product. A single nail used in the

manufacture of a specific product is not direct material, because it is *impractical* in view of the small value of the nail to incur the clerical expense required to allocate it as direct material.

Material which cannot be classed as direct is termed *indirect material* and its cost is included as an item of factory burden.

3. Labor.

By *labor* is meant the *human effort* used in converting material into the finished product.

Direct labor comprises those labor costs which are conveniently allocable to specific lots of production, as, for instance, the labor cost of a machinist doing turning work on a specific job order.

Labor which cannot be classed as direct is termed *indirect labor* and handled as an item of factory burden.

4. Factory burden.

Factory burden comprises all manufacturing costs other than direct material and direct labor. The more important items of factory burden in any industrial establishment are the following:

1. Taxes.
2. Depreciation.
3. Insurance.
4. Rent.
5. Maintenance.
6. Indirect labor.
7. Indirect material.
8. Power, light, and heat.
9. Supervision.
10. Factory accounting.

5. Prime, conversion, and factory cost.

Prime cost is the sum of the direct material and direct labor costs. *Conversion cost* comprises the direct labor plus the factory burden costs. *Factory cost* consists of the total of the direct material, direct labor, and factory burden costs.

6. Inventories of a manufacturing business.

The inventories of a manufacturing business are divided on the basis of *stage of manufacture* into three kinds:

1. *Materials inventory,* which is substance on which the concern has applied no manufacturing effort. This inventory is usually kept in the *storeroom.*

2. *Work in process inventory,* which is material the concern has partly but not completely processed. This inventory is usually on the *factory floor.* For cost accounting convenience, the work in process inventory is usually broken up on the basis of *cost elements* into the following:

(*a*) Material in process inventory.
(*b*) Labor in process inventory.
(*c*) Burden in process inventory.

3. *Finished goods inventory,* which is material the concern has completed processing and which is therefore ready for shipment to customers. This inventory is usually stored in the *warehouse.*

7. Steps in the manufacturing process.

The five distinct steps that are usually present in the ordinary manufacturing process are as follows:

1. *Materials procurement.* To permit their acquisition at favorable prices and to assure continuous manufacturing operations, the materials to be used are usually bought well in advance of actual need. Upon arrival at the plant, they are placed in the *materials storeroom* to await use in manufacturing.

2. *Materials requisitioning.* As materials are needed for manufacturing operations, they are withdrawn from the materials storeroom onto the *factory floor.* Under an adequately organized materials control system, withdrawal of material from the storeroom for use in manufacturing is effected by means of *material requisitions,* which are written orders signed by responsible shop supervisors directing the storeroom clerk to release materials.

3. *Labor application.* On the factory floor the materials are fashioned into the finished product by workers, and the cost of their labor is charged, or "applied," to the production.

4. *Burden application.* During the period of manufacture, factory burden expenses, such as taxes, depreciation, insurance, rent, and maintenance, are necessarily incurred, and their cost is also applied to the production.

5. *Product completion.* When the manufacturing processes have been completed, the original material has been converted into the finished product. The finished product is then transferred from the factory floor to the *finished stock warehouse* at the applicable costs for material, labor, and burden reflected by the cost records.

8. Journal entries reflecting the steps in manufacturing.

The summary journal entries recording the usual steps in the fabricating process, based on the June 19— manufacturing data of the Borchard Machine Works, are as follows:

(1)

Materials Inventory	$28,000	
Accounts Payable		$28,000

Raw materials purchased in June 19—.

(2)

Materials in Process Inventory	26,000	
Materials Inventory		26,000

Materials requisitioned for use in manufacturing during June 19—.

(3)

Labor in Process Inventory	40,000	
Accrued Payroll		40,000

Labor costs incurred in June 19— and applied to production.

(4)

Burden in Process Inventory	43,000	
Accrued Taxes		9,000
Unexpired Insurance		4,000
Cash		12,000
Reserve for Depreciation		18,000

June 19— factory burden costs incurred and applied to production:

Taxes (Accrued)	$ 9,000
Insurance (Expired)	4,000
Power (Paid)	12,000
Depreciation (Accrued)	18,000
Total	$43,000

(5)

Finished Goods Inventory	100,000	
Materials in Process Inventory		25,000
Labor in Process Inventory		37,000
Burden in Process Inventory		38,000

Cost of goods completed in June 19— transferred from the factory floor to the finished goods warehouse at the applicable material, labor, and burden prices reflected by the cost records.

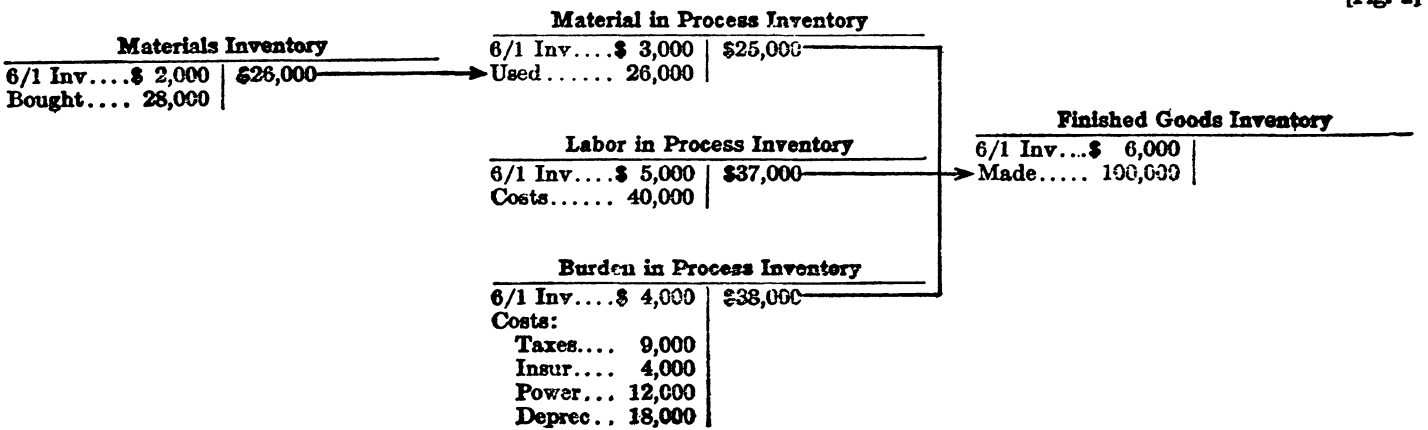
The records and forms used to develop the data necessary for the cost summarization entries will be considered in later chapters.

9. Accounts reflecting the steps in manufacturing.

The summary journal entries reflecting the steps in manufacturing are posted to the inventory accounts, which then appear as in Fig. 1. The June 1 inventories shown in Fig. 1 are assumed amounts.

After all the postings have been completed, the account balances of Fig. 1 reflect the *closing inventories* of materials, work in process, and finished goods.

[Fig. 1]


Materials Inventory
6/1 Inv....$ 2,000
Bought.... 28,000
$26,000
Material in Process Inventory
6/1 Inv....$ 3,000
Used..... 26,000
$25,000
Labor in Process Inventory
6/1 Inv....$ 5,000
Costs..... 40,000
$37,000
Burden in Process Inventory
6/1 Inv....$ 4,000
Costs:
Taxes.... 9,000
Insur.... 4,000
Power... 12,000
Deprec.. 18,000
$38,000
Finished Goods Inventory
6/1 Inv....$ 6,000
Made..... 100,000

10. The manufacturing statement.

The material, labor, and burden in process accounts completely reflect the manufacturing activities, for they are charged with the material, labor, and burden costs applied to fabricating and are credited with the material, labor, and burden costs applicable to goods completed. The information they disclose is periodically summarized in an exhibit termed the *manufacturing statement.* Fig. 2 is a manufacturing statement prepared from data disclosed by the material, labor, and burden in process accounts of Fig. 1.

[Fig. 2]

BORCHARD MACHINE WORKS — Exhibit III

Manufacturing Statement—Month Ended June 30, 19—

Particulars	Amounts		Per Cent of Cost
DIRECT MATERIAL:			
In Process—June 1, 19—	$ 3,000		
Requisitioned in June	26,000		
Total	$29,000		
In Process—June 30, 19—	4,000	$ 25,000	25%
DIRECT LABOR:			
In Process—June 1, 19—	$ 5,000		
Applied in June	40,000		
Total	$45,000		
In Process—June 30, 19—	8,000	37,000	37
FACTORY BURDEN:			
In Process—June 1, 19—	$ 4,000		
Applied in June:			
Taxes	9,000		
Insurance	4,000		
Power	12,000		
Depreciation	18,000		
Total	$47,000		
In Process—June 30, 19—	9,000	38,000	38
COST OF GOODS MANUFACTURED (To Exhibit II)		$100,000	100%

Since the manufacturing statement is an operating exhibit, it covers a period of time, and the length of that period must be clearly disclosed in the heading of the statement. The per cent analysis of the statement discloses the proportions in which material, labor, and burden contribute to finished-product cost. If the business made but one product, a *Per Unit Cost* column could be advantageously added to the manufacturing statement.

On the profits statement of an industrial concern, the *cost of goods manufactured* amount disclosed by the manufacturing

statement takes the place given to *Purchases* in the profits statement of a merchandising business, thus:

[Fig. 3]

Cost of Goods Sold:		
Opening Inventory of Finished Goods	$ 6,000	
Cost of Goods Manufactured in June 19—(Exhibit III)	100,000	
Total Finished Goods Available	$106,000	
Closing Inventory of Finished Goods	8,000	$98,000

ASSIGNMENT 1

Problem 1.

The following is a summary of the August 19— manufacturing transactions of the Baird Gear Works:

1. Material bought and placed in stores, $42,000.
2. Material (direct) requisitioned for use in manufacturing, $39,000.
3. Payroll for direct labor, $32,000.
4. Paid factory maintenance expense, $2,000.
5. Insurance expired in the month is estimated at $400.
6. The following expenses accrued during the month:

Taxes on Plant Property	$ 600
Depreciation on Plant and Equipment	3,400

7. The cost of the orders completed in the month consisted of the following:

Materials	$36,000
Labor	31,000
Burden	7,000

8. Inventories at August 1, 19—, were as follows:

Materials	$ 2,000
Materials in Process	4,000
Labor in Process	3,000
Burden in Process	1,000

(*a*) Journalize transactions 1–7, inclusive.
(*b*) Set up in T-accounts the August 1, 19—, inventories.
(*c*) To the T-accounts set up in (*b*) post the entries made in (*a*).
(*d*) From the data posted to the in-process inventory accounts, prepare the August manufacturing statement of the Baird Gear Works.

Question 1.

Distinguish between direct material, direct labor, and factory burden.

Question 2.

Name the five main steps in the manufacturing process.

Question 3.

From what source are the data for the manufacturing statement taken?

Question 4.

Distinguish between prime, conversion, and factory cost.

Additional Work

Problem 2.

The Nanssen Company maintains control accounts and subsidiary ledgers for (1) operating expenses and (2) creditors. In September 19— the following transactions involving operating expenses and creditor accounts occurred:

Sept. 1. Bought from the Crane Company valves costing $500 and couplings costing $300; terms, 1/10, n/60.

3. Issued checks as follows:

Postage (U. S. Post Office)	$ 10
Donations (Red Cross)	50
Advertising (*Post-Telegraph*)	100

5. Bought from Babcock and Ruhl $400 of valves and $700 of couplings; terms, 2/10, n/30.

7. Received invoice of Horder and Company for stationery, $25; terms, net 30 days.

9. Paid the Crane Company the invoice of September 1, deducting the cash discount.

14. Paid September rent to Estate of John Sells, $150.

15. Paid half the invoice of Babcock and Ruhl dated September 5.

22. Issued check for sales and office salaries, $200.

23. Received credit memo of Horder and Company adjusting the September 7 invoice for stationery to the correct amount of $15.

25. Bought from the Symington-Gould Company couplings costing $800; terms, net 60 days.

27. Bought on credit from the American Car and Foundry grease valves costing $1,200.
Bought on credit from the Colborne Manufacturing Company a machine costing $850.

30. Accrued sales and office salaries at close of month, $100.
September provision for taxes, $50.
September provision for depreciation, $100.

(*a*) Enter the foregoing transactions in the journals of Form Page 39 of your workbook.

(*b*) Foot and rule each of the records.

(*c*) Post to the general, operating expense, and creditors ledgers of Form Pages 40–42, inserting proper folio references and datings in both the journals and ledgers.

(*d*) Prove the correctness of postings to each of the ledgers at September 30, 19—, by filling out the trial balance and ledger abstract forms shown on Form Pages 40–42 of your workbook.

Question 5.

Differentiate between the inventories of a merchandising business and those of a manufacturing business.

Question 6.

Could a manufacturing statement of the form illustrated in Figure 2 be prepared if only a single work in process inventory account were kept?

Question 7.

The general ledger is in balance, but the subsidiary expense ledger is in disagreement by $108.50 with its control account. In what ledger does the error probably lie? Why?

Question 8.

Your employer, having studied bookkeeping years ago, notices that you post a $500 entry from the simple two-column general journal to the credit of the *Expense Ledger Control* and also to the credit of Insurance expense. He insists that you have made two postings of the credit item, and that, therefore, your books will be out of balance. Explain whether or not your employer is right, giving full reasons.

Question 9.

Show how the following data should appear in the Customers Ledger Control account. Use a standard form of account and indicate therein the dates and folio references. Also balance and rule the control account and explain how you would prove the correctness of its balance.

Sales	$175,000
Bad Debts Charged Off	800
Notes Received from Customers	6,000
Cash Received from Customers	130,000
Discounts Allowed to Customers	1,200

CHAPTER 2

The Nature and Uses of Cost Accounting

11. What cost accounting deals with.

Cost accounting deals with finding *per-item*, or *unit*, costs. The unit costs found may be those of production or those of distribution. In this book, only the unit costs of manufacturing will be discussed.

12. The costing points.

A *costing point* is a base about which cost data are gathered and from which unit costs are calculated. The costing point or base may be any one of the following:

1. A labor operation.
2. A part or final product.
3. A manufacturing stage.
4. A service.

The circumstances under which each of these costing points is used will be briefly considered.

13. The labor operation as the costing point.

If the manufacturing process consists of performing on the material a series of labor operations, the minimum unit conversion cost of the product is achieved when the unit cost of each of its component labor operations is minimized. To aid in achieving this purpose, each of the component labor operations on the product is set up as a costing point. Thus, for a 4-H drawing pencil, each of the nine component labor operations described in Fig. 4 is set up as a costing point.

At the end of each period, the costs accumulated for each labor operation are divided by the number of times the operation was performed during that period, and the *per unit cost* of the operation for that period is thus determined.

Comparison of *the unit costs experienced in previous periods* with the current-period unit costs discloses for each labor opera-

[Fig. 4]

Operation Number	Description	Total June Costs	Times Performed in June	Per-Unit Cost			
				June	May	April	Aimed for
1	Cutting.....	$ 368.00	368,000	$.0010	$.0011	$.0011	$.0009
2	Splicing.....	684.00	342,000	.0020	.0022	.0023	.0018
3	Grooving.....	1,242.00	414,000	.0030	.0033	.0032	.0030
4	Shaping.....	1,137.00	379,000	.0030	.0028	.0027	.0027
5	Cutting.....	426.00	426,000	.0010	.0011	.0012	.0008
6	Shaping.....	698.00	349,000	.0020	.0023	.0024	.0018
7	Gluing.....	368.00	368,000	.0010	.0010	.0010	.0009
8	Painting.....	780.00	390,000	.0020	.0021	.0020	.0017
9	Stamping.....	402.00	402,000	.0010	.0009	.0010	.0008
Total conversion cost.....				$.0160	$.0168	$.0169	$.0144

tion the *trend* of conversion costs. Thus, Fig. 4 discloses that the per-unit conversion cost of Operation Number 4 is rising, that of Operation Number 5 is falling, and that of Operation Number 7 is stationary.

Comparison of *the unit costs which careful engineering study indicates can be achieved* with the current-period unit costs discloses for each labor operation the *position* of conversion costs in relation to what they *could* be. Thus, Fig. 4 discloses that in June all the operation unit costs except that of Operation Number 3 were higher than those aimed for as reasonably attainable.

The fact that the unit conversion costs are calculated and compared for each component labor operation aids in the control of the completed pencil cost, because the changes in the production cost are not obscured by the offsetting of the lower cost of one operation by the higher cost of another. Thus Fig. 4 discloses that, while the June *total conversion cost* ($.0160) per unit is lower than that of May ($.0168), the per unit costs of Operation Number 4 and Operation Number 9 have increased. Executive attention is thus drawn to, and can be centered on, the points of production for which the results have not been favorable.

14. The part and final product as costing points.

In the manufacture of a multi-part product, the usual production method is to make separately each of the component parts and then to assemble these parts into the final product. To compute the per-unit cost of the final product, it is necessary to know the per-unit cost of each of the component parts. It is required, therefore, to set up as a costing point:

1. Each component part.
2. Each final product.

Each component-part unit cost comprises the sum of the per-unit costs of its included materials and conversion labor operations. Each final-product unit cost comprises the sum of the per-unit costs of its included parts and assembly operations. Figure 5 shows how the per-unit costs of (1) each component part and (2) the final product are computed for a pencil.

[Fig. 5]

Particulars	Component Part		
	Holder	Filler	Together
The per-unit costs of the raw materials:			
Cedar	$.015		
Graphite		$.010	
Plus the per-unit costs of labor operations:			
Cut	.001		
Splice	.002		
Groove	.003		
Shape	.003		
Cut		.001	
Shape		.002	
Are the per-unit costs of component parts	$.024	$.013	$.037
The component parts are combined by labor operations:			
Gluing			.001
Painting			.002
Stamping			.001
Into a finished pencil of per-unit cost			$.041

Knowledge of the per-unit cost of each component part is necessary not only for the purpose of computing the per-unit cost of the final product but also for the purpose of determining whether to make or to buy the part. If, in the case of the pencil, the holder can be bought for $.02 a unit, it might be unwise to continue manufacturing it at a cost of $.024 per unit.

15. The manufacturing stage as the costing point.

If the business makes a single product like cement or flour, and the production routine consists of a series of processes or

THE HART BRICK COMPANY [Fig. 6]

Process Cost Sheet—September 19—

Particulars	Process of		
	Shaping	Drying	Burning
Clay	$ 4,000	$	$
Direct Labor	6,000	2,000	4,000
Factory Burden	5,000	3,000	6,000
Transfers:			
Shaping to Drying	$15,000	→ 15,000	
Drying to Burning		$20,000	→ 20,000
Burning to Warehouse			$30,000
M's Produced	5,000	5,000	5,000
Per M Cost Through	$3	$4	$6

stages of manufacture, the natural costing point is *the stage or process*, and the accumulation of unit cost for each of the processes from inception to the end of manufacture proceeds as is shown in Fig. 6.

Here, too, the comparison of the current-period per-unit costs with (1) those of previous periods and (2) those which careful engineering study indicates to be attainable aids in promoting production efficiency.

16. The service as the costing point.

If, for example, the business produces its own power or provides its own tool maintenance, *the service* is used as a costing point for collecting information as to its cost of production. Comparison of the current-period unit costs of production with those of previous periods indicates the *trend of cost* of the service. Comparison of the unit cost of producing the service with the price at which it could be bought shows whether or not it is economical to produce rather than to buy the service. Thus, Fig. 7 discloses that, for the Tangney Company, the cost per kilowatt-hour of producing power is increasing, and that the cost of producing exceeds substantially the cost of buying a kilowatt-hour of power.

THE TANGNEY COMPANY [Fig. 7]

Power Costs—June 1–August 31, 19—

Particulars	June	July	August
Fuel	$1,500	$1,400	$1,700
Direct Labor	2,400	2,300	2,500
Factory Burden:			
Taxes	300	300	300
Depreciation	400	400	400
Maintenance	500	600	700
Insurance	200	200	200
Supplies	150	300	200
Total Cost	$5,450	$5,500	$6,000
K.W.H. Produced	54,500	50,000	50,000
Cost Per K.W.H.	10¢	11¢	12¢
Market Price Per K.W.H.	9¢	9¢	9¢

17. The kind and number of costing points to be used.

From what has been said in Sections 13–16, it is seen that the *kind* of costing points used by a factory depends on these factors:

1. The unit-cost facts wanted.
2. The conditions of production.

If the cost per service-hour of tool maintenance is desired, the service costing point "Tool Maintenance" is set up. If, to aid

in promoting efficiency or determining whether to perform or subcontract, the unit cost of performing a labor operation is desired, that labor operation is set up as a costing point.

If the products made consist of assemblies of separately manufactured parts, it is necessary to set up as costing points (1) each component part and (2) each final product. If the production consists of a *flow* of material through a series of stages or processes of manufacture, the stage or process is set up as the costing point.

Each costing point, whether labor operation, part, product, or process, develops *one unit-cost fact.* The *number* of costing points used depends, then, on the number of unit-cost facts wanted. If a dozen or a hundred unit-cost facts are wanted, then a dozen or a hundred costing points will be used.

18. Uses of cost accounting data.

To be practical, a cost system, like any other application of accounting, must develop information worth at least as much as the expense it entails. If the system is well designed, the information it provides is usually worth vastly more. A cost system, adequately planned and properly used, affords data of use to the executive for the following purposes:

1. Sales control.
2. Administrative control.
3. Production control.

The use of a cost system for each of these purposes will be briefly reviewed.

19. Use of the cost data for purposes of sales control.

Unit product costs developed by a cost system should guide sales executives in setting satisfactory selling prices. If an article costs $4 to make, it follows that profitable operations require that it sell for more than $4.

Ordinarily a concern cannot set prices solely on the basis of its costs, because it must meet the prices set by competition. In such cases, the unit product costs can be used as a basis for determining what products should be made. If article *A* returns a loss, while articles *B* and *C* bring in profits, why not make and sell only articles *B* and *C*?

In order to present a "full line," the concern may have to offer certain articles to the trade at what the cost information shows to be a loss. In such instances, on the basis of the infor-

mation provided by cost data, the management may so direct the selling efforts as to minimize the sale of "loss" articles and increase the sale of profitable ones. Thus it may be provided that on all articles sold below cost, the salesman receives no commission, while on extremely profitable ones he receives double commission. Working on such incentive commission rates, the sales force will apply its efforts to what is profitable for the business.

20. Use of the cost data for purposes of administrative control.

The manufacturing, profits, and balance sheet statements disclose to administrative executives the operating results and financial position of the business and markedly influence the control policies adopted. The more frequently prepared, the more promptly rendered, and the more accurate these statements are, the better their service as a basis for administrative decision. By making quickly available as *of any date* accurate closing inventories, an adequate cost system makes practical accurate quarterly and even monthly statements, each prepared within a few days of the close of the period.

The factors of inventory calculation in a manufacturing business, as in a mercantile business, are the following:

1. The number of units.
2. The price per unit.

In a manufacturing business, were it not for the inventory amounts reflected by the book accounts under an adequate cost system, accurate inventories for use in preparing the financial statements would be impossible, frequent inventories would be impractical, and promptly available inventories would be improbable. Accurate inventories would be impossible because, without the unit cost data supplied by the cost system, no reliable basis would be available for pricing the quantities found to be on hand. Frequent inventories would be impractical because each inventory-taking often involves shutting down the plant while the quantities on hand are being counted. The task of making a physical count of the quantities and then pricing them would preclude the probability of promptly available inventories.

21. Use of the cost data for purposes of production control.

An article of a given quality may often be made of various kinds and grades of material, with various types and classes of

labor, and with differing machine facilities. Progress in minimizing product cost is achieved by experimenting with:

1. Various kinds and grades of material.
2. Various types and classes of labor.
3. Differing machine facilities.
4. Various combinations of material, labor, and machine facilities.

Experimentation in production methods is valuable only to the extent that the results of the experiments can be measured and compared. If it is impossible to measure the results of experiments in methods of production in concrete and comparable terms, the merits of one method of production over another can be only a matter of speculation and conjecture. An adequately operated cost system aids in production control by affording a concrete means of measuring and, therefore, of comparing the results of experiments in production methods.

In manufacturing, that method is the best which, quality considered, produces the article at the lowest unit cost. The cost system develops the unit costs of production. By comparing the unit costs under the various production methods, the superior one is quickly discerned. Thus, on the empirical basis of *lowest unit cost*, the cost system may disclose that the superior production method employs the most expensive material, labor, and machinery.

22. Kinds of cost systems.

Depending on the conditions of production, the manufacturing costs are charged against either:

1. Specific *lots* of production, or
2. The entire output in a *period* of production.

If the manufacturing costs are charged against specific *lots of production*, a *job-lot cost system* is said to be in use. If the manufacturing costs are charged against the entire output in a *period of production*, a *process cost system* is said to be in use.

In general, the *job-lot cost system* is found in those plants which make a varied line of products, especially if those products are made to the customer's order. In all such plants it is both possible and practical to identify manufacturing costs with specific lots of production from the time they start until the instant they come to the end of the fabricating process. Typical

examples of job-lot businesses are printeries, machine shops, and custom furniture factories.

Usually, the *process cost system* is found in those plants which make a single uniform product which is of such a nature that, once production has started, definite lots of product cannot be practicably identified. Typical examples of "process" businesses are flour mills, refineries, and smelters.

Often in a single business the conditions of manufacture are such that for some of its costing problems the job-lot cost plan is used and for others the process cost plan is used. Thus, a steel mill is essentially a process cost business; yet, in determining the cost of the tools that its maintenance department makes, a job-lot cost system may be used.

ASSIGNMENT 2

Problem 3.

From the following data prepare *in good cost accounting form* a manufacturing statement for the Unit Corporation. *Ignore irrelevant information.*

Particulars	Inventory as at Jan. 1, 19—	Inventory as at June 30, 19—
Materials	$ 3,000	$ 2,000
Materials in Process	4,000	3,000
Labor in Process	5,000	6,500
Factory Expense in Process	2,000	2,500
Finished Goods	4,000	2,000
Totals	$18,000	$16,000
Purchases of Material		$18,000
Operating Expenses for the Period:		
Direct Labor		$21,000
Indirect Labor		1,000
Factory Superintendence		2,000
Salesmen's Salaries		4,000
Advertising		3,000
Power		1,500
Plant Maintenance		500
Machinery Depreciation		2,000
Sales Discounts		500
Factory Rent		1,000
Units Produced (all identical)		10,000

Question 10.

Name four common costing points, and discuss the conditions of manufacture under which each is used.

Question 11.

The Merton Company is thinking of installing a cost-finding plan. Write a letter to the president of the company outlining the advantages which an adequate cost-finding plan would afford the company.

Question 12.

Distinguish briefly between the job-lot and process cost systems. Under what conditions of manufacturing would you recommend the use of each?

Additional Work

Problem 4.

The Torley Farm Equipment Company, which deals in plows and harvesters, maintains (1) a general ledger and (2) a subsidiary customers ledger. Using Form Pages 43–45, (*a*) make the necessary journal entries and postings to record the company's June 19— transactions, and (*b*) prepare a trial balance, or list of balances, at June 30, 19—, of each ledger to prove the correctness of the postings.

Transactions

June 1. Sold plows for $16,000 and harvesters for $9,500 to the Central Distributing Co.; terms, 2/15, n/60; Sales Invoice #321.

2. Sold plow for $1,500 to T. A. Simpson; terms, n/30; Invoice #322. Sold a harvester to Schell and Rawlings for $1,250; terms, 1/10, n/30; Invoice #323.

3. Received $300 cash as rent on building space leased out.

6. Sold plows for $2,400 to the Farmers' Supply Co.; terms, 2/10, n/30; Invoice #324.

8. Granted allowance of $300 to the Central Distributing Co. for defect in harvesters billed on Invoice #321.

10. Received cash payment for Invoice #323 less cash discount.

11. Sold plow for $1,800 to J. T. Hastings; terms, net 30 days; Invoice #325.

14. The Central Distributing Co. paid for its net purchase on Invoice #321.

15. Sold harvester for $3,650 to the Farmers' Supply Co.; terms, 2/10, n/30; Invoice #326.

17. J. T. Hastings returned plow parts billed to him at $600 on Invoice #325.

20. The Farmers' Supply Co. paid Invoice #324.

21. Sold plows for $12,000 and harvesters for $7,000 to the Central Distributing Co.; terms, 2/15, n/60; Invoice #327.

23. Sold harvester for $2,700 to Haffner Bros.; terms, 1/10, n/30; Invoice #328.

24. J. T. Hastings paid his account in full.

27. Received $70 cash from the railroad company to adjust error in freight bill of May.

Bought a truck for use in the business on credit from the Berkee Company issuing a 6% 60-day note payable for the entire $3,750 purchase price.

June 28. T. A. Simpson paid $1,000 on account.
29. Charged Haffner Bros. $70 in the *general journal* to correct for error in billing amount of Invoice #328.
30. Sold a harvester for $1,300 to A. W. Whiting; terms, n/30; Invoice #329.

Question 13.

What is the value of finding per-unit service costs?

Question 14.

What reasons could you give for the necessity of finding per-unit component-part costs?

Question 15.

Explain how the control account-subsidiary ledger plan may result in a reduction in the clerical work involved in keeping the books.

CHAPTER 3

Outline of the Job-Lot Cost Plan

23. Key forms of the job lot cost system.

In the general ledger, the charges to production are reflected by the *Material in Process, Labor in Process,* and *Burden in Process* accounts. The problem of cost accounting is to devise a systematic plan for allocating to the individual costing points the total material, labor, and burden charges shown by these control accounts. In an *interlocking job-lot cost system,* the problem is solved by the use of these key forms:

1. The job cost sheet.
2. The materials requisition.
3. The labor time ticket.

The features and functions of each of the forms will be briefly considered.

24. The job cost sheet.

The job cost sheet is a *form of subsidiary account* used to accumulate the material, labor, and burden charges applicable to a costing point consisting of a particular lot, or "run," of production. Fig. 8 illustrates a common form of job cost sheet.

Careful study of Fig. 8 reveals that the typical job cost sheet:

1. *Describes the costing point to which it refers.* This costing point may be a product, part, or labor operation. Thus, the job cost sheet of Fig. 8 is shown to refer to a finished-part run of 300 bunged but unpainted 30-gallon barrel heads.

2. *Discloses the identifying number assigned the run.* In all job lot plants every "run" of product is assigned a *production order number.* This number serves as a convenient means of referring to the run on the material requisitions and labor time tickets applicable to it.

[Fig. 8]

JOB COST SHEET

Article 300 bunged but unpainted 30-gallon barrel heads
Job Order No. 841
Started 10/7/—
Done 10/11/—
For Stock

Material			Labor			
Date		Amount	Date		Hours	Amount
Oct.	7	$ 42 00	Oct.	9	8	$ 8 00
	9	158 00		10	92	67 00
	11	25 00		11	200	75 00
		225 00			300	150 00

Cost Summary

Particulars	Amount	Per Unit
Material	$225.00	$ .75
Labor	150.00	.50
Burden—300 hr. @ 80¢	240.00	.80
Total	$615.00	$2.05

3. *States whether the order is for stock or a customer.* Thus, the cost sheet of Fig. 8 states that the order is for stock.

4. *Shows the manufacturing costs applicable to the run.* These costs are detailed as to the following elements:

1. Direct material.
2. Direct labor.
3. Factory burden.

In an *interlocking* job-lot cost system, the sum of the material charges disclosed by all of the *uncompleted cost sheets* agrees with the general ledger *Material in Process* account balance. Similarly, the sum of the labor charges shown by all of the uncompleted cost sheets agrees with the general ledger Labor in Process account balance, and the sum of the burden charges appearing on all of the uncompleted cost sheets agrees with the general ledger Burden in Process account balance.

In plants making custom goods, each "run," or production order for which a job cost sheet is set up may show the costs applicable to a somewhat different product. In plants continuously making the same articles, the production order is used merely as a device for obtaining frequent unit costs. Thus, in a

continuously operating barrel factory, a production order is issued for, say, every 50 barrels. All costs applicable to a run are collected on its job cost sheet. When the run is completed, the aggregate of its job cost sheet material, labor, and burden amounts each divided by 50 give the per-barrel material, labor, and burden cost. Thus, although production is continuous, unit costs for control purposes are available as often as 50 barrels are made. The device of the lot, or run, then permits not only the separate and frequent costing of each *kind* of product, part, or labor operation, but also the separate and frequent costing of each *batch* of each kind of product, part, or labor operation.

25. The materials requisition.

The materials requisition is the form used to charge the cost of materials used in manufacturing to the benefited production

[Fig. 9]

MATERIALS REQUISITION

PRODUCTION ORDER NO. 841 REQUISITION NO. 912

DATE 10/7/—

Quantity	Description	Material Acc't. No.	Unit Price	Amount
100 sheets	12-gauge steel 32" x 96"	S-49	$ .42	$42 00

orders. Study of Fig. 9 shows the more important facts reflected by a direct material requisition to be:

1. The cost value of the material issued.
2. The production order to which the material is chargeable.
3. The items of material issued.

The material costs shown by the direct material requisitions are debited to the *materials section* of the individual job cost sheets and credited to the various material accounts. Periodically, the material costs shown by the direct material requisitions are totaled, and for their sum this entry is made:

Materials in Process—Control	$8,000	
Materials—Control		$8,000
Total amount of material cost shown by the material requisitions applicable to specific production orders.		

After this summary entry has been posted, the general ledger account *Materials in Process—Control* shows in total what its subsidiary ledger, the materials sections of the individual job cost sheets, shows in detail.

26. The labor time ticket.

The labor time ticket is the form used to charge production orders with the direct labor *cost* and *time* applicable to them.

[Fig. 10]

LABOR TIME TICKET

NAME S. CASS PRODUCTION ORDER NO. 841

DATE 10/9/—

Hours Worked	Hourly Rate	Labor Cost
8	$1.00	$8.00

Study of Fig. 10 discloses that the typical direct labor time ticket sets out these important facts:

1. The laborer's name.
2. The number of hours worked.
3. The direct labor cost.
4. The production order to which the labor hours and cost are chargeable.

The direct labor *cost* and *time* shown by the direct labor time tickets are posted to the *labor section* of the individual job cost sheets to which they refer. Periodically the labor costs shown by these tickets are totaled, and for their *sum* this entry is made:

Labor in Process—Control	$9,000	
Accrued Payroll		$9,000

Total amount of labor cost shown by the labor time tickets applicable to specific production orders.

After this summary entry has been posted, the general ledger account *Labor in Process—Control* shows in total what its subsidiary ledger, the labor section of the individual job cost sheets, shows in detail.

27. Charging the job sheets for factory burden.

By definition, factory burden is that portion of manufacturing cost which cannot be identified with particular cost units

and must therefore be prorated among all the cost units on some arbitrary basis. A common method of charging factory burden to the cost sheets is at an *estimated rate per direct labor hour.* If this basis of factory burden proration is used, the burden section of the job cost sheet consists of the *hours column* of the labor section; the dollar amount of the factory burden applicable to the job cost sheet is calculated as:

Actual direct labor hours
times
Estimated factory burden rate per direct labor hour.

In Fig. 8 the direct labor hour column of the job cost sheet shows that 300 direct labor hours have been applied to the production order. The cost of factory burden is estimated at 80¢ per direct labor hour. The factory burden applicable to the production order is then figured as

300 direct labor hours at 80¢ each, or $240.

The direct labor hours shown on the job cost sheets were posted thereto from the direct labor time tickets. Periodically, the hours shown by the direct labor time tickets are totaled, and this entry is made:

Factory Burden in Process—Control	$6,400	
Factory Burden—Applied		$6,400
Actual direct labor hours—per time tickets	8,000	
Estimated burden rate per direct labor hour	$ .80	
Factory burden applied to job cost sheets	$6,400	

After this summary entry has been posted, the general ledger account *Burden in Process—Control* shows in total what its subsidiary ledger, the *factory burden section* of the individual job cost sheets, shows in detail.

28. Completion of a production order.

When a job order has been completed and the finished article has been transferred to the finished goods warehouse, the material, labor, and factory burden applicable to it are *taken out of inventory in process* by this entry:

Finished Goods Inventory	$435	
Materials in Process—Control		$135
Labor in Process—Control		160
Burden in Process—Control		140

Manufacturing costs applicable to Job Order #884.

THE INTERLOCKING JOB-LOT COST PLAN [Fig. 11]

MATERIALS REQUISITION

Production Order No. 841 — Requisition Number 912

Date 10/7/—

Quantity	Description	Material Account No.	Unit Price	Amount
100 sheets	12-gauge steel 32" x 96"	S—49	$.42	$42 00

LABOR TIME TICKET

Name S. Cass — Production Order No. 841

Date 10/9/—

Hours Worked	Hourly Rate	Labor Cost
8	$1.00	$8.00

JOB COST SHEET

Article 300 bunged but unpainted 30-gallon barrel heads — Job Order No. 841 — Started 10/7/— — Done — For Stock

Material			Labor			
Date		Amount	Date		Hours	Amount
Oct.	7	$ 42 00	Oct.	9	8	$ 8 00
	9	158 00		10	92	67 00
	11	25 00		11	200	75 00
		225 00			300	150 00

Cost Summary

Particulars	Amount
Material	$225.00
Labor	150.00
Burden—300 hr. @ 80¢	240.00
Total	$615.00

Material in Process—Control

Used—per sum of direct material requisitions	$8,000	Finished — per sum of completed job cost sheets	$6,000
		Balance — represents sum of uncompleted cost sheets	2,000

Labor in Process—Control

Applied — per sum of direct labor time tickets	$9,000	Finished — per sum of completed job cost sheets	$6,500
		Balance — represents sum of uncompleted cost sheets	2,500

Burden in Process—Control

Applied — per sum of hours on direct labor time tickets times estimated cost of burden per direct labor hour	$6,400	Finished — per sum of completed job cost sheets	$4,900
		Balance — represents sum of uncompleted job cost sheets	1,500

The general ledger *in-process control account balances* show *in total* what the subsidiary ledger of *incomplete job cost sheets* shows in detail. Proof of this relationship is periodically made by means of an abstract of the uncompleted job lot sheets, as follows:

ABSTRACT OF UNCOMPLETED JOB COST SHEETS

Production Order No.	Material in Process	Labor in Process	Burden in Process
841	$ 225 00	$ 150 00	$ 240 00
857	118 00	91 00	80 00
864	84 00	73 00	92 00
931	16 00	7 00	8 00
1261	82 00	81 00	84 00
1263	146 00	139 00	136 00
1274	13 00	17 00	18 00
1284	71 00	62 00	65 00
1291	19 00	23 00	23 00
Per control accounts	$2,000 00	$2,500 00	$1,500 00

The credit to the subsidiary ledger of job cost sheets supporting the general ledger *Materials in Process, Labor in Process,* and *Burden in Process* accounts is effected by stamping "Finished" on Job Cost Sheet #884 and removing it from the unfinished job cost sheet file.

29. Diagram of the interlocking job cost plan.

The sources of material, labor, and burden charges to:

1. The general ledger in process control accounts and
2. The subsidiary ledger job cost sheets,

and the relationship between the general ledger in-process control accounts and their subsidiary ledger job cost sheets are set out by Fig. 11. The figures and amounts of Fig. 11 are those used in Sections 23–28.

30. Mechanics of job lot cost accounting.

Sections 24–29 have sought to present a bird's-eye view of the *plan* of job lot cost accounting. The accounting mechanics for the smooth accumulation of material, labor, and burden costs and their accurate distribution among the job cost sheets will be considered for:

1. Materials in Chapter 4.
2. Labor in Chapter 5.
3. Factory burden in Chapters 6–10.

The reason for the larger amount of text space allotted to factory burden is that the accurate and equitable proration among the costing points of factory burden is in most instances the major cost accounting problem.

ASSIGNMENT 3

Practice Set.

The Loren Manufacturing Company manufactures freight trailers for use by motor transport companies. Two sizes of standard-design trailers are manufactured for stock, while special types of trailers are made to the specifications of the customer. The standard-type trailers are made in lots of twenty each, while the special-type trailers are made in the lots ordered by the customer. The company's complete set of double-entry books includes an interlocking job lot cost-finding plan. The records maintained by the company are as follows:

Journals	Ledgers
1. General	1. General
2. Cash Receipts	2. Customers
3. Cash Disbursements	3. Creditors
4. Sales	4. Work in Process
5. Purchases	5. Factory Burden
6. Material Requisitions	6. Operating Expense
7. Finished Goods	

Practice Set Pages 2–27 disclose:

1. The form of each of the journals employed.
2. The titles of the accounts kept in each of the ledgers and their balances at January 31, 19—.

In this and the nine succeeding chapters, the February 19—transactions of the Loren Manufacturing Company will be reported in summary. The student will be required to:

1. Record the transactions in the appropriate journals.
2. Close the journals and post them to the ledgers.
3. Take a trial balance of each of the ledgers.
4. Prepare the final statements and closing entries.

Following through the complete accounting cycle from the recording of the transactions through the posting of the closing entries should give the student in the space of but a few hours of clerical effort a working comprehension of the accounting routine of a manufacturing business.

As the first assignment of the Practice Set,

(*a*) Record on the forms provided by Practice Set Pages 29–31 the trial balance at January 31, 19—, of each of the ledgers. Establish, particularly, that each of the subsidiary ledgers is in agreement with its general ledger control account. The burden rate of the Loren Manufacturing Company is 75¢ per direct labor hour. Therefore, the burden applicable to an open job order is the direct labor hours recorded on its job cost sheet priced at 75¢. Thus, the burden in process of Job Order #8416 of the Practice Set is 16,800 × 75¢, or $12,600.

(*b*) Enter in the appropriate journals the five transactions listed below. In recording the transactions of the Practice Set, restrict yourself to the use of the account titles listed in the account classification appearing on Practice Set Page 2.

Transactions

Feb. 2. Paid $9,400 on account to the U. S. Plywood Company; Check #3547.

Issued check for $11,200 to the Associated Insurance Agency for a three-year fire insurance policy dated as of February 1, 19—. Charge the $11,200 to *Unexpired Insurance.*

Issued check for $27,200 to cover payroll accrued at January 31, 19—.

Feb. 3. Collected $6,237 in full of the account of Denby's Motor Freight.

Paid the Commonwealth Edison Company's $1,265 invoice for power and light.

Fig. 12 illustrates the form, method of recording typical entries in, and plan of ruling and folioing of a cash disbursements journal such as is used by the Loren Manufacturing Company. Note from Fig. 12 that:

1. The "payee" section is used to record the name of the person to whom the check is made payable. Payroll checks are made payable to "Payroll."
2. The "Particulars" section is used to indicate briefly the reason for issuance of the check.
3. The "Sundry Accounts" column is used to record debits to those accounts for which no special columns are provided.
4. For amounts recorded in the "Factory Burden," "Selling and Administrative Expense," and "Sundry Accounts" columns, the number of the account to which the item is to be posted is recorded in the folio space *at the time the entry is made.* When the posting is made, the fact is denoted by a check mark at the side of the account number.

The procedure in posting the amounts recorded in each of the columns of this form of cash disbursements journal is as follows:

Columns	Procedure in Posting
1. Cash in Bank Purchase Discount Accrued Payroll	Since the amounts in each of these columns all refer to the same account, their total as shown by the *column footing* is posted to that account as one item *at the end of the month.*
2. Sundry Accounts	Since the amounts in the column refer to various accounts, they are posted *individually* to those accounts *daily.*
3. Accounts Payable Factory Burden Selling and Administrative Expense	Each of these columns refers to a control account and a subsidiary ledger. The amounts in them are therefore posted *in detail daily* to the individual subsidiary ledger accounts and *in total at the end of the month* to the control account in the general ledger.

[Fig. 12]

Cash Disbursements Journal

19—		Payee	Particulars	Check No.	F.	✓	Cr. Cash in Bank	Cr. Purchase Discount	Dr. Accounts Payable	Dr. Factory Burden	Dr. S. & A. Expense	Dr. Accrued Payroll	Dr. Sundry Accounts
		Totals brought	forward				$39,851 00	$241 00	$14,824 00	$6,982 00	$2,753 00	$13,417 00	$ 2,116 00
Jan.	27	Valspar Company	Invoice of 1/10/—	3,746		✓	1,287 00	13 00	1,300 00				
		Commonwealth Edison Co.	Power and light	47	313	✓	885 00			885 00			
		Payroll	Week ended 1/26/—	48			4,426 00					4,426 00	
		Reliance State Bank	To reduce loan	49	53	✓	10,000 00						10,000 00
	28	Motor Transport Age	January 1–15 inc.	50	209	✓	1,213 00				1,213 00		
	31	Thor Sales Co.	For new truck	3,796	35	✓	1,050 00						1,050 00
		Acme Foundries	Invoice of 1/24/—	97		✓	784 00	16 00	800 00				
							$65,262 00	$288 00	$18,471 00	$9,171 00	$5,114 00	$17,843 00	$14,951 00
							(1)	(415)	(51)	(300)	(200)	(56)	

Problem 5.

From information disclosed by the following accounts of the Borsig Products Company, prepare for the year 19—: (*a*) a manufacturing statement, (*b*) a profit and loss statement, and (*c*) the closing entries.

Material in Process Inventory			
Jan. 1....	$ 8,000	$33,000	Finished
Used.....	29,000		

Finished Goods Inventory			
Jan. 1..	$ 9,500	$136,000.....	Sold
Finished	131,000		

Labor in Process Inventory			
Jan. 1....	$ 6,500	$64 000	Finished
Applied...	61,000		

Cost of Goods Sold			
Year...	$136,000		

Burden in Process Inventory			
Jan. 1....	$ 3,500	$34,000	Finished
Applied...	33,500		

Sales			
Returns..	$4,000	$204,000.....	Gross

Selling and Administrative Expense	
Salaries...	$13,000
Rent.....	6,000
Advertising	9,500
Traveling.	2,500
Deprec...	3,000
Bad Debts	2,000

Discounts			
Sales.....	$2,500	$500.....	Purchase

Interest			
Expense...	$4,000	$1,000.....	Income

Flood Loss
$90,000

Question 16.

What form is used to charge the job cost sheets for: (*a*) direct material; (*b*) direct labor; (*c*) factory burden?

Question 17.

When a job order is completed and, from data reflected by its cost sheet, the entry shown below is made, how is the credit to the subsidiary job cost sheet ledger supporting the material, labor, and burden in process control accounts effected?

Finished Goods	$500	
Material in Process		$240
Labor in Process		180
Burden in Process		80

Question 18.

Under an interlocking job-lot cost system, what is the relationship between the general ledger in-process accounts for material, labor, and burden and the individual cost sheets?

Question 19.

Name some of the costing points to which a job cost sheet may conceivably refer.

Question 20.

The Bixgorn Instrument Company keeps in a single general ledger accounts with or for approximately:

1,200 customers
325 creditors
750 kinds of materials
12 operating expenses
5 items of equipment

The company is considering the installation of a system of control accounts and subsidiary ledgers. Write a letter to the president of the company listing the subsidiary ledgers and control accounts which the company ought to maintain, and explaining the benefits that the company should experience from their use.

Additional Work

Problem 6.

The general ledger of the Banta Company exhibited the following balances at April 1, 19—: Cash, $7,590; Notes Receivable, $7,950; Customers Ledger, $7,250; Merchandise Inventory, $7,500; Accrued Payroll, $450; Accounts Payable, $6,100; Equipment, $6,750; Depreciation Reserve, $1,350; Mortgage, $6,275; Common Stock, $25,000; and Deficit, $2,135.

The footings of the columns of the various journals for April 19— were as follows:

Cash Disbursements:
Cash, $9,455; Purchase Discount, $115; Expense Ledger, $2,120; Accounts Payable, $5,750; and Miscellaneous, $1,700, representing $1,000 paid on the mortgage, $250 expended on additional equipment, and $450 disbursed in settlement of the payroll accrued at April 1.

Cash Receipts:
General Ledger, $8,570, representing $4,570 collected on notes receivable and $4,000 proceeds of a bank loan; Customers Ledger, $7,925; Sales Discount, $140; and Cash, $16,355.

Other Journals:
The single money-column Sales Record discloses sales on credit of $8,400 and the single money-column Purchase Book records purchases on credit of $5,875. The General Journal recorded:

(*a*) The credit memo for a $10 overcharge on a purchase.
(*b*) The receipt of a note of $950 from a customer.
(*c*) Depreciation provision for April of $65.
(*d*) Accrued taxes for April of $40.

Required:

1. Record all of the foregoing in a general ledger; use the T form of account to conserve time and space.
2. Submit a trial balance of the Banta Company as of April 30, 19—.

Question 21.

Submit the entry to record the applied factory burden in a period if an estimated rate per direct labor hour is used to charge the jobs for burden.

Question 22.

From the viewpoint of clerical control of the inventory data, what is gained by keeping a separate in-process account for each of the cost elements?

Problem 7.

The Karpass Company, which already operates control accounts and subsidiary ledgers for customer and creditor accounts, proposes to establish a control account and subsidiary ledger plan for Selling and Administrative Expenses. Outline the columnarization you would suggest as desirable for:

(*a*) The cash disbursements book.
(*b*) The general journal.

Also explain when and how the postings are made from each column of each of those journals.

CHAPTER 4

Cost Accounting for Material

31. Material; meaning of term.

Strictly defined, the term *material* includes only the substances *from which* the factory's products are made. In most instances, however, the meaning of the term is broadened to encompass also the substances used to maintain the factory facilities. In such cases, the term *stores* rather than *materials* better describes the contents of the materials storeroom.

As materials are received from the various suppliers, they are placed in the *materials storeroom* to await use by the factory. In the storeroom, no distinction is made between material ultimately to be used: (1) to make the factory's products and (2) to maintain the factory's facilities. It is all just material. The distinction of *direct* and *indirect* material first arises when the material *leaves* the materials storeroom. At that time the material is classified as:

1. *Direct,* if the cost is chargeable to a production order.
2. *Indirect,* if the cost is chargeable to a factory burden account.

32. Material cost elements.

Material cost includes all outlays for material to the point at which it is ready to use on the factory floor. The more important elements of material cost are the following:

1. Invoice amount.
2. Duties and excises.
3. Freight and cartage in.
4. Handling and aging expense.

Each of these elements should, when such a procedure is at all practical, be charged to the cost of the specific material. For invoice amount and duties, it is usually easy to follow this practice. For freight and handling expense, however, it is

sometimes difficult. Thus, a single small freight bill may cover a shipment including a wide variety of differently sized and valued materials; or the expense of one storeroom may be applicable to many thousands of materials each of different weight, bulk, value, or fragility. In such cases, it may be expedient to omit the freight or handling expense as a material cost and treat it as a factory burden item. This procedure, of course, results in somewhat understating the material costs.

33. Stores control.

An adequate plan of stores control is necessary in any manufacturing business to:

1. *Minimize waste and theft of materials.* If a periodic accounting for inventory is not provided, less restraint exists on both:

(*a*) *Waste of materials* caused by (1) workmen scrapping slightly imperfect materials because, if wages are paid on a piece-rate basis, they can earn more working only on perfect material, or (2) carelessness fostered because no systematic plan exists for disclosing spoilage losses, and

(*b*) *Theft of materials* by workmen and others having access to the factory.

Materials waste and theft are "loss leaks" which a factory must make every effort to curb.

2. *Assure a steady supply of each material item.* Without the constant *quantity-on-hand* information in regard to each material item afforded by an adequate plan of stores control, there is always danger that the inventory of a particular item will be either:

(*a*) *Too small,* which condition may cause the heavy loss consequent upon a whole assembly line's having to stop operations for lack of a single part, or

(*b*) *Too large,* which condition may cause serious obsolescence losses and will always result in excess inventory expense.

Adequate control of the stores of a manufacturing business is attained by a plan of:

1. *Placing in a materials storeroom* and charging to a *Materials Inventory* account all materials bought.

2. Allowing *issues* of material from the storeroom to be made only on the authority of a properly authorized *material requisition.*

Charging materials bought to, and crediting materials used out of, a *Materials Inventory* account is affected by means of a *book inventory procedure.* The theory and mechanics of a typical book inventory procedure will be considered in Sections 34–45.

34. Theory of a book inventory for materials.

The fundamental plan of a book inventory for materials is to have an account for *each item* of materials handled. This account is:

1. Charged for all receipts of the material into stock,
2. Credited for all issues of the material out of stock;

and its balance at any date represents the inventory of that material then on hand.

The individual material accounts are segregated in a separate *materials ledger,* and their aggregate amount is reflected in the general ledger by a *Materials Ledger—Control* account. The relationship between the *Materials Ledger—Control* account and the materials ledger is the usual one existing between a control account and its subsidiary ledger.

35. Form of the materials ledger account.

The form of the account found in the materials ledger varies. A common form, in which is recorded both *quantity* and *dollar data,* is illustrated by Fig. 13.

[Fig. 13]

SUPPLIERS:
Birk Gear Works
Norden Tool Company
Sarett Corporation

MATERIAL No. 473
Two-inch chrome steel gears

MAXIMUM 1,000 Units
MINIMUM 400 Units

19—		Receipts			Issues			Balance	
		Units	Per Unit	Amount	Units	Per Unit	Amount	Units	Amount
Sept.	4	400	1.10	$440 00				400	$440 00
	4				100	$1.10	$110 00	300	330 00
	6	600	1.00	600 00				900	930 00
	7				300	1.10	330 00		
					200	1.00	200 00	400	400 00

The units of a material received into and issued out of stock are respectively charged and credited to the material's account at *cost amount.* In crediting materials out of stock, a common practice is to consider the material units first bought to be those first issued. Thus, Fig. 13 discloses that:

1. The $930 inventory of Material #473 at the beginning of business on September 7 consisted of:

300 units bought September 4 at $1.10 each = $330.
600 units bought September 6 at $1.00 each = $600.

2. The issues of Material #473 on September 7 aggregated 500 units.

In accord with the *first-in, first-out* plan, the issues of September 7 are considered to consist of:

300 units of purchase of September 4 costing $1.10 each = $330,
200 units of purchase of September 6 costing $1.00 each = $200,

and the inventory at the end of business on September 7 of Material #473 is then caused to consist of 400 units of the latest or September 6 purchase, which cost $1.00 each, or $400.

The first-in, first-out plan of pricing inventory issues is in trade usage termed the *FIFO* method.

36. Last-in, first-out method of pricing inventory issues.

An alternative plan of pricing inventory issues which is favored by an increasing number of businesses is the *last-in, first-out* method. Under this plan, the units last bought are considered to be those first issued. In accord with the last-in, first-out method, the pricing of the inventory issues shown in Figure 14 is as follows:

[Fig. 14]

SUPPLIERS:
Birk Gear Works
Norden Tool Company
Sarett Corporation

MATERIAL No. 473
Two-inch chrome steel gears

MAXIMUM 1,000 Units
MINIMUM 400 Units

19—		Receipts			Issues			Balance	
		Units	Per Unit	Amount	Units	Per Unit	Amount	Units	Amount
Sept.	4	400	1.10	$440 00				400	$440 00
	5				100	$1.10	$110 00	300	330 00
	6	600	1.00	600 00				900	930 00
	7				500	1.00	500 00	400	430 00

September 5. The 100 units issued are priced at $1.10, since that is the per-unit cost of the last (September 4) purchase.

September 7. The 500 units issued are priced at $1.00, since that is the per-unit cost of the last (September 6) purchase.

If the September 7 issue had been for 700 units, 600 of them would have been priced at $1.00 and 100 at $1.10.

The last-in, first-out plan of pricing inventory is in trade usage termed the *LIFO* method.

37. Evaluation of the FIFO method of handling material issues.

Merits of the first-in, first-out method of pricing material issues are that:

1. *It is simple to operate.* The first-in, first-out plan is easily explained to the ledger clerks, and the arithmetic it involves takes a minimum of time.

2. *Its theory is in accord with sound methods of materials handling.* It is only reasonable that, to minimize loss due to shelfworn and obsolete material, the management would use up the oldest stock first.

3. *It results in a sound valuation of the materials inventory.* Under the first-in, first-out method, the inventory is valued at the prices shown by enough of the latest invoices to cover the quantity in the inventory. These *latest invoice prices* are more likely than any others to be in accord with current market values.

A grave defect of the FIFO method is that in a period of rising prices it causes the profits to be increased by the larger per-unit cost value assigned to the closing inventory, and in a period of falling prices it causes the profits to be decreased by the smaller per-unit cost value assigned to the closing inventory. Figure 15 following deals with a situation in which (*a*) the January 1, 1951 opening inventory consisted of 100 Model "A" cars and (*b*) 100 Model "A" cars were bought and sold in each of 1951 and 1952:

[Fig. 15]

Year	Opening Inventory (100 cars)	Purchases (100 cars)	Cost of Sales (100 cars)	Closing Inventory (100 cars)
1951	$100,000	$125,000	$100,000	$125,000
1952	125,000	105,000	125,000	105,000

In 1951 the profits are increased $25,000 because an opening inventory of 100 Model "A" cars valued at $100,000 became a

closing inventory of 100 Model "A" cars valued at $125,000. In 1952 the profits are decreased $20,000 because an opening inventory of 100 Model "A" cars valued at $125,000 became a closing inventory of 100 Model "A" cars valued at $105,000.

If the business profit consists solely of increase in inventory amount developed by the FIFO method of pricing inventory issues, the effect of an income tax is to confiscate part of the concern's physical capital. Thus, if the 1951 profit of the company referred to in Figure 15 consisted solely of the $25,000 inventory appreciation, and this profit was taxed at 40 per cent, the company would have to apply the value of eight cars (8 × $1,250) to pay the $10,000 tax (40 per cent of $25,000). While monetarily the business would show a profit after taxes of $15,000, physically it would show a decline in total assets by an equivalent of eight Model "A" cars.

38. Evaluation of the LIFO method of pricing inventory issues.

The great merit of the LIFO method of pricing inventory issues is that, so long as the quantities bought and sold are balanced, it eliminates the effect on inventory values of changes in the costs of merchandise. Thus, using the LIFO method, the data of Figure 15 become as follows:

[Fig. 16]

Year	Opening Inventory (100 cars)	Purchases (100 cars)	Cost of Sales (100 cars)	Closing Inventory (100 cars)
1951	$100,000	$125,000	$125,000	$100,000
1952	100,000	105,000	105,000	100,000

Under the LIFO method the profits of the business in question are neither increased nor decreased by increase or decrease in the cost value assigned to the inventory, because the inventory of 100 Model "A" cars stayed at a constant $100,000 value.

Defects of the last-in, first-out method of pricing inventory issues are that:

1. *Its theory fails to accord with sound methods of inventory handling.* To minimize loss due to shelfworn and obsolete inventory, the management would normally use the oldest rather than the newest stock first.

2. *It too often results in a cost evaluation of the inventory which fails to align with its replacement value.* In periods of rising prices the cost value of the inventory under LIFO is below its replacement value, while in periods of falling prices it is above that value.

In mechanics of operation, the LIFO method of pricing inventory issues is about as simple as the FIFO method.

39. Average cost as a method of pricing inventory issues.

A criticism of both the FIFO and LIFO methods of pricing inventory issues is that they may cause different jobs to be charged sharply different prices for identical materials, a situation which could not occur if some *average cost plan* were used. To this objection the reply is that, if the purchase prices vary, any plan for pricing material issues at average cost would involve the considerable problem of calculating average cost for each material after each purchase. In a materials ledger containing eight or ten thousand accounts, each involving numerous purchases at varying prices, the clerical work and expense entailed would probably prove prohibitive. Further, the material costs would not even then be exactly uniform, because the changes in the purchase prices would cause changes in the average costs.

In some kinds of statistical cost systems, charging the products for materials at an average cost is quite practical. Such a plan is used in the operational cost system explained in Chapters 14 and 15 of this text.

40. Control of the material inventories through minimum-maximum quantities.

It is necessary in successful factory management that each inventory item be stocked in neither too high nor too low a quantity. If too high a quantity of a material is stocked, large loss may result from obsolescence, shrinkage, or mere carrying costs. If too low a quantity of a material is stocked, an even larger loss

[Fig. 17]

ARTICLE "B"
Maximum: 800 units
Minimum: 400 units

19—		Receipts			Issues			Balance	
		Units	Unit Cost	Amount	Units	Unit Cost	Amount	Units	Amount
Mar.	3	400	$1.25	$500 00				400	$ 500 00
	4				25	$1.25	$ 31 25	375	468 75
	5	350	1.20	420 00				725	888 75
	17	100	1.30	130 00				825	1,018 75
	19				250	1.25	312 50	575	706 25
April	2				125	1.25	156 25	450	550 00
	4				75	1.20	90 00	375	460 00

may result from the necessity of stopping an entire assembly line for want of that one item. To reduce the dangers of over- or understocking, it is common to determine for each inventory item the minimum and maximum quantities in which it should be stocked. Thus, Figure 17 following shows that, for Article "B," the quantity on hand should not exceed 800 or fall below 400 units. In view of these limits, commitments for Article "B" should cease after the purchase of March 17 and be resumed after the issue of April 4.

41. Considerations in determining minimum-maximum quantities.

The minimum quantity to be stocked of an item is determined by considerations of:

(*a*) The time elapsing from date of order to date of receipt of the item.
(*b*) The units of the item normally used in the time required for replacement to be effected.
(*c*) Reasonable allowance for possibility of: (1) delay in replacement, and (2) unusual demand for the item.

Thus, from date of order to date of receipt of Article "A" requires ten days. In ten days, the normal usage of Article "A" is 200 units. A twenty days' supply is believed adequate to allow for all contingencies as to delay in replacement or unusual demand for the item. Therefore, 2×200, or 400, units is the indicated minimum quantity for Article "A."

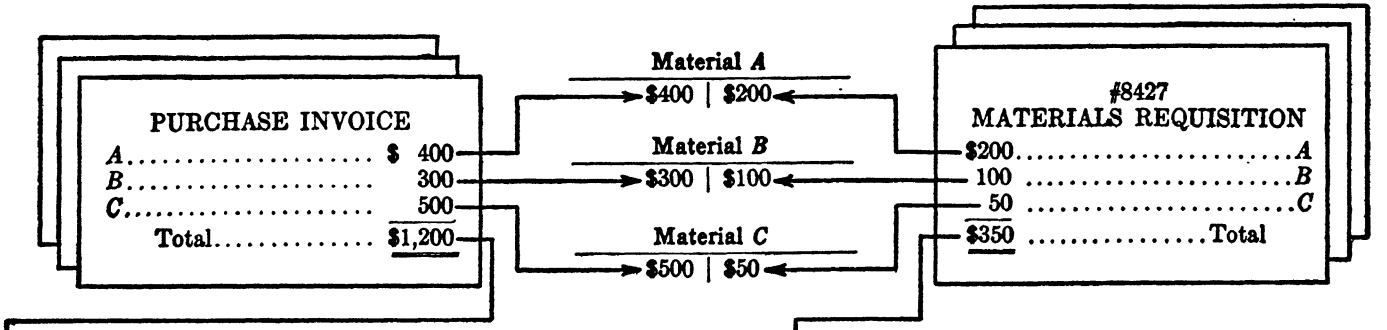
The maximum quantity to be stocked of an item is determined by considerations of:

(*a*) Possibilities of supersession or obsolescence.
(*b*) Investment involved per unit of inventory.

For an item subject to sudden obsolescence or to gradual deterioration, the maximum quantity to be stocked ought not to be far from the minimum one. For a staple item, the maximum quantity to be stocked may be set high enough to permit taking advantage of favorable purchase opportunities. Expensive inventory items are usually stocked in close to minimum quantities in order to reduce the investment in inventories.

42. Mechanics of a book materials inventory plan.

As part of the control account and subsidiary ledger arrangement, the mechanics of a plan for a book inventory of materials



Materials Purchase Record

19—		Vendor	Terms	P/O #	Dr.—Materials / Cr.—Creditors
May	5	Barr & Co.	Net 30 days	414	$ 1,200
	7	Paxon & Co.	2/10, n/30	427	4,700
	8	Casey & Co.	1/15, n/60	385	5,200
		R. Sandor	Net 15 days	347	510
	31	P. Binder	Net 30 days	430	405
					$30,000

Materials Requisition Journal

19—		Requisition No.	Cr. Materials	Dr. Materials in Process	Dr. Factory Burden
May	5	8427	$ 350	$ 320	$ 30
	7	8428–8490	7,100	6,400	700
	8	8491–8512	1,500	1,300	200
	9	8513–8532	800	750	50
	30	9106–9124	1,400	1,250	150
	31	9125–9163	1,300	1,100	200
			$20,000	$17,000	$3,000

Materials Ledger—Control

$30,000 | $20,000

must provide for the smooth charging of material receipts and crediting of material issues:

1. *In detail* to the individual materials ledger accounts.
2. *In total* to the Materials Ledger—Control account.

A typical plan for effecting this purpose is outlined by Fig. 18. Study of Fig. 18 discloses the key forms in the mechanics of a book materials inventory plan to be the following:

1. The purchase invoice.
2. The materials requisition.

The detailed procedure in the handling of each of the forms will now be considered.

43. Handling of the materials invoices.

The precise form of the materials invoice varies but it always shows not only the vendor, dating, and terms for payment, but also the following for each item covered:

1. The quantity.
2. The price per unit.
3. The dollar extension.

Materials received are held in the *receiving room* until the vendors' invoices covering them arrive. The quantities of each item actually received are then compared with those shown by the invoice, and note is made on the invoice for any excess or shortage disclosed. The materials are then transferred to the storeroom to be placed in stock. The storeroom clerk initials the corrected invoice as acknowledgment of his receipt of the goods and then sends it to the factory accounting office.

In the factory office, the invoice is corrected for any unit price, extension, or footing errors disclosed by comparison with its corresponding purchase order. The amount of the invoice is then, as illustrated by Fig. 18:

1. *Charged to the Materials Inventory—Control account* by recording it in the materials purchases record.
2. *Charged to the individual materials accounts* by debiting the costs of the individual items to the materials ledger accounts affected.

44. Handling the materials requisitions.

All the necessary information required on the materials requisition other than:

1. The price per unit, and
2. The dollar extension

is recorded thereon in the factory by the workers or their foremen. Upon issue of the materials requested, the requisition is surrendered to the storeroom clerk.

The storeroom clerk examines each requisition to see that it clearly discloses:

1. The job order or factory burden account to which it is chargeable.
2. The precise material item or items to be issued.
3. The exact quantity of each item to be issued.
4. An authorized materials-release signature.

He then arranges the requisitions in *serial order*, accounting for any missing numbers, and forwards them to the factory accounting office.

In the factory accounting office, by reference to the affected materials accounts, the requisitions are priced, and, *at the same time as they are priced*, they are credited to the individual materials accounts. The priced requisitions are then separated, on the basis of whether they are chargeable to a job order or a factory burden account, into:

1. *Direct material requisitions*, which are then sorted on the basis of job order number.
2. *Indirect material requisitions*, which are then sorted on the basis of factory burden account number.

The direct material costs disclosed by this sorting as applicable to each job order are posted to the cost sheet for that job order. The indirect material costs disclosed by the sorting are posted to the affected factory burden accounts.

45. The materials requisition journal.

Through the media of the materials requisitions and in the manner described in Section 44, the costs of materials used are posted to the *subsidiary ledgers* as:

1. Charges to materials sections of the affected job cost sheets.
2. Charges to the affected factory burden accounts.
3. Credits to the individual materials ledger accounts.

To cause the affected control accounts to reflect the same charges and credits, the following journal entry is necessary:

Materials in Process—Control	$360	
Factory Burden—Control	60	
Materials Inventory—Control		$420

Summary of May 1, 19—, requisitions.

A journal entry such as the foregoing must be made every day to reflect the cost of materials used. It is axiomatic in accounting that, if entries of a certain kind occur frequently, they should, in order to minimize clerical work, be recorded in a special journal. The materials requisition journal illustrated by Fig. 19 is the book employed to record the daily entry for the cost of materials used.

[Fig. 19]

Materials Requisition Journal

19—		Requisition Numbers	Cr. Materials Control	Dr. Materials in Process	Dr. Factory Burden
May	1	761–787	$ 420 00	$ 360 00	$ 60 00
	2	788–799	252 00	212 00	40 00
	30	1537–1569	485 00	310 00	175 00
	31	1570–1614	560 00	530 00	30 00
		Totals	$8,600 00	$7,040 00	$1,560 00
			(31)	(36)	(200)

Note that, in Fig. 19:

1. Each line of the requisition journal effects entry to the control accounts for the cost of materials used *that day.*
2. The requisition journal is posted in total *periodically* as:

Materials in Process—Control	$7,040	
Factory Burden—Control	1,560	
Materials Inventory—Control		$8,600

and the fact of such posting is indicated by writing below the column footings the numbers of the accounts to which they were posted.

3. The requisition journal provides space for satisfactorily accounting for all the materials requisition numbers.

46. Materials requisitions handling chart.

Fig. 20 outlines in chart form the handling of the materials requisitions from the time they reach the factory accounting office until they are recorded in the materials requisition journal.

THE MATERIAL REQUISITIONS are priced (at, say, $2,100) and at the same time *credited* to the individual material accounts. They are next separated into

1. DIRECT (say, $1,700), which are then sorted according to job order, as follows:

#821	$ 43
#837	71
#843	85
etc.	1,501
Total	$1,700

which amounts are then *debited* to the materials sections of the respective cost sheets.

2. INDIRECT (say, $400), which are then sorted according to factory burden account, as follows:

#310	$ 75
#314	40
etc.	285
Total	$400

which amounts are then *debited* to the respective factory burden accounts.

The charges and credits to the affected *control accounts* are made by this entry in the materials requisition journal

Materials Requisition Journal

Date		Requisition No.	Cr. Materials	Dr. Materials in Process	Dr. Factory Burden
Sept.	1	1–437	$ 2,100	$ 1,700	$ 400
	2	438–901	2,300	2,000	300
	30	8902–9324	1,800	1,600	200
			$41,000	$37,500	$3,500

ASSIGNMENT 4

Problem 8.

Record in the stores ledger accounts of Form Page 47 the following data respecting receipts into, and issues out of stock of, material items x and y in accord with the FIFO method of pricing inventory issues:

May 3. Bought from White and Company 1,000 units of x and 2,000 units of y at unit costs of 92¢ and 45¢, respectively.
Issued the following requisitions:

#147 for 200 units of x and 100 units of y
#183 for 300 units of x
#243 for 400 units of x and 100 units of y

5. Purchased from Bell & Sanders 350 units of x for $290.50 and 400 units of y for $160.
Issued the following requisitions:

#427 for 400 units of x
#583 for 700 units of y

6. Purchased from the Southern Supply Company 500 units of x for $430 and 900 units of y for $378.
Issued the following requisitions:

#653 for 400 units of x
#724 for 300 units of y
#851 for 500 units of y

Problem 9.

From information disclosed by the Dorn Company's February 28, 19—, materials requisitions shown on Form Pages 49–51:

(*a*) Calculate the February 28, 19—, material costs chargeable to:

(1) Each production order.
(2) Each factory burden account.

(*b*) Record in the material requisitions journal of Form Page 52 the data concerning the material issues of February 28, 19—.

(*c*) Foot and rule the February 19— material requisitions journal.

(*d*) Submit the journal entry that will summarize the debits and credits of the February 19— material requisitions journal.

(*e*) Explain the media through which the detail of the control account debits and credits of the entry made in (*d*) were made to the subsidiary ledgers involved.

Question 23.

Discuss the main merits of a book stores ledger system.

Question 24.

Outline the procedure for handling the materials requisitions.

Question 25.

What is the function of the materials requisition journal?

Question 26.

In what way does the determination of minimum and maximum quantity for each item stocked aid in the control of the inventories of a company?

Additional Work

Problem 10.

From the following data as to the purchases and issues of Article "B" in January 19—:

1. Record in the material accounts of Form Page 53 the purchases and issues of the item under: (*a*) the LIFO and (*b*) the FIFO method of pricing materials used.
2. Compute from the unit receipts and issues of Material "B" in January the probably desirable minimum inventory quantity of the item if a 50 per cent safety factor is to be allowed. Show your computation.
3. Discuss the factors to be considered in determining the maximum inventory quantity of the item.

Purchases

19—	Vendor	Units	Cost
Jan. 1	Polishing Corporation of America	375	$742.50
5	Supreme Manufacturing Company	300	588.00
9	Buffer Company	175	341.25
13	Elite Polishing Works	225	435.38
17	Sampson & Company	70	133.00
21	Bixton Supply Co.	350	668.50
25	Braden, Inc	150	288.00
29	Clow Industries, Inc	300	585.00

Issues

19—	Units
Jan. 2	250
7	400
15	200
19	100
21	300
27	200
31	200

Problem 11.

Submit in simple journal form the entries to the affected control accounts for these transactions concerning material:

1. Bought on credit $21,450 of the kinds of material usually used on specific jobs and $1,285 of materials of the kinds usually used for repair and maintenance work.

2. Issued materials on requisitions: (*a*) chargeable to specific jobs, $18,370; and (*b*) chargeable to factory burden accounts, $1,365.
3. Material costing $150 was returned to the vendor, Barnes and Company, for credit.
4. Material costing $75 requisitioned for and charged to Job Order #484 was returned to the storeroom as unnecessary for the job.
5. Woolens requisitioned for and charged to Job Order #563 were ruined by wetting caused by a leaky water pipe. The cost of the wool was $48; as junk, it brought $4.
6. Barnes and Company allowed only $135 on the material returned in (3) above, claiming that it was customary in their industry to deduct 10 per cent for handling expense on goods returned for credit.
7. Paid $285 of freight invoices allocable to specific material items.
8. The book inventory of materials, priced at FIFO cost, amounts to $6,849. The physical inventory, priced on the same basis, is only $6,648.

Problem 12.

Record the data given in Problem 8 in the stores ledger accounts of Form Page 55 of your workbook, using the LIFO method of pricing inventory issues.

Question 27.

Of what value is a physical inventory if a book inventory of materials is kept?

Question 28.

Discuss the practicality of book inventories kept in quantities only.

Question 29.

What factors would you consider in determining minimum and maximum quantities for an item of inventory?

Question 30.

Compare the effects of the FIFO and LIFO methods of pricing material requisitions on these points:

(*a*) Ease of clerical effort.
(*b*) Effect on the balance sheet valuation of the inventory.
(*c*) Effect on the periodic profits.

Question 31.

The Barry Company has been using the first-in, first-out method of inventory pricing but is being urged by its trade associates to change to the last-in, first-out plan. The treasurer of the Barry Company

believes that inventory prices in the industry have reached their peak and are now on the threshold of a long and continuous decline. In the Barry Company's experience, its inventory quantities have not fluctuated much, and it is believed that this will continue to hold true in the future.

In your opinion will the Barry Company gain by changing to the last-in, first-out method of inventory pricing? Give full reasons for your answer.

Question 32.

What are among the main elements of material cost?

Question 33.

Is determination of whether a material is direct or indirect made at the time of its purchase or at the time of its use?

Question 34.

What is the difference between the FIFO and the LIFO methods of pricing materials requisitions?

CHAPTER 5

Cost Accounting for Labor

47. Labor; meaning of term.

"Labor" encompasses the expense of all human effort used in the manufacture of the product. As a matter of practical cost accounting procedure, however, the term is taken to apply to only those labor costs that are evidenced by labor time tickets. In accordance with this interpretation of the term, the amounts paid to factory executives are not considered or accounted for as labor costs but as burden.

48. Direct and indirect labor.

In a job-lot cost system, the labor cost evidenced by a particular labor time ticket is:

1. *Direct* if it applies to a job cost sheet;
2. *Indirect* if it applies to a factory burden account.

Each labor time ticket discloses the job cost sheet or factory burden account number to which the labor cost it records applies. Separation of the direct from the indirect labor costs is, therefore, readily accomplished by separating those time tickets whose labor costs are shown to be applicable to job cost sheets from those whose labor costs are shown to be applicable to factory burden accounts.

49. Accounting for labor.

An adequate plan of accounting for labor in a job-lot cost-finding system must provide for:

1. Preparation of the periodical plant payroll.
2. Charging the applicable labor cost to:
   (*a*) Each job cost sheet.
   (*b*) Each factory burden account.

3. Charging the applicable direct labor hours to each job cost sheet if burden is to be applied as a rate per direct labor hour.

Each of these objectives is attained through the use of the labor time ticket.

50. The labor time ticket.

As shown by Fig. 21, the labor time ticket of a job-lot cost-

[Fig. 21]

LABOR TIME TICKET

DATE 8/7/—

NAME B. Carr JOB COST SHEET No. 841

Hours Worked	Hourly Rate	Labor Cost
4	$1.00	$4.00

LABOR TIME TICKET

DATE 8/7/—

NAME B. Carr BURDEN ACCOUNT No. 311

Hours Worked	Hourly Rate	Labor Cost
4	$1.00	$4.00

finding system discloses the following significant points of information:

1. The worker's name.
2. The *cost sheet* or *burden account* involved.
3. The labor hours.
4. The labor cost.

A labor time ticket is made out each time a worker does work chargeable to a different job order or burden account. If in one eight-hour day he does work chargeable to six different job orders or burden accounts, he makes out six *separate* labor time tickets, the aggregate time of which adds up to the eight hours worked.

51. Handling the labor time tickets.

All the information shown on the labor time ticket, except (1) the *hourly rate* and (2) the *labor cost*, is recorded on it by the worker at the time he begins or finishes work chargeable to a job order or burden account. At the close of each day, the foreman or other labor supervisor:

1. Scans each labor time ticket to detect any obvious errors that the men may have made in writing in the job order or burden account numbers.
2. Initials each labor time ticket as evidence of his approval of it for payroll and costing purposes.
3. Forwards the time tickets to the factory accounting office.

In the factory accounting office, the labor time tickets are priced and then separated, on the basis of whether they are chargeable to a job order or factory burden account, into (1) direct and (2) indirect. Then the:

1. *Direct labor time tickets* are sorted on the basis of:
   (*a*) Dollar cost—according to job order.
   (*b*) Labor hours—according to (1) employee and (2) job order.
   The direct labor costs and hours disclosed by this sorting to be applicable to each job order are posted to its cost sheet. The labor hours disclosed by this sorting to be applicable to each *worker* are entered in the direct labor payroll record.
2. *Indirect labor time tickets* are sorted on the basis of:
   (*a*) Dollar cost—according to factory burden account.
   (*b*) Labor hours—according to employee.
   The applicable labor costs disclosed by this sorting are posted to each factory burden account. The labor hours disclosed by this sorting to be applicable to each *worker* are entered in the indirect labor payroll record.

Fig. 22 outlines in chart form the daily procedure followed in handling the labor time tickets after they reach the factory accounting office. Following through carefully the illustrative hour and cost amounts used in Fig. 22 should aid the student in understanding the procedure outlined.

52. Deductions from Wages and Salaries.

From the *gross earnings* of each employee there are deducted amounts paid or to be paid by the company for his benefit, such as:

1. Federal insurance contribution tax.
2. Federal income tax.
3. Union dues.
4. Group insurance.
5. Cash advances.

[Fig. 22]

DAILY HANDLING OF THE LABOR TIME TICKETS

After approval by the shop foreman, the labor time tickets are PRICED, coming to, say, 22,000 hours costing $12,000.

They are then separated into

1. DIRECT — 18,000 hours costing $9,000 — which are in turn sorted on the basis of

HOURS according to

1. JOB ORDER, thus:

#741.....	140
#823.....	240
#847.....	560
etc.....	???
Total...	18,000

which hours are then posted to the respective *cost sheets* to serve as a basis for charging them for applicable factory burden.

2. WORKER, thus:

Smith....	8
Bendix...	8
Morton...	7
etc.....	??
Total...	18,000

which hours are posted to the *direct labor payroll* record to serve as the basis for periodically calculating the wages due each worker.

DOLLARS according to JOB ORDER, thus:

#741.....	$ 70
#823.....	140
#847.....	520
etc.....	???
Total...	$9,000

which labor costs are posted to the labor sections of the respective *cost sheets.*

2. INDIRECT — 4,000 hours costing $3,000 — which are in turn sorted on the basis of

HOURS according to WORKER, thus:

Barnes...	8
Kent.....	8
etc.....	??
Total...	4,000

which hours are posted to the *indirect labor payroll* record to serve as the basis for calculating the wages due each worker.

DOLLARS according to FACTORY BURDEN ACCOUNT, thus:

#310.....	$ 260
#316.....	940
etc.....	???
Total...	$3,000

which labor costs are posted to the respective *factory burden accounts.*

The deductions for the federal insurance contribution and income taxes are required by statute. The deductions for such items as union dues, group insurance, and cash advances are in accord with agreements entered into with the employee or his authorized representatives.

The federal insurance contribution deduction is at present set by statute as 1½ per cent of the employee's gross earnings up to a maximum deduction for tax in any one calendar year of $45.00. The deduction for income tax withholding varies with the earnings and the number of *withholding exemptions* claimed by the employee. At present, the income tax law defines a withholding exemption as the employee himself or a close relative who has less than $500 per year of gross income and toward whose support the employee contributes more than 50 per cent. The Treasury Department furnishes each year withholding tables, showing the

[Fig. 23]

If the payroll period with respect to an employee is Weekly:

And the wages are—		And the number of withholding exemptions claimed is—										
At least	But less than	0	1	2	3	4	5	6	7	8	9	10 or more
		The amount of tax to be withheld shall be—										
$50	$51	$7.50	$5.60	$3.70	$1.80	$0	$0	$0	$0	$0	$0	$0
51	52	7.70	5.80	3.90	1.90	0	0	0	0	0	0	0
52	53	7.80	5.90	4.00	2.10	.20	0	0	0	0	0	0
53	54	8.00	6.10	4.20	2.20	.30	0	0	0	0	0	0
54	55	8.10	6.20	4.30	2.40	.50	0	0	0	0	0	0
55	56	8.30	6.40	4.50	2.50	.60	0	0	0	0	0	0
56	57	8.40	6.50	4.60	2.70	.80	0	0	0	0	0	0
57	58	8.60	6.70	4.80	2.80	.90	0	0	0	0	0	0

amounts to be withheld as income tax from an employee's earnings under varying conditions. Thus, Figure 23, which is an excerpt from such a withholding table, shows that, for a person claiming three withholding exemptions and paid weekly, the withholding deduction should be:

$2.10..... if he earns at least $52 but less than $53
2.40..... if he earns at least $54 but less than $55
2.80..... if he earns at least $57 but less than $58

If the taxpayer claimed only one withholding exemption, the withholding deduction should be, according to Figure 23:

$5.90..... if the person earns at least $52 but less than $53
6.20..... if the person earns at least $54 but less than $55
6.70..... if the person earns at least $57 but less than $58

53. Form of the payroll records.

To provide a complete record of the payroll transactions, it is necessary that the payroll journal, the employee's payroll ledger card, and the check issued to the employee each show:

1. The hours worked.
2. The rate per hour.
3. The gross earnings.
4. Each deduction made from the gross earnings.
5. The net amount paid to the employee.

Suitable forms of payroll journal, employee's payroll ledger card, and payroll check are illustrated in Figure 24. Since the payroll data for the employee shown on the payroll journal, payroll ledger card, and check stub are identical, the common practice is to use a payroll machine device which, as the payroll journal data are recorded, produces as carbon copies the check stub and the employee's payroll-card record of the information.

To facilitate the periodic journalization of the payroll data, segregation is made in the payroll record of the direct labor costs from the indirect. Thus, Figure 24 shows that in the week ended January 5, the direct labor cost was $6,340.00, the indirect labor cost $2,140.00, and the gross payroll $8,480.00.

54. Journalization of the payroll record data.

Since the payroll record of Figure 24 shows separately the direct and indirect labor costs, a general journal entry such as follows to *record the gross payroll liability* is readily prepared:

(1)

Labor in Process—Control	$6,340.00	
Factory Burden—Control	2,140.00	
Accrued Payroll		$8,480.00
To accrue the gross payroll for the week ended 1/5/—.		

The effect of this summary entry in the *general journal* is to debit *in total periodically* the *control accounts:*

1. Labor in Process;
2. Factory Burden,

for the amounts debited *in detail daily* to their respective *subsidiary ledgers:*

PAYROLL RECORD—WEEK ENDED JANUARY 5, 19—

Particulars	Hours Worked M	T	W	T	F	S	Total	Rate Per Hour	Gross Earnings	DEDUCTIONS FOR F.I.C.A. Tax	Income Tax	Union Dues	Group Insurance	Cash Advances	Net Cash Payment	For Week Ended	Paid By Check No.
DIRECT LABOR:																	
Abbot	8	8	8	8	8	8	48	$ 1.50	$ 72 00	$ 1 08	$ 3 20	$ 25	$ 40	$ 5 00	$ 62 07	1/5/—	4621
Burns	7	8	8	6	8	4	41	1.60	65 60	98	5 90	25	40	— —	58 07	1/5/—	4622
Conley	8	8	8	8	8	4	44	1.50	66 00	99	4 30	25	40	— —	60 06	1/5/—	4623
Stadton	8	8	8	8	8	8	48	2.00	96 00	1 44	8 70	25	1 20	— —	84 41	1/5/—	4709
Wilson	8	8	0	8	8	4	36	1.60	57 60	86	2 80	25	80	— —	52 89	1/5/—	4710
Totals							4,000		$ 6,340 00	$ 95 10	$ 410 80	$ 23 00	$ 92 00	$ 85 00	$ 5,634 10		
INDIRECT LABOR:																	
Allen	8	8	8	8	4	8	44	1.70	$ 74 80	$ 1 12	$ 1 60	$ 25	$ 80	$ — —	$ 71 03	1/5/—	4711
Borg	8	8	8	8	8	0	40	1.80	72 00	1 08	5 20	25	40	— —	65 07	1/5/—	4712
Veblen	8	8	4	4	0	8	32	1.50	48 00	72	1 50	25	40	2 00	43 13	1/5/—	4739
Totals									$ 2,140 00	$ 32 10	$ 113 50	$ 9 50	$ 31 50	$ 27 00	$ 1,926 40		
Grand Totals									$ 8,480 00	$ 127 20	$ 524 30	$ 32 50	$ 123 50	$ 112 00	$ 7,560 50		

EMPLOYEES' PAYROLL RECORD

ARTHUR ABBOT—112 W. LEE 4 EXEMPTIONS SOC. SECURITY NO. 36-4446-185

Total Hours	Rate Per Hr.	Gross Earnings	F.I.C.A. Tax	Income Tax	Union Dues	Group Insurance	Cash Advances	Cash Payment	Week Ended	Check Number
48	1.50	72 00	1 08	3 20	25	40	5 00	62 07	1/5/—	4621

Total Hours	Rate Per Hr.	Gross Earnings	F.I.C.A. Tax	Income Tax	Union Dues	Group Insurance	Cash Advances	Cash Payment	Week Ended	Check Number
48	$ 1.50	$ 72 00	$ 1 08	$ 3 20	$ 25	$ 40	$ 5 00	$ 62 07	1/5/—	4621

JANUARY 7, 19— REX CORP.—PAYROLL CHECK NO. 4621

Pay to the order of ..... ARTHUR ABBOT $62.07

..... Sixty two and 7/100 ..... DOLLARS

FIRST SECURITY BANK OF CHICAGO ..... BY _____

[Fig. 24]

1. The labor section of the job cost sheets;
2. The individual factory burden accounts,

through the day-by-day postings of the direct and indirect labor time tickets.

The extent to which the gross payroll liability was reduced by *payroll deductions* is recorded by a general journal entry such as follows:

(2)

Accrued payroll	$919.50	
Accrued federal insurance contributions		$127.20
Accrued withholding taxes		524.30
Accrued union dues		32.50
Group insurance		123.50
Employee accounts receivable		112.00

To record the part of the gross payroll of the week ended 1/5/— liquidated by payroll deductions.

When actual payment of the net payroll is made, the fact is recorded by an entry such as this in the cash disbursements record:

(3)

Accrued payroll	$7,560.50	
Cash		$7,560.50

For net payroll of the week ended 1/5/—.

After entries (1)–(3) preceding have been posted, the Accrued Payroll account appears as follows:

[Fig. 25]

Accrued Payroll

Payroll deductions	$ 919.50	Gross Earnings	$8,480.00
Cash	7,560.50		

The gross earnings amount disclosed by the credits in Accrued Payroll is used to prove the correctness of the totals of lists of employees' gross earnings submitted in connection with returns for federal insurance contributions, unemployment, and withholding taxes.

55. Application of factory burden; direct-labor-hour rate method.

The 4,000 direct labor hours disclosed by the payroll record of Fig. 26 represent *in total* the direct labor hours posted *in detail* to the individual job cost sheets by the daily postings of the direct labor time tickets. For each job cost sheet, the applicable factory burden is figured as:

Recorded direct labor hours
times
Burden rate per direct labor hour.

Using the 4,000-hour control total disclosed by the payroll record, the change *in aggregate* to *Burden in Process—Control* is made as follows:

[Fig. 26]

Burden in Process—Control	$5,000	
Factory Burden—Applied		$5,000
Total direct labor hours for the period	4,000	
Burden rate per direct labor hour	$1.25	
Burden applicable to all cost sheets	$5,000	

56. Charging the additional cost of overtime labor.

In most businesses today it is required either by law or agreement with the employees to pay for overtime work at 50 per cent above the ordinary rate. Thus, where 40 hours is the normal work week, an employee who works 48 hours is paid for 52, computed as follows:

Normal week work hours	40
Overtime hours	8
50 per cent of 8 overtime hours	4
Total hours for which payment is to be made	52

If the overtime hours are applied on specific job orders, the question arises as to whether the 50 per cent premium paid for the overtime hours should be charged to:

1. The specific jobs on which the overtime hours were worked as direct labor cost, or
2. A factory burden account termed "Overtime Labor," and be distributed through the factory burden rate as a cost of all the jobs in the period whether or not they were worked upon overtime.

If the overtime was caused by the specific job being worked upon overtime, the 50 per cent additional labor cost should be charged to that job. If the overtime was not caused by the specific job being worked upon overtime but by general production conditions, the 50 per cent additional labor cost should be charged as factory burden. In the latter case, there is no reason why the particular job that happened to be processed during overtime hours should be charged for additional costs arising from the policy of the company to operate extra hours.

ASSIGNMENT 5

Practice Set.

(*a*) Record in the appropriate journals the February 2–8 transactions.
(*b*) Make all possible postings to the general and subsidiary ledgers.

Transactions

Feb. 2. Received $34,500 of materials from the Midland Steel Products Company; terms, 2/10, n/60.

4. Issued check to the First National Bank to reduce bank loan to $50,000.

Collected $16,200 from the Arrow Forwarding Company on account.

5. Material invoices received as follows:

Creditor	Terms	Amount
Goodyear Rubber Company	1/10, n/30	$8,390
Acme Foundries	Net	6,385

8. Paid Elmer Clow and Company $11,630 for shop repairs.

Summary of Material Requisitions #412–424 issued during the week:

Direct—Chargeable to Job Order:

#8416	$1,735	
#8421	200	
#8437	4,100	
#8443	3,310	
#8445	4,115	
#8446	1,240	
#8447	4,920	
#8448	405	$20,025

Indirect—Chargeable to Burden Account:

#318	$3,875	
#319	1,475	5,350
Total Material Issues		$25,375

Make the detail charges from the foregoing summary directly to the affected job orders and burden accounts. Then enter the *summary amounts* in the materials requisition journal in the manner illustrated in Fig. 19. The folio reference in the factory burden ledger accounts for debits posted thereto directly from the summary of the material requisitions is the page number of the materials requisition journal on which the entry for the requisitions is recorded, thus:

Maintenance **#318**

19—	F.	Amt.
2/8	RJ–1	$3,875

Problem 13.

On Form Pages 57 and 58 are shown the original labor time tickets of Saturday, June 7, 19—, of the Martin Tool Works as delivered to the factory office by the shop foreman.

(*a*) Using the hourly rates disclosed by the payroll record of Form Page 59, price the time tickets.

(*b*) From the priced labor time tickets:

(1) Complete the payroll record of Form Page 59, which covers the week ending Saturday, June 7, 19—.
(2) Determine the labor cost and hours applicable to each production order for Saturday, June 7, 19—.
(3) Determine the labor cost applicable to each factory burden account for Saturday, June 7, 19—.

(*c*) Submit the journal entry to record the labor costs shown by the payroll record for the week ended June 7, 19—.

(*d*) Assuming the factory burden rate to be 80¢ per direct labor hour, submit the journal entry to record the amount of factory burden applied to the job orders in the week ended June 7, 19—.

Question 35.

What facts must be shown by a labor time ticket? For what purpose must each of these facts be shown?

Question 36.

Why are the applicable labor hours posted to the job cost sheets but not to the factory burden accounts?

Question 37.

How are the direct labor time tickets distinguished from the indirect labor tickets?

Question 38.

How many labor time tickets does each workman make out each day?

Additional Work

Problem 14.

From the payroll sheet shown on workbook Form Page 61, prepare the entries to:

1. Record the gross payroll.
2. Record the charge to Accrued Payroll for deductions from wages.
3. Record payment of the net payroll.
4. Record disbursement of the federal insurance contribution, union dues, and withholding tax deductions.

Question 39.

Explain how the 50 per cent premium paid for overtime labor should be charged.

Question 40.

Referring to the data of Problem 13, submit the entry to record the applied burden for the period if the burden rate is: (*a*) $1.50 per direct labor hour; (*b*) 125 per cent of direct labor cost.

Question 41.

The Borcke Company's bookkeeper journalizes the data disclosed by its payroll record with an entry such as follows:

Labor in Process	$8,500	
Factory Burden Actual—Control	1,500	
Accrued Federal Insurance Contribution		$ 100
Accrued Withholding Tax		275
Accrued Payroll		9,625
Payroll summary; week ended 6/14/—.		

What criticism have you of such a method of payroll journalization?

Question 42.

Submit a suitable form of time card if all labor is paid solely at piece rates.

Question 43.

What is the purpose of determining the labor hours: (*a*) worked by each employee; (*b*) worked on each job?

Question 44.

What are some of the more common items deducted on the payroll record from the gross earnings of a worker?

Question 45.

Why is it important that the foreman approve each time ticket made out by a workman?

CHAPTER 6

Factory Burden—Nature; Accumulation; Measurement; Distribution Methods

57. Definition.

Factory burden comprises all costs of manufacture other than direct material and direct labor. The more common items of factory burden are the following:

1. Taxes.
2. Depreciation.
3. Insurance.
4. Rent.
5. Maintenance.
6. Supervision.
7. Power, light, and heat.
8. Factory accounting.

Factory burden applies to *goods produced*, and hence is a factor in inventory value. It must, therefore, be carefully distinguished from selling and administrative expenses, which apply only to goods sold and are therefore not an inventory factor. Precise distinction between factory burden and selling and administrative expense is difficult, but, broadly, a cost is:

1. *Factory burden* if it is incurred to make the product ready for sale.
2. *Selling or administrative expense* if it is incurred for any other operating purpose.

58. Nature of factory burden.

To engage in manufacturing, it is not only necessary to buy material to be fabricated and hire labor to do the fabricating, but it is also necessary to provide *manufacturing facilities*, consisting of a plant *in which* to manufacture, machinery *with which* to manufacture, and a management staff of superintendents,

engineers, and foremen to plan and supervise the manufacturing. The provision and use of these plant, machine, and management facilities necessarily entail expenses such as the following:

1. Taxes.
2. Depreciation.
3. Insurance.
4. Rent.
5. Maintenance and repairs.
6. Supervision.
7. Power, light, and heat.
8. Factory accounting.

Since these expenses make up the great bulk of the factory burden, it becomes clear that factory burden consists mainly of the *expense of manufacturing facilities*, and that the problem of fairly prorating factory burden among the costing points is that of charging each with its fair share of the expense involved in providing and using the manufacturing facilities.

Because the bulk of factory burden comprises plant, machinery, and supervision costs, it follows that factory burden as a cost element is more important in industries involving huge plants, expensive machinery, and large technical staffs than in simple hand-labor lines. Since the trend of industrial development for some decades past has been toward increasing mechanization and complexity, the problem of factory burden has been and still is a growing one.

59. Accumulation of factory burden.

It is common practice to segregate the individual factory burden accounts in a separate ledger which is controlled by the general ledger account *Factory Burden Actual—Control.* By *factory burden actual* is meant the *incurred factory burden* as recorded on the books by the entries for factory burden costs paid for or accrued. The relationship between the *Factory Burden Actual—Control* account and the factory burden ledger is the same as that existing between any control account and its subsidiary ledger.

Charges to the individual factory burden ledger accounts arise in:

1. *The cash disbursements journal,* for those disbursements which are chargeable to factory burden accounts such as the following:

(*a*) Rent.
(*b*) Power.
(*c*) Taxes.
(*d*) Insurance.
(*e*) Repairs.
(*f*) Supplies.

Each of these charges is evidenced by a supporting *invoice* or *labor time ticket* approved by authorized persons and termed a *disbursement voucher*.

2. *The general journal*, for those accruals which are chargeable to factory burden accounts such as the following:

(*a*) Rent.
(*b*) Taxes.
(*c*) Depreciation.
(*d*) Insurance.

Each of these charges is evidenced by a supporting form approved by specified persons and termed a *journal voucher*.

3. *The requisitions journal*, for those material withdrawals which are chargeable to factory burden accounts such as the following:

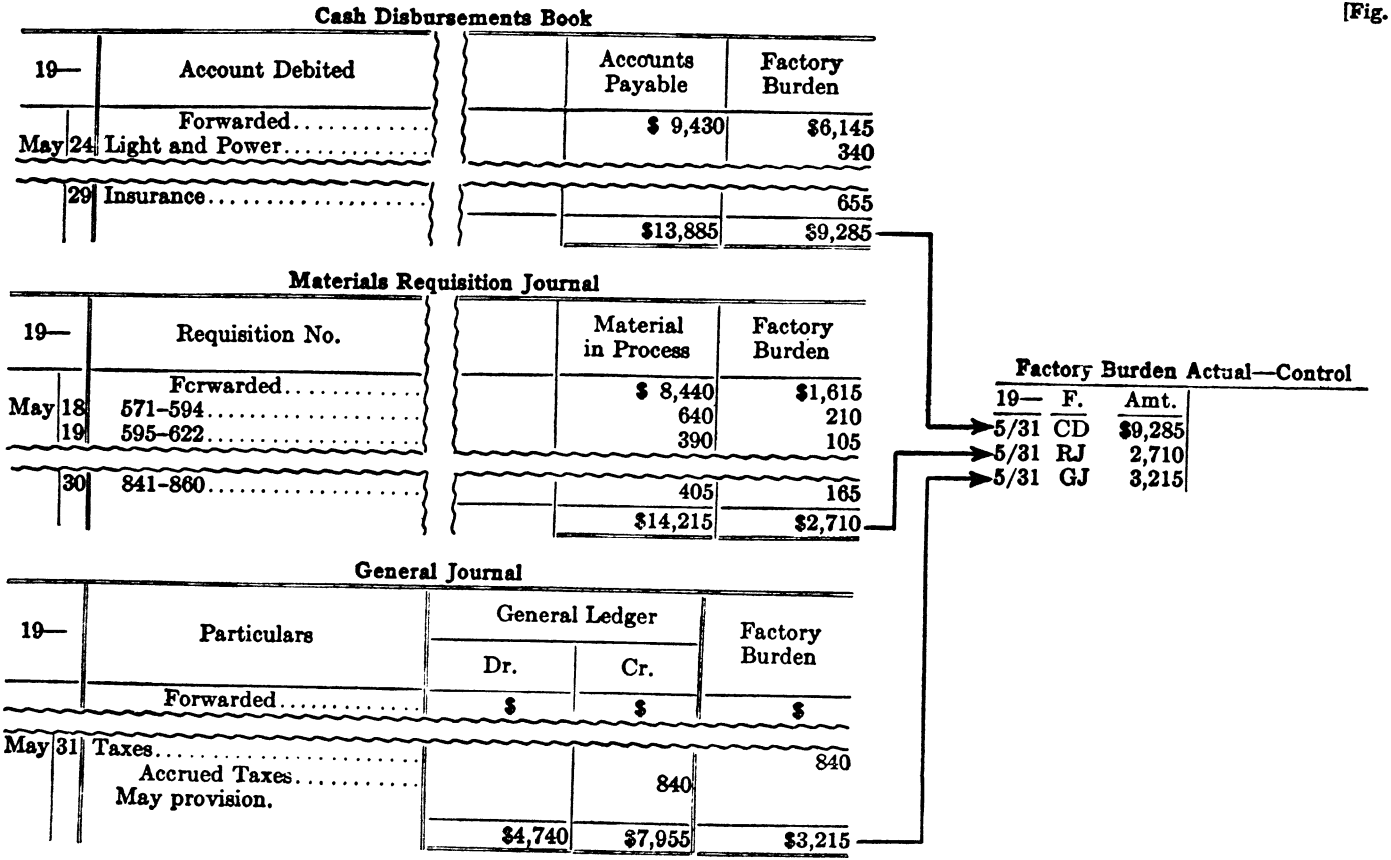
(*a*) Fuel.
(*b*) Repairs.
(*c*) Janitor supplies.
(*d*) Maintenance.

Each of these charges is supported by a properly authorized *materials requisition*.

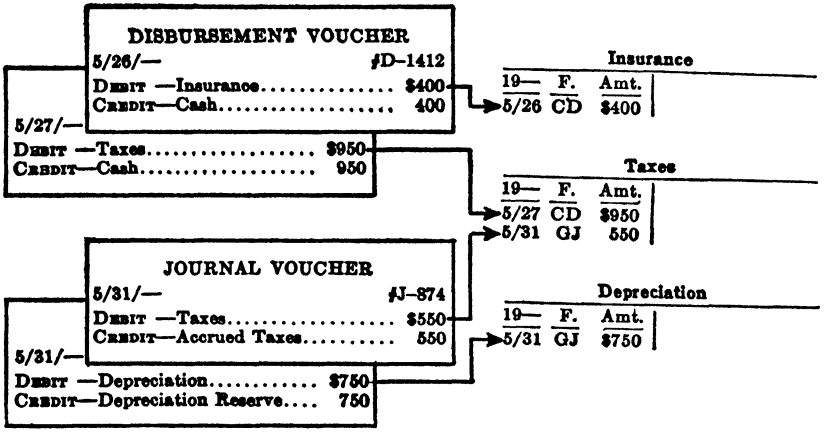
To *segregate* the charges applicable to the factory burden accounts, the disbursements book, requisition record, and general journal, each includes a *factory burden ledger* column. Debits to the *Factory Burden Actual—Control* account for the aggregate of the charges to the individual factory burden accounts recorded in each of these factory burden columns are effected periodically by debiting the footing of the column to the *Factory Burden Actual—Control* account in the manner shown by Fig. 27.

Charges to the individual factory burden accounts are made by posting from the detail of the disbursement vouchers, journal vouchers, and indirect material requisitions supporting the cash disbursement, general, and requisitions journal entries affecting factory burden in the manner shown by Fig. 28.

[Fig. 27]


Cash Disbursements Book
19— Account Debited
Accounts Payable
Factory Burden
Forwarded
$ 9,430
$6,145
May 24 Light and Power
340
29 Insurance
655
$13,885
$9,285
Materials Requisition Journal
19— Requisition No.
Material in Process
Factory Burden
Forwarded
$ 8,440
$1,615
May 18 571-594
640
210
19 595-622
390
105
30 841-860
405
165
$14,215
$2,710
General Journal
19— Particulars
General Ledger
Dr.
Cr.
Factory Burden
Forwarded
$
$
$
May 31 Taxes
840
Accrued Taxes
840
May provision.
$4,740
$7,955
$3,215
Factory Burden Actual—Control
19— F. Amt.
5/31 CD $9,285
5/31 RJ 2,710
5/31 GJ 3,215

[Fig. 28]



60. Measuring factory capacity and its consumption.

Nearly all the factory burden is incurred in order to provide manufacturing capacity as measured in terms of plant, machinery, and technical staff. It follows, then, that, in equity, proration of the factory burden among the benefiting costing points should be in the proportion in which they consume the factory capacity.

A both practical and accurate measurement of plant capacity is the number of *man-hours of productive labor* available. All other things being equal, a plant having available 10,000 productive man-hours has twice the capacity of a plant having available only 5,000 man-hours, and half the capacity of a plant having available 20,000 man-hours.

If the *man-hour of productive labor* is taken as the unit for measuring plant capacity, the portion of a plant's capacity used by a particular job lot is the per cent which the direct labor hours applicable to that job lot bears to the direct labor hours available in the whole plant. If $8,000 of factory burden provides a plant capacity of 10,000 identical direct labor hours, a job which consumes 5,000 of the hours consumes half the plant capacity and should, therefore, bear half the $8,000 cost of providing that capacity.

61. Methods of distributing the factory burden cost among the job orders.

By definition, factory burden costs cannot be allocated as direct charges to any job order. They must, therefore, be prorated among all the job orders on some arbitrary basis. Promi-

nent among the methods used to distribute the factory burden costs among the job orders are the following:

1. The rate per direct labor hour.
2. The per cent of direct labor cost.
3. The per cent of prime cost.

The procedure under, the equity of, and the practicability of each of these methods will be briefly reviewed. Illustration is based on a company which in the year 19— experienced the following:

Factory Burden Cost	$100,000
Direct Labor Hours	100,000
Direct Labor Cost	$200,000
Direct Material Cost	$300,000

62. Rate per direct labor hour.

The rate of factory burden per direct labor hour is calculated as

$$\text{Rate} = \frac{\text{Factory burden—\$100,000}}{\text{Direct labor hours—100,000}} = \$1.00.$$

Since the job cost sheets in aggregate show that 100,000 hours of direct labor have been applied to them, charging each for factory burden at the rate of $1.00 per direct labor hour will charge to them all precisely the $100,000 factory burden cost of the plant.

In theory, the rate per direct labor hour represents perhaps the ideal in methods of factory burden proration. Factory burden accumulates on a time basis; the rate per direct labor hour distributes it on a time basis. Factory capacity, of which factory burden represents the cost, is most accurately and practicably measured in terms of direct labor hours; the rate per direct labor hour charges burden cost to the job cost sheet on that basis. The factory burden cost provides so many hours of productive facilities. The direct labor hour-rate method of burden proration charges each job order with that portion of the burden cost which the productive hours it consumes bear to the total productive hours available. If a job has used 1,000 direct labor hours, it has consumed 1 per cent of the available 100,000 hours of factory capacity. The rate-per-direct-labor-hour method of burden proration causes it to be charged with precisely that per cent of the factory burden cost.

A practical defect of the rate-per-direct-labor-hour method of burden proration is that its use requires considerable *extra* clerical work. Under the plan, each job cost sheet must show the number of direct labor hours applicable to it. To effect this purpose, it is necessary to:

1. Write on each direct labor time ticket the number of hours of labor it represents.
2. Determine each day the number of direct labor hours applicable to each job cost sheet.
3. Record each day on each job cost sheet the number of direct labor hours applicable to it.

Each of these steps involves much clerical work. In all cases, Steps 2 and 3 are necessary only for the purpose of using the rate-per-direct-labor-hour method of burden distribution. If the plant, as is frequently the case, pays its labor on a piece basis, Step 1 also becomes necessary only for the purpose of using the rate-per-direct-labor-hour method of burden application. In many cases, the greater accuracy in burden distribution effected by the use of the rate per direct labor hour is not thought sufficient to offset the extra burden of clerical work that it involves.

63. Per cent of direct labor.

The per cent that factory burden bears to direct labor cost is calculated as

$$\text{Per cent} = \frac{\text{Factory burden—\$100,000}}{\text{Direct labor cost—\$200,000}} = 50 \text{ per cent.}$$

Since the cost sheets in aggregate show \$200,000 of direct labor cost, charging for factory burden at 50 per cent of direct labor cost will apply to the cost sheets precisely the \$100,000 factory burden of the plant.

Application of factory burden as a per cent of direct labor cost does not require that the cost sheets show any direct labor hour data. The method, therefore, allows the elimination of all the clerical work incident to causing the job cost sheets to show that information, and hence affords a means of substantially decreasing the expense of operating a cost-finding system.

If we grant the premise that time is the correct basis for burden proration, it follows that the per-cent-of-direct-labor-cost method gives accurate results only if labor cost is proportional to labor time. This situation obtains if:

1. *When the labor is paid on an hourly basis,* the rate per hour is substantially the same for all the workers. Thus, if each laborer receives $1.00 an hour, a $6.00 direct labor cost represents just twice the labor time that a $3.00 direct labor cost does.

2. *When the labor is paid on a piece basis,* the *skill* of the men is substantially the same. Thus, if all the laborers work at the same speed and are paid the same piece rates, a $6.00 direct labor cost represents twice the labor time that a $3.00 direct labor cost does.

On occasion, these conditions hold true, or substantially so, throughout an entire factory. In such a case, the per cent of direct labor cost represents an inexpensive method of accurately prorating the burden. More often, for a whole factory, these conditions do not hold true. Most factories employ labor of various trades, the hourly or piece rates of which vary markedly. Thus, the rate paid a machinist is substantially different from that paid a painter, a fitter, or an assembler. In these cases, the per cent of direct labor cost is not a reliable method of burden distribution, because, if labor rates vary markedly, the labor cost applied to a job no longer is substantially in proportion to the applicable labor time. It must be emphasized that, while factory burden cost is a direct function of time, it has no necessary relationship to direct labor cost. It usually takes twice as much burden cost to operate a factory two months as to operate it one month, but ordinarily the hourly or piece rate of pay of the laborer has no significant effect on such main burden items as the following:

1. Taxes.
2. Depreciation.
3. Rent.
4. Power, light, and heat.
5. Insurance.
6. Superintendence.

64. Per cent of prime cost.

The per cent that factory burden bears to prime cost is calculated as

$$\text{Per cent} = \frac{\text{Factory burden—\$100,000}}{\text{Prime cost—\$500,000}} = 20 \text{ per cent.}$$

Since the cost sheets in aggregate show $500,000 of prime cost, charging for factory burden at 20 per cent of prime cost

will apply to the cost sheets precisely the $100,000 factory burden of the plant.

The per-cent-of-prime-cost method eliminates the need for showing direct-labor-hour data on the job cost sheets, and, hence, also allows the elimination of all the clerical work required to do so.

Like the per-cent-of-direct-labor-cost plan, the per-cent-of-prime-cost method is accurate only if it applies the same burden amount to each job order as would be applied by the use of a rate per direct labor hour. This condition could exist only in the unusual coincidence that the sum of the direct material and labor costs for substantially all jobs is proportional to consumed labor time. Neither the labor- nor the material-cost component of the prime-cost basis has any necessary relationship to the accumulation of the main factory burden items. It therefore follows that the two together form no inherently sound basis for the distribution of burden.

ASSIGNMENT 6

Practice Set.

(*a*) Record in the appropriate journals the February 8 transactions.

(*b*) Make all possible postings to the general and subsidiary ledgers.

Transactions

Feb. 8. Collected $21,483 from Keeshin and Company in full of their account.

Paid to the city collector $28,000 on the accrued taxes.

Paid to the First National Bank $410 interest on the bank loan.

Disallowed discount of $63 taken by Denby's Motor Freight because the invoice paid for was not subject to discount.

The labor time tickets for the week ended February 7, 19—, are summarized as follows:

Direct—Chargeable to Job Order:

	Hours	Amount
#8416	5,160	$ 5,320
#8421	600	600
#8437	2,240	2,330
#8443	2,240	1,840
#8445	3,760	3,410
#8446	2,480	2,340
#8447	7,560	6,365
#8448	760	670
Totals	24,800	$22,875

Indirect—Chargeable to Burden Account:

	Amount	
#316	$3,575	
#318	3,215	
#319	635	$ 7,425

Selling—Chargeable to Account:

#202	$2,010	
#204	3,115	5,125
Total Payroll		$35,425

Make the *detailed* hour and cost charges directly to the affected subsidiary ledger accounts; then make entries in:

(1) *The general journal,* debiting *Labor in Process—Control* ($22,875), *Factory Burden Actual—Control* ($7,425), and *Selling and Administrative Expense—Control* ($5,125), and crediting *Accrued Payroll* ($35,425).
(2) *The disbursements journal,* debiting *Accrued Payroll* and crediting *Cash* for the payroll amount ($35,425).

The folio reference in the *Factory Burden* and *Selling and Administrative Expense* ledger accounts for debits posted thereto directly from the summary of the labor time tickets is the number of the page of the general journal on which the summary entry for the payroll is recorded, thus:

Maintenance #318

19—	F.	Amt.	
2/8	GJ-1	$3,215	

Fig. 29 illustrates the form of, method of recording typical entries in, and plan of folioing and ruling a general journal such as is used by the Loren Manufacturing Company. Observe from Fig. 29 that:

1. The date of the transaction is recorded in the center of the Particulars section. If no date is recorded for a transaction, the same date as that of the preceding transaction is implied.
2. As in the case of the simple general journal, a vacant space is used to separate the individual entries.
3. For debits in the "Labor in Process," "Factory Burden," and "Selling and Administrative Expense" columns *arising from the summary payroll entry,* the postings to the subsidiary ledger accounts are made directly from the summary of the labor time tickets. To denote that further posting of these items to the subsidiary ledger accounts is *not* to be made, a dash (—) is placed in the folio space opposite those debits when the payroll entry is recorded.

[Fig. 29]

General Journal—Month of February 19—

Dr. S. & A. Expense Ledger	Dr. Factory Burden Ledger	Dr. Labor in Process	Dr. General Ledger	F.	Particulars	F.	Cr. General Ledger	Cr. Accounts Receivable	Cr. Accounts Payable
$ 727 00	$ 814 00	$ 3,461 00	$ 2,417 00		Totals Forwarded		$ 3,831 00	$ 2,746 00	$ 842 00
					(6)				
			44 00	3/✓	Denton Freight Fleet				
					Sales Discounts	410	44 00		
					Disallowed on invoice of January 2.				
			3,410 00	4	Customers' Notes Receivable				
					Jones and Smith	✓		1,210 00	
					Keeshin and Company	✓		2,200 00	
					5% notes received in settlement of their open accounts.				
					(8)				
		4,740 00		—	Labor in Process—Control				
	1,310 00			—	Factory Burden Actual—Control				
1,550 00				—	Selling and Administrative Expense—Control				
					Accrued Payroll	56	7,600 00		
					Payroll of week ended February 8.				
					(31)				
30 00				216	Office Supplies and Expense				
					Horder and Company	✓			30 00
					Invoice for office supplies.				
	670 00			304	Depreciation				
					Reserve for Depreciation	35–R	670 00		
					Provision for January on the depreciable factory equipment.				
$4,816 00	$5,397 00	$17,841 00	$24,636 00				$34,607 00	$14,247 00	$3,836 00
(200)	(300)	(9)						(4)	(51)

The procedure in posting the amounts recorded in each of the several columns of this form of general journal is as follows:

Columns	Procedure in Posting
1. General Ledger	Since the amounts in these columns refer to various accounts, they are posted *individually* to those accounts *daily*.
2. Labor in Process Selling and Administrative Expense Factory Burden Accounts Receivable Accounts Payable	Each of these columns refers to a control account and a subsidiary ledger. The amounts in it are therefore posted *in detail daily* to the individual subsidiary ledger accounts and *in total at the end of the month* to the control account in the general ledger. However, the debits in these columns arising from the summary payroll entry are *not posted* because they are charged to the subsidiary ledger accounts directly from the summary of the labor time tickets.

Question 46.

State three methods of prorating factory burden and illustrate how the burden rate is computed under each method.

Question 47.

The labor hour is said to be the logical basis for factory burden distribution. Is this statement true? Give full reasons for your answer.

Question 48.

Under what circumstances is the per-cent-of-direct-labor-cost method of factory burden distribution preferable to the rate-per-direct-labor-hour plan?

Question 49.

How would you prove the correctness of the balance in the Factory Burden in Process—Control account if the method the factory uses to apply the burden is the:

(*a*) Rate per direct labor hour?
(*b*) Per cent of direct labor cost?
(*c*) Per cent of prime cost?

Additional Work

Problem 15.

From information shown in the payroll record of Form Page 63 of your work-book, prepare in simple journal form the entries to record:

1. Accrual of the payroll for the week ended April 13, 19—.
2. Payment of the withholding taxes to the collector of internal revenue.
3. Purchase, for $225, of savings bonds to be distributed to employees who have accumulated sufficient credits to cover issuance of a bond.

Question 50.

Explain what is meant by the statement that any method of factory burden distribution other than the rate per direct labor hour is accurate only by coincidence.

Question 51.

Since each burden distribution method distributes among all the job cost sheets the same aggregate factory burden cost, what difference does it make which method is used? Discuss fully.

Question 52.

Does the proportion of factory cost represented by factory burden have any bearing on the method of burden distribution to be employed? Give full reasons.

Question 53.

The X Company's labor rates range from 97¢ to $1.03 an hour. The company makes jewelry items from copper, brass, aluminum, and also the precious metals. Which of the three methods of burden distribution would you suggest as both practical and accurate in this case? Explain your objection to the company's use of each of the other two methods of burden proration.

Question 54.

What constitutes the burden section of the job cost sheet if the method used to apply factory burden is:

(*a*) Rate per direct labor hour?
(*b*) Per cent of direct labor cost?
(*c*) Per cent of prime cost?

Question 55.

The Maxton Company makes jewelry items out of both the precious and base metals. An analysis of its manufacturing costs over several years shows that they consist of:

Materials	68%
Labor	15%
Burden	17%

Since the main element of cost was shown to be materials, the president of the company suggested that the factory burden be prorated among the jobs as a per cent of direct material cost. Comment on the soundness of the president's proposal.

CHAPTER 7

The Normal Burden Rate

65. Actual factory cost; meaning of term.

By *actual factory cost* is meant the *incurred* material, labor, and burden expenses. For direct material, it represents the sum of the cost recorded on the direct material requisitions; for direct labor, it comprises the sum of the costs recorded on the direct labor time tickets. For factory burden, *actual cost* consists of the aggregate expense evidenced by:

1. The indirect material requisitions.
2. The indirect labor time tickets.
3. The disbursement vouchers applicable to burden accounts.
4. The journal vouchers applicable to burden accounts.

In the general ledger, actual factory burden is reflected by the account *Factory Burden Actual—Control*, which is supported by a subsidiary ledger containing individual factory burden accounts such as the following:

1. Rent.
2. Taxes.
3. Depreciation.
4. Maintenance.
5. Insurance.
6. Power.
7. Supervision.
8. Factory Accounting.

66. Defects of an actual burden rate.

The burden rates discussed in Chapter 6 were *actual burden rates*, since they were calculated as:

$$\text{Rate} = \frac{\text{Actual factory burden}}{\text{Actual direct labor hours, direct labor cost, or prime cost}}$$

An actual burden rate has the merit of distributing among the job cost sheets precisely the incurred factory burden. It is subject, however, to these grave defects:

1. It is unavailable until after the close of the accounting period.
2. It fluctuates violently with the volume of production.

That the actual burden rate cannot be available until after the end of the accounting period, when (1) the experienced factory burden cost and (2) the experienced direct labor hours are first known, is an obvious fact which requires no further discussion. To understand that an actual burden rate fluctuates violently with the level of factory activity requires consideration of:

1. The fixed nature of factory burden costs.
2. The fluctuating nature of factory activity.

67. Fixed nature of factory burden cost.

Direct material and direct labor costs vary almost directly with production volume. A 50 per cent rise or fall in units produced should produce an almost equal change in direct material and direct labor costs. Certainly, no direct material or direct labor costs occur if the plant is completely idle, because there are then no jobs to which material or labor could be charged. All labor costs are in such case charged to factory burden.

Factory burden cost, unlike direct material or direct labor, accumulates not with factory activity, but *with time. Plant costs,* such as depreciation, taxes, insurance, and rent, continue unchanged regardless of factory activity. Substantially the same is true of *staff costs.* The research, engineering, and supervisory staffs cannot be decreased much in dull times and need not be increased greatly in busy times. If the plant operates at all, most of its power costs remain, particularly if it generates its own energy. Therefore, actual factory burden, wholly unlike actual direct material or direct labor, is largely a *fixed cost.*

68. Fluctuating nature of factory activity.

Fluctuation in the level of factory activity, sometimes mild but often sharp, is unavoidable for most industrial businesses. In many industries, *seasonal factors* cause the fluctuation in operating activity. Thus, sporting goods manufacturers are more active in the winter and spring than in the summer and fall seasons, while stove manufacturers are busier in the summer and fall than in the winter and spring seasons.

In all businesses, *cyclical factors* cause increases and decreases in the level of plant activity. Under our present plan of eco-

nomic organization, periods of business boom and depression appear to be unavoidable. During boom periods, with the demand for the product running high, it is inevitable that the level of factory activity rise. In depression times, with demand for the product greatly diminished, it is necessary that factory activity be reduced.

Sometimes the fluctuation in factory operating activity due to seasonal or cyclical factors is slight. Thus, in companies making staple products, periods of seasonally slack sales are used to build up inventories for peak periods, so that the rate of factory activity is leveled for the year around. Again, in certain food and utility lines, public requirement of the product is such that the influence of cyclical factors on the production is not material.

Often, however, the fluctuations in factory activity caused by seasonal or cyclical factors are violent. Thus, in the steel industry, *cyclical factors* in the single period 1938–1939 lifted the operating rate from 35 to 98 per cent of plant capacity. Again, in the automobile industry, *seasonal factors* normally cause the operating activity to fluctuate between a low of 20 to 25 per cent in July to a high of 80 to 85 per cent in March or April.

69. Effect of fluctuating factory activity on the burden rate.

An increase in the level of factory activity is marked by a rise in the number of direct labor hours worked, while a fall in the level of factory activity is marked by a decrease in the number of direct labor hours worked. If the factory burden amount remains fixed, while the number of direct labor hours varies with the factory operating level, it follows that the burden rate will vary and *vary inversely with the level of the factory activity.* A tabular illustration of this variation is given by Fig. 30, which for the sake of simplicity deals with the extreme case of an absolutely fixed $10,000 monthly burden amount.

[Fig. 30]

Factory Burden Amount	Direct Labor Hours Worked	Factory Burden Rate Per Direct Labor Hour
$10,000	10,000	$ 1.00
10,000	8,000	1.25
10,000	5,000	2.00
10,000	4,000	2.50
10,000	2,000	5.00
10,000	1,000	10.00

Note from Fig. 30 that the actual factory burden rate per direct labor hour:

1. *Increases as the factory activity falls.* Thus, in Fig. 30 the decrease of factory activity from 10,000 to 8,000 hours increased the burden rate per direct labor hour from $1.00 to $1.25.

2. *Decreases as the factory activity rises.* Thus, in Fig. 30 increase of factory activity from 1,000 to 2,000 hours decreased the burden rate per direct labor hour from $10.00 to $5.00.

This sharp fluctuation of the actual factory burden rate would seriously impair the usefulness of the unit cost data furnished by a cost-finding system using such a burden rate.

70. Impairment of usefulness of unit cost data.

As explained in Sections 18–21, the unit cost data developed by a cost system are intended for use in

1. Setting selling prices.
2. Pricing inventories.
3. Measuring factory efficiency.

The effect of a factory burden rate which fluctuates violently with the level of factory activity is to impair the usefulness of unit cost data for each of those purposes.

The unit costs are unserviceable for setting selling prices because they rise abruptly in depression and fall sharply in boom times. If they were used as a basis for setting selling prices, they would cause selling prices to be highest when, to stimulate sales, they ought to be lowest, and to be lowest when the conditions of business would justify the highest prices. In any event, their use as a basis would preclude the possibility of a stable price structure.

The unit costs are unsatisfactory for inventory prices because in dull times they exceed the probable selling prices of the goods, while in peak times they are so low that the margin between the balance sheet value and the sales price of the goods becomes exaggerated.

The unit costs fail as an index of the trend in factory efficiency because the changes they might reflect as to the efficiency with which material, labor, and factory facilities are being consumed are obscured, offset, or accentuated by changes in unit costs caused by mere increases and decreases in the level of factory activity.

71. Attitude of the accountant toward the fluctuating burden rate.

The early attitude of the accountant toward the fluctuating burden rate was one of resignation and acquiescence. *Total*

factory cost, he reflected, consisted of the expenditures for material, labor, and factory burden. Unit cost for factory burden was, therefore, the total of the expenditures for that cost element divided by the number of units produced. That the resultant unit burden cost was displeasing, vexatious, or perhaps even unusable was no affair of his. Accounting, he observed, was like a thermometer. Its sole function was to record the facts. That the factual recording was not to the reader's satisfaction was no fault of the thermometer.

72. Attitude of the engineer toward the fluctuating burden rate.

From the first, the attitude of the production engineer toward the seeming fact of a fluctuating burden rate was one of skepticism. *Unit factory cost,* he reasoned, consisted of (1) the material used, (2) the labor applied, and (3) a *fair charge* for the factory facilities needed to produce the unit. If a factory burden cost of $10,000 made available 10,000 hours of factory facilities, the burden cost per direct labor hour of factory facilities was $1.00. In such a case, a job involving 50 hours of direct labor should bear a $50 charge for use of factory facilities whatever might be the rate of factory activity. If for seasonal or cyclical reasons the job was performed at a time when half of the 10,000 available hours of factory facilities were not used, that was no reason for doubling the per-hour cost of the *used facilities.* The fluctuating burden rate, he argued, arose from the failure of the accountant to distinguish between the factory burden cost applicable to the *used facilities* and that applicable to the *unused facilities.* The portion of the factory burden applicable to the *used facilities* represented *the cost of production;* the portion of the factory burden applicable to the *unused facilities* represented *the cost of idle time.* In line with this reasoning the data of Fig. 30 should be presented as shown in Fig. 31.

[Fig. 31]

Factory Burden Cost	Direct Labor Hours of Factory Facilities			Factory Burden Cost		
				Per Available Hour	Applicable to	
	Available	Employed	Idle		Production	Idle Time
$10,000	10,000	10,000	—	$1.00	$10,000	$ —
10,000	10,000	8,000	2,000	1.00	8,000	2,000
10,000	10,000	5,000	5,000	1.00	5,000	5,000
10,000	10,000	4,000	6,000	1.00	4,000	6,000
10,000	10,000	2,000	8,000	1.00	2,000	8,000
10,000	10,000	1,000	9,000	1.00	1,000	9,000

To say that production burden costs increase as factory activity falls and decrease as factory activity rises, he continued,

was opposite to the actual facts. In dull times, only the best machines and operators are used, and the *time applied* per produced unit *decreases*. In peak times, inexperienced operators and reserve machines must be used, and the average *time applied* per produced unit *increases*. Since the burden cost per *available hour of factory facilities* is practically constant, the lower applied time per unit in dull times means decreased unit burden costs, and the higher applied time per unit in peak times means increased unit burden costs. An actual burden rate indicates the opposite movement of unit costs only because:

1. *In dull times* the burden rate *is inflated* with the expense applicable to *idle hours* of factory facilities.
2. *In peak times* the burden rate *is deflated* with the special profits arising from *overtime hours* of operation.

The logical, the equitable, and the practical handling of factory burden cost, he concluded, was to employ *throughout the year* a burden rate which represented the per-direct-labor-hour cost of factory facilities under *ordinary conditions*. Such a burden rate he termed a *normal burden rate*.

73. Advantages of using a normal burden rate.

If a *predetermined normal burden rate* is used, the burden as well as the material and labor unit costs of a job order may be computed as soon as the job is completed. Further, the use of a normal burden rate improves the value of the product unit cost data as:

1. An aid to setting selling prices.
2. A means of pricing inventories.
3. An index for measuring factory efficiency.

The unit costs are more satisfactory as a basis for setting selling prices and pricing inventories because their rise or fall is now due solely to change in (1) the prices, or (2) the quantities of the material, labor, and factory facilities used. Changes in cost due to these factors, unlike those due to idle or overtime hours, are changes that ought reasonably to be considered in the selling price or balance sheet valuation of the products.

The *burden unit costs* become a reliable index of factory efficiency because, being figured as:

Actual direct labor hours *times* a constant burden rate,

they are now a direct variable of the time taken to perform a job. An increase in burden cost per unit denotes that more hours were taken to do the job, and a decrease in per-unit burden cost denotes that fewer hours were taken to do the job. More hours taken to do a job mean that factory efficiency is deteriorating; fewer hours taken to do a job mean that factory efficiency is improving.

74. Calculation of the normal burden rate.

The exposure of the fallacy of actual burden as a correct measure of production burden cost was so conclusive, and the administrative advantages of using a normal burden rate were so obvious, that employment of a *predetermined normal* rather than an *historical actual* burden rate became the accepted cost accounting practice. The formula for computing the normal factory burden rate per direct labor hour is given as:

$$\text{Normal burden rate} = \frac{\text{Estimated normal factory burden cost}}{\text{Estimated normal direct labor hours}}.$$

From this formula it is seen that the computation of the normal burden rate per direct labor hour involves estimating *in advance of actual production:*

1. The normal amount of the factory burden costs.
2. The normal number of direct labor hours.

Because of the nature of the factory burden costs and manufacturing facilities, neither of the estimates involves excessive difficulty.

75. Estimating the normal burden amount.

Because most of the factory burden costs are of fixed nature, estimating the probable amount of factory burden cost under representative conditions is not difficult. Adjusting the cost of each of the burden expenses experienced in the past for the changes anticipated in the period for which the estimate is being made gives the normal factory burden amount, as is illustrated by Fig. 32.

Revision of the normal burden amount to accord with current conditions affecting the items comprising it may be made as required. Infrequent revision of the estimate of normal burden amount allows the same burden rate to be used for several accounting periods and thus makes the unit burden costs of those

periods completely comparable. A disadvantage, of course, is that the burden rate then fails to give effect to current conditions affecting the cost of the factory burden items. The gravity of this defect depends, of course, on how much or how rapidly the burden expense items are changing. In ordinary times and in companies that are not undergoing marked expansion, the year-to-year changes in the main factory burden items of rent, taxes, depreciation, insurance, maintenance, and supervision are not of material amount.

[Fig. 32]

Expense Item	Actual 1951	Estimated as Normal for 1952	Remarks
Rent	$ 6,000	$ 6,000	No change in lease rates.
Depreciation	19,000	19,500	More depreciable assets to be acquired.
Taxes	14,000	17,500	More taxable assets; also, higher tax rates.
Power	4,500	5,000	Rates for power about 10% higher.
Supervision	13,500	13,500	No change in budgeted salaries.
Maintenance	8,500	9,000	Labor costs about 5% higher.
Insurance	5,500	5,500	No change in rates expected.
Accounting	4,000	4,000	No change in budgeted salaries.
Totals	$75,000	$80,000	

76. Estimating the normal number of direct labor hours.

The normal number of direct labor hours is arrived at by deducting from the *available labor hours* the number which past experience indicates will for various reasons not be applicable to specific job orders. If a plant operates 2,000 hours a year and employs 50 men, the available labor hours are 2,000 × 50, or 100,000. The nondirect labor hours are those which past experience indicates will represent hours:

1. *Lost* because of employee absences and imperfect scheduling of work.
2. *Used indirectly* for purposes of repair and maintenance of the plant facilities.

If, in the given instance, past experience has been that about 20 per cent of the available labor hours are either lost or used indirectly, the normal number of direct labor hours will be figured as follows:

Available Labor Hours	100,000
Less—20% Allowed for Lost and Indirect Hours	20,000
Normal Number of Direct Labor Hours	80,000

A revision of the estimate of the normal number of direct labor hours is made only if experience discloses a marked change in the proportion between the available and nondirect labor hours, or if the available number of labor hours greatly increases or decreases, owing to plant expansion or contraction.

77. Entries to record burden applied at normal rates.

If the factory burden is distributed by means of a normal burden rate per direct labor hour, the entry to record the factory burden applied to production in a period at that normal rate is:

Factory Burden In Process—Control		$9,600	
Factory Burden—Applied			$9,600
Actual direct labor hours in the period	6,400		
Normal burden rate per direct labor hour	$ 1.50		
Factory burden applied in the period	$9,600		

The actual direct labor hours in the period are determined for purposes of the applied burden entry from either the payroll record or an hours record kept as shown in Figure 33 following:

[Fig. 33]

DIRECT LABOR HOURS RECORD
July 19—

Date	Day	Remarks	Direct Labor Hours
1	S		0
2	M		234
3	T		285
4	W	Plant closed	0
30	T		307
	Total		6,400

It is incorrect for the purpose of the applied burden entry to determine the actual direct labor hours in the period by adding the direct labor hours recorded in that time on the individual job cost sheets. The reason is that, in such a case, the balance in Factory Burden in Process—Control having been *determined*, in effect, by adding the sum of the balances of its subsidiary ledger accounts, it cannot correctly be used to *prove* the accuracy of the sum of the balances of those same subsidiary ledger accounts.

If the factory burden is applied as a normal per cent of direct labor or prime cost, the entry to record the factory burden applied in the period at those normal rates is:

Factory Burden in Process—Control		$8,000	
Factory Burden—Applied			$8,000
Actual direct labor cost in the period	$6,400		
Per cent of normal burden to direct labor cost	125%		
Factory burden applied in the period	$8,000		

or

Factory Burden in Process—Control		$7,400	
Factory Burden—Applied			$7,400
Actual prime cost in the period	$14,800		
Per cent of normal burden to prime cost	50%		
Factory burden applied in the period	$ 7,400		

The actual direct labor cost in the period is given by the net charges in that time to the Labor in Process—Control account, and the actual direct material cost by the net charges in that time to the Materials in Process—Control account.

78. Nature of the Factory Burden—Applied account.

The balance in the *Factory Burden—Applied* account is the amount of burden charged to the job cost sheets in the period. Since Factory Burden—Applied measures the extent to which the actual factory burden incurred in the period was distributed to the job cost sheets, it is equivalent to a credit to the Factory Burden Actual—Control account and at the period end is closed out against it. When a normal burden rate is used, the credit for burden charged to the job cost sheets in the period is made to Factory Burden—Applied instead of to Factory Burden Actual—Control, because to credit Factory Burden Actual—Control in such a case would pose the problem of how to make detail credits aggregating the same amount to the individual factory burden accounts supporting the Factory Burden Actual—Control account.

79. Distinction between Factory Burden—Actual, In-Process, and Applied accounts.

Factory Burden—Actual is a control account which shows the factory burden incurred in the accounting period. It is supported by a subsidiary ledger of individual factory burden accounts, such as taxes, depreciation, supervision, rent, insurance, and power.

Factory Burden in Process is a control account which shows the amount of factory burden applicable to the uncompleted job cost sheets. It is supported by a subsidiary ledger consisting of the burden sections of the "open" job cost sheets.

Factory Burden—Applied is an account which shows the amount of the factory burden charged to the job cost sheets in the period under the plan of burden distribution used. If an actual burden rate is used, the balance of Factory Burden—Applied is identical with that of Factory Burden—Actual. Factory Burden—Applied is not a control account.

ASSIGNMENT 7

Practice Set.

(*a*) Record in the appropriate journals the February 10–15 transactions.

(*b*) Make all possible postings to the general and subsidiary ledgers.

Transactions

Feb. 10. Received notes in reduction of customer accounts as follows:

1. Benson Trucking Lines	$15,000
2. Rixon's Freight Fleet	15,000
3. Wickett Transit Company	9,800

11. Paid $4,200 for advertising in *Motor Transport Age.*
Issued check for $16,100 to the Inland Steel Company to apply on account.

12. Collected $100 on account from Rixon's Freight Fleet.

13. Received $785 interest on notes receivable. *Accrued Interest Receivable* is to be credited with $350 of this amount; the balance is to be credited to *Interest Earned.* (Why?)
Paid the Melrose Coal Co. $4,500 for fuel.

14. Purchased material costing $4,500 from the Wright Wholesale Hardware Company; terms, net.
Issued check for $3,500 to the Office Equipment Co. for *supplies.*

15. Paid semimonthly executive salaries of $12,000.
Summary of Material Requisitions #425–436 issued during the week:

Direct—Chargeable to Job Order:		
#8416	$3,665	
#8437	2,340	
#8443	1,915	
#8445	3,105	
#8446	3,310	
#8447	3,785	
#8448	2,840	$20,960
Indirect—Chargeable to Burden Account #318		2,455
Total Material Issues		$23,415

Summary of labor time tickets for the week:

	Hours	Amount
Direct—Chargeable to Job Order:		
#8416	3,240	$ 3,870
#8437	4,480	3,755
#8443	3,960	3,910
#8445	3,400	3,160
#8446	2,640	2,610
#8447	4,400	3,510
#8448	2,720	2,345
Totals	24,840	$23,160
Indirect—Chargeable to Burden Account:		
#316	$3,800	
#318	2,000	5,800
Selling—Chargeable to Account:		
#202	$2,010	
#204	3,550	
#219	750	6,310
Total Payroll		$35,270

Question 56.

Discuss the merits of an actual as compared to a normal factory burden rate.

Question 57.

State the formula for calculating the normal factory burden rate.

Question 58.

Explain what is meant by "normal" in respect to: (*a*) factory burden cost; (*b*) available direct labor hours.

Question 59.

When should revision of the normal burden rate be made? Would you favor annual revision of the rate?

Additional Work

Problem 16.

Complete the payroll record of Form Page 65 of your workbook, giving effect to the following:

1. The federal insurance contribution tax is 1½ per cent of wages earned.
2. The income tax withheld is according to the table shown below.
3. The U. S. savings bond deduction is 5 per cent of the wages earned adjusted to the nearest whole dollar.
4. Employees claiming one or no exemption pay $1.25 hospital insurance monthly. Those claiming two or more exemptions pay $3.00 hospital insurance monthly. The deduction for hospital insurance is made on the last payroll of the month.

5. Hours in excess of 40 are paid for at time and one-half. Overtime premium paid to direct laborers is to be charged as direct labor cost.

INCOME TAX WITHOLDING TABLE

If the payroll period with respect to an employee is Weekly:												
And the wages are—		And the number of withholding exemptions claimed is—										
At least	But less than	0	1	2	3	4	5	6	7	8	9	10 or more
		The amount of tax to be withheld shall be—										
$55	$56	$8.30	$6.40	$4.50	$2.50	$ .60	$0	$0	$0	$0	$0	$0
56	57	8.40	6.50	4.60	2.70	.80	0	0	0	0	0	0
57	58	8.60	6.70	4.80	2.80	.90	0	0	0	0	0	0
58	59	8.70	6.80	4.90	3.00	1.10	0	0	0	0	0	0
59	60	8.90	7.00	5.10	3.10	1.20	0	0	0	0	0	0
60	62	9.10	7.20	5.30	3.40	1.50	0	0	0	0	0	0
62	64	9.40	7.50	5.60	3.70	1.80	0	0	0	0	0	0
64	66	9.70	7.80	5.90	4.00	2.00	.10	0	0	0	0	0
66	68	10.00	8.10	6.20	4.30	2.30	.40	0	0	0	0	0
68	70	10.30	8.40	6.50	4.60	2.60	.70	0	0	0	0	0
70	72	10.60	8.70	6.80	4.90	2.90	1.00	0	0	0	0	0
72	74	10.90	9.00	7.10	5.20	3.20	1.30	0	0	0	0	0
74	76	11.20	9.30	7.40	5.50	3.50	1.60	0	0	0	0	0
76	78	11.50	9.60	7.70	5.80	3.80	1.90	0	0	0	0	0
78	80	11.80	9.90	8.00	6.10	4.10	2.20	.30	0	0	0	0

Question 60.

From what source would you obtain the data for computing the applied factory burden in the period if the company applies factory burden by using:

1. A rate per direct labor hour?
2. A per cent of direct labor cost?
3. A per cent of prime cost?

Question 61.

In cost accounting, does the term "actual burden rate" mean correct burden rate?

Question 62.

For purpose of computing the normal burden rate, the normal direct labor hours are determined as a per cent of the available direct labor hours. In your opinion, should this per cent be based on the

past experience of the individual business, or on that of the entire industry of which that business is a unit?

Question 63.

If an actual burden rate is used, what is gained by using a Factory Burden—Applied account?

Question 64.

What causes the balances in Factory Burden in Process and Factory Burden—Applied accounts usually to differ in amount although the entry applying the factory burden of the period charges one and credits the other for the same amount?

Question 65.

If an actual burden rate is used, the same burden amount is applied to production whether a rate per direct labor hour, a per cent of direct labor cost, or a per cent of prime cost is used to distribute the burden. Is that also true if a normal burden rate is used? Explain fully, giving illustrations, if possible.

Question 66.

Because the normal burden rate used by the Merton Company was too low, the underabsorbed burden of the company in 19— was $100,000. The company's bookkeeper, in correcting for this situation, prorated the underabsorbed burden between the work in process and the finished goods inventories. Discuss fully the adequacy of this solution of the matter.

CHAPTER 8

Departmental Factory Burden Rates

80. The blanket burden rate.

So far, in the proration of factory burden among the jobs, we have used for the *entire factory* a single, or *blanket*, burden rate. Such a rate distributes the factory burden among the jobs in the proportion that they use the available hours of factory facilities. It gives equitable results, therefore, only if the expense of providing and using an hour of factory facilities is uniform *throughout the factory.*

81. The departmental burden rates.

The conditions of operation are often such that the expense of providing and using an hour of factory facilities is *not* uniform throughout the factory. Differences in the kind and amount of machinery, space, supervision, and maintenance used may be so marked among the *departments* of a factory as to cause their burden costs per available direct labor hour to vary markedly. In such a case, it becomes necessary to consider whether accuracy in cost accounting requires the use of a separate burden rate for each department.

Because they are more closely gauged to the expense conditions under which the production occurs, *departmental rates* effect a more correct distribution of the factory burden among the jobs than is obtained with a *blanket* rate. However, a separate rate for each of, say, eight departments necessitates about eight times as much clerical effort in calculating and applying factory burden as is required by one blanket rate. Brief consideration will be given to the circumstances under which the added expense of burden proration inherent in the more accurate departmental rates is justified.

82. When are departmental burden rates necessary?

If the differences between the separate burden rates of the departments are small, it would seem impractical and unneces-

sary to use departmental rates. Thus, in Fig. 34 the largest variation of any departmental rate from the $1.80 average or blanket burden rate is 5¢ per direct labor hour, or something less than 3 per cent. If factory burden is, say, 30 per cent of total factory cost, a 3 per cent error in burden application is an error of

[Fig. 34]

Department Number	Factory Burden Cost	Available Direct Labor Hours	Factory Burden Rate Per Direct Labor Hour
1	$15,750	9,000	$1.75
2	10,740	6,000	1.79
3	9,150	5,000	1.83
4	3,600	2,000	1.80
5	9,250	5,000	1.85
6	14,560	8,000	1.82
7	5,520	3,000	1.84
8	7,080	4,000	1.77
Together	$75,650	42,000	1.80

but nine-tenths of 1 per cent in total factory cost. It is unlikely that to eliminate so small an error in total factory cost would justify increasing eightfold the expense of gathering and distributing the factory burden.

Even though the differences between the separate departmental burden rates are sizable, if each product is processed about the same length of time in each department, the use of departmental rates is unnecessary, because in such a case the product is charged with the same amount of burden whether a blanket or a departmental burden rate plan is used. Thus, in Fig. 35 the departmental burden rates vary markedly, but a product which is processed five hours in each department is charged $30.00 for burden under either plan. The calculations

[Fig. 35]

Department Number	Factory Burden Cost	Available Direct Labor Hours	Factory Burden Rate Per Direct Labor Hour
1	$ 5,000	5,000	$1.00
2	8,000	4,000	2.00
3	15,000	5,000	3.00
Together	$28,000	14,000	2.00

for the burden applied to the product under each plan are shown by Fig. 36.

The extra clerical expense involved in using departmental burden rates must be undertaken to achieve accuracy in final product cost only if (1) the burden rates per direct labor hour

[Fig. 36]

1. *Departmental burden rate plan:*

5 hours in Department #1 at $1.00	$ 5.00	
5 hours in Department #2 at $2.00	10.00	
5 hours in Department #3 at $3.00	15.00	
Total for 15 hours		$30.00

2. *Blanket burden rate plan:*

15 hours at the average rate of $2.00	$30.00
Difference in the total burden charge to the product	None

vary markedly between departments and (2) each product is *not* processed in each department about the same length of time. Thus, the *A B* Printery, to care for the various kinds of printing jobs, maintains three types of presses, each segregated as a separate department or *factor*. No job uses more than one kind of press. The factory burden costs of each of the press *factors* are as set out in Fig. 37.

[Fig. 37]

Factor Number	Factory Burden Cost	Available Direct Labor Hours	Factory Burden Rate Per Direct Labor Hour
1	$ 3,000	2,000	$1.50
2	10,000	5,000	2.00
3	12,000	3,000	4.00
Together	$25,000	10,000	2.50

To obtain accuracy in product costs, the *A B* Printery must use departmental burden rates, because to use the average, or blanket, burden rate of $2.50 would be to overcharge jobs done in Press Factors #1 and #2 and undercharge those done in Press Factor #3.

83. Problems involved in the use of departmental burden rates.

If departmental burden rates are to be used, it is necessary to know for each department

1. The amount of the department factory burden.
2. The total number of the direct labor hours.
3. The number of direct labor hours applicable to each job cost sheet.

The amount of the department factory burden and the total number of direct labor hours must be known in order that the departmental burden *rate* may be *computed*. The total number of direct labor hours and their distribution among the job cost sheets must be known in order that the departmental burden

may be *applied.* The procedure in determining each of these points of information will be explained.

84. Accumulating the departmental burden amounts.

To accumulate the factory burden of each department, it is necessary only to maintain for each a separate set of burden accounts. As illustrated by Fig. 38, the account-numbering plan of a company is easily adapted to such a purpose.

[Fig. 38]

NUMBERING PLAN FOR DEPARTMENTAL BURDEN ACCOUNTS

Burden Item	Account Number of the Item for Department			
	#1	#2	#3	#4
0. Rent	410	420	430	440
1. Power and Light	411	421	431	441
2. Taxes	412	422	432	442
3. Insurance	413	423	433	443
4. Supervision	414	424	434	444
5. Repairs and Maintenance	415	425	435	445
6. Depreciation	416	426	436	446
7. Factory Accounting	417	427	437	447
8. Crating	418	428	438	448
9. Storeroom	419	429	439	449

Observe that in each account number of Fig. 38:

1. *The first digit* denotes that it is a factory burden account. The general ledger *Factory Burden Actual—Control* account number is 400. Hence, the numbering plan provides that only factory burden account numbers begin with the digit "4."

2. *The middle digit* discloses the department to which the account applies. Thus, each of the factory burden accounts of Department #1 has "1" as the middle digit and each of those of Department #4 has "4" as the middle digit.

3. *The third digit* refers to the specific subject of the account. Thus a third digit "0" means "Rent" and a third digit of "2" means "Taxes," whatever may be the department involved.

Each *voucher* in evidence of a factory burden cost shows the number of the burden account to which the cost is chargeable. The entry of the *vouchers* in the various journals and the posting of their amounts (1) in total to the *Factory Burden Actual—Control* account and (2) in detail to the individual factory burden accounts proceed in the same manner under a departmental burden account classification as was described in Section 59 for a blanket burden account classification.

85. Joint burden costs; bases for their proration.

In accumulating the factory burden, it is found that certain burden vouchers evidence expense applicable to several departments, as, for instance, the vouchers for rent, taxes, power, and insurance. Each such *joint expense* must be distributed on some equitable basis among the departments to which it applies. The following tabulation lists common items of *joint expense* and an acceptable basis for the distribution of each among the departments:

Expense Item	Suggested Basis for Distribution Among the Departments
Power	Kilowatt-hours consumed
Rent	Square feet of floor space occupied
Taxes—Social Security	Direct plus indirect labor payroll
Taxes—Real Estate	Square feet of floor space occupied
Taxes—Personal Property	Value of machinery and inventories
Insurance—Real Estate	Square feet of floor space occupied
Insurance—Contents	Value of machinery and inventories
Insurance—Compensation	Direct plus indirect labor payroll
Supervision	Direct plus indirect labor hours
Factory Office	Direct plus indirect labor hours

The basis for distribution of a joint expense should be that factor of which the expense is most nearly a variable. Thus, power costs are a variable of kilowatt-hours of energy consumed. Hence, distribution of power costs among the departments is on the kilowatt-hour of consumption basis. Again, rent costs are usually a variable of floor space. Hence, rent is ordinarily prorated among the departments on the basis of area occupied.

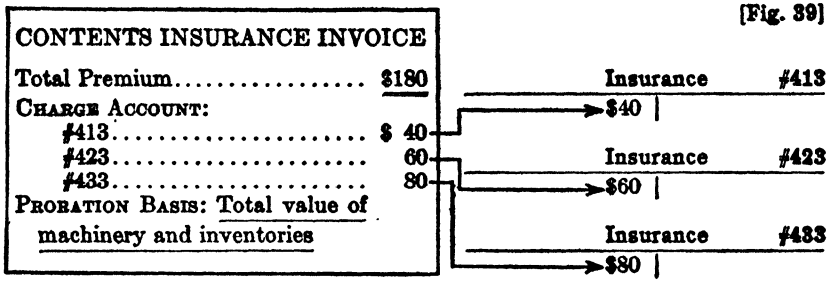
For certain joint expenses it is difficult to find a completely satisfactory basis of distribution. Thus, for workmen's compensation insurance, *hazard* as well as *wages paid* is a factor in the cost, but is difficult to measure the hazard factor concretely.

86. Procedure in the proration of joint burden costs.

Proration of the joint burden costs among the benefited departments can be effected by computing for, and noting on, each evidencing factory burden voucher the amount chargeable to each department, as in Fig. 39.

However, this method becomes burdensome if the vouchers affecting each joint expense are numerous. In such a case, the common practice is to accumulate each joint expense in a separate account and then at the period-end to make a single dis-

[Fig. 39]



tribution of the expense among the departments. To aid in, and to serve as a permanent record of, the distribution of the joint expenses, a worksheet form such as is illustrated by Fig. 40 is used.

BARDY AND COMPANY [Fig. 40]

Expense Distribution Worksheet—June 19—

Expense Item	Total Expense	Allocated to Dept. #1	#2	#3	Basis of Proration
Rent	$800	$200	$260	$340	Floor space
Taxes—Real Estate	200	50	65	85	Floor space
Taxes—Personal Property	180	20	100	60	Value of machinery and inventory
Insurance—Contents	120	15	75	30	Value of machinery and inventory
Insurance—Compensation	80	10	25	45	Total payroll
Totals	$1,380	$295	$525	$560	

Record *on the books* of proration of a joint expense is made by means of a general journal entry. Thus, the entry to record distribution of the rent expense shown in Fig. 40 is as follows:

Rent Expense—#410	$200	
Rent Expense—#420	260	
Rent Expense—#430	340	
Rent Expense—#400		$800

To record allocation of rent cost among the departments.

For accumulation of the joint expenses, a separate series of burden accounts is maintained. For Bardy and Company, the joint burden accounts are distinguished by a "0" middle account-number digit. If 410 refers to *Rent Expense* of Department #1 and 420 refers to *Rent Expense* of Department #2, then 400 refers to joint *Rent Expense*.

87. Minimizing joint burden costs.

The correctness of *distributed expense* can at best be only approximate. It is, therefore, desirable to minimize the amount

of such expense included in the departmental burden costs. With but small effort this can easily be done. Thus, upon request, the insurance company will furnish data for charging compensation insurance *directly* to each department. Also, *direct charge* can be made of:

1. *Depreciation,* by keeping a separate inventory of the depreciable assets in each department and then charging each department for the depreciation of its own assets.
2. *Supervision,* by requiring supervisory workers to submit time cards detailing the time applied in each department.
3. *Supplies,* by requiring that indirect material be released from the storeroom only upon requisition chargeable to the burden of a specific department.

88. Producing and service departments.

A *producing department* is one directly engaged in processing the articles made by the concern, as, for instance, the enameling department of a kitchenware company or the foundry of a stove factory. A *service department* is one which works not on the products manufactured, but rather for the benefit of the other departments. Thus, the *power department* operates only to supply the energy needs of the other departments, and the *maintenance department* exists solely to render the upkeep and repairs required by the other departments.

89. Proration of service department costs.

Since the producing departments consume the services rendered by the service department, they must absorb the service department costs. Distribution of service department costs among the benefited departments proceeds in the same way as the distribution among them of joint expenses. The basis used for the distribution is the *factor of variability* of the service cost; and after distribution is effected on the *expense distribution worksheet,* the book record is made by a journal entry. Thus, for the data of Fig. 41, Entries (1) and (2) following distribute the *joint expenses,* while Entries (3) and (4) distribute the *service division* costs among the departments:

(1)

Insurance—Power Department	$ 50	
Insurance—Repairs Department	100	
Insurance—Machine Department	175	
Insurance—Assembly Department	75	
Insurance—Joint		$400

To prorate joint insurance costs among the departments.

(2)

Rent—Power Department	$125	
Rent—Repairs Department	100	
Rent—Machine Department	175	
Rent—Assembly Department	100	
Rent—Joint		$500

To prorate joint rent cost among the departments.

(3)

Power—Repair Department	50	
Power—Machine Department	175	
Power—Assembly Department	150	
Supervision—Power Department		100
Depreciation—Power Department		100
Insurance—Power Department		50
Rent—Power Department		125

To prorate the Power Department expenses among the using departments.

(4)

Repairs—Machine Department	300	
Repairs—Assembly Department	225	
Supervision—Repair Department		150
Depreciation—Repair Department		125
Insurance—Repair Department		100
Rent—Repair Department		100
Power—Repair Department		50

To prorate the Repair Department expenses among the using departments.

THE BIXBY COMPANY [Fig. 41]

Expense Distribution Worksheet

August 19—

Particulars	Total Cost	Service Dept.		Producing Dept.		Proration Basis
		Power	Repair	Machine	Assembly	
DIRECT EXPENSE:						
Supervision	$800	$100	$150	$350	$200	
Depreciation	600	100	125	225	150	
JOINT EXPENSE:						
Insurance	400	50	100	175	75	Value of insurable assets
Rent	500	125	100	175	100	Floor space used
Total	$2,300	$375	$475	$925	$525	
SERVICE COSTS:						
Power		*$375*	50	175	150	K.W.H. used
Repair			*$525*	300	225	Direct labor hours
Final Burden Cost				$1,400	$900	

90. Accumulating the direct labor hours of each department.

If departmental burden rates are used, each direct labor time ticket discloses the department in which the labor hours it records were applied. Each day the labor hours shown on the labor time tickets of each department are added, and their total

is recorded on a form termed the *departmental time summary*, which is illustrated by Fig. 42.

[Fig. 42]

DEPARTMENTAL TIME SUMMARY

June 19—

Day	Particulars	Direct Labor Hours			
		Dept. #1	Dept. #2	Dept. #3	Total
1		118	273	297	688
2	Sunday	—	—	—	—
3		132	286	321	739
4		123	293	335	751
29		139	278	341	758
30	Sunday	—	—	—	—
31		127	284	347	758
	Total Direct Labor Hours	3,750	8,500	9,000	21,250
	Normal Burden Rate Per Direct Labor Hour	80¢	45¢	60¢	—
	Applied Burden for the Month	$3,000	$3,825	$5,400	$12,225
	Normal Direct Labor Hours	3,500	9,000	10,000	22,500
	Actual Direct Labor Hours	3,750	8,500	9,000	21,250
	Idle or Overtime Hours	(250)	500	1,000	1,250

At each month-end, computation is made on the departmental time summary for each department and for the whole factory of:

1. *The burden applied in the month*, which is determined by pricing the total direct labor hours, at the normal burden rate. Thus, for Department #1, the June applied burden is 3,750 hours at 80¢, or $3,000.

2. *The number of idle or overtime hours in the month*, which is found as the difference between the actual and normal direct labor hours. Thus, in Fig. 42, Department #1 shows 250 hours of overtime, while Department #3 shows 1,000 hours of idle time.

The *total* applied burden of the factory is recorded on the books by this month-end general journal entry:

Burden in Process—Control	$12,225	
Factory Burden—Applied		$12,225
To record the June 19—applied burden as computed on the departmental time summary for the month.		

91. Applying departmental burden to the job cost sheets.

If departmental burden rates per direct labor hour are used, the job cost sheet is designed to record by *departments* the direct

[Fig. 43]

JOB COST SHEET

ARTICLE 80 extra-heavy lube tanks; per specifications of supply division.

JOB ORDER No. 843
STARTED 8/13/—
FINISHED 8/25/—
FOR U. S. Army

Materials			Direct Labor				
Date	Amount	Date	Hours in Dept. #1	Hours in Dept. #2	Hours in Dept. #3	Amount
Aug. 13	$ 843 00	Aug. 13	60	—	—	$ 64 00
14	91 50	18	40	20	10	83 00
17	83 00	20	80	65	40	218 00
24	16 50	23	20	15	25	81 00
	1, 034 00	25	—	50	25	144 00
			200	150	100	590 00

COST SUMMARY

Particulars		Amount
Materials		$1,034.00
Labor		590.00
Burden of Department		
#1—200 hours at 80¢	$160.00	
#2—150 hours at 45¢	67.50	
#3—100 hours at 60¢	60.00	287.50
Total Cost		$1,911.50

labor hours applicable to it. The burden charge to the completed job is then computed as the hours it was processed in each department *times* the normal burden rate of that department. The form of the job cost sheet and the computation of the burden charge to a job are illustrated by Fig. 43.

92. Machine-hour burden rates.

In departmentalizing a factory for the purpose of burden proration, the ideal is for each department to comprise an area within which the expense of providing and using one hour of factory facilities is the same as that of providing and using any other hour. Often, this ideal is achieved by setting up as a separate department each significant *machine group*. Thus, in a

printery, a battery of Miehle presses may constitute one department, a group of rotary presses a second department, and an assembly of hand presses a third department. If a single machine involves unusual burden costs, it may for the purpose of burden distribution be set up as a separate department. This would be the case in a printery, for, say, a five-color press and in a forge works for, say, a 200-ton press or a traveling crane.

A machine or machine group set up as a department for the purpose of factory burden proration is referred to as a *machine center* or *machine factor*, and its burden rate per hour is termed a *machine-hour burden rate.* A machine-hour burden rate differs in amount from a direct-labor-hour burden rate only if the machine and direct labor hours are of unlike number. When one worker attends several machines, the machine hours are several-fold the direct labor hours, and the machine-hour burden rate is less than would be the direct-labor-hour burden rate because the same burden is divided among more hours. Conversely, when each machine requires a crew of workers, the machine hours are a fraction of the direct labor hours, and the machine-hour burden rate is more than would be the direct-labor-hour burden rate, because the same burden is divided among fewer hours.

93. Machine-hour conversion rates.

If the burden rate per hour of a machine is materially larger than the labor cost, and if the role of the laborer is largely that of *machine tender*, it is common to include the labor cost as a part of the machine-hour rate, which then is termed a *machine-hour conversion rate.* The advantage claimed for a machine-hour conversion rate is that it averages out over all jobs those differences in direct labor costs for which the particular job is not responsible, as, say, when length of service rather than skill determines the employee's hourly wage rate. An obvious defect of the machine-hour conversion rate is that it causes direct labor as well as burden to be charged to the jobs on an estimate basis. Also, because it averages out labor-cost differences over all the jobs, it obscures the fact that such differences do exist.

94. Machine-hour sold rates.

If to the conversion cost is added an allowance for the normal selling and administrative expenses of the business, the machine-hour conversion rate becomes a *machine-hour sold rate.* Machine-hour sold rates are found in lines such as printing and machining work, in which the raw material is either furnished by the

customer or bought solely upon his order. It is claimed that the use of *sold hour rates* facilitates the quick and accurate estimating of the total cost to make and sell a contemplated job.

When a machine-hour sold rate is used, the closing inventories of work in process and finished goods include selling and administrative expenses. Accepted accounting principles reject the inclusion of non-factory costs in the balance-sheet value of the inventories. It is necessary, therefore, when preparing the financial statements, to eliminate the selling and administrative expenses from the inventories.

95. Per cent of direct-labor-cost departmental burden rates.

As was explained in Section 63, the inexpensive per-cent-of-direct-labor-cost method of factory burden proration gives satisfactory results in the circumstance that:

1. *When the labor is paid on an hourly basis,* the *rate* per hour is substantially the same for all workers.

[Fig. 44]

JOB COST SHEET

ARTICLE 40 light lube tanks; standard design

JOB ORDER No. 984
STARTED 9/2/—
FINISHED 9/6/—
FOR Borkin

Materials			Direct Labor					
Date	Amount		Date	Cost in Department				
				#1	#2	#3	Total	
Sept. 2	$240	00	Sept. 2	$14	00	$12	00	$— —	$26	00
4	40	00	3	28	00	15	00	18	00	61	00
5	25	00	4	18	00	24	00	41	00	83	00
	305	00	6	—	—	13	00	21	00	34	00
				60	00	64	00	80	00	204	00

COST SUMMARY

Particulars		Amount
Materials		$305.00
Labor		204.00
Factory Burden of Department		
#1— 75% of $60.00	$45.00	
#2—100% of 64.00	64.00	
#3— 60% of 80.00	48.00	157.00
Total Cost		$666.00

2. *When the labor is paid on a "piece" basis,* the *output* of the men is substantially the same.

While these conditions seldom hold true for a whole factory, they usually hold true for a single department. Thus, if an hourly rate of pay prevails in a department, it tends to be about the same for all direct labor employees, and if a piece-rate pay plan is used, the output of the workers tends toward uniformity for the reasons that:

1. The practice of good management is to weed out unusually slow workers.
2. The disapproval of their fellows curbs the output of the unusually apt workers.

If per-cent-of-direct-labor-cost departmental burden rates are used, the form of the job cost sheet and the computation of the factory burden charge to a job are as illustrated in Fig. 44.

ASSIGNMENT 8

Practice Set.

(*a*) Record in the appropriate journals the February 17–22 transactions.

(*b*) Make all possible postings to the general and subsidiary ledgers.

Transactions

Feb. 17. Issued checks as follows to apply on account:

Creditor	Cash	Discount
Acme Foundries	$ 8,134	$166
Goodyear Rubber Co	4,200	—
Midland Steel Products Co	25,872	528
Wright Wholesale Hardware Company	7,722	78

22. Summary of labor time tickets for the week:

	Hours	Amount
Direct—Chargeable to Job Order:		
#8437	6,280	$ 7,135
#8443	2,160	2,420
#8445	1,940	1,610
#8446	2,520	2,020
#8447	5,240	5,225
#8448	5,840	5,005
Totals	23,980	$23,415
Indirect—Chargeable to Burden Account:		
#313	$1,100	
#316	3,750	
#318	2,400	
#319	1,320	8,570
Selling—Chargeable to Account:		
#202	$2,050	
#204	3,005	5,055
Total Payroll		$37,040

Summary of Material Requisitions #437–447 issued during the week:

Direct—Chargeable to Job Order:		
#8437	$4,660	
#8443	2,575	
#8445	2,280	
#8446	2,325	
#8447	4,095	
#8448	4,780	$20,715
Indirect—Chargeable to Burden Account:		
#313	$ 735	
#319	4,490	5,225
Total Material Issues		$25,940

Problem 17.

The Merkle Company operates four departments: (1) Machine, (2) Assembly, (3) Storage, and (4) Factory Office. Only the Machine and Assembly Departments are producing ones. (*a*) Giving effect to the supplementary information tabulated below, complete the burden distribution sheet of Form Page 67 in such a manner as to set forth thereon:

(1) The expense of each department.
(2) The total burden each producing department must absorb.
(3) The burden rate per *direct labor hour* of each producing department.

Supplementary Information

Department	Square Feet of Space Used	Value of Machinery	Direct Labor Amount	Direct Labor Hours	Supervision and Maintenance Labor	Average Inventory	K.W.H. Power Used
Machine	8,000	$150,000	$59,000	41,000	$ 7,500	$40,000	26,000
Assembly	5,000	20,000	17,000	13,000	1,700	20,000	15,000
Storage	4,000	20,000	—	6,000	1,800	—	—
Office	3,000	10,000	—	—	3,000	—	—
	20,000	$200,000	$76,000	60,000	$14,000	$60,000	41,000

(*b*) Give the journal entry necessary to record the distribution of:

(1) Heating Expense among the using departments.
(2) Office Department cost among the using departments.
(3) Storage Department cost among the using departments.

Question 67.

Why do departmental burden rates effect a more accurate distribution of factory burden among the job cost sheets than is obtained when a blanket burden rate is used?

Question 68.

Discuss briefly the conditions which require that departmental factory burden rates be used.

Question 69.

Distinguish briefly between the following:

1. Direct and joint departmental burden costs.
2. Service and producing departments.

Additional Work

Problem 18.

Complete the departmental time summary of Form Page 69, and from the completed summary prepare the entry to record the applied factory burden of August 19—.

Problem 19.

From these estimates for 19— for the color press section of the Mills Printing Company, compute for the department, accurate to the nearest cent, three kinds of machine-hour rates:

Particulars	Amount
Labor of operators (40,000 hours)	$76,000
Depreciation	20,000
Rent of space occupied	3,500
Power used	6,000
Repairs and maintenance of the machines	4,300
Taxes on the machines	3,800
Share of the selling and administrative expenses	20,400
Share of the desired profit of the company	16,000

The section consists of five Model-14 Clayborne color presses, each of which can normally be expected to operate 1,600 hours a year.

Question 70.

Why is the inexpensive per-cent-of-direct-labor-cost method of burden proration better adapted to use with a departmental than with a blanket factory burden rate plan?

Question 71.

What is a departmental time summary? What purposes does it serve? From what sources are the data it shows taken?

Question 72.

How would you suggest charging as direct departmental costs the items listed under indirect burden on Form Page 67?

Question 73.

Distinguish between the various kinds of machine-hour rates and state the circumstances under which each kind is desirably used.

Question 74.

What is the difference between a direct labor-hour and machine-hour burden rate? For a particular department, when would the machine- and direct labor-hour burden rates differ in amount?

CHAPTER 9

The Control of Factory Burden Amount

96. Steps in the control of factory burden amount.

It is the function of effective cost accounting not only to accumulate and distribute the factory burden, but also to keep to a minimum the amount of each of its items. Success in achieving this purpose is attained by:

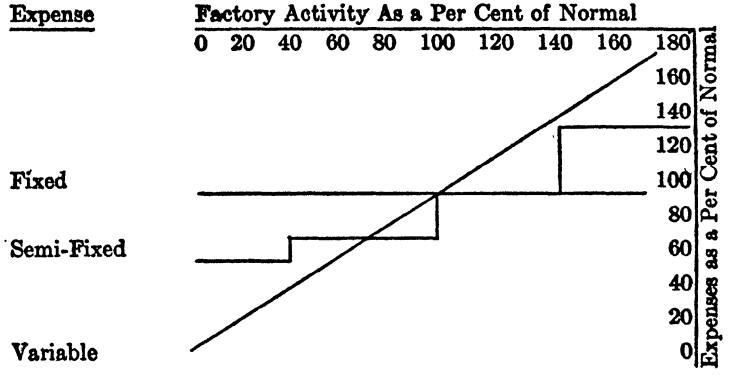
1. *Predetermining* for each factory burden item the amount to which, in view of the expected conditions of operating, it should be limited.
2. *Comparing* at regular intervals the *actual* amount of each factory expense with the amount *predetermined* as reasonably necessary.
3. *Investigating* thoroughly the reasons for substantial variation between the actual and predetermined amounts of each expense.

97. Behavior of the factory expenses.

The individual factory expenses are not alike in their behavior. Some, like *Rent* and *Real Estate Taxes*, are unaffected in their amount by the level of factory activity and, therefore, constitute *fixed expenses*. Others, like *Royalties* and *Spoilage*, vary in amount directly with the level of factory activity and, therefore, constitute *variable expenses*. Still others, like Machinery Repairs and Supervision, termed *semi-fixed expenses*, are in between the fixed and variable expense groups. They do increase and decrease with the level of factory activity, but they do so neither gradually nor in direct proportion to the factory activity. In graph form, the behavior of the fixed, variable, and semi-variable expenses appears as in Figure 45, on page 106.

The *fixed expense* remains constant at 100 per cent of normal amount at all the levels of factory activity. The *variable expense* increases and decreases in direct proportion to the increase or

[Fig. 45]



decrease in the factory activity. At 20 per cent of factory activity, it is 20 per cent of normal amount; at 40 per cent of factory activity, it is 40 per cent of normal amount; and so on. The *semi-fixed expense* remains fixed for a range of production, then increases or falls sharply, remains fixed at the new level for a further range of production, and then increases or falls sharply again.

Whereas the graph of the *fixed expense* is a horizontal straight line and that of the *variable expense* a *gradually sloping* one, that of the *semi-fixed expense* is a *series of steps* or *plateaus*. This kind of appearance of the semi-fixed expense graph reflects the fact that for short ranges of factory activity, the semi-fixed expense is a fixed one.

98. Factors in the behavior of a factory expense.

Among the factors which determine the behavior of a factory expense are the following:

1. The basis for the expense.
2. The length of time under consideration.
3. The service capacity to be provided.
4. The number of units contributing to the expense.
5. Special circumstances foreseen and unforeseen.

For *Spoilage* and *Power Costs*, the *basis for the expense* is factory activity, as measured, say, in terms of direct labor or machine hours utilized. The basis of these expenses being factory activity, they can be expected to vary closely in amount with the rate of factory activity. For *Depreciation* and *Rent*, the basis of the expense is the provision of a certain kind of production facility. Since the facility is needed whatever may

be the rate of factory activity, these expenses cannot be expected to vary directly with the factory activity.

If a sufficiently *long period of time* is considered, few factory expenses are completely fixed. Thus, if factory activity is low for a long time, excess equipment is not replaced when depreciated, and hence the fixed expenses of depreciation, insurance, and taxes are reduced. Also, continued low factory activity usually forces reduction of the relatively fixed salaries expense.

Conversely, over a very *short period of time*, few factory expenses are completely variable. Thus, to make labor a completely variable cost requires a combination of callousness in hiring and firing, elasticity in the labor supply, and efficiency in the use of labor that is rarely encountered.

The *service capacity to be provided* is an important factor in the behavior of a factory expense. If the factory's power plant has a capacity of 1,000 horsepower, the expense *Depreciation of Power Plant Equipment* is *fixed* up to the point at which 1,000 horsepower are generated. If more than 1,000 horsepower of electricity are to be produced, additional generating equipment is required, and the expense *Depreciation of Power Plant Equipment* increases to a larger amount. The depreciation expense then remains *fixed* at that larger amount until the service capacity of the power department is permanently increased or decreased by the addition of new equipment or the retirement of old equipment.

A factory expense *consisting of many units* is more likely to vary with the factory activity than is an expense consisting of one or a very few units. Thus, if the salary of one draftsman constitutes all the drafting expense of a company, *Drafting Expense* is likely to be a fixed cost, since the company probably must have a draftsman whatever may be the rate of factory activity. However, if the company employs 80 draftsmen, diminution in their number and, therefore, decrease in *Drafting Expense*, is quite practicable if the factory activity falls.

Special circumstances, foreseen or unforeseen, also influence the amount of a factory expense. Thus, for income tax reasons, maintenance expenditures may be *deliberately* increased beyond the normal amount. Again, a factory mishap may involve a substantial, unforeseen, and *involuntary* increase in *Repairs Expense*.

99. The variable budget of factory expenses.

From what is said in Sections 97 and 98, it is clear that the *necessary total* of the factory expenses varies with the rate of

factory activity. To permit comparison of the *actual* with the *necessary* burden costs, an estimate of the amount necessary at each of several levels of factory activity is made for each factory expense. Thus, Figure 46 shows for Department #3 the estimated necessary monthly amount of each factory expense at 40 per cent, 60 per cent, 80 per cent, and 100 per cent of *normal activity* as measured in terms of utilized direct labor hours. An estimate of the factory expenses drawn up in such form is termed a *variable burden budget.* In the variable burden budget of Figure 46, the expenses the department head can control are separated from those he cannot. The *uncontrollable expenses* include the *fixed costs*, such as *Superintendence* and *Depreciation*, and those *allocated costs*, such as *Rent* and *Factory Office*, the amounts of the charges for which are not affected by the efficiency of the department. The department head can be held responsible for, and need give his attention to, meeting only the controllable expense portion of his budget.

[Fig. 46]

DEPARTMENT #3
VARIABLE BUDGET OF BURDEN

Particulars	Activity Level			
	40%	60%	80%	100%
Direct Labor Hours	4,000	6,000	8,000	10,000
Uncontrollable Expenses:				
Rent	$ 500	$ 500	$ 500	$ 500
Depreciation	850	850	850	850
Personal Property Taxes	350	350	350	350
Superintendence	900	900	900	900
Factory Office	150	200	250	300
Total	$2,750	$2,800	$2,850	$2,900
Controllable Expenses:				
Power	$ 450	$ 575	$ 675	$ 700
Maintenance	300	350	375	400
Machinery Repairs	400	525	625	700
Social Security Taxes	100	150	200	250
Workmen's Liability Insurance	40	60	80	100
Idle Labor	600	400	200	100
Small Tools	60	90	95	100
Crating	400	600	800	1,000
Spoiled Work	300	450	600	750
Total	$2,650	$3,200	$3,650	$4,100
Grand total—the necessary burden at the indicated activity level	$5,400	$6,000	$6,500	$7,000

The usual practice is to prepare a variable budget of burden for each factory department and then to combine all the departmental expense budgets into a master factory expense budget.

A reliable estimate of each of the expense amounts appearing in the variable budget of burden can be made only through careful consideration of:

1. The general nature of the expense: fixed, semi-fixed, or variable.
2. The expense experienced at that activity level in previous accounting periods.
3. The advice of the responsible department head.

Particularly important is the extent to which the responsible department head is permitted to aid in the preparation of his expense budget. Enlisting his co-operation in the work affords the opportunity of:

1. Teaching him the need of limiting the business expenses to accord with the rate of factory activity.
2. Coaching him on points of expense he can reasonably be expected to control.
3. Allowing his practical *experience* and his *plans* to be reflected in the expense estimate adopted.

Further, it is only to the extent that he helped to formulate and that he finally agreed to the departmental expense budget, that the average department head is likely to feel a strong responsibility for meeting or bettering it.

100. The necessary burden "at level."

The factory expense budgeted as necessary at each level of factory activity is referred to as the *necessary burden "at level."* Thus, in Figure 46, the *necessary burden "at level"* for Department #3 is:

$5,400	at	40%	of	normal	factory	activity
6,000	at	60%	"	"	"	"
6,500	at	80%	"	"	"	"
7,000	at	100%	"	"	"	"

101. Comparison of the actual and necessary factory expense amounts.

At regular intervals, comparison is made for each department of the actual and estimated necessary factory expense amounts. A useful form of the *comparative factory expense statement* is illustrated by Figure 47 for Department #3. Note

[Fig. 47]

FACTORY DEPARTMENT NUMBER 3

COMPARATIVE STATEMENT OF EXPENSES

AUGUST 19—

(Operating Activity, 80% of Normal)

Particulars	Actual	Budgeted	Increase *Decrease*
UNCONTROLLABLE EXPENSES:			
Rent	$500	$500	$ —
Depreciation	875	850	25
Personal Property Taxes	350	350	—
Superintendence	900	900	—
Factory Office	230	250	*20*
Total	$2,855	$2,850	$ 5
CONTROLLABLE EXPENSES:			
Power	$660	$675	$ *15*
Maintenance	355	375	*20*
Machinery Repairs	600	625	*25*
Social Security Taxes	205	200	5
Workmen's Liability Insurance	82	80	2
Idle Labor	213	200	13
Small Tools	85	95	*10*
Crating	770	800	*30*
Spoiled Work	1,050	600	450
Total	$4,020	$3,650	$370
Grand Total	$6,875	$6,500	$375

ANALYSIS OF IDLE TIME

Particulars	This Month	Last Month
Normal Direct Labor Hours	10,000	10,000
Actual Direct Labor Hours	8,000	8,500
Idle Hours	2,000	1,500
Idle Hours Due to		
1. No Business	1,300	1,200
2. Employee Absences	180	150
3. Machines Out of Repair	420	80
4. Faulty Scheduling	100	70
Total	2,000	1,500

that, in the comparative factory expense statement illustrated by Figure 47, a detailed and comparative analysis is made of the factors contributing to the department's idle time. This analysis assists in fixing the responsibility for the idle time and should thus speed the taking of remedial measures.

102. Investigation of the expense variations.

With the *fact of variation* as a starting point, an investigation is made into the cause of the variation. Oftentimes, the *real cause* of the variation will be found far removed from the *apparent cause.* Thus, upon asking the foreman of Department #3 to explain satisfactorily the $450 excess spoiled work expense, it may be learned that the fault really lies with the purchasing department, which, in order to gain a negligible price advantage, bought inferior raw material. Again, the 420 hours of idle time due to unrepaired machines may be found largely due to failure of the maintenance division to make requested repairs promptly.

Obviously, as the cause of an unfavorable expense variation is definitely determined, the necessary correcting measures are taken. Thus, the purchasing agent may be instructed not to reorder the inferior grade of raw material, and the maintenance division may be sharply reminded that failure to make repairs promptly causes large and unnecessary expense and that for such unnecessary expense it will in the future be held strictly accountable.

103. The necessary burden at level as the basis for the predetermined burden rate.

It is sometimes suggested that if a variable burden budget is prepared, the predetermined burden rate to be used in the ensuing period be computed as:

$$\frac{\text{Estimated Necessary Burden at the Expected Level of Operations}}{\text{Estimated Direct Labor Hours at the Expected Level of Operations}}$$

In this way, it is argued, the predetermined burden rate used will approximate the actual burden rate of the period.

In Section 70 it was explained that because an actual burden rate fluctuates markedly and inversely with the production level, it is undesirable for most costing purposes. This weighty reason for rejecting the use in cost accounting of an actual burden rate applies equally to an approximately actual burden rate. Further, because the actual level of factory operations is not easy to

forecast, a rate predetermined in the manner suggested may result in application during the period of a burden rate which is neither approximately actual nor approximately normal. This would be true if the predetermined rate were based on an estimated 80 per cent level of factory activity in the year, although the actual level of activity averaged only 50 per cent.

104. Normal rate charges burden to cost as a variable expense.

When a normal burden rate is used, the factory expense applied in a period is computed as:

The actual direct labor hours *times* the normal burden rate.

If the actual direct labor hours are half the normal number, half the normal burden amount is applied to production cost. If the actual burden hours are one-fourth the normal number, one-fourth the normal burden amount is so charged. Since the normal burden rate charges to production cost for burden that percentage of the normal burden amount which the actual activity level bears to the normal one, it applies burden to production cost as though all the burden items were exactly variable expenses.

The direct material and direct labor being innately variable costs, the use of a normal burden rate results in all the elements of factory cost being charged to production as exactly variable expense.

105. Measuring the level of departmental activity.

The best basis for measuring the activity level of a department is the number of direct labor or machine hours worked. If a department normally has available 100,000 direct labor or machine hours, it is operating at 40 per cent of normal when 40,000 such hours are worked, and at 120 per cent of normal when 120,000 such hours are worked. Under this method of measuring departmental activity level, it is immaterial whether:

1. *Identical or widely diverse items are made.* 50,000 direct labor or machine hours are 50 per cent of a 100,000 direct-labor or machine-hour departmental capacity, whether applied to identical or to widely diverse products.
2. *The production takes more or less than the estimated necessary time.* 50,000 direct labor or machine hours actually worked means that half of a 100,000 direct-labor or machine-hour departmental capacity was utilized,

even though for the output realized 40,000 direct labor or machine hours should have been sufficient.

Units of product made fails as an acceptable basis for measuring departmental activity if either:

1. *Diverse items are manufactured.* Manufacturing 500 tractors and 10 locomotives is not the same as making 10 tractors and 500 locomotives.
2. *The production sometimes takes more or less than the estimated necessary time.* 5,000 units may represent half the normal output of a department; but if this production took 60,000 of the 100,000 normally available direct labor or machine hours, the department was operating at, not 50, but at 60 per cent of normal.

ASSIGNMENT 9

Practice Set.

(*a*) Record in the appropriate journals the February 24–28 transactions.

(*b*) Make all possible postings to the general and subsidiary ledgers.

Transactions

Feb. 24. Increased the bank loan to $125,000.

25. Received material purchased on credit from the following:

Vendor	Terms	Amount
Inland Steel Company	2/10, n/30	$8,650
U. S. Plywood Company	Net	8,490
Valspar Company	2/10, n/30	5,725

26. Paid the Valspar Company $6,100 on account.
Paid the Bell Telephone Company $815 for charges for the month.

27. Received $5,000 from the Benson Trucking Lines and $4,800 from the Wickett Transit Company in payment of notes receivable.

28. Summary of Material Requisitions #448–456 issued during the week:

Direct—Chargeable to Job Order:		
#8443	$1,810	
#8445	2,340	
#8446	2,775	
#8447	5,745	
#8448	3,950	$16,620
Indirect—Chargeable to Burden Account:		
#313		4,480
Total Material Issues		$21,100

Problem 20.

You are consulted by the Tangney Corporation as to its burden rates for 19— under each of the various methods of burden distribution. The company presents these 19— data concerning its factory costs:

Dept.	Factory Expense	Direct Labor Hours	Direct Labor Cost	Direct Material	Prime Cost
A	$ 6,400	8,000	$ 8,000	$ 4,800	$12,800
B	4,800	12,000	4,800	3,200	8,000
C	3,840	4,000	3,200	6,400	9,600
D	4,320	6,000	7,200	14,400	21,600
E	2,400	10,000	6,000	2,000	8,000
Totals	$21,760	40,000	$29,200	$30,800	$60,000

Compute the burden rate (or rates) applicable in 19— under each of these methods of burden distribution:

(a) Blanket percentage of prime cost.
(b) Blanket percentage of direct labor cost.
(c) Blanket hourly rate per direct labor hour.
(d) Percentage of direct labor cost for each department.
(e) Rate per direct labor hour for each department.
(f) Percentage of prime cost for each department.

Problem 21.

Referring to the data of Problem 20, write a letter to Belden Burk, president of the Tangney Corporation, explaining whether:

1. The company should use departmental burden rates.
2. Whether labor cost, prime cost, or labor time should be the basis for the factory burden proration.

Give full reasons for every statement which you make in your letter.

Question 75.

Distinguish between fixed, variable, and semi-variable factory expenses, and present the graph of each kind.

Question 76.

The president of the Hart Company proposes that the company's predetermined factory burden rate be computed as:

$$\frac{\text{Budgeted Burden at the Expected Level of Operations}}{\text{Estimated Direct Labor Hours at the Expected Level of Operations}}$$

As a cost accountant, what comment have you as to the merit of the president's proposal?

Question 77.

Explain the following:

" . . . the effect of using a normal burden rate is to make all the elements of factory cost variable expenses . . . "

Question 78.

The normal burden of the Peasely Company is $20,000 per month. The applied burden at the normal rate was as follows:

June	$14,000	August	$21,400
July	18,500	September	23,600

At what activity level did the company operate in each of the months?

Question 79.

The Marks Company makes but one model of one product. Is there any reason in such case why the company's activity level should not be measured on the basis of units produced in the period?

Additional Work

Problem 22. (Adapted from A.I.A. examination problem.)

The Metal Products Company operates a plant at which is produced a standardized line of metal articles that differ markedly in type, method of manufacture, and sales value.

It has been decided to include burden in the production cost at departmental normal rates, and you are called in to calculate these rates from the following normal annual operating data prepared by the company:

PRODUCTIVE CAPACITY OF MANUFACTURING DEPARTMENTS

Particulars	Machine Hours	Direct Labor Hours	Direct Labor Amount
Machining A	50,000	100,000	$80,000
Machining B	40,000	40,000	30,000
Bench assembly	.....	60,000	27,000
Packing	.....	50,000	25,000

MISCELLANEOUS OPERATING DATA

Particulars	Square Feet Occupied	Cost of Machinery	Number of Employees	Horse-Power Rating	% of Time In Use
Machining A	36,000	$ 89,000	60	125	80
Machining B	15,000	60,000	24	80	80
Bench assembly	20,000	12,000	36	...	..
Packing	10,000	18,000	30	10	50
Maintenance	4,000	9,000	...	5	40
Receiving and stores	13,000	8,000	...	5	60
General plant	2,000	4,000	...	15	60
Totals	100,000	$200,000	150	240	

INDIRECT LABOR, SUPPLIES, AND MAINTENANCE

Particulars	Supervision and Other Indirect Labor	Supplies	Maintenance Materials*	Maintenance Labor*
Machining A	$15,000	$12,000	$ 8,000	$ 9,000
Machining B	8,000	7,270	5,000	4,000
Bench assembly	17,200	3,569	2,000	2,000
Packing	6,000	2,291	800	600
Maintenance	8,000	3,501	1,000	500
Receiving and stores	4,000	867	300	200
General plant	16,000	2,688	500	300
Totals	$74,200	$32,186	$17,600	$16,600

*Maintenance labor is charged directly to the various departments from maintenance department time tickets, while maintenance materials are charged directly to the various departments from maintenance department material requisitions.

OTHER EXPENDITURES AND CHARGES

Social Security taxes—4% of payroll	
Workmen's compensation—per $100 of payroll:	
Machining departments	$ 2.50
General plant department	.75
Other departments	1.50
Purchased power	18,300
Rent and heat	30,000
Insurance on machinery	2,000
Depreciation of machinery—10% per annum of cost price	

The receiving and stores department receives and stores the sheet metals, all of which enter into the manufacturing processes through machining department "A."

The general plant department consists of the superintendent's, the paymaster's, and cost accounting offices.

Required:

From the foregoing information, prepare a schedule showing in total and by departments: (*a*) the normal burden amount and (*b*) the normal burden rate. State clearly in your schedule the basis you used to prorate: (*a*) each of the joint expenses, and (*b*) each service department's costs. Also explain why you chose the basis of burden distribution that you used for each producing department.

Question 80.

Can you give some examples of factory expenses that are absolutely fixed or completely variable under all circumstances?

Question 81.

What is meant by a variable budget of factory expenses, and what is its purpose?

Question 82.

Why is it desirable that the department heads be asked to co-operate in the preparation of the departmental factory expense budget?

Question 83.

What are some of the factors influencing the behavior of a factory expense?

Question 84.

Does the statement comparing the actual and budgeted factory expenses disclose the *cause* as well as the *amount* of the variations of actual from the budgeted expense?

Question 85.

Why, in a plant making altogether different products or markedly different models of the same product, is it necessary to measure factory activity in terms of utilized direct labor or machine hours instead of in terms of units produced?

Question 86.

As respects a departmental factory expense budget, what is the distinction between the controllable and uncontrollable expenses?

Question 87.

Explain whether burden is applied to production cost as though it were an exactly variable cost if the method used to distribute the factory burden is:

1. Normal rate per direct labor hour.
2. Normal rate per machine hour.
3. Normal per cent of direct labor cost.
4. Normal per cent of prime cost.

Question 88.

Can you name a factory burden item which varies *inversely* with the rate of factory activity and explain why it does so?

Question 89.

What are some of the bases available for measuring the level of factory activity?

Question 90.

The normal burden of the X Company is $100,000. If the X Company uses a normal burden rate, how much will its applied burden be if the factory operates at the 60% activity level? 94%? 127%? 184%? 79%?

Question 91.

What is meant by the phrase "necessary burden at level"?

CHAPTER 10

Underabsorbed and Overabsorbed Factory Burden

106. Differences between actual and applied factory burden.

If an *actual* burden rate is used, the credit balance of the *Factory Burden—Applied* account is identical in amount with the debit balance of the *Factory Burden—Actual* account. Since the actual burden rate is computed as:

$$\text{Burden Rate} = \frac{\text{Balance of Factory Burden—Actual account}}{\text{Actual number of direct labor hours}},$$

it follows that the aggregate credit to the *Factory Burden—Applied* account in the period, which is calculated as:

Actual direct labor hours *times* Actual burden rate,

will be an amount identical with the balance of the *Factory Burden—Actual* account.

If a *normal* factory burden rate is used, equality in the amount of the account balances:

1. *Factory Burden—Actual*, representing the sum of the incurred factory overhead expenses, and
2. *Factory Burden—Applied*, representing the actual direct labor hours priced at the normal factory burden rate

could occur only as a matter of coincidence. In practical experience, a difference invariably exists between the debit balance of *Factory Burden—Actual* and the credit balance of *Factory Burden—Applied.* If the balance of *Factory Burden—*

[Fig. 48]

Factory Burden—Actual	Factory Burden—Applied
$ 9,550 |	| $ 8,000

[Fig. 49]

Factory Burden—Actual	Factory Burden—Applied
$10,400 |	| $12,000

Actual is in excess, the difference is termed *underabsorbed factory burden.* If the balance of *Factory Burden—Applied* is in excess, the difference is termed *overabsorbed factory burden.* In Figure 48 the *underabsorbed* factory burden is $1,550, computed as follows:

Factory Burden—Actual	$9,550
Factory Burden—Applied	8,000
Underabsorbed Factory Burden	$1,550

In Figure 49 the *overabsorbed* factory burden is $1,600, computed as follows:

Factory Burden—Applied	$12,000
Factory Burden—Actual	10,400
Overabsorbed Factory Burden	$ 1,600

The underabsorbed burden of Figure 48 is set up as an account balance, and the *Factory Burden—Actual* and *Factory Burden—Applied* accounts are closed by the general journal entry:

Underabsorbed Factory Burden	$1,550	
Factory Burden—Applied	8,000	
Factory Burden—Actual		$9,550

Conversely, the overabsorbed factory burden of Figure 49 is set up as an account balance by the general journal entry:

Factory Burden—Applied	$12,000	
Factory Burden—Actual		$10,400
Overabsorbed Factory Burden		1,600

107. Factors entering into under- or overabsorbed burden.

The factors entering into the difference between the actual and applied factory burden of a business are:

1. Expense excess or saving.
2. Idle time cost or overtime profit.

In Sections 108 and 109 following, the meaning of each of these factors will be explained and the method of computing its dollar amount illustrated. The illustrations will be based on the following burden data of the Bondie Company:

MONTHLY VARIABLE BURDEN BUDGET

Activity Rate	Estimated Necessary Burden
60%	$ 9,000
80%	9,400
100% (normal)	10,000
120%	10,600
140%	11,100

Particulars	July	August
Actual level of operations as compared to normal	80%	120%
Actual factory burden	$9,550	$10,400
Applied factory burden:		
80% of $10,000 normal burden	8,000	—
120% of $10,000 normal burden	—	12,000

Since the Bondie Company uses a normal burden rate, the applied burden is that per cent of the normal burden which the actual activity level bore to normal.

108. Expense excess or saving.

Expense excess or saving is the amount by which the actual burden at a level of factory activity exceeds or is less than the estimated necessary burden at that level. For the Bondie Company, the July, 19— *expense excess* is $150, computed as follows:

Actual burden at the 80% activity level	$9,550
Estimated necessary burden at the 80% activity level	9,400
Expense excess	$ 150

Conversely, the August, 19— *expense saving* is $200 computed as follows:

Estimated necessary burden at the 120% activity level	$10,600
Actual burden at the 120% activity level	10,400
Expense saving	$ 200

The actual burden at the particular activity level is obtained from the ledger Factory Burden—Actual account, while the estimated necessary burden is obtained from the variable burden budget.

109. Idle-time cost or overtime profit.

Idle-time cost or *overtime profit* is the amount by which, owing to the low or high level of factory activity, the estimated necessary burden is more or less than the applied burden when a normal burden rate is used. Thus, for the Bondie Company the July 19— idle-time cost is $1,400, computed as follows:

Necessary burden at the 80% activity level	$9,400
Applied burden at the 80% activity level	8,000
Idle-time cost	$1,400

Conversely, the August, 19— overtime profit of the Bondie Company is $1,400, computed as follows:

Applied burden at the 120% activity level	$12,000
Necessary burden at the 120% activity level	10,600
Overtime profit	$ 1,400

The difference between the necessary and applied burden measures the cost of idle time or the profit of overtime, because when factory operations are:

1. *Below normal*, it measures the amount by which, owing to the influence of the fixed and semi-fixed expenses, the factory burden cannot fall in proportion to the drop from normal in the factory activity;
2. *Above normal*, it measures the amount by which, owing to the influence of the fixed and semi-fixed expenses, the factory burden need not rise in proportion to the increase above normal in the factory activity.

The applied factory burden at the particular activity level is obtained from the ledger Factory Burden—Applied account, while the estimated necessary factory burden is obtained from the variable burden budget.

Because the idle-time cost or overtime profit is due to a fall or a rise in the *volume* of factory operations as compared to normal, it is often termed the *volume variation*. The volume variation is, of course, favorable if the plant operates above, and unfavorable if the plant operates below, normal activity.

110. Analysis of the under- or overabsorbed burden.

Presenting the computation of its expense excess and idle-time cost factors in the form of a statement, the analysis of the $1,550, July, 19— underabsorbed burden of the Bondie Company appears as follows:

BONDIE COMPANY [Fig. 50]
UNDERABSORBED BURDEN ANALYSIS—JULY 19—

Actual burden		$9,550
Applied burden		8,000
Underabsorbed burden		$1,550
Due to *expense* excess:		
Actual burden at 80% activity	$9,550	
Estimated necessary burden at 80% activity	9,400	$ 150
Due to idle *time:*		
Estimated necessary burden at 80% activity	$9,400	
Applied burden at 80% activity	8,000	1,400
Underabsorbed burden accounted for		$1,550

Conversely, presenting the computation of the expense saving and overtime profit factors in the form of a statement, the analysis of the $1,600, August, 19— overabsorbed burden of the Bondie Company appears as follows:

BONDIE COMPANY [Fig. 51]
OVERABSORBED BURDEN ANALYSIS—AUGUST 19—

Applied burden		$12,000
Actual burden		10,400
Overabsorbed burden		$ 1,600
Due to *expense* saving:		
Estimated necessary burden at 120% activity	$10,600	
Actual burden at 120% activity	10,400	200
Due to over*time:*		
Applied burden at 120% activity	$12,000	
Estimated necessary burden at 120% activity	10,600	1,400
Overabsorbed burden accounted for		$ 1,600

111. Computation of the necessary burden at intermediate levels.

Often the experienced activity is at a level other than one for which the variable budget shows an estimate of the necessary factory burden. Thus, the variable budget of the Bondie Company shows the estimated necessary burden at the 60% and 80% activity levels but not at the 75% one. If, in a particular month, the Bondie Company operated at the 75% activity level, the estimated necessary burden at that level would be approximated by means of *interpolation* as follows:

At 80% activity, the necessary burden is	$9,400
At 60% activity, the necessary burden is	9,000
In the 20 percentiles between the 60% and 80% activity levels, the necessary burden increases by	$ 400

The 75% activity level is the 60% level plus 15/20's of the difference between the 60% and 80% levels.

The necessary burden at the 75% activity level is, therefore, the 60%-activity-level amount of $9,000 plus 15/20's of the $400 difference in necessary burden between the 60% and 80% levels, or $9,300.

Interpolation assumes—and the accuracy of its results is based on—the premise that the increase in the necessary factory burden is even throughout each range of factory activity. This is true of the fixed and variable items in the factory burden but not of the semi-fixed items. Thus, one semi-fixed item may remain the same throughout the 60%–80% activity range while another may increase very sharply at the 72% level and remain indefinitely fixed thereafter.

112. Analysis by burden item into expense and volume factors.

In Figures 50 and 51 analysis of the under- or overabsorbed burden of the Bondie Company into its expense and volume factors was made only for the factory burden as a whole. However, as illustrated by Figure 52 for the July, 19— under-

absorbed factory burden of $1,550, such analysis can be made for each item of factory burden.

BONDIE COMPANY [Fig. 52]
UNDERABSORBED BURDEN ANALYSIS—JULY 19—
(Actual activity level, 80% of normal)

Expense	Normal Burden	Necessary Burden	Actual Burden	Applied Burden	Unapplied Burden	Unapplied Burden Due to: Expense Excess or (Saving)	Unapplied Burden Due to: Idle Time
Rent	$ 1,200	$1,200	$1,200	$ 960	$ 240	$ —	$ 240
Depreciation	2,400	2,400	2,400	1,920	480	—	480
Factory office	900	800	850	720	130	50	80
Power	800	700	760	640	120	60	60
Maintenance	1,900	1,740	1,600	1,520	80	(140)	220
Idle labor	600	700	790	480	310	90	220
Small tools	1,500	1,300	1,350	1,200	150	50	100
Spoiled work	700	560	600	560	40	40	—
Totals	$10,000	$9,400	$9,550	$8,000	$1,550	$150	$1,400

Note with respect to each burden item appearing in illustrative Figure 52 that:

1. The *normal* and *necessary at level* amounts are obtained from the variable budget of burden.
2. The *actual burden* amount is that appearing in the item's factory expense ledger account.
3. The *applied burden* is computed as the normal amount times the activity rate. Thus, for Rent it is $1,200 × 80%, or $960.
4. The *unapplied burden* is computed as the actual minus the applied burden. Thus, for Rent it is $1,200 minus $960, or $240.
5. The *expense variation* is the difference between the actual and the necessary burden amounts. Thus, for Power it is $760 minus $700, or $60.
6. The *volume* (idle or overtime) *variation* is the difference between the necessary and the applied burden amounts. Thus, for Power it is $700 minus $640, or $60.

113. Limitations on the accuracy of the computed expense and volume variations.

The amounts computed as expense and volume variations in analyses of under- or overabsorbed burden, such as are illustrated in Figures 50–52, cannot usually be exactly accurate for these reasons:

1. *Necessary burden at level,* the base from which the measurement is made, cannot usually be estimated with exactness because few expenses are completely fixed or variable, and because the behavior of the in-between expenses is not easily predicted.

2. The *actual level of factory activity* does not usually exactly accord with any level for which burden has been carefully estimated. Thus, the factory may operate at 67 per cent of normal, whereas a variable burden budget for it has been calculated at only 20 per cent intervals, and, as explained in Section 111, because of the uncertain behavior of the semi-fixed expenses, interpolation cannot adjust exactly the available budget of burden for the 60% level to the necessary burden for the 67% one.

114. Analysis of under- or overabsorbed burden if a variable budget is not prepared.

When a budget showing the estimated necessary burden at each of several levels of operation has not been prepared, the practice is sometimes followed of *measuring from normal burden* in determining the expense and volume factor contributions to the under- or overabsorbed burden. On this basis the analysis of the $1,550, July 19— underabsorbed burden of the Bondie Company would be as follows:

BONDIE COMPANY [Fig. 53]
UNDERABSORBED BURDEN ANALYSIS—JULY 19—

Actual burden at 80% activity		$9,550
Applied burden at 80% activity		8,000
Underabsorbed burden		$1,550
Due to expense saving:		
Normal burden at 100% activity	$10,000	
Actual burden at 80% activity	9,550	$ (450)
Due to idle time:		
Normal burden at 100% activity	$10,000	
Applied burden at 80% activity	8,000	2,000
Underabsorbed burden accounted for		$1,550

For purposes of useful business decision, it is necessary to be able to interpret:

1. *Expense excess or saving*—as the amount by which, owing to loose or close management control of them, the actual expenses exceeded or were less than the estimated necessary amount.

2. *Idle-time cost or overtime profit*—as the amount by which, owing to the low or high level of factory activity, the estimated

necessary burden is under- or overabsorbed when a normal burden rate is used.

The kind of burden analysis illustrated in Figure 53 precludes such an interpretation. It measures the expense and time variations from normal burden amount and, owing to the influence of the variable and only semi-fixed expenses, the normal is not the necessary burden amount at levels above or below normal factory activity. Thus, measuring from $10,000 normal, Figure 53 indicates that the $9,550 of actual expense at the 80% operating level represents a $450 *expense saving*. The truth is that, since at the 80% level only $9,400 of expense was necessary, the $9,550 of actual burden at that level measures a $150 *expense excess*. Again, measuring from $10,000 normal, Figure 53 indicates that, because at 80% of activity only $8,000 of burden is absorbed at the normal burden rate, the cost due to the 20% of idle factory time is the $10,000 normal expense minus the $8,000 applied burden, or $2,000. When factory activity falls from 100% to 80%, not only does the burden applied at the normal burden rate fall from $10,000 to $8,000, but the *necessary burden* decreases from $10,000 to $9,400. Therefore, when a normal rate is used, the burden necessarily unabsorbed, if the plant is 20% idle, is only the $9,400 necessary burden minus the $8,000 applied burden, or $1,400.

Since the kind of under- or overabsorbed burden analysis obtained by measuring from the normal rather than from the necessary burden amount is not only inaccurate but positively misleading, its use is not recommended.

115. Final disposition of under- or overabsorbed burden.

If the necessary burden at each of the common activity levels is carefully estimated, the actual factory expenses will only rarely be less than the budgeted amount. Factory burden in excess of the budgeted amount is *unnecessary* expense. It follows, therefore, that in the usual instance:

1. *Underabsorbed burden* is the cost of idle time plus the cost of unnecessary factory expense, and
2. *Overabsorbed burden* is the profit from overtime operations minus the cost of unnecessary factory expense.

The cost of idle factory facilities, unnecessary factory expense, and the profits of overtime use of the factory facilities are not a part of the cost of making the product. Neither are they a part

of the cost of selling the product. Their net amount, as represented by underabsorbed or overabsorbed burden, is, therefore, periodically closed out as a special charge or credit to *Profit and Loss* with one of the following general journal entries:

Profit and Loss	$450	
Underabsorbed Factory Burden		$450
To close underabsorbed burden to Profit and Loss.		
Overabsorbed Factory Burden	300	
Profit and Loss		300
To close overabsorbed burden to Profit and Loss.		

On the profit and loss statement, *Underabsorbed Burden* is shown as a special deduction from, and *Overabsorbed Burden* is shown as a special addition to, the ordinary profits amount, thus:

[Fig. 54]

Net Profit from Operations		$4,300
Financial (Income) and Expense:		
Sales Discount	$900	
Purchase Discount	(300)	
Interest Earned	(100)	500
Net Profit Before Special Charges		$3,800
Underabsorbed Burden		450
Net Profit to Surplus Account		$3,350

116. Interim handling of underabsorbed and overabsorbed burden.

Under the normal burden rate plan, it is intended that over a period of, say, a year the normal burden rate applied against the actual direct labor hours, direct labor cost, or prime cost will distribute the normal burden amount. Since the year includes both the seasonally active and the slack months, the underabsorbed or overabsorbed burden amount disclosed by a month-end trial balance may be due to seasonal factors which will be offset in the operations of the remaining months. For this reason, the common practice is to close underabsorbed or overabsorbed burden to *Profit and Loss* only at the year end, and to handle it in the interim monthly statements as a deferred item on the *balance sheet.*

117. Supplementary burden rate.

It is sometimes urged that the underabsorbed or overabsorbed burden be distributed among the job cost sheets by means of an *additional* or *supplementary* burden rate computed as follows:

$$\text{Rate} = \frac{\text{Underabsorbed burden} \quad — \$450}{\text{Burden applied at normal rate} — \$9{,}000} = 5\%.$$

If such an *additional* burden rate is used, the cost summary of a job cost sheet becomes as follows:

[Fig. 55]

Direct Material	$ 400
Direct Labor	600
Factory Burden (at the normal rate)	440
Cost on the basis of the normal burden rate	$1,440
Supplementary Factory Burden Charge—5% of $440	22
Cost on the basis of the actual burden rate	$1,462

The plan does effect distribution among the job cost sheets of all the incurred factory burden and does permit showing separately on each job cost sheet the factory burden at (1) the normal burden rate and (2) the actual burden rate. Against these minor merits, however, must be weighed the grave defects that using a supplementary burden rate:

1. Requires that completion of the job cost sheets and their entry in the finished goods journal be held up until after the close of the accounting period.
2. Doubles the clerical work of charging factory burden to the job cost sheets, since both a normal and a supplementary rate must be applied.
3. Defeats the purposes of a normal burden rate by returning the burden charge to an actual-cost basis.

As a practical matter, supplementary burden rates are seldom used, except when, as in the case of a "cost-plus" order, the manufacturer is required by contract to adjust his unit costs to an actual basis.

118. Blanket or departmental burden rates.

What has been said in this chapter regarding the computation, analysis, and disposition of the under- or overabsorbed burden applies whether a blanket or departmental plan of burden distribution is used. If a departmental plan of burden distribution is used, analysis of the under- or overabsorbed burden into its expense and volume factors by departments may prove of much managerial value, but the use of departmental supplementary rates to distribute the under- or overabsorbed burden will often prove a serious clerical task.

ASSIGNMENT 10

Practice Set.

(*a*) Make accrual entries for the February 28 transactions listed below.

(*b*) Make all possible postings to the general and subsidiary ledgers.

Transactions

Feb. 28. Summary of labor time tickets for the week:

Direct—Chargeable to Job Order:

	Hours	Amount
#8443	2,280	$ 2,400
#8445	2,540	2,760
#8446	5,680	5,170
#8447	6,800	5,885
#8448	7,200	5,895
	24,500	$22,110

Indirect—Chargeable to Account:

	Am't	
#313	$1,200	
#316	4,025	
#318	1,350	
#319	1,925	$ 8,500
Selling—Chargeable to Account:		
#202	$2,050	
#204	3,250	
#219	1,200	6,500
Total Payroll		$37,110

The normal burden rate used by the Loren Equipment Company is 75¢ per direct labor hour. Make entry in the general journal for the 98,120 hours of burden applied to job orders at this 75¢ rate during the month of February.

Taxes of $2,500 have accrued for the month.

Depreciation for the month is to be provided as follows:

Asset	Rate per Year
Building	3%
Equipment	10%

The reserve for bad debts is to be increased by $8,500. It is also decided to charge off the account of The Porter Transport Company as uncollectible. Charge *Reserve for Bad Debts.*

$3,300 insurance has expired in February.

Interest of $485 on notes receivable and $125 on securities owned has accrued in February.

Executive salaries of $12,000 are accrued at February 28.

Problem 23.

Referring to the burden data of the Barr Company appearing on Form Page 71, it is asked that you:

1. Analyze the unapplied amount of each item in the burden budget into its expense and volume factors.

2. Submit the report which a cost accountant might write after having investigated the cause of each of the expense variations from budget adjusted to level.

Problem 24.

The actual factory burden of the Merit Company for 19— was $144,000. The normal burden of the company is $150,000 and the applied burden in the year was $120,000. The variable budget of the company shows that, at the level at which the company operated in 19—, the factory burden should have been $136,000. The auditors of the company in their annual report made this analysis of the company's $24,000 of unapplied burden:

Due to expense saving:		
Normal factory burden	$150,000	
Actual factory burden	144,000	($ 6,000)
Due to idle time:		
Normal factory burden	$150,000	
Applied factory burden	120,000	30,000
Unapplied burden		$24,000

Criticize the auditors' analysis, and present what in your opinion would be a better one.

Question 92.

Referring to the data of Problem 24, it is asked that you compute:

1. The level of factory activity actually achieved by the Merit Company in 19—.
2. The supplementary rate required to distribute the underabsorbed burden among the job cost sheets.

Question 93.

The cost sheet of Job Order #344 completed in November 19— records the following costs:

Material	$ 54
Labor	65
Normal Burden	70
Total	$189
Supplementary Burden	70
Total	$259

Explain what cost amount should be used for: (*a*) fixing the fair selling price of the goods, and (*b*) pricing them for inventory purposes.

Question 94.

Discuss (*a*) the purpose and (*b*) the practicability of a supplementary factory burden rate.

Question 95.

Referring to the data of Problem 24, submit the journal entry required to set up the unapplied burden amount as a separate account balance.

Additional Work

Problem 25.

The Gordie Company, which manufactures a line of metal products, applies burden as a normal per cent of direct labor cost. In 1951, the company shows over $100,000 of unapplied burden, whereas in 1950 the actual burden was almost exactly absorbed, using the normal rate. Investigation on your part discloses the following facts:

Particulars	1951	1950
Direct labor hours	398,980	399,210
Direct labor cost	$400,117	$600,203
Material cost	901,506	751,118
Factory burden	302,446	303,116

Units produced of all items were about the same in 1951 as in 1950 and selling prices were slightly higher.

In the light of the foregoing information, what would be your recommendation as to the disposal of the balance in the Unabsorbed Burden account? Give full reasons for your recommendations.

Problem 26. (Adapted from A.I.A. Problem)

At the quarter ended March 31, 19— the nominal accounts of the Dorr Company showed these balances:

Materials Inventory 1/1/—	$ 3,480
Material in Process 1/1/—	2,950
Labor in Process 1/1/—	4,200
Burden in Process 1/1/—	4,200
Finished Goods 1/1/—	15,660
Purchases	34,000
Direct Labor	40,000
Factory Burden—Actual	44,968
Selling and Administrative Expenses	58,450
Sales (4,800 units)	201,600
Purchase Discounts (2% of Purchases)	680

A review of the records discloses the following additional information bearing on the above account balances:

1. Purchases of material in the quarter consisted of the following invoices:

Date	Vendor	Units	Cost	
			Total	Per Unit
1/18	E. R. Englehart	1,400	$ 8,400	$6.00
2/6	Ollie Williams, Inc	1,900	11,685	6.15
3/14	W. R. Lea Company	850	5,950	7.00
3/26	Mort Clow & Son	1,350	7,965	5.90
	Totals	5,500	$34,000	

2. Purchases as detailed in (1) above fail to reflect a credit memo of $833 received April 13 from the W. R. Lea Company as an adjustment of $1.00 per unit less 2% cash discount on the March 14 purchase.
3. The direct labor of $40,000 does not include a 6% increase in *direct labor payroll* retroactive to January 1, 19— ordered by a labor mediation board April 9, 19—.
4. Based on the wage scales and burden costs in effect before the labor mediation board decision, the normal burden rate was 100% of direct labor cost.

Each unit of finished product contains one unit of raw material. In the quarter ended March 31, 19— no spoilage or losses of material occurred. Quantity data on the opening and closing inventories as determined by physical counts are as follows:

Classification	Units at 1/1/—	Units at 3/31/—
Raw Material	600	?
Work in process—80% fabricated	500	—
—40% fabricated	—	750
Finished goods	600	750

Required:

Prepare in good form (1) the Statement of Cost of Goods Manufactured and (2) the Statement of Profit and Loss. For purposes of these statements, you are to price all the closing inventories *at cost* as follows:

Direct material—according to the first-in, first-out method.
Direct labor—at an average rate determined by dividing the direct labor cost of the quarter by the number of equivalent complete units made.
Factory burden—by applying to the direct labor cost the normal per cent of factory burden.

Problem 27.

In February 19— the Dorr Company of Problem 26 billed the United States Navy for units made and sold to it in that month as follows:

Material at FIFO actual cost	$ 615.00
Labor at actual time-ticket cost	900.00
Burden at 100% of direct labor	900.00
Total factory cost	$2,415.00
10% of factory cost for profit as per contract	241.50
Sales price—billed on Invoice #8437	$2,656.50

In the light of the information given in Problem 26 or developed in your solution to it, compute the amount of the debit or credit memo the Dorr Company should send to the United States Navy to adjust the

billing on Invoice #8437 to the actual cost-plus basis of the Navy contract.

Question 96.

In view of the situation presented in Problem 25, what is your conclusion as to the desirability of the use of a normal per cent of direct labor or prime cost as a method of burden distribution in times of markedly fluctuating material and labor prices? Give full reasons for your decision.

Question 97.

Referring to your analysis in Problem 23 of the elements entering into the Barr Company's unapplied burden, state what factors usually prevent the amounts computed as the expense and volume variations from being exactly accurate.

Question 98.

Why are the expense and volume variations more significant if measured from budget adjusted to level instead of from normal burden?

Question 99.

What may be the cause or causes of each of the following burden variations from budget adjusted to level?

(1) Favorable expense variation.
(2) Unfavorable expense variation.
(3) Favorable volume variation.
(4) Unfavorable volume variation.

Question 100.

If, under a normal rate plan, all the burden items are charged into production as though they were perfectly variable expenses, what happens to that part of the actual burden item which measures the extent to which the item could not increase or decrease in proportion to the increase or decrease in plant activity?

Question 101.

State three methods of disposing of under- or overabsorbed burden, and explain the circumstances under which each method is applicable.

Question 102.

How does a plan of departmental factory burden distribution affect the practicability of the supplementary-rate method of disposing of under- or overabsorbed factory burden?

Question 103.

Why does interpolation usually fail to produce the exactly necessary burden amount for intermediate factory operating levels?

Question 104.

Comment on the soundness of the following:

"If a normal rate is used to distribute the factory burden, the additional 50% paid for overtime labor should be charged to Factory Burden—Actual. In that way, the overabsorbed burden resulting from overtime operations is reduced by the additional labor costs incident to such overtime operations."

Question 105.

The current cost of manufacture of article y is disclosed by the cost sheets to consist of the following:

Direct Material	$ 32
Direct Labor	44
Normal Burden	44
Total	$120
Supplementary Burden	22
Actual Cost	$142

A mail order company has offered to purchase 4,000 units at a price of $126 each. Write your opinion on whether the offer should be accepted, and tell whether you think acceptance of an offer of $112 each for a further 3,000 units should be seriously considered. Give full reasons for your opinions.

CHAPTER 11

Completion and Sale of the Product

119. Entry to record completion of a job order.

When a job is completed, it is removed from the factory floor and transferred to the finished goods warehouse. To reflect this *transfer of inventories*, the material, labor, and burden costs of the

[Fig. 56]

JOB COST SHEET

ARTICLE 10 Hi-boy Lub. Tanks—50 gallons capacity

JOB ORDER No. 1872
STARTED 8/4/—
DONE 8/6/—
FOR Stock

Material			Labor			
Date		Amount	Date		Hours	Amount
Aug.	4	$44 00	Aug.	5	50	$48 00
	5	8 00		6	60	57 00
		52 00			110	105 00

COST SUMMARY

Particulars	Amount	Per Unit
Material	$ 52.00	$ 5.20
Labor	105.00	10.50
Burden—110 hours @ 60¢	66.00	6.60
Totals	$223.00	$22.30

order, as shown on its job cost sheet, are credited to the inventories of work in process and charged to the inventory of finished goods by an entry such as is shown on the following page.

Finished Goods Inventory	$223.00	
Materials in Process Inventory		$ 52.00
Labor in Process Inventory		105.00
Burden in Process Inventory		66.00

To record completion of Job Order #1872.

The completion of some jobs takes place daily in a factory. It is fundamental in accounting that, if one kind of transaction occurs frequently, it should, to minimize clerical work, be recorded in a special journal. The finished goods journal is the special book used for the daily recording of the material, labor, and burden make-up of each completed job cost sheet.

120. The finished goods journal.

A common form of the finished goods journal and the manner of its month-end posting are illustrated by Fig. 57.

[Fig. 57]

Finished Goods Journal

19—		Job Order No.	Dr. Finished Goods	Cr. Materials in Process	Cr. Labor in Process	Cr. Burden in Process
Aug.	1	1684	$ 400 00	$ 130 00	$ 155 00	$ 115 00
		1639	212 00	84 00	71 00	57 00
		1701	184 00	79 50	50 50	54 00
	31	1843	243 00	93 00	84 00	66 00
		1857	851 00	386 00	293 00	172 00
		1884	937 00	377 50	342 50	217 00
			$47,841 00	$23,815 00	$14,318 00	$ 9,708 00
			(25)	(22)	(23)	(24)

Finished Goods—Control #25

19—	F.	Amt.
8/31	FG	$47,841

Material in Process—Control #22

19—	F.	Amt.
8/31	FG	$23,815

Labor in Process—Control #23

19—	F.	Amt.
8/31	FG	$14,318

Burden in Process—Control #24

19—	F.	Amt.
8/31	FG	$9,708

Note that, in Fig. 57:

1. Each line of the finished goods journal expresses a journal entry, such as the following:

Finished Goods Inventory	$400	
Materials in Process Inventory		$130
Labor in Process Inventory		155
Burden in Process Inventory		115

Cost of completed Job Order #1684.

2. Entry to the *control accounts* referred to in the finished goods journal is accomplished by month-end posting of its column footings, as follows:

Finished Goods Inventory—Control	$47,841	
Materials in Process Inventory—Control		$23,815
Labor in Process Inventory—Control		14,318
Burden in Process Inventory—Control		9,708

Credits to the ledger of individual job cost sheets supporting the *Materials in Process—Control, Labor in Process—Control,* and *Burden in Process—Control* accounts are effected by *removing the completed job cost sheets* from that ledger. Charges to the individual finished goods accounts supporting the *Finished Goods Inventory—Control* account are made by posting to them directly from the completed cost sheets in the manner indicated by Fig. 61.

121. Entries to record sales and cost of sales.

If half of the goods referred to on the job cost sheet of Fig. 56 were sold on credit to Carl Bengston for $225, the entry in the sales book to record the sale would be the equivalent of the following:

Carl Bengston	$225	
Sales		$225

To transfer the cost of the goods sold to Carl Bengston from the finished goods inventory to an expense account, this entry is made:

Cost of Goods Sold	$111.50	
Finished Goods Inventory		$111.50

The duplicate of the sales invoice shows the *cost* as well as the *selling price* of the goods sold. Therefore, by using a specially ruled salesbook, a record of both the *sales revenue* and the *merchandise expense* arising from a sales transaction can be conveniently made as one entry.

122. Form of sales record in a manufacturing business.

A common form of sales record used in a manufacturing business is illustrated by Fig. 58.

Each item in each money column of the sales record expresses a complete journal entry. Each item in the "Cost of Sales—Finished Goods" column expresses a journal entry such as the following:

Cost of Goods Sold	$633	
Finished Goods Inventory		$633

Each item in the "Customers—Sales" column expresses this kind of entry:

Customer	$852	
Sales		$852

Debits and credits to the general ledger accounts affected by the record are made by month-end posting of the *column footings*, as follows:

Cost of Goods Sold	$42,879	
Customers—Control	64,837	
Finished Goods—Control		$42,879
Sales		64,837

[Fig. 58]

Sales Record

19—		Customer	Terms	Invoice Number	F.	Dr.—Cost of Sales / Cr.—Fin. Goods	Dr.—Customers / Cr.—Sales
Aug.	1	S. Barton	Net	8401	✓	$633.00	$852.00
		R. Croxton Co.	1/5, n/30	02	✓	282.00	417.00
		Martin & Means	1/10, n/60	03	✓	731.50	952.50
	30	L. Hanson	Net	8497	✓	874.00	1,247.00
		B. McCool & Co.	2/10, n/30	98	✓	1,087.50	1,332.50
		David Price Co.	2/10, n/30	99	✓	311.00	484.00
						$42,879.00	$64,837.00
						(61)-(9)	(4)-(100)

The fact of this posting is indicated by writing the numbers of the accounts posted to directly beneath the column footings.

Debits to the individual customer accounts supporting the *Customers—Control* account may be made by posting the detail of the "Customers" column. Often, however, it is done by posting directly to the customers' accounts from the duplicate sales invoices.

Credits to the individual finished goods accounts supporting the *Finished Goods Inventory—Control* account is made by posting to them directly from the duplicate sales invoices.

123. Unit production cost file.

To facilitate study and comparison of the cost information, a card is kept for each product, on which are recorded the unit material, labor, and burden costs incurred on each job order

affecting it. The cards are collectively referred to as the *unit production cost file.* A common form of the card record used for the unit production cost file is illustrated by Fig. 59.

[Fig. 59]

UNIT PRODUCTION COST RECORD

PRODUCT No. 864 — Six-inch chrome steel sprocket wheel.

STANDARD RUN 40 Units as established by production study made in June 19—

Job Order Number	Date Finished	Units Made	Per-Unit Cost			Remarks
			Materials	Labor	Burden	
837	3/6/—	40	.94	.54	.46	
891	4/24/—	30	.95	.58	.51	Emergency run
1243	5/16—	40	.96	.53	.45	
1284	6/11/—	40	.97	.55	.44	
1393	6/18/—	40	.99	.58	.43	
1456	7/7/—	60	.99	.59	.45	Experimental run
1512	8/9/—	40	.99	.60	.42	

Study of the unit production cost record of a product facilitates determination of:

1. *The trend of its manufacturing cost.* Thus, from Fig. 59 it is seen that, for Product #864, the unit material and labor costs are rising, while the unit burden cost is falling.

2. *The effect on its unit costs of variation from the standard production lot quantity.* Thus, from Fig. 59 it is seen that, for Product #864, deviation from 40 as the production lot results in higher per-unit costs.

If the factory burden is applied at a normal rate per direct labor hour, study of the per-unit burden cost discloses the trend of efficiency in the use of direct labor and the factory facilities. Thus, in Fig. 59, the decreasing per-unit burden cost indicates that less and less labor time is being taken to produce a unit of Product #864.

124. Book inventory of finished goods.

To aid in controlling the amount of goods stocked and to afford the inventory information required for preparing monthly financial statements, it is necessary to arrange for a book inven-

tory of the finished goods as well as of the raw materials and work in process.

In a book inventory for finished goods, an account is kept for each finished goods item handled. This account is:

1. Charged for all receipts of the product into stock,
2. Credited for all issues of the product out of stock.

and its balance at any date represents the inventory of that finished goods item then on hand.

The form of the finished goods ledger account is similar to that of the materials ledger. The units of a product received into and issued out of stock are, respectively, charged and credited to the finished goods account at *cost*. In pricing units issued from stock, the *first-in, first-out* and *last-in, first-out* are the methods most commonly used.

Fig. 60 shows a form of the finished goods ledger account and the first-in, first-out procedure of making charges and credits to it.

[Fig. 60]

REMARKS: Can if necessary be bought from Borkin & Porth.

PRODUCT NO. 864 — Six-inch chrome steel sprocket wheel.

MAXIMUM 40 Units

MINIMUM 20 Units

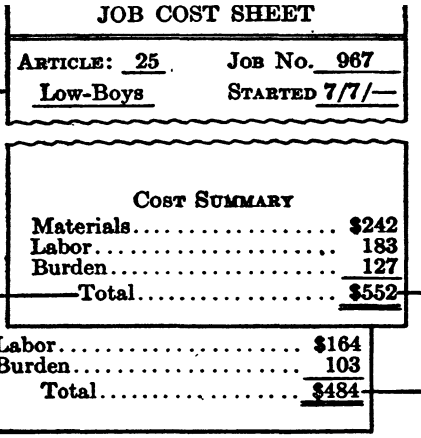
19—	Receipts			Issues			Balance	
	Units	Per Unit	Amount	Units	Per Unit	Amount	Units	Amount
Mar. 6	40	$1 94	$77 60				40	$ 77 60
Apr. 9				10	$1 94	$19 40	30	58 20
24	30	2 04	61 20				60	119 40
May 6				20	1 94	38 80	40	80 60
9				5	1 94	9 70	35	70 90

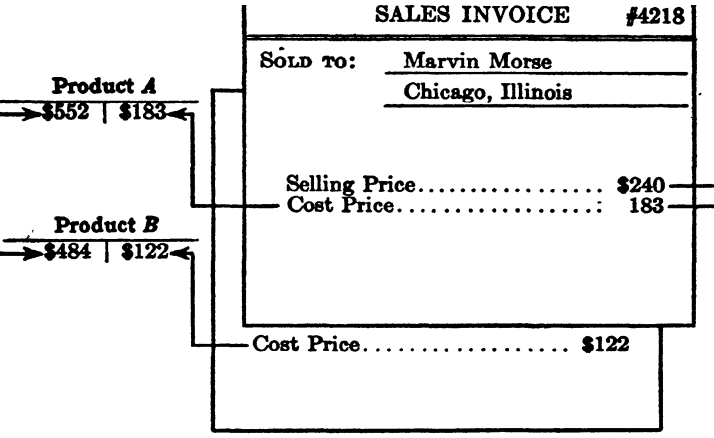
125. Mechanics of a book finished goods inventory.

A satisfactory book inventory of finished goods must provide for the charging of finished goods receipts and the crediting of finished goods issues:

1. *In detail* to the individual finished goods ledger accounts.
2. *In total* to the finished goods ledger control account.

A plan for effecting the purpose is outlined by Fig. 61.





Product *A*
$552 | $183

Product *B*
$484 | $122

Finished Goods Journal

19—		Order Number	Dr. Finished Goods	Cr.—In Process: Materials	Labor	Burden
Aug.	1	967	$ 552	$ 242	$ 183	$ 127
		887	491	213	174	104
	31	922	351	133	126	92
		893	427	122	183	122
			$18,473	$6,426	$6,836	$5,211

Sales Journal

19—		Customer	Invoice No.	F.	Dr.—Cost Sales / Cr.—Fin. Goods	Dr.—Customers / Cr.—Sales
Aug.	1	Marvin Morse....	4218		$ 183	$ 240
		Norman Doman..	19		181	247
	31	H. Carr & Co.....	4372		137	201
		Fuller & Bistor...	73		278	503
		Paul Sax Co.....	75		118	165
					$12,642	$18,498

Finished Goods Ledger—Control

19—	F.	Amt.	19—	F.	Amt.
8/31	FG	$18,473	8/31	SJ	$12,642

Study of Fig. 61 discloses that the key forms used in the operation of a book finished goods inventory plan are:

1. The job cost sheet.
2. The sales invoice.

Through entry of its amount in the finished goods journal, the job cost sheet is used to effect a charge to the *Finished Goods Inventory—Control* account for the cost amount of the finished goods received in stock. Through direct posting of its amount to the affected individual finished goods account, the job cost sheet is used to effect a charge to the subsidiary finished goods ledger for the cost amount of the goods received in stock.

Through entry of its *cost amount* in the sales record, the sales invoice is used to effect credit to the *Finished Goods Inventory—Control* account for the cost value of the goods sold. Through direct posting of the cost amount to the affected individual finished goods account, the sales invoice is used to effect credit to the subsidiary finished goods ledger for the cost amount of the goods sold.

ASSIGNMENT 11

Practice Set.

(*a*) Record the remaining February 28 transactions in the appropriate journals.

(*b*) Make all possible detail postings to the general and subsidiary ledgers.

(*c*) Foot all the journals and prove the equality of their footing debits and credits.

(*d*) Rule all the journals in the manner illustrated by the text examples.

Transactions

Feb. 28. Customers' orders completed and delivered during the month were as follows:

Order	Invoice	Date Completed	Sold to	Selling Price	Terms
#8416	#2016	2/13	Keeshin and Company	$87,120	2/30, n/90
8437	2018	2/22	Rixon's Freight Fleet	72,900	2/30, n/90

Orders for stock completed during the month were as follows:

Order Number	Date Completed
8421	2/7
8443	2/26
8448	2/28

Sales on credit from stock during the month were as follows:

Date	Invoice	Customer	Sales Price	Cost Price	Terms
2/11	#2015	Arrow Forwarding Company	$50,490	$36,245	2/30, n/90
2/15	2017	Benson Trucking Lines	25,500	18,200	Net
2/23	2019	Denby's Motor Freight	64,320	39,595	2/30, n/90

Collections on accounts receivable in February were as follows:

Customer	Cash	Discount
Arrow Forwarding Company	$19,600	$ 400
Benson Trucking Lines	9,400	—
Denby's Motor Freight	25,480	520
Keeshin and Company	62,700	1,300
Rixon's Freight Fleet	39,200	800

Question 106.

What purposes are served by the unit production cost record of a product?

Question 107.

What change in the form of the finished goods journal would you suggest if many of the completed job cost sheets represent:

(*a*) Orders for parts to be placed in stock for later use in manufacturing?
(*b*) Orders to be shipped directly to the customer instead of being placed in the finished goods warehouse?
(*c*) Repair orders chargeable to factory burden?
(*d*) Improvement orders chargeable to fixed assets?

Question 108.

Give, in simple journal entry form, the entry you would make to record completion of a job cost sheet representing?

(*a*) A repair order chargeable to a factory burden account.
(*b*) An improvement order chargeable to a fixed asset account.
(*c*) An order chargeable to finished parts inventory.

Additional Work

Problem 28.

For several years the Maxton Company has operated at normal capacity, but in each of the years its normal burden rate has failed to absorb all the factory burden. At December 31, 19—, the trial balance of the company is as follows:

Particulars	Dr.	Cr.
Cash	$ 17,000	$
Receivables	75,000	
Fixed Assets	150,000	
Materials Inventory	18,000	
Materials in Process Inventory	14,000	
Labor in Process Inventory	16,000	
Burden in Process Inventory	12,000	
Finished Goods Inventory	71,000	
Factory Burden Actual	92,000	
Factory Burden Absorbed		80,000
Cost of Goods Sold	235,000	
Selling and General Expenses	60,000	
Sales		350,000
Capital Stock		200,000
Surplus		130,000
Totals	$760,000	$760,000

The company operates an interlocking job lot cost system. Burden at normal rates included in opening finished goods inventory was $2,800, and analysis of the 19— Burden in Process Inventory account is as follows:

Burden in Process Inventory

Opening balance	$ 8,000	$76,000	In goods completed in 19—.
Applied at normal rate	80,000	12,000	Closing balance.

The entire $22,000 opening inventory of finished goods was sold in 19—, as were 75 per cent of the goods made in the year. The goods sold in 19— were completely representative of the items manufactured. Actual burden in the year prior to 19— was 120 per cent of applied burden.

It is asked that you:

1. Explain what disposition you would make in this case of the Unapplied Factory Burden.
2. Submit the journal entries necessary on the company's books to give effect to your plan of: (*a*) disposing of the unapplied burden, and (*b*) correctly reflecting on the books the 19— net profit. Show all your computations as part of the journal entry explanations.
3. Present the burden section of the manufacturing statement as it should appear after giving effect to your adjustments.
4. Submit the entries necessary to close the company's books for 19—.

Problem 29.

The Brassert Company applies to cost a normal *machine-hour-sold rate* made up of these elements:

Direct Labor	$2.00
Factory Burden	1.00
Selling Expense	2.00
Total	$5.00

Makeup of the company's opening and closing 19— inventories is as follows:

Particulars	1/1/—	12/31/—
Material	$ 8,000	$ 6,000
Work in Process:		
Materials	12,000	8,000
Labor, burden, and selling expense at normal rate	30,000	24,000
Finished Goods:		
Materials	18,000	6,000
Labor, burden, and selling expense at normal rate	45,000	15,000

The company maintains a book inventory for: (*a*) materials, (*b*) work-in-process, and (*c*) finished goods. The trial balance of the company at December 31, 19—, is as follows:

Particulars	Dr.	Cr.
Various Other Assets	$180,000	$
Materials Inventory	6,000	
Work-in-Process Inventory	32,000	
Finished Goods Inventory	21,000	
Various Liabilities		40,000
Capital Stock		100,000
Surplus		82,000
Cost of Goods Sold	300,000	
Direct Labor	70,000	
Factory Burden	40,000	
Selling Expense	50,000	
Labor, Burden, and Selling Expense Applied		175,000
Discounts on Material Purchases		2,000
Sales		300,000
Totals	$699,000	$699,000

1. Submit the entries to make the company's accounts show:
   - *a.* The 19— cost of goods sold exclusive of selling expense.
   - *b.* The December 31, 19— inventories at cost exclusive of selling expenses.

2. Compute the company's 19— over- or underabsorbed labor and factory burden.

3. Present the company's 19— profits statement, showing as separate items:
   - *a.* The manufacturing cost of goods sold.
   - *b.* The selling expenses.
   - *c.* The under- or overabsorbed factory burden.

4. Prepare the entries to close the company's books for 19—.

CHAPTER 12

The Financial Statements and Closing Entries

126. Condition of the ledger prior to closing.

Upon completion of posting of all except the closing entries, the general ledger appears as in Fig. 62. In order that all the account balances may appear on one page, the balances of certain similar or related accounts are included under one T form.

[Fig. 62]

Materials in Process Inventory

1/1 Inv.	$2,000	$11,000	Completed
Used	12,000		

Burden in Process Inventory

1/1 Inv.	$1,000	$7,500	Completed
Applied	9,000		

Labor in Process Inventory

1/1 Inv.	$1,500	$9,500	Completed
Applied	10,000		

Finished Goods Inventory

1/1 Inv.	$4,000	$27,000	Sold
Produced	28,000		

Sales

Returns	$2,000	$52,000	Gross

Cost of Goods Sold

Year	$27,000

Other Assets

Materials	$2,200
Customers	9,000
Cash	4,000
Land	5,000
Building	14,000

Liabilities and Net Worth

$4,000	Payables
2,000	Bank Loans
1,500	Accrued Taxes
2,500	5% Mtge.
25,000	Capital Stk.
6,450	Surplus

Valuation Reserves

$ 500	Bad Debts
2,500	Depreciation

Operating Expenses

Rent	$ 3,000
Salaries	11,000
Depreciation	400
Advertising	3,200
Bad Debts	300
Insurance	800

Deferred Expenses

Insurance	$500
Advertising	300

Cash Discounts

Sales	$500	$750	Purchase

Underabsorbed Burden

$1,500

From this ledger a trial balance such as is shown in Fig. 63 is taken and expanded into a worksheet which separates the bal-

ance-sheet from the profit-and-loss-statement account balances and discloses the net profit or loss amount.

F. BRETT COMPANY [Fig. 63]
Worksheet—December 31, 19—

Account Name	Trial Balance		Profit and Loss		Balance Sheet	
	Dr.	Cr.	Dr.	Cr.	Dr.	Cr.
Materials in Process Inventory	$ 3,000	$	$	$	$ 3,000	$
Labor in Process Inventory	2,000				2,000	
Burden in Process Inventory	2,500				2,500	
Finished Goods Inventory	5,000				5,000	
Materials Inventory	2,200				2,200	
Customers	9,000				9,000	
Reserve for Bad Debts		500				500
Cash	4,000				4,000	
Land	5,000				5,000	
Building	14,000				14,000	
Reserve for Depreciation		2,500				2,500
Prepaid Insurance	500				500	
Prepaid Advertising	300				300	
Accounts Payable		4,000				4,000
Bank Loans		2,000				2,000
Accrued Taxes		1,500				1,500
5% Mortgage—Due in 10 Years		2,500				2,500
Capital Stock		25,000				25,000
Surplus		6,450				6,450
Sales		52,000		52,000		
Sales Returns	2,000		2,000			
Cost of Goods Sold	27,000		27,000			
Rent	3,000		3,000			
Salaries	11,000		11,000			
Depreciation	400		400			
Advertising	3,200		3,200			
Bad Debts	300		300			
Insurance	800		800			
Sales Discount	500		500			
Purchase Discount		750		750		
Underabsorbed Burden	1,500		1,500			
	$97,200	$97,200				
Subtotals			$49,700	$52,750	$47,500	$44,450
Net Profit to Surplus			3,050			3,050
Totals			$52,750	$52,750	$47,500	$47,500

127. Periodic statements of a manufacturing business.

The periodic financial statements of a manufacturing concern usually comprise the following:

1. Cost of goods made and sold statement.
2. Profit and loss statement.
3. Balance sheet.

The procedure for preparing each of the statements will be briefly discussed.

128. The cost of goods made and sold statement.

The items entering into the cost of goods made and sold statement appear in the following four inventory accounts:

1. Materials in Process.
2. Labor in Process.
3. Burden in Process.
4. Finished Goods.

Since the ledger trial balance shows only the closing balance of each of these inventories, the statement is not prepared from the trial balance but directly from the details appearing in the ledger inventory accounts themselves. Using for its preparation the data disclosed by the inventory accounts of Fig. 62, the cost of goods made and sold statement of the F. Brett Company for the year ended December 31, 19—, appears as shown in Fig. 64.

[Fig. 64]

F. BRETT COMPANY — Exhibit III

Cost of Goods Made and Sold Statement
Year Ended December 31, 19—

Particulars	Amounts		Per Cent of Total Cost
DIRECT MATERIAL:			
In Process—Jan. 1, 19—	$ 2,000		
Applied in the Year	12,000		
Total	$14,000		
In Process—Dec. 31, 19—	3,000	$11,000	39.3%
DIRECT LABOR:			
In Process—Jan. 1, 19—	$ 1,500		
Applied in the Year	10,000		
Total	$11,500		
In Process—Dec. 31, 19—	2,000	9,500	33.9
FACTORY BURDEN:			
In Process—Jan. 1, 19—	$ 1,000		
Applied in the Year	9,000		
Total	$10,000		
In Process—Dec. 31, 19—	2,500	7,500	26.8
COST OF GOODS MADE		$28,000	100.0%
Inventory of Finished Goods—Jan. 1, 19—		4,000	
Total Finished Goods Available for Sale		$32,000	
Inventory of Finished Goods—Dec. 31, 19—		5,000	
COST OF GOODS SOLD (To Exhibit II)		$27,000	

Note that the cost of goods made and sold statement is the cost of goods manufactured statement studied in Chapter 1 expanded to include the computation of the cost of goods sold, a calculation heretofore shown in the profit and loss statement.

129. Profit and loss statement.

The profit and loss statement is prepared from the information disclosed by the profit and loss section of the worksheet. On the basis of the data of Fig. 63, the profit and loss statement of the F. Brett Company for the calendar year 19— appears as shown in Fig. 65.

[Fig. 65]
Exhibit II

F. BRETT COMPANY
Profit and Loss Statement
Year Ended December 31, 19—

Particulars	Amounts		Per Cent to Net Sales
Gross Sales		$52,000	
Less—Sales Returns		2,000	
Net Sales		$50,000	100.00%
Cost of Goods Sold (From Exhibit III)		27,000	54.00
Gross Profit on Sales		$23,000	46.00%
Operating Expense:			
Rent	$ 3,000		
Salaries	11,000		
Depreciation	400		
Advertising	3,200		
Bad Debts	300		
Insurance	800	18,700	37.40
Net Profit from Operations		$ 4,300	8.60%
Miscellaneous Income and *Expense:*			
Purchase Discount	$ 750		
Sales Discount	*500*	250	.50
Net Profit Before Special Charges		$ 4,550	9.10
Underabsorbed Burden		1,500	3.00
Net Profit to Surplus (To Exhibit I)		$ 3,050	6.10%

Fig. 65 shows the underabsorbed factory burden as a special charge against profits. Sometimes it is urged that its amount be added to *Cost of Goods Sold* in order to bring that item to an actual cost basis. The argument against doing so is that the practice would cause the gross profit rate to fluctuate with the volume of factory production.

130. Balance sheet.

The balance sheet is prepared from the information shown in the balance sheet section of the worksheet and is the same in

form for a manufacturing business as for a merchandising business. For the purpose of condensation, the several in-process inventory amounts of a manufacturing concern are often shown on the balance sheet as one item, *Work in Process.* On the basis of the data disclosed by Fig. 63, the balance sheet of the F. Brett Company at December 31, 19—, appears as shown in Fig. 66.

[Fig. 66]
Exhibit I

F. BRETT COMPANY
Balance Sheet—December 31, 19—

Assets			
CURRENT ASSETS:			
Cash		$ 4,000	
Customers	$ 9,000		
Less—Reserve for Bad Debts	500	8,500	
Inventories:			
Material	$ 2,200		
Material in Process	3,000		
Labor in Process	2,000		
Burden in Process	2,500		
Finished Goods	5,000	14,700	
Total Current Assets			$27,200
DEFERRED EXPENSES:			
Insurance		$ 500	
Advertising		300	800
FIXED ASSETS:			
Land		$ 5,000	
Building	$14,000		
Less—Reserve for Depreciation	2,500	11,500	16,500
Total Assets			$44,500
Liabilities and Net Worth			
CURRENT LIABILITIES:			
Accounts Payable		$ 4,000	
Bank Loans		2,000	
Accrued Taxes		1,500	
Total Current Liabilities			$ 7,500
5% MORTGAGE (Due in 10 Years)			2,500
NET WORTH:			
Capital Stock		$25,000	
Surplus:			
Balance—January 1, 19—	$ 6,450		
Net Profit for 19— (From Exhibit II)	3,050	9,500	34,500
Total Liabilities and Net Worth			$44,500

131. Cross-referencing the financial statements.

The cost of goods made and sold statement supports the profits statement in that the cost of goods sold amount it shows is transferred to the profits statement. Similarly, the profits statement supports the balance sheet in that the profit or loss

amount it arrives at is transferred to the net worth section of the balance sheet. By assigning to each financial statement an exhibit number, reference is easily made in each to:

1. The statement from which a transferred amount comes.
2. The statement to which a transferred amount goes.

Thus, for the F. Brett Company, the cost of goods sold amount developed in Exhibit III is shown to be transferred to the profits statement, Exhibit II, while the profits amount arrived at in Exhibit II is shown to be transferred to the net worth section of the balance sheet, Exhibit I. Conversely, the cost of goods sold amount shown in the profits statement is labeled as transferred from the cost of goods made and sold statement in Exhibit III, while the profits amount appearing in the net worth section of the balance sheet is labeled as transferred from the profits statement, Exhibit II.

132. Closing entries.

The entries to close the income and expense account balances to *Profit and Loss* and from there to *Surplus* are easily drafted from information disclosed in the profits section of the worksheet. For the F. Brett Company, the closing entries made from data shown in Fig. 63 are as follows:

(1)

Sales	$52,000	
Purchase Discounts	750	
Profit and Loss		$52,750
To close credit-balance nominal accounts to Profit and Loss.		

(2)

Profit and Loss	49,700	
Sales Returns		2,000
Cost of Goods Sold		27,000
Rent		3,000
Salaries		11,000
Depreciation		400
Advertising		3,200
Bad Debts		300
Insurance		800
Sales Discount		500
Underabsorbed Burden		1,500
To close debit-balance nominal accounts to Profit and Loss.		

(3)

Profit and Loss	3,050	
Surplus		3,050
To close net profit to the Surplus account.		

133. Ruling of the nominal accounts.

After the closing entries have been posted, the nominal ledger accounts no longer contain balances. To indicate formally the fact of closure, the nominal accounts are footed and ruled as illustrated by Fig. 67.

[Fig. 67]

Cost of Goods Sold #200

19—	Particulars	F.	Amount	19—	Particulars	F.	Amount
Dec. 31		J-6	$27,000 00	Dec. 31	To P. & L....	J-6	$27,000 00

Salaries #320

19—	Particulars	F.	Amount	19—	Particulars	F.	Amount
Dec. 15		CD-51	$ 4,500 00	Dec. 31	To P. & L....	J-6	$11,000 00
31		CD-56	6,500 00				
			$11,000 00				$11,000 00

Rent #330

19—	Particulars	F.	Amount	19—	Particulars	F.	Amount
Dec. 4		CD-49	$3,000 00	Dec. 31	To P. & L....	J-6	$3,000 00

Purchase Discount #502

19—	Particulars	F.	Amount	19—	Particulars	F.	Amount
Dec. 31	To P. & L...	J-6	$750 00	Dec. 31		CD-55	$750 00

Profit and Loss #97

19—	Particulars	F.	Amount	19—	Particulars	F.	Amount
Dec. 31		J-6	$49,700 00	Dec. 31		J-6	$52,750 00
31	To Surplus...	J-6	3,050 00				
			$52,750 00				$52,750 00

Note in regard to the "closed" accounts of Fig. 67 that:

1. The money columns are footed only if either the debit or the credit side has two or more entries.
2. The balance transferred to *Profit and Loss* (or the *Surplus* account) is clearly indicated.
3. The single rulings extend only across the money columns; the double rulings extend across the folio and date as well as the money columns.

134. Ruling of the balance sheet accounts.

The balance sheet, or *real*, accounts usually are *not ruled.* However, when an account has many entries and it is desired to

summarize them formally as a single amount, the account is *balanced and ruled* as follows:

[Fig. 68]

Small Tools #33

19—		Particulars	F.	Amount		19—		Particulars	F.	Amount	
June	14	Hi-Speed drills....	CD	$450	00	June	7	Hack saws returned	J-7	$ 20	00
	17	Files and rasps....	CD	100	00		30	Balance down.....	✓	830	00
	23	Hack saws.....	CD	60	00						
	26	Pressure pump....	CD	80	00						
	29	Emery wheels.....	CD	160	00						
				$850	00					$850	00
July	1	Balance down.....	✓	$830	00						

Such balancing and ruling of a real account is only for convenience. It may be done at *any* time and has nothing to do with the closing entries. The check mark in the folio space of the "balance down" amount is to denote that the item is a *summarizing figure* and *not* a posting from a journal page.

135. Trial balance after closing.

After the nominal accounts are ruled, a *trial balance after closing* is taken. The purpose of such a trial balance is to show that:

1. No "open" nominal accounts now appear in the ledger.
2. The ledger contains equal debits and credits at the beginning of the next accounting period.

The items in the trial balance after closing are identical with those appearing in the balance sheet section of the worksheet except that, whereas the worksheet section shows *separately* (*a*) the opening *Surplus* account balance and (*b*) the net income for the period, the trial balance after closing shows the combined amount of the two as the *Surplus* account balance at the end of the period.

136. Frequency of closing the books.

The closing entries are made and the nominal accounts are ruled at the end of each formal accounting period. In most businesses, the formal accounting period is one year. In some, however, the length of the accounting period is but six months. The fact that the financial statements may be prepared monthly does not mean that the closing entries are made that often.

ASSIGNMENT 12

Practice Set.

(*a*) Make the necessary postings of the footings of the journals.

(*b*) Take a trial balance of each of the ledgers, using the forms on Practice Set Pages 29–31.

(*c*) Establish that each subsidiary ledger is in agreement with its general ledger control account.

(*d*) Prepare a six-column worksheet, using the form on Practice Set Page 33 for the purpose.

Problem 30.

From information disclosed by the following accounts, prepare in good form the 19— financial statements of James Porth, Inc. Also submit the entries necessary to close the books.

Materials Inventory

1/1/—	$ 4,000	$46,000	Used
Bought	50,000		

Materials in Process Inventory

1/1/—	$ 6,000	$43,000	Completed
Used	46,000		

Labor in Process Inventory

1/1/—	$ 3,000	$41,000	Completed
Expended	42,000		

Burden in Process Inventory

1/1/—	$ 5,000	$35,000	Completed
Expended	31,000		

Finished Goods Inventory

1/1/—	$ 8,000	$116,000	Sold
Finished	119,000		

Sales

Returns	$ 4,000	$204,000	Gross

Cost of Goods Sold

Year	$116,000

Interest

Expense	$ 1,500	$2,000	Earned

Operating Expenses

Rent	$1,000
Salaries	4,000
Insurance	2,000
Advertising	3,000

Unabsorbed and Overabsorbed Burden

	$1,800

Other Assets

Customers	$48,400
Land	22,400
Building	39,200
Equipment	13,800

Liabilities and Net Worth

$ 2,000	Bank Loan
3,500	Creditors
1,200	Accrued Taxes
3,000	5-yr. Mtge.
50,000	Capital Stk.
7,000	Surplus

Deferred Expenses

Prepaid Ins.	$400
Prepaid Rent	300

Valuation Reserves

$ 200	Bad Debt
9,700	Depr.—Bldg.
4,600	Depr.—Equip.

Question 109.

Give the source of the data from which the following are prepared:

(*a*) Balance sheet.
(*b*) Profit and loss statement.
(*c*) Cost of goods made and sold statement.
(*d*) Closing entries.

Question 110.

What is meant by "cross-referencing" the financial statements, and how is it done?

Additional Work

Problem 31.

During March 19—, the Godehn Manufacturing Company worked on four orders, numbered consecutively 801 through 804. Numbers 801 and 804 were completed during the month. Numbers 802 and 803 were in process at the end of the month. Order #804 was sold in March to Sam Smith on credit for cost plus 50 per cent. During March:

1. The material purchases (all on credit) aggregated $4,500.
2. The material requisitions were as follows:

Direct—for Job Order:		
#801	$440	
802	480	
803	560	
804	520	$2,000
Indirect—for Factory Burden Account:		
#402—Maintenance	$300	
408—Repairs	250	$ 550
Total		$2,550

3. The labor time tickets were as follows:

	Hours	Amount
Direct—for Job Order:		
#801	1,400	$ 820
802	1,340	670
803	1,900	950
804	1,360	690
	6,000	$3,130

Indirect—for Factory Burden Account:		
#403—Supervision	$450	
408—Repairs	180	
402—Maintenance	220	850
Total		$3,980

4. Other factory burden items for the month were as follows:

Taxes (accrued)	$ 500
Depreciation	800
Rent (paid in cash)	650
Insurance (paid in cash)	250
Total	$2,200

Factory burden was applied on the normal direct-labor-hour basis; normal factory burden per month is $4,000, and normal direct labor hours are 8,000. The estimated necessary factory burden at various levels of activity is as follows:

60%	$3,400
80%	3,660
100%	4,000
120%	4,250
140%	4,400

(*a*) Give the summary journal entries reflective of the following:

(1) The materials purchased.
(2) The materials used.
(3) The labor costs.
(4) The actual factory burden incurred.
(5) The factory burden applied.
(6) The cost of goods completed.
(7) The sales and cost of sales.

In lieu of an explanation, state for each summary entry the record in which the data for preparing it would be found.

(*b*) Prepare a schedule showing material, labor, and burden charges to each of the job orders. Use a form headed as follows for the purpose:

Job Order Number	Direct Materials	Direct Labor		Factory Burden	Total Cost
		Hours	Cost		
	$		$	$	$
Totals	$		$	$	$

(*c*) Calculate the amount of the underabsorbed or overabsorbed burden and analyze it into the factors of: (1) expense variation and (2) idle or overtime.

(*d*) Give the entries to (1) set out and (2) dispose of the underabsorbed or overabsorbed burden amount.

Problem 32.

A physical count shows the December 31, 19— inventories of the Martin Corporation to be as follows:

Materials	$ 9,000
Materials in Process	6,000
Labor in Process	12,000
Burden in Process	6,000
Finished Goods	39,600

Giving effect to those inventories, complete the worksheet of the company which appears on Form Page 73, and prepare from that worksheet:

(*a*) Manufácturing Statement.
(*b*) Profit and Loss Statement.
(*c*) Balance Sheet.
(*d*) Closing Entries.

CHAPTER 13

Process Cost Accounting

137. Job-lot costing.

When the circumstances of manufacture are such that the production consists of lots or batches each identifiable from the time started until the time completed, it is not only possible but also practicable to:

1. Allocate to each lot the specific material and labor costs plus a fair share of the total factory burden.
2. Compute separately for *each lot* the *average* material, labor, burden, and total *per-unit cost.*

Lines in which the production consists of such distinguishable lots are termed *job-lot industries,* and the plan of cost accounting that treats each of those lots as a costing point is termed *job-lot costing.* The Loren Manufacturing Company practice set illustrated the case of a job-lot business using a job-lot costing system.

In job-lot cost accounting, the *cost data* concerning each *production lot* are recorded on a *job cost sheet* form such as is illustrated by Fig. 69.

As is shown by the job cost sheet of Fig. 69, in job-lot cost accounting:

1. *The basic costing point is the specific batch of an item.* Thus, in Fig. 69, the batch consists of 20 standard two-ton lowboy trailers completely fitted.

2. *The manufacturing costs are charged against specific production batches.* The material and labor costs are charged precisely on the basis of material requisitions and labor time tickets; the factory burden cost, less exactly, on some equitable pro rata basis. Thus, in Fig. 69, on the basis of material requisitions and labor time tickets, Job Order No. 8421 is charged with $11,800 of material and $14,100 of labor cost, while, at $.75 per direct labor hour, the job is charged with $10,500 of factory burden.

[Fig. 69]

JOB COST SHEET

ARTICLE 20—Standard low-boy trailers; two ton; completely fitted

JOB ORDER No. 8421
STARTED 1/3/—
FINISHED 2/8/—
FOR Stock

Materials			Labor			
Date	Amount		Date	Hours	Amount	
Jan. 31	$11,600	00	Jan. 31	13,400	$13,500	00
Feb. 8	200	00	Feb. 8	600	600	00
	11,800	00		14,000	14,100	00

COST SUMMARY

Particulars	Amount	Per Unit
Materials	$11,800	$ 590
Labor	14,100	705
Burden—14,000 hrs. at 75¢ per hr.	10,500	525
Totals	$36,400	$1,820

3. *Average per-unit cost is computed for each batch of each kind of product, part, or operation.* Thus, in Fig. 69, the per-unit cost of a standard two-ton low-boy trailer is shown to be:

(*a*) Material	$ 590
(*b*) Labor	705
(*c*) Factory burden	525
(*d*) Total	$1,820

When the individual lots of each item are numerous, per-unit costs are available at short intervals. Thus, if a run of two-ton low-boy trailers is completed each week, 52 sets of per-unit costs of the item are available each year for use by the management in determining the trend and satisfactoriness of costs.

138. Process industries.

Lines in which the circumstances of manufacture are such that *separate production lots cannot be distinguished* are termed *process industries.* Process industries are usually characterized by these features:

1. The production consists of a *steady flow* through the plant of *identical items.*

2. The production routine consists of a series of regular *steps* or *stages* termed *processes,* with the finished product of one process constituting all or part of the raw material of the next.

3. The *fluid nature of the production* and the *complete identity of the items processed* make it impossible to distinguish specific production lots.

4. The expenses of *service departments,* as distinguished from producing ones, constitute a considerable part of the manufacturing costs.

The process businesses are not numerous, but, because of the vital lines they involve and their large average size, they are industrially very important.

139. Process cost accounting.

In process cost accounting, the *cost data* concerning *all the production* are periodically summarized on a Process Cost Sheet such as is shown in Fig. 70.

As is disclosed by the process cost sheet of Fig. 70, in process cost accounting:

1. *The basic costing points are:* (*a*) *each service division, and* (*b*) *each manufacturing process.* Thus, in Fig. 70, costs are gathered for the power and maintenance *services,* and the mixing and shaping, drying, and burning *processes.*

2. Distinction is made in each *process* between (*a*) conversion and (*b*) production cost. *Conversion cost* is the sum of the labor and burden items, while *production cost* is the conversion plus the material costs. Included in the conversion cost of each process as *burden* are the charges to it from the service divisions. Included in the production cost of each process as *material* are the inventory transfers to it from preceding processes. In Fig. 70, for Drying, the conversion cost is $4,500, while the production cost is $19,500.

3. *Average per-unit cost of* (*a*) conversion and (*b*) production is computed for each process *for a period of time.* If that period is a long one, the average per-unit cost may easily conceal wide variations from that average. For instance, in Fig. 70, the average per "M" production cost through Drying in May was $3.25, but that does not mean that some of the production in the month was not made at a per "M" cost of much more or less

THE BOLLING BRICK COMPANY [Fig. 70]

Process Cost Sheet—May 1–31 of 19—

Particulars	Power	Repairs	Mixing & Shaping	Drying	Burning	Total	Cost of Sales
DIRECT CONVERSION COSTS:							
Labor	$ 300	$ 600	$ 4,200	$ 3,050	$ 950	$ 9,100	
Depreciation	200	75	600	400	300	1,575	
Depletion	—	—	2,200	—	—	2,200	
Taxes	100	50	300	250	150	850	
Coal	300	—	—	—	—	300	
Supplies	50	25	200	150	100	525	
Other burden items	50	150	800	200	150	1,350	
Totals	$1,000	$ 900	$ 8,300	$ 4,050	$ 1,650	$15,900	
SERVICE COSTS DISTRIBUTION:							
Power—at 10¢ per K.W.H.	(1,000)	100	300	200	400	—	
Repairs—at $1 per service hour	(1,000)		400	250	350	—	
TOTAL CONVERSION COSTS			$ 9,000	$ 4,500	$ 2,400	$15,900	
INVENTORY TRANSFERS:							
Storeroom to the processes			$ 9,000	1,000	1,350	11,350	
Production cost thru wet shaping			$18,000				
Shaping to drying—7,000 M at $2.00			(14,000)	14,000			
Production cost thru drying				$19,500			
Drying to burning—5,000 M at $3.25				(16,250)	16,250		
Production cost thru burning					$20,000		
Burning to cost of sales—3,000 M at $5.00					(15,000)		$15,000
TOTAL COSTS OF PRODUCTION						$27,250	
COST OF GOODS SOLD							$15,000
CLOSING INVENTORIES			$ 4,000	$ 3,250	$ 5,000		
"M" OF BRICKS PRODUCED			9,000	6,000	4,000		
PER "M"—							
Conversion cost			$ 1.00	$ .75	$ .60		
Production cost			$ 2.00	$ 3.25	$ 5.00		

than $3.25. To minimize the effect of this serious defect, the practice in process cost accounting is to use short cost periods.

140. The problems and procedures in process cost accounting.

The main problems in a process cost accounting system are those of:

1. Selecting the costing points.
2. Determining the charges applicable to each costing point.
3. Computing per-unit costs that adequately reflect departmental responsibility.

The special procedures in process cost accounting are those incidental to:

1. Accumulating the direct labor and burden costs of each costing point.
2. Distributing the costs of each of the service divisions.
3. Recording the costs of the raw material used by each process.
4. Recording at cost amount the inventory transfers between the processes.

These problems and procedures peculiar to process industries will be considered in their application to the development of the data appearing in the process cost sheet of Fig. 70.

141. Description of the business.

The Bolling Brick Company makes common brick from clay extracted from its own pits. The several stages in the manufacture of the bricks are as follows:

1. *Mixing and shaping.* In this division, the clay extracted from the company's pits is mixed with the other brick ingredients, and then, while still wet, molded into brick form. As formed, the wet bricks are placed on racks for transfer to the drying process.

2. *Drying.* In the drying room, the excess moisture is removed from the wet bricks. The racks of bricks are then taken to the burning division.

3. *Burning.* In the burning ovens, the dried bricks are baked to the desired degree of hardness. After completion of this process, the bricks are ready for sale.

To aid the *producing processes*, the company maintains service divisions for (*a*) power and (*b*) maintenance. The Power division generates the electricity needed in the production, while the Maintenance division keeps the plant facilities in top condition.

142. Accumulation of the direct conversion costs.

The labor and burden costs of each producing or service division are accumulated in separate expense accounts under a system of departmental expense accounting such as is described in Sections 84–87 of Chapter 8. At the close of the accounting period, the *direct conversion costs* disclosed by each department's expense accounts are listed on the Process Cost Worksheet in the manner illustrated by Fig. 71:

THE BOLLING BRICK COMPANY [Fig. 71]

Process Cost Worksheet—May 1–31 of 19—

Particulars	Power	Repairs	Mixing & Shaping	Drying	Burning	Total
DIRECT CONVERSION COSTS:						
Labor	$ 300	$600	$4,200	$3,050	$ 950	$ 9,100
Depreciation	200	75	600	400	300	1,575
Depletion	—	—	2,200	—	—	2,200
Taxes	100	50	300	250	150	850
Coal	300	—	—	—	—	300
Supplies	50	25	200	150	100	525
Other burden items	50	150	800	200	150	1,350
Totals	$1,000	$900	$8,300	$4,050	$1,650	$15,900

After the *direct conversion costs* are listed on the Process Cost Sheet, it is necessary only to apportion the costs of the service divisions to find the *total conversion cost* of each producing process.

143. Apportioning the service department costs.

The cost of each service division is divided among the other departments on the basis that it is believed best measures the use of its service. For the Bolling Company, Power is spread on the basis of the K.W.H. of energy used and Maintenance on the basis of the hours of repair service used. In May, 19—, use of the available power and maintenance service was as follows:

Department	K.W.H. of Power Used	Hours of Repair Service Used
Maintenance	1,000	—
Mixing and shaping	3,000	400
Drying	2,000	250
Burning	4,000	350
Totals	10,000	1,000

Since the total Power cost was $1,000, the per-K.W.H. cost was $1,000 ÷ 10,000, or 10¢. When each using department is charged at this 10¢ rate for the power it consumed, the $1,000 power cost is spread as follows:

Department	K.W.H. Used	Cost at 10¢ Per K.W.H.
Maintenance	1,000	$ 100
Mixing and shaping	3,000	300
Drying	2,000	200
Burning	4,000	400
Totals	10,000	$1,000

Since, after including the $100 charge for power, the total Maintenance cost was $1,000, the per-service-hour cost was $1,000 ÷ 1,000, or $1. When each using process is charged at this $1 rate for the repair service used, the $1,000 maintenance cost is spread as follows:

Department	Service Hours Used	Cost at $1 Per Hour
Mixing and shaping	400	$ 400
Drying	250	250
Burning	350	350
Totals	1,000	$1,000

On the books, the entries to record the distribution of the service department costs would be:

(1)

Maintenance—power	$100	
Mixing and shaping—power	300	
Drying—power	200	
Burning—power	400	
Power—labor		$300
Power—depreciation		200
Power—taxes		100
Power—coal		300
Power—supplies		50
Power—other burden items		50

To distribute the Power division costs among the using departments.

(2)

Mixing and shaping—maintenance	400	
Drying—maintenance	250	
Burning—maintenance	350	
Maintenance—labor		600
Maintenance—depreciation		75
Maintenance—taxes		50
Maintenance—supplies		25
Maintenance—other burden items		150
Maintenance—power		100

To distribute the Maintenance division costs among the using departments.

144. Total conversion cost; per-unit total conversion cost.

After recording thereon the distribution of the service division costs, the Process Cost Sheet appears as follows:

THE BOLLING BRICK COMPANY [Fig. 72]

Process Cost Sheet—May 1–31 of 19—

Particulars	Power	Maintenance	Mixing & Shaping	Drying	Burning	Total
DIRECT CONVERSION COSTS	$1,000	$ 900	$8,300	$4,050	$1,650	$15,900
SERVICE COSTS DISTRIBUTION:						
Power at 10¢ per K.W.H.	(1,000)	100	300	200	400	—
Maintenance at $1 per hour		(1,000)	400	250	350	—
TOTAL CONVERSION COSTS			$9,000	$4,500	$2,400	$15,900
"M" OF BRICKS PROCESSED			9,000	6,000	4,000	
PER "M" TOTAL CONVERSION COST			$ 1.00	$ .75	$ .60	

Adding the *prorated service department costs* to the *direct conversion costs* gives the *total conversion costs* of each process. Then dividing the total conversion cost by the number of units processed gives the *per-unit total conversion cost.* Thus, Fig. 72 shows that for Mixing and Shaping the total conversion cost for the 9,000 "M" of bricks processed was $9,000. The per "M" total conversion cost of Mixing and Shaping is then computed as $9,000 ÷ 9,000, or $1.00.

Note from Fig. 72 that apportioning the service costs does not affect the company's total labor and burden costs. It only concentrates their entire amount (in this case, $15,900) as charges to the producing processes.

145. Charges for materials and supplies.

Materials and supplies as purchased are, in process as in job lot costing, placed in a storeroom and charged to *Materials Inventory*. When materials and supplies are issued, they are charged as costs of the requisitioning departments. For the Bolling Company, the May, 19—, storeroom requisitions were charged as follows:

Department	Charge For Supplies	Charge For Materials
Power	$ 50	$ —
Maintenance	25	—
Mixing and shaping	200	9,000
Drying	150	1,000
Burning	100	1,350
Total	$525	$11,350

The book entries to record these charges for the materials and supplies issued are:

(1)

Power—supplies	$ 50	
Maintenance—supplies	25	
Mixing and shaping—supplies	200	
Drying—supplies	150	
Burning—supplies	100	
Materials Inventory		$ 525

To charge the supply requisitions of May, 19—.

(2)

Mixing and shaping—materials	9,000	
Drying—materials	1,000	
Burning—materials	1,350	
Materials Inventory		11,350

To charge the material requisitions of May, 19—.

The charge for the supplies used is included in the direct conversion costs shown in Fig. 71. The charge for the materials used is recorded under *Inventory Transfers* on the process cost sheet in the manner illustrated by Fig. 73.

146. Data on production and transfers.

To permit (*a*) computation of the per-unit costs and (*b*) recording at cost the inventory transfers between the processes, record is kept, for each process, of:

1. The number of units of output.
2. The number of units transferred out.

The number of units of output is used to compute the per-unit conversion cost *of* and the per-unit production cost *through* the process. The number of units transferred out is used to record *at cost* the inventory sent to the next process. For the Bolling

Company, the production and transfers in May, 19—, were as follows:

Process	Produced	Transferred
Mixing and Shaping	9,000	7,000
Drying	6,000	5,000
Burning	4,000	3,000

In measuring a process's production, only the usable units are counted. Thus, for the Bolling Company, the bricks spoiled in Drying and Burning are excluded from the production of those processes.

To facilitate computation of the per-unit costs, the uncompleted work of each process is included in the production in terms of its estimated equivalent in completed units. Thus, 500 "M" of partly dried bricks might be included in the production as 300 "M."

Exactness in stating the uncompleted work in terms of equivalent finished units is not often attainable. However, the in-process inventories are usually so small in relation to the entire production that the effect on process per-unit costs of any probable error in them is negligible.

147. Recording the inventory transfers; computing the production costs.

On the process cost sheet, the data on the production and transfers are recorded and the per-unit production costs and the closing inventory amounts are developed in the manner illustrated by Fig. 73 following:

THE BOLLING BRICK COMPANY [Fig. 73]

Process Cost Sheet—May 1-31, of 19—

Particulars	Mixing & Shaping	Drying	Burning	Total Costs	Cost of Sales
TOTAL CONVERSION COSTS (Fig. 72)	$ 9,000	$ 4,500	$ 2,400	$15,900	$ —
INVENTORY TRANSFERS:					
Storeroom to processes—per requisitions	9,000	1,000	1,350	11,350	—
Production cost through shaping	$18,000				
Shaping to drying; 7,000 "M" at $2	(14,000)	14,000			
Production cost through drying		$19,500			
Drying to burning; 5,000 "M" at $3.25		(16,250)	16,250		
Production cost through burning			$20,000		
Burning to cost of sales; 3,000 "M" at $5			(15,000)		15,000
TOTAL PRODUCTION COST				$27,250	
COST OF GOODS SOLD					$15,000
CLOSING INVENTORY	$ 4,000	$ 3,250	$ 5,000		
"M" OF BRICKS PROCESSED	9,000	6,000	4,000		
PER "M"—					
Conversion cost	$ 1.00	$ .75	$ .60		
Production cost	$ 2.00	$ 3.25	$ 5.00		

The student will note from study of Fig. 73 that for each process:

1. *The production cost* is the total conversion cost plus the transfer charges. Thus, in Fig. 73, the production cost for Drying is the $4,500 total conversion cost plus the $15,000 of transfer charges, or $19,500.

2. *The per-unit production cost* is the production cost divided by the number of units processed. Thus, in Fig. 73, the per "M" production cost for Drying is the $19,500 production cost divided by the 6,000 "M" of bricks processed, or $3.25.

3. *Inventory transfers* are made at the per-unit production *cost of the transferring department.* Thus, in Fig. 73, the 5,000 "M" sent from Drying to Burning are transferred at the $3.25 per "M" production cost through Drying.

4. *The closing inventory* is the difference between the total production cost and the credit for the transfers to (*a*) the next process or (*b*) the cost of sales. Thus, in Fig. 73, the closing inventory of Drying is $19,500 minus $16,250, or $3,250.

Proof of the clerical accuracy of the process cost sheet is given by the fact that the sum of the closing inventories ($12,250) plus the cost of goods sold ($15,000) is equal to the total production cost ($27,250).

The book entry to record the transfer of materials from the storeroom to the processes was given in Section 145 as:

(1)

Mixing and shaping—materials	$9,000	
Drying—materials	1,000	
Burning—materials	1,350	
Materials		$11,350

To charge the material requisitions of May, 19—.

The entries on the books to record (1) the transfers of inventory between the processes and (2) the cost of the goods sold are as follows:

(2)

Drying—shaped bricks	$14,000	
Mixing and shaping—transfers out		$14,000

7,000 "M" transferred at $2 per M.

(3)

Burning—dried bricks	16,250	
Drying—transfers out		16,250

5,000 "M" transferred at $3.25 per "M".

(4)

Cost of goods sold	15,000	
Burning—transfers out		15,000

3,000 "M" sold; cost $5 per "M".

148-a. Shrinkage loss; its absorption in the process costs.

In certain processes, some loss in production because of *shrinkage* is regularly experienced. This shrinkage loss may

result from *spoilage*, or it may arise from *compression* or *evaporation* occurring in the course of manufacture. Whatever the cause, the units of product transferable to the next manufacturing stage are fewer than those started into the process.

In processes subject to shrinkage loss, the practice is to measure the production in terms of *units transferable to the next process*. Then, by computing the per-unit costs as:

$$\frac{\text{The Total Costs through the Process}}{\text{The Number of Transferable Units Produced}}$$

the shrinkage loss is absorbed in the cost of the transferable units. Thus, when, as in the case of the Bolling Company, 7,000 "M" of bricks are placed into Drying, but 1,000 "M" crack in the process and must be discarded, the expense allocable to the discarded 1,000 "M" is absorbed in the usable 6,000 "M" by computing the per-"M" conversion cost of drying as:

$$\frac{\text{The Total Conversion Costs in Drying—\$4,500}}{\text{The "M" of Transferable Bricks Produced—6,000}} = 75¢ \text{ per "M,"}$$

and by computing the per-"M" production cost through the Drying process as:

$$\frac{\text{The Total Production Costs Through Drying—\$19,500}}{\text{The "M" of Transferable Bricks Produced—6,000}} = \$3.25 \text{ per "M."}$$

148-b. Alternative method of developing per-unit process costs.

An alternative method of developing the per-unit process costs which is used when the producing divisions have *opening in-process inventories* is given by Figure 74.

The student will note, with respect to the process cost sheet illustrated in Figure 74, that:

1. The opening in-process inventories are stated at the amounts at which they were priced as the closing in-process inventories of the preceding period.
2. The material received from stores is the sum of the requisitions on the storeroom signed for by the division.
3. The labor costs in the period are those shown by the departmental payroll records.
4. The burden costs incurred in the period are those shown by the departmental factory burden ledgers *after* distribution has been made of the service department costs.
5. The transfers from prior processes are priced at the total per-unit costs through those prior processes.

6. The production of each process in the period, finished or unfinished, is stated in terms of *equivalent completed units* through a computation such as shown in Figure 75:

[Fig. 74]

BARR COMPANY
PROCESS COST SHEET—AUGUST 19—

Particulars	Producing Process A	B	C	Total (Excluding Interprocess Transfers)
MATERIALS:				
In opening in-process inventories.	$ 325.00	$ 576.00	$ 556.00	$ 1,457.00
Received from stores	2,600.00	324.00	444.00	3,368.00
Received from prior processes:				
From "A"—600 units at $7.50	—	4,500.00	—	—
From "B"—500 units at $15.00	—	—	7,500.00	—
Total material costs	$2,925.00	$5,400.00	$8,500.00	$ 4,825.00
Equivalent completed units made	650	600	500	
Per-unit material cost through.	$ 4.50	$ 9.00	$ 17.00	
LABOR AND BURDEN:				
In opening in-process inventories.	$ 300.00	$ 600.00	$ 900.00	
Incurred in the period:				
Labor	1,000.00	2,000.00	2,400.00	
Burden	800.00	1,300.00	1,800.00	
Total conversion costs	$2,100.00	$3,900.00	$5,100.00	$11,100.00
Equivalent completed units made	700	650	600	
Per-unit conversion cost through	$ 3.00	$ 6.00	$ 8.50	
TOTAL PER-UNIT COST THROUGH	$ 7.50	$ 15.00	$ 25.50	
TOTAL COST OF PRODUCTION				$15,925.00

COMPUTATION OF EQUIVALENT COMPLETED UNITS

[Fig. 75]

Particulars	A	B	C
MATERIALS:			
Units completed in the period	600	580	480
Add—closing in-process inventory:			
125 units—40% done	50		
100 units—20% done		20	
200 units—10% done			20
Equivalent complete units made	650	600	500
LABOR:			
Units completed in the period	600	580	480
Add—closing in-process inventory:			
125 units—80% done	100		
100 units—70% done		70	
200 units—60% done			120
Equivalent complete units made	700	650	600

148-c. Inventories, cost of sales, and proof of production cost under the alternative method of developing per-unit process costs.

Assuming that 400 of the 480 units completed in Process "C" in August were sold that month, the August 31 inventory and August cost of sales amounts of the Barr Company are computed and the August cost of production is proved by this computation:

Uncompleted work in:	
Process "A":	
Materials—50 equivalent units at $4.50	$ 225
Labor and burden—100 equivalent units at $3.00	300
Process "B":	
Materials—100 equivalent units at $9.00	900
Labor and burden—150 equivalent units at $6.00	900
Process "C":	
Materials—20 equivalent units at $17.00	340
Labor and burden—120 equivalent units at $8.50	1,020
Finished Goods in Process "C":	
80 units at $25.50	2,040
Cost of Goods Sold from Process "C":	
400 units at $25.50	10,200
Total cost of production in August—per Figure 74	$15,925

Computation of the *equivalent units* in the closing in-process and finished goods inventories is made as follows:

EQUIVALENT UNITS [Fig. 76]

Particulars	Made	Transferred to: Next Process	Transferred to: Cost of Sales	Remaining in Inventory of: Finished Goods	Remaining in Inventory of: Work in Process
Process "A":					
Materials	650	600	—	—	50
Labor and Burden	700	600	—	—	100
Process "B":					
Materials	600	500	—	—	100
Labor and Burden	650	500	—	—	150
Process "C":					
Materials	500	—	400	80	20
Labor and Burden	600	—	400	80	120

149. Standard rates for service divisions; unabsorbed service expense.

In process lines, per-unit *conversion cost* rather than per-unit *production cost* is the reliable index of process operating efficiency. The reason is that the process completely controls its labor and burden costs, but must accept as a transfer from a preceding department or from stores all of its material costs.

If total conversion costs include sizable service department charges, even per-unit conversion cost fails as an index of process operating efficiency, because then an increase in process per-unit

conversion costs may conceivably be all due to larger charges for Power and Maintenance arising from the inefficiency of those service departments.

To cause per-unit process conversion cost to be affected only by *process efficiency*, a frequent practice is to charge for inter-department service at *standard* rather than at the actual per-unit costs. With this practice, a change in the charge to a process for, say, Power service is due not partly to a change in the rate per K.W.H. at which the power is charged, but solely to more or fewer K.W.H. used. Since using more or fewer K.W.H. of power is strictly within the control of the process, a change in power cost is, then, a measure of a similar change of process efficiency in using power.

If the rate per unit used as standard in charging out Power or Maintenance approximates the fair market value of the service, the difference between the actual expense of the division and the amount charged out for its service measures the saving to the company effected by the department. Thus, if power is worth 8¢ per K.W.H. and maintenance service 90¢ per hour, Fig. 77 shows that for the Bolling Company neither Power nor Maintenance is a cost-saving division:

THE BOLLING BRICK COMPANY [Fig. 77]

Process Cost Sheet—May 1–31 of 19—

Particulars	Power	Maintenance	Mixing & Shaping	Drying	Burning	Total
DIRECT CONVERSION COSTS.....	$1,000	$900	$8,300	$4,050	$1,650	$15,900
SERVICE COST DISTRIBUTION:						
Power at 8¢ per K.W.H.....	(800)	80	240	160	320	
Maintenance at 90¢ per hr.....		(900)	360	225	315	
UNABSORBED SERVICE EXPENSE.	$ 200	$ 80				
TOTAL CONVERSION COST.....			$8,900	$4,435	$2,285	$15,900

Since the *under- or overabsorbed service department expense* of process lines is akin to the under- or overabsorbed factory burden of job order businesses, the prevalent plan for its disposition is similar. From month to month, the under- or overabsorbed service department expense is carried as a deferred item on the balance sheet; at the end of the year, it is closed out as a special charge or credit to Profit and Loss.

150. Inter-use of service departments.

It often happens that the service divisions use each other's services to a considerable extent. Thus, in the Bolling Company, Power might use some of the maintenance hours, and Maintenance, some of the power output. In such a case, the

service costs chargeable to the producing processes would be the direct Power and Maintenance costs adjusted to give effect to their *inter-use.*

A practical method of adjusting for service department inter-use is illustrated by Fig. 78 following:

THE BOLLING BRICK COMPANY [Fig. 78]

Process Cost Sheet—May 1-31 of 19—

Particulars	Power	Maintenance	Mixing & Shaping	Drying	Burning	Total
DIRECT CONVERSION COST.....	$1,000	$900	$8,300	$4,050	$1,650	$15,900
Estimated value of maintenance used by Power.....	200	(200)				
SERVICE COST DISTRIBUTION:						
Power—at $.12 per K.W.H.....	(1,200)	120	360	240	480	
Maintenance—at $.82 per hr.....		(820)	328	205	287	
TOTAL CONVERSION COST.....			$8,988	$4,495	$2,417	$15,900

The adjustment for inter-use made in Fig. 78 is as accurate as the estimate of the value of the maintenance service used by Power. Since accurate data exist as to the hours of maintenance service used by Power and the past per-hour cost of maintenance service, the error in the estimate could not be large.

ASSIGNMENT 13

Practice Set.

From information disclosed by: (1) the practice set ledger accounts, or (2) the six-column worksheet, prepare in good form the following:

(*a*) A manufacturing statement.
(*b*) A profit and loss statement.
(*c*) A balance sheet.

Problem 33.

The Booth Cement Company's cost records show these data for the month of June 19—:

	SERVICE DEPTS.		PRODUCING DEPARTMENTS			
Particulars	Light & Power	Repairs & Maintenance	Raw Grinding	Clinker Burning	Clinker Grinding	Total
Direct Charges.....	$1,000	$900	$8,300	$4,050	$1,750	$16,000
Material Used.....			9,000			

During the month, the production was as follows:

Light & Power—5,000 K.W. hours consumed by:

(*a*) Maintenance.....	500	K.W. hours
(*b*) Grinding.....	1,500	" "
(*c*) Burning.....	1,000	" "
(*d*) Grinding.....	2,000	" "

Maintenance and Repairs—1,000 service hours used by:

(*a*) Grinding..... 400 hours
(*b*) Burning..... 250 "
(*c*) Grinding..... 350 "

Raw Grinding—9,000 tons, of which 7,000 tons were transferred to Clinker Burning.
Burning—6,000 tons, of which 5,000 tons were transferred to Clinker Grinding.
Clinker Grinding—5,000 tons, of which 3,000 tons were sold.

Required: Process cost sheet for the company which sets out the:

(*a*) Unit conversion cost for each process, and
(*b*) Unit production cost for each process and service department.

Question 111.

What are the manufacturing conditions that characterize process industries?

Question 112.

Are the per-unit costs determined under process cost accounting as useful or as reliable as those determined under job-lot cost accounting?

Question 113.

Are burden accumulation and distribution the major problems in process cost accounting that they are in job-lot cost accounting?

Question 114.

The Mackay Corporation produces power and steam for its own requirements. For 19—, the data on costs, quantities produced, and quantities distributed are as follows:

Particulars	Power	Steam
Total costs of production in 19—....	$13,400	$24,000
Units produced.....	350,000 K.W.H.	500,000 Pounds
Units distributed to:		
Department #1.....	40,000 K.W.H.	70,000 Pounds
Department #2.....	55,000 "	150,000 "
Department #3.....	80,000 "	120,000 "
Department #4.....	140,000 "	40,000 "
Department #5.....	20,000 "	20,000 "

Based on the foregoing data, how should the service costs be distributed among the five producing departments?

Additional Work

Problem 34.

The Claxton Company produces one product and uses the process method of cost accounting. The available data for June 19— are:

Particulars	Service Depts. General Works	Steam	Producing Depts. Burning #1	Grinding #2	Packing #3
Costs:					
Materials	$ —	$ 4,200	$ 4,000	$ —	$ —
Labor	5,000	2,000	3,000	5,000	4,000
Other Manufacturing Expense.	5,000	2,000	2,000	5,000	4,000
Proceeds from Sale of Ashes	—	200	—	—	—
Statistics:					
Pounds of Steam:					
(a) Produced in period	—	100,000	—	—	—
(b) Used in period	—	—	40,000	40,000	20,000
Labor hours for the period	10,000	10,000	30,000	40,000	20,000
Tons of Product:					
(a) Produced in the period	—	—	10,000	7,000	5,000
(b) Transferred to next department in the period.	—	—	8,000	6,000	4,000
(c) In inventory at the close of the period	—	—	2,000	1,000	1,000

Required: Process cost sheet for the company which sets out:

(a) Unit conversion costs for each process.
(b) Unit production costs for each process and service department.

Problem 35.

Bennett Chemicals operates producing processes A, B, and C and three service divisions: Administration, Maintenance, and Power. Two materials are used in the manufacturing: "X," which is applied at the start of Process A, and "Y," which is applied midway through Process C. The company prices material issues at FIFO cost, and inter-process transfers and goods sold at the average cost for the period. A market exists for the product as it emerges from each producing process and some is sold at each such stage. The August 19— operating data of the company are as follows:

1. Analysis of material transactions:

Material	8/1 Inventory Tons	Cost	Purchases Tons	Cost	Issues Tons	Cost
"X"	1,000	$ 9,000	2,000	$20,000	1,500	
"Y"	2,000	12,500	2,500	15,000	2,500	

2. Description of in-process inventories:

Process	August 1, 19— Material	Conversion	August 31, 19— Tons	% Processed in Dept.
A	$ 2,900	$2,700	300	60
B	5,020	2,300	400	40
C	11,669	2,387	300	70

3. Production, transfers, and sales of completed units:

Process	Tons Made	Tons Transferred to Subsequent Process	Tons Sold to Customers	Tons on Hand 8/31/—
A.....	1,700	1,200	300	200
B.....	1,000	700	200	100
C.....	2,600	—	2,100	500

4. Labor and direct burden costs:

Division	Direct Labor	Direct Burden
Process A	$ 9,200	$ 6,270
Process B	7,200	3,182
Process C	12,600	6,500
Administration	2,100	1,200
Maintenance	1,500	1,000
Power	2,500	1,500
Totals	$35,100	$19,652

5. Administrative services are estimated to be used by the departments in the proportions of their labor costs.
6. Use of the maintenance and power divisions:

Division	K.W.H. of Power Used	Hours of Maintenance Service Used
Process A	16,000	700
Process B	12,000	500
Process C	10,000	350
Administration	—	—
Maintenance	4,500	—
Power	—	—
Totals	42,500	1,550

It is asked that you prepare for Bennett Chemicals these August 19— schedules:

(*a*) Equivalent tons of production in each producing process.
(*b*) Direct and total conversion cost of each producing process and service division.
(*c*) Total and per-ton material, conversion, and production cost through each producing process.
(*d*) Proof of the accuracy of the production costs computed in (*c*).

Problem 36.

For the Bryant Company, which uses a process cost accounting system, the costs of Process "A" in August 19— were as follows:

Cost transferred from prior process	$33,000
Material cost added in the process	41,870
Labor costs of the process	13,800
Factory burden of the process	6,900
Total	$95,570

Data as to tne production of the process in the month are as follows:

Units received from the prior process	10,000
Units finished and transferred to subsequent process	8,000
Units unfinished and in the process at August 31	2,000

Of the units in process at closing, 25% were 80% done; 50% were 60% finished; and the rest were 40% completed. Of the $41,850 material cost added in the process, $21,000 was added at the start, $10,650 at the 50% completion point, and $10,200 at the 75% completion point. Labor and burden costs were incurred uniformly throughout the process.

Required:

1. Compute the per-unit cost *by element* through Process "A" in August 19—.
2. Compute the value at cost of the closing in-process inventory.
3. Present your proof of the August 19— production costs.

Question 115.

Is it conceivable that the plan of cost accounting for a company may be partly process and partly job lot?

Question 116.

In process lines, what is meant by *shrinkage*, and how is its expense handled in the process costs?

Question 117.

What is the difference between the plans of charging the cost of service departments under process and under job-lot cost accounting?

Question 118.

Can and should per-unit costs be determined for service as well as for producing departments in both job-lot and process cost accounting?

Question 119.

What is gained by charging the producing departments for service-division costs at arbitrary instead of at actual rates?

Question 120.

If the services of nonproducing departments are charged out at standard rather than actual rates, what should be the disposition of the resulting over- or underabsorbed service department expense?

Question 121.

How is the cost of shrinkage and/or spoilage handled in process cost accounting?

Question 122.

What records must be kept in process cost accounting in connection with:

(*a*) The direct labor and burden costs?
(*b*) The materials and supplies?
(*c*) The units produced?
(*d*) The units transferred or sold?

Question 123.

Explain in a letter to the factory superintendent the circumstances in which it is desirable in process cost accounting to:

1. Adjust for inter-use by the service departments.
2. Charge out the services of nonproducing departments at standard rates.

Question 124.

The Bixby Manufacturing Company charges and credits its Power Department as follows:

Power Department	
Actual cost of— (a) coal (b) labor (c) other expenses	At prevailing market value for K.W.H. of power transferred to the using departments.

What is gained by following this accounting procedure?

Question 125.

From the following partial process cost sheet of the Mixter Company, submit the journal entries required to record the distribution of the service department costs.

THE MIXTER COMPANY
PROCESS COST SHEET—OCTOBER of 19—

	Service		Producing			
Particulars	Power	Repairs	Mix	Grind	Pack	Total
Direct Conversion Costs:						
Labor	$ 800	$ 900	$3,000	$2,000	$4,000	$10,700
Rent	100	150	400	300	100	1,050
Depreciation	100	50	500	100	400	1,150
Total	$1,000	$1,100	$3,900	$2,400	$4,500	$12,900
Service Costs:						
Power	(1,000)	100	400	300	200	
Repairs		(1,200)	300	500	400	
Total Conversion Costs			$4,600	$3,200	$5,100	$12,900

CHAPTER 14

Operational Cost Accounting—The Basic Plan

151. Job-lot and process cost accounting not always applicable.

In many *assembly industries*, the conditions of manufacture preclude both job-lot and process cost accounting. In Bell Inc., for example, a maker of meters, these conditions of manufacture exist:

1. Each meter is an *assembly* of many *piece parts.*
2. Each meter assembly combines many previous *sub-assemblies.*
3. *Labor operations* are performed on each piece part in several departments.
4. As a *portion* of a *piece-part lot* is processed in one department, it is forthwith transferred to the next. This practice minimizes the in-process inventory and the time lost by employees waiting for work.
5. For operations such as anodizing, hobbing, and plating, the piece parts may be sent to *outside processors.* Often the parts sent out are returned in irregular quantities over long periods of time.
6. The practices described in (4) and (5) result in dispersing some piece-part lots among many departments and outside processors. Thus, 6,000 gears started as one lot may at a date be dispersed as follows:

   1,000 in *Lathe* being machined
   1,500 in *Burring* being smoothed
   2,000 at an *outside processor* being hobbed
   1,000 on the *final assembly* line
   500 already incorporated in *finished meters*

Under the described conditions, neither process nor job-lot cost accounting is applicable. Process costing is inapplicable because the company's products are neither identical nor similarly processed. Job-lot cost accounting also fails in the circumstances because:

1. The extreme dispersal of some of the piece-parts lots precludes the practicality of identifying their separate costs.

2. Piece parts are often used in assemblies before their costs are known. Thus, in (6) preceding, 500 of the gears are already in finished meters, although, since their part lot has not been wholly completed, their cost is unknown.

152. The operational cost plan; main characteristics.

In those *assembly industries* where neither process nor job-lot costing applies, the *approximate per-unit costs* may be determined through what is termed *operational cost accounting.* In the operational cost accounting plan:

1. The costing points are successively: (1) the *piece-part material,* (2) the *labor operation,* (3) the *piece-part,* (4) the *subassembly,* and (5) the *finished product.*

2. The per-unit (*a*) *labor operation* and (*b*) *piece-part material* costs are determined through *test runs.* To find the cost of a *fabricating* or *assembly* labor operation, a test run is made under typical operating conditions. Dividing the labor cost of the run by the number of times the operation was performed gives the operation's per-unit labor cost. Similarly, dividing the material costs of a test *piece-part run* by the number of pieces produced gives the per-unit material cost of that piece part.

3. The per-unit piece-part, subassembly, and finished-product costs are built up from the available test-run data as to per-unit material and labor costs. The *piece-part material* cost plus the cost of the required *fabricating labor operations* gives the *piece-part cost.* The cost of the included *piece parts* plus the cost of the required *subassembly labor operations* yields the *subassembly cost.* The cost of the included *piece parts* and *subassemblies* plus the cost of the required *final assembly labor operations* results in the *finished product cost.*

153. Definition of terms.

As the terms are used in operational cost accounting:

1. A *piece part* is an item entering into a sub- or final assembly. It consists of but *one piece of material.* Standard piece parts, such as screws, rivets, and washers, are usually bought, but piece parts peculiar to the product, such as castings, gears, and pinions, are usually made.

2. A *fabricating labor operation* is a process performed on the base material in fashioning it into the desired piece part. Thus, in making washers from sheet steel stock, the fabricating labor operations are:

(*a*) Shearing the sheet steel stock into strips.
(*b*) Stamping the washers out of the sheet steel strips.
(*c*) Inspection to eliminate defective units.

3. A *subassembly* is a combination of two or more piece parts and/or subassemblies which itself becomes an element in a later combination. In electric motor manufacturing, for instance, the armature is a subassembly.

4. A *finished product* is a final assembly of piece parts and/or subassemblies. Thus, in cutlery manufacture, a pair of shears is a final assembly of these piece parts:

(*a*) Left blade.
(*b*) Right blade.
(*c*) Pinion.

5. An *assembly labor operation* is a step performed in putting together the elements of a sub- or final assembly. Thus, the assembly operations in putting together the blades of a pair of shears are:

(*a*) Pinion insertion.
(*b*) Pinion flattening.
(*c*) Inspection.
(*d*) Testing.

154. The procedure in operational cost accounting.

A first step in establishing an operational cost accounting system is to determine for:

1. Each piece part:

   (*a*) The raw stock base.
   (*b*) The required fabricating labor operations.
   (*c*) The necessary outside operations.

2. Each assembly:

   (*a*) The component piece parts and/or subassemblies.
   (*b*) The required assembly labor operations.

This work is usually done by the *production planning division* on the basis of the data available or determinable from its:

1. Product drawings—which detail:
   (*a*) The raw stock base of each piece part.
   (*b*) The piece parts making up each assembly.
2. Job analyses—which detail:
   (*a*) The fabricating labor operations required to make each piece part.
   (*b*) The assembly labor operations required to put together the components of each assembly.

As ascertained, the facts as to the material make-up, outside processes, and labor operations affecting each piece part and assembly are listed in the Particulars sections of *Piece Part* and *Assembly Cost Sheets* such as shown in Fig. 79 and Fig. 80:

[Fig. 79]

BELL INC.
PIECE PART COST SHEET

PIECE PAPT NO. 424

DESCRIPTION Panel Door

Particulars	TEST RUN AVER			AGE COST PER 1,000		
	Jan.	Feb.	Mar.	Oct.	Nov.	Dec.
BASE MATERIALS:						
14-gage stainless steel	1.21	1.22	1.22	1.23	1.23	1.22
OUTSIDE OPERATIONS:						
Anodizing (#424-A)	2.60	2.60	2.60	2.40	2.40	2.40
Chrome plating (#424-C.P.)	3.51	3.51	3.51	3.43	3.43	3.43
Total outside operations cost	6.11	6.11	6.11	5.83	5.83	5.83
LABOR OPERATIONS:						
424-1 Cutting	1.96	2.86	2.14	1.84	1.75	1.63
424-2 Bevelling	2.30	2.30	2.30	2.21	2.21	2.21
424-8 Burring	3.14	3.42	3.31	3.24	3.34	3.34
424-9 Inspection	2.16	2.28	2.24	2.28	2.31	2.29
Total labor cost	43.86	44.81	45.26	44.23	43.21	42.81
BURDEN AT 100% OF DIRECT LABOR	43.86	44.81	45.26	44.23	43.21	42.81
TOTAL FACTORY COST	95.04	96.95	97.85	95.52	93.48	92.67

[Fig. 80]

BELL INC.
ASSEMBLY COST SHEET

ASSEMBLY NO. 430

DESCRIPTION Gear Box

Particulars	TEST RUN AVER			AGE COST PER 1,000		
	Jan.	Feb.	Mar.	Oct.	Nov.	Dec.
PIECE PART COMPONENTS:						
#424—Panel door	95.04	96.95	97.85	95.52	93.48	92.67
425—Casement	430.76	427.18	427.49	431.46	433.15	430.29
426—Hinge	16.85	17.02	17.15	16.96	17.01	16.98
429—Knob	14.41	14.87	14.64	15.02	14.85	14.62
Total parts cost	557.06	556.02	557.13	558.96	558.49	554.56
ASSEMBLY LABOR OPERATIONS:						
#430-1—Fitting door to casement	13.43	14.16	13.12	14.75	15.02	14.26
430-2—Hinging door to casement	26.37	25.18	27.13	26.85	25.14	24.86
430-4—Affixing knob on door	9.86	9.27	10.03	11.05	10.26	9.92
430-9—Inspection	15.22	16.03	15.91	15.60	14.98	14.89
Total labor cost	149.42	166.16	159.12	164.13	158.26	150.94
BURDEN AT 100% OF LABOR	149.42	166.16	159.12	164.13	158.26	150.94
TOTAL FACTORY COST	855.90	888.34	875.37	887.22	875.01	856.44

After the information shown in the Particulars section of the *Piece Part* and *Assembly Cost Sheets* has been inserted, it remains only to set up the mechanism for determining at desirable intervals the per-unit cost of each item so shown.

155. The problems in operational cost accounting.

To obtain unit cost data such as appear in Fig. 79 and Fig. 80, there must exist practicable procedures for determining at desired intervals:

1. For each piece part:

   (*a*) The base material cost.
   (*b*) The cost of each outside process.
   (*c*) The cost of each fabricating labor operation.

2. For each assembly:

   (*a*) The cost of each component piece part.
   (*b*) The cost of each assembly operation.

Sections 156–159 following deal with the procedures used to attain those purposes. The costs in these sections are all *per 1,000*, such a unit being convenient when the parts and operations are small.

156. Cost accounting for piece-part material costs.

For *purchased piece parts*, the per-unit costs are obtained from the covering *vendors' invoices*. The successive unit costs for each piece part are recorded on a *Purchased Piece Part Cost Card* such as is shown by Fig. 81:

[Fig. 81]

PURCHASED PIECE PART COST CARD

NAME Hinge for Gear Box Panel Door PART NO. 426

19—		Vendor	This Invoice			Invoices Month to Date		
			Quan.	Total Cost	Per 1000 Cost	Quan.	Total Cost	Per 1000 Cost
Jan.	4	Hewe Inc. . .	1,200	$18.39	$15.32	1,200	$18.39	$15.32
	16	Barr Inc. . . .	2,000	37.07	18.54	3,200	55.46	17.33
	24	S. Coe.	1,000	15.32	15.32	4,200	70.78	16.85

At the month-end, the average per-1,000 cost for the month shown by the *Purchased Piece Part Cost Card* is recorded in the Piece Part Components section of the Assembly Cost Sheet in the manner illustrated by Fig. 80. For purchased piece part #426, the per-1,000 cost recorded in Fig. 80 for January is $16.85.

For *made piece parts*, the per-unit material costs are obtained through *test runs* made under *typical operating conditions*. A quantity of base material is requisitioned from the storeroom for fashioning into the piece-part form. Record is kept of the number of units obtained from that material quantity. Then the cost of the base material divided by the number of units obtained gives the part's per-unit material cost. A *Piece Part Material Cost Test Run Ticket*, such as is shown in Fig. 82, is used to record the data concerning each test run:

[Fig. 82]

PIECE PART MATERIAL COST TEST RUN TICKET
NO. 1477

TEST RUN SUPERVISOR Kucera DATE 1/13/— PIECE PART NO. 424

121 lb. of 20-gauge stainless steel at 4¢ lb	$4.84
Good units obtained	4,000
Cost per 1,000	$1.21

REMARKS No irregular conditions encountered

The cost information shown by the *Piece Part Material Cost Test Run Ticket* is recorded on a *Fabricated Piece Part Material Cost Card* such as is shown in Fig. 83. At the month-end, the

[Fig. 83]

FABRICATED PIECE PART MATERIAL COST CARD

NAME Panel Door for Gear Box NO. 424

19—		Test Run Ticket #	This Test Run			Test Runs for the Month		
			Units	Total Cost	Per 1,000	Units	Total Cost	Per 1,000
Jan.	13	1477	4,000	4.84	1.21	4,000	4.84	1.21
	24	1688	3,000	3.57	1.19	7,000	8.41	1.20
	30	2139	6,000	7.32	1.22	13,000	15.73	1.21

average per-unit costs for the month shown by the *fabricated piece part material cost cards* are recorded in the base material sections of the piece part cost sheets in the manner illustrated by Fig. 79. For fabricated piece part #424, the January average per-1,000 cost recorded in the base material section of Fig. 79 is $1.21.

157. Cost accounting for outside operation costs.

For *outside operations*, the per-unit costs are obtained from the covering *vendors' invoices*. The successive per-unit costs are recorded on an *Outside Operations Cost Card* such as is shown in Fig. 84.

[Fig. 84]

OUTSIDE OPERATIONS COST CARD

DESCRIPTION Anodizing Panel Door for Gear Box NO. 424-A

19—		Processor	This Invoice			Invoices for the Month		
			Units	Total Cost	Per 1,000	Units	Total Cost	Per 1,000
Jan.	7	Arco Inc.	2,000	5.20	2.60	2,000	5.20	2.60
	18	Arco Inc.	4,000	10.40	2.60	6,000	15.60	2.60
	29	Arco Inc.	3,000	7.80	2.60	9,000	18.20	2.60

At the month-end, the average per-unit costs for the month shown by the *Outside Operations Cost Cards* are recorded in the Outside Operations sections of the Piece Part Cost Sheets in the manner illustrated by Fig. 79. For outside operation #424-A, the January average per-1,000 cost recorded in Fig. 79 is $2.60.

158. Cost accounting for labor operation costs.

The cost of each fabricating and assembly labor operation is determined through *test runs* made under *typical operating conditions.* The data concerning each labor operation cost test run are recorded on a *Labor Operation Cost Test Run Ticket* such as is shown in Fig. 85:

[Fig. 85]

LABOR OPERATION COST TEST RUN TICKET

TEST NO. 9436 DATE 1/13/—

Started	8.00	OPERATION NO. 424-1
Finished	11.92	DESCRIPTION Cutting panel door from raw stock
Elapsed Time	3.92	
Rate per hour	$ 1.00	WORKER Gurley
Total cost	$ 3.92	SUPERVISOR Kucera
Units Processed	2,000	REMARKS All work conditions were normal.
Per-1,000 cost	$ 1.96	

The information of each labor operation cost test run ticket is recorded on a *Labor Operation Cost Card* such as is shown in Fig. 86:

[Fig. 86]

LABOR OPERATION COST CARD

DESCRIPTION Cutting Panel Door from Raw Stock NO. 424-1

19—		Test Ticket No.	This Run			Runs for the Month		
			Units	Total Cost	Per 1,000	Units	Total Cost	Per 1,000
Jan.	13	9436	2,000	3.92	1.96	2,000	3.92	1.96
	21	9889	1,000	2.00	2.00	3,000	5.92	1.97
	31	10247	2,000	3.88	1.94	5,000	9.80	1.96

At the month-end, the average per-unit costs for the month shown by the Labor Operation Cost Cards are recorded in the labor operations section of the Piece Part and Assembly Cost Sheets in the manner illustrated in Fig. 79 and Fig. 80. For fabricating labor operation #424-1, the January average per-1,000 cost recorded in the labor operations section of Fig. 79 is $1.96.

159. Completing the piece part and assembly cost sheets.

The Piece Part Cost Sheets are completed each month-end by recording thereon the average per-unit costs for that month shown by the Piece Part Material, Outside Operations, and Labor Operation Cost Cards of the included material, outside processes, and fabricating labor operations. Each Piece Part Cost Sheet then appears as in Fig. 79.

The Assembly Cost Sheets are completed each month-end by recording thereon the average per-unit costs for that month shown by the fabricated Piece Part Cost Sheets, Purchased Piece Part Cost Cards, and Assembly Labor Operation Cost Cards of the included piece parts and assembly labor operations. Each Assembly Cost Sheet then appears as in Fig. 80.

The factory burden, in operational cost accounting, is almost always applied as a blanket per cent of direct labor cost. To use the more accurate direct-labor-hour departmental burden rate for applying burden is usually impractical because of the undue accounting expense that would be involved in causing the piece part and assembly cost sheets to show by department the direct labor time applied.

160. Frequency of the cost test runs.

The frequency with which test-run costs of a labor operation or piece-part material must be obtained depends largely on the

stability of its costs. If the labor operation or piece-part material is of such nature or has been so thoroughly standardized that there is little likelihood of significant variation in successive costs, a test run every 60 or 90 days is probably sufficient. For a labor operation or material piece part for which successive costs show wide variations, test runs to determine costs may wisely be made as frequently as once or even twice a week. The thought, of course, is to incur the expense of a cost test run only if significant cost information is thereby obtained.

At regular intervals, the clerk in charge scans the piece-part material and labor operation cost cards to determine:

1. Piece-part materials and labor operations for which there have been no recent cost test runs.
2. Piece-part materials and labor operations whose unit costs fluctuate violently or are otherwise out of line.

He then makes out a *Request for Cost Test Runs* on a form such as is shown in Fig. 87. The Requests for Cost Test Runs

[Fig. 87]

REQUEST FOR COST TEST RUNS

DEPARTMENT NO. 4 DATE 1/14/—

FOREMAN Zulaski

Arrange immediately for cost test runs of the following labor operations. Report to the cost division any operation for which you cannot arrange a test run.

Oper. #	Oper. #	Oper. #	Oper. #	Oper. #	Oper. #	Oper. #
424-3	433-4	439-1	452-3	460-3	471-4	473-16
424-5	433-7	439-3	452-7	460-5	471-6	524-1
424-9	433-8	439-4	452-19	463-1	471-7	527-9
428-7	433-13	447-2	453-4	463-11	473-4	527-18
428-16	437-4	447-3	453-5	465-3	473-5	543-1
431-4	437-6	447-5	453-9	468-11	473-6	546-7
431-8	437-14	451-4	453-11	468-12	473-11	581-3
431-11	437-17	451-11	460-1	469-5	473-13	590-2

are sent to the foremen in charge of the operations involved, who arrange with the timekeeper to make the necessary test runs.

161. Test runs must be made under representative operating conditions.

For the test run costs to have meaning, it is necessary that the test runs be made under representative operating conditions. Thus, for piece-part material cost test runs, it is necessary that:

1. The base material be of the kind and quality usually used.
2. The quantity run be that usually made in one lot.

Again, for a labor operation cost test run, it is necessary that:

1. A worker of about average skill perform the work.
2. The tools used be of the kind usually employed for the operation.
3. The run take long enough to include all the conditions of work encountered in the factory work day. Thus, a test run of only fifteen minutes' duration is of little value, since for a period so short the tempo of labor can easily be greatly accelerated or slowed.

To assure that both the timing and count will be accurate, it is desirable that the test runs be made under the supervision of a trained timekeeper. The work can seldom be entrusted entirely to the departmental foreman.

162. More detailed costs developed under operational costing.

Of all the methods of cost accounting, the operational plan develops by far the most detailed cost information. In job-lot costing, *specific-lot* per-unit costs are developed for component parts and completed products. In process cost accounting, *average-for-the-period* per-unit costs are developed for manufacturing stages and completed products. In operational cost accounting, as shown by Figs. 79–86:

1. Both *specific-lot* and *average-for-the-period* per-unit costs are developed for each piece-part material, outside service, and labor operation (Figs. 79–86).
2. *Average-for-the-period* per-unit costs are developed for each piece part and assembly (Figs. 79 and 80).

When it is considered that each part, manufacturing stage, or finished product usually includes many material components and numerous labor operations, the greater cost detail developed under operational cost accounting is readily apparent.

163. Better cost information available under operational costing.

Under job-lot and process cost accounting, there are no per-unit data on component material and labor operation costs. It is, therefore, quite possible under those systems for sizable changes in the included costs of component parts, manufacturing stages, or finished products to be hidden or obscured by the offsetting of the lower costs of some of their material components and labor operations against the higher costs of others. This is

not the case under operational cost accounting. Here the per-unit costs and the trends therein of each material component, outside service, and labor operation are separately available. From the study of those separate costs, the management can act to keep low the cost of each included material component, outside service, and labor operation and, thus, to minimize the cost of each entire part and assembly.

Also, in operational costing, the cost forms are uniquely suited to (1) reflecting clearly the cost trends and (2) allowing the maximum in cost comparisons. Thus, the piece-part and assembly cost sheets of Figs. 79 and 80 disclose:

1. *The average-per-unit cost by month of each material component, outside service, and labor operation.* This makes it easy not only to discern the trend of costs for each material component, outside service, and labor operation, but also to compare the cost of each in, say, March with the cost in any other month.

2. *The effect on costs of each change in manufacturing method.* If a machining labor operation is replaced in July by a broaching one, the piece-part cost sheet will in the July column show the July cost of the broaching operation for comparison with the costs shown in the pre-July columns for the superseded machining operation.

Similarly, in Figs. 81, 83, 84, and 86, the successive run or lot costs of each purchased piece-part, made piece-part material, outside service, and labor operation are available for ready comparison to determine cost trends.

164. Further merits of operational cost accounting.

In addition to (1) often being applicable in instances where neither job-lot nor process cost accounting is practical, and (2) developing more detailed and usable cost data, the operational cost plan possesses further merits in that it:

1. *Concentrates the costing effort at the points where it is needed.* A labor operation on which the performance is poor or erratic is the subject of frequent test runs for cost, whereas one whose cost is low and stable is the subject of only an occasional test run for costs.

2. *Leads to scientific study of what the costs should be.* Once the material and labor operations needed to make an item are, as in operational cost accounting, clearly identified, scientific study can be undertaken as to what the material and labor operation costs should be. *Job analysis* and time and motion studies are natural concomitants of a plan for operational cost accounting.

In such a case, the plan is not only to find the costs, but also to create the manufacturing conditions under which the costs must be satisfactory.

3. *Facilitates reliable estimate of the new costs when the product design or method of manufacture is changed.* For instance, the forthcoming 19— model of a company's product involves:

25 new labor operations
175 labor operations previously performed

In estimating the probable cost of the 19— product, conjecture enters only into the cost of the 25 new labor operations.

ASSIGNMENT 14

Practice Set.

(*a*) Prepare and post the closing entries. Note that closing an expense control account also involves closing all the accounts of its subsidiary ledger.

(*b*) Rule the nominal accounts of the general and subsidiary ledgers in the manner illustrated in Chapter 12.

(*c*) Draft a trial balance after closing of the general ledger, using the form on Practice Set Page 35 for the purpose.

Problem 37.

You have applied for the position of executive cost accountant of the Stark Corporation. To test your capacity for analysis of cost data, the president of the company asks you to write a short report on the significant cost information disclosed by the following piece-part cost sheet:

PIECE PART COST SHEET

NO. 496 DESCRIPTION Ratchet

MATERIAL:	Jan.	Feb.	Mar.	April	May	June
Stainless steel	$ 8.41	$ 8.57	$ —	$ —	$ —	$ —
Aluminum	—	—	6.32	6.25	—	—
Magnesium	—	—	—	—	7.40	7.15
OUTSIDE OPERATIONS:						
Anodizing	$ —	$ —	$ .85	$ .85	$ .60	$ .60
LABOR OPERATIONS:						
1. Shearing	$ 1.21	$ 1.24	$ 1.40	$ 1.40	$ 1.55	$ 1.55
2. Stamping	2.11	2.12	2.40	2.40	2.60	2.60
3. Machining	3.21	3.12	2.14	2.36	2.13	2.12
4. Burring	1.41	1.42	—	—	—	—
5. Inspection	1.30	1.30	1.30	1.30	1.30	1.31
Total	$ 9.24	$ 9.20	$ 7.24	$ 7.46	$ 7.58	$ 7.58
FACTORY BURDEN—						
50% of LABOR	$ 4.62	$ 4.60	$ 3.62	$ 3.73	$ 3.79	$ 3.79
TOTAL FACTORY COST	$22.27	$22.37	$18.03	$18.29	$19.37	$19.12

You may assume that the utility and sales value of the ratchet is the same in all the months covered by the piece-part cost sheet.

Problem 38.

Referring to the piece part cost sheet of Problem 37, explain through what supporting records and forms you would trace sharp changes in the per-unit cost of:

(*a*) The material.
(*b*) Each fabricating labor operation.
(*c*) Each outside operation.

Question 126.

In operational cost accounting, what is the meaning of each of the following terms:

(*a*) Piece part?
(*b*) Fabricating labor operation?
(*c*) Subassembly?
(*d*) Finished product?
(*e*) Assembly labor operation?
(*f*) Outside operation?

Question 127.

What are the main costing points used under a plan of operational cost accounting?

Additional Work

Problem 39.

The Bostwick Company operates a process cost system. Material and labor are charged to the processes at actual, but factory burden is charged at 50 per cent of direct labor cost and correspondingly credited to the Factory Burden—Applied account. When the books were closed December 31, 1951, the inventory of uncompleted goods in Process "A" consisted of 1,000 units priced as follows:

Direct material	$6,750
Direct labor	2,000
Factory burden	1,000
Total	$9,750

The units in process were 80 per cent complete as to material content and 40 per cent done as to labor.

In 1952, work was begun on 12,000 additional units in Process "A." Materials used in the year cost $58,200, direct labor amounted to $41,400, and burden was applied at the 50 per cent of direct labor normal rate. In the year, 9,000 units were completed in Process "A" and transferred to Process "B." Of the 9,000 units transferred out of Process "A" in 1952,

6,000 were sold in the year;
1,000 are in Process "B" closing inventory of unfinished work;
2,000 are in closing finished goods inventory.

At December 31, 1952, the uncompleted goods inventory of Process "A" consisted of 2,000 units 75 per cent done as to material and 30 per cent done as to labor.

After the 1952 transfers between the in-process inventories, finished goods, and cost of goods sold had been recorded but before the books were closed for the year, it was discovered that in Process "A" the actual per cent of burden to direct labor cost was 60 per cent in 1951 and 70 per cent in 1952. For all the other processes, the 50 per cent rate used was the actual one.

Giving effect to the foregoing information, it is asked that you:

1. Compute for Process "A" the 1952 actual per-unit cost detailed as to cost elements.
2. Submit the entry to set up Unabsorbed Burden as a separate account balance.
3. Submit the entries to: (*a*) eliminate the balance in Unabsorbed Burden and (*b*) correct the opening balance of Earned Surplus.

Question 128.

Explain the use in operational cost accounting of each of these forms:

(*a*) Piece part cost sheet.
(*b*) Assembly cost sheet.
(*c*) Purchased piece part cost card.
(*d*) Piece part material cost test run ticket.
(*e*) Fabricated piece part material cost card.
(*f*) Labor operation cost test run ticket.
(*g*) Labor operation cost card.
(*h*) Request for test run.
(*i*) Outside operations cost card.

Question 129.

In what ways are the costs under operational cost accounting more detailed than those under job lot or process cost accounting?

Question 130.

What makes the cost data under operational cost accounting more usable than those under job lot or process cost accounting?

*

CHAPTER 15

Operational Cost Accounting—Further Procedures

165. Notices of changes in manufacturing procedure.

In every factory, changes are constantly being made in the material specifications and labor operations affecting the products. The task of the cost department is to assure that each such change is promptly reflected in the per-unit costs. In operational cost accounting, this task is done through a plan such as follows:

1. Each proposed change in material specifications and fabricating or assembly labor operations must be submitted to the works manager for approval.
2. If the proposed change is approved, a *Notice of Change in Manufacturing* is made out, signed by the works manager, and sent to the cost department.
3. Upon receipt of the Notice of Change in Manufacturing, the cost division proceeds to:

   (*a*) Note on the cost records the discontinuance of use of the old materials or labor operations.
   (*b*) Open cost cards for the new materials or labor operations.
   (*c*) Arrange for the test runs necessary to determine the costs of the new materials or labor operations.

Suitable *Notice of Change in Manufacturing* forms are illustrated in Fig. 88 and Fig. 89.

166. Spoilage costs.

If spoilage is of negligible amount or is fairly uniform in extent for all the piece parts and assemblies, the prevailing practice is to charge its cost as an item in the factory burden rate.

[Fig. 88]

NOTICE OF CHANGE IN MATERIALS SPECIFICATION

PIECE PART NO. 847 EFFECTIVE DATE 1/25/—
ASSEMBLY NO. —

FORMER MATERIAL Stainless Steel—16 gauge

NEW MATERIAL Aluminum Sheet ACO-8

REMARKS Aluminum is better for the purpose and is now available in sufficient quantities.

APPROVED Eugene Haiges
Works Manager

[Fig. 89]

NOTICE OF CHANGE IN LABOR OPERATIONS

PIECE PART NO. 845 EFFECTIVE DATE 1/27/—
ASSEMBLY NO. —

FORMER OPERATION		NEW OPERATION	
No.	Description	No.	Description
845-1	Machining	845-8	Broaching
845-4	Burring	—	None

REMARKS Broaching is cheaper than machining and makes possible elimination of the burring operation.

APPROVED Eugene Haiges
Works Manager

The charges to the factory burden account *Spoilage Expense* comprise:

1. *For irreparable spoilage,* the costs applied to the spoiled piece parts and assemblies to the point at which they were removed from in-process. This charge includes

not only the cost of the material but also that of the labor and burden.

2. *For repairable spoilage,* the material, labor, and burden costs incurred to restore the items.

When a piece part or assembly is found to be irreparably spoiled, the foreman makes out a *Spoilage Report* such as is shown in Fig. 90.

[Fig. 90]

SPOILAGE REPORT

PIECE PART NO. 424 DATE 1/14/—
ASSEMBLY NO. _____ DEPT. 5
SPOILED IN OPER. NO. 424-2 REMARKS Bevel off line; due to poor machine setup.

Particulars	MATERIAL	LABOR
COST PER 1000 THROUGH POINT OF SPOILAGE	$1.21	$4.26
UNITS SPOILED	500	500
COST OF THE SPOILAGE	$ .61	$2.13

As the spoilage reports reach the cost office, the spoilage is priced at the cost through the point of spoilage shown by the items' cost sheets. Thus, Fig. 90 shows that piece part #424 was spoiled in labor operation #424-2. Reference to the Fig. 91 cost sheet of piece part #424 shows that for January its cost per 1000 units through labor operation #424-2 was material $1.21 and labor $4.26 (operation #424-1—$1.96 and operation #424-2—$2.30). The cost of the 500 defectives is therefore extended on the spoilage report as:

Material..... $1.21 × 500/1000..... = $ .61
Labor..... $4.26 × 500/1000..... = $2.13

At the month-end, the cost amounts shown by the spoilage reports are added, and a journal entry such as follows is made:

Spoilage Expense	$1,585.78	
Material in Process		$430.44
Labor in Process		577.67
Burden in Process (100% of Labor)		577.67

Summary of January 19— spoilage costs; spoilage reports 748-816 inclusive.

The credits are to the in-process accounts so as to remove from the floor inventories the cost of the irreparably spoiled items.

Piece parts and assemblies determined to be defective, but not irreparably so, are accumulated until there are enough of

[Fig. 91]

BELL INC.
PIECE PART COST SHEET

PIECE PART NO. 424

DESCRIPTION—Panel Door

Particulars	TEST RUN AVER			AGE COST PER 1,000		
	Jan.	Feb.	Mar.	Oct.	Nov.	Dec.
BASE MATERIALS:						
14 gage stainless steel	1.21	1.22	1.22	1.23	1.23	1.22
OUTSIDE OPERATIONS:						
Anodizing (#424-A)	2.60	2.60	2.60	2.40	2.40	2.40
Chrome plating (#424-C.P.)	3.51	3.51	3.51	3.43	3.43	3.43
Total outside operations cost	6.11	6.11	6.11	5.83	5.83	5.83
LABOR OPERATIONS:						
424-1 Cutting	1.96	2.86	2.14	1.84	1.75	1.63
424-2 Bevelling	2.30	2.30	2.30	2.21	2.21	2.21
424-8 Burring	3.14	3.42	3.31	3.24	3.34	3.34
424-9 Inspection	2.16	2.28	2.24	2.28	2.31	2.29
Total labor cost	43.86	44.81	45.26	44.23	43.21	42.81
BURDEN AT 100% OF DIRECT LABOR	43.86	44.81	45.26	44.23	43.21	42.81
TOTAL FACTORY COST	95.04	96.95	97.85	95.52	93.48	92.67

them to warrant a *Rework Job.* The costs of each such rework job are accumulated on a *Rework Job Cost Sheet* such as is shown by Fig. 92.

[Fig. 92]

REWORK JOB COST SHEET

JOB NO. 8421 STARTED 1/18/—
DESCRIPTION December Spoilage DONE 1/24/—

MATERIAL			LABOR		
19—		Amount	19—		Amount
Jan.	8	14.26	Jan.	9	9.46
	10	7.85		12	18.52
	13	9.36		14	13.65
		31.47		18	14.27
				24	17.44
					73.34

SUMMARY	
MATERIAL	$ 31.47
LABOR	73.34
BURDEN—(100% of Labor)	73.34
Total Cost	$178.15

At the month-end, the costs shown by the Rework Job Cost Sheets are charged to *Spoilage Expense* with an entry such as follows:

Spoilage Expense	$971.92	
Material in Process		$194.16
Labor in Process		388.88
Burden in Process (100% of labor)		388.88

Summary of January 19— rework job cost sheets #8421–8429.

The credits are to the in-process accounts so as to remove from the floor inventories the extra material, labor, and burden used to complete the repairably spoiled items.

167. Keeping the book inventories.

In operational as in job-lot cost accounting, it is practicable to maintain *book inventories in units* for the base materials, piece parts, and assemblies kept in the storeroom, thus:

[Fig. 93]

BASE MATERIAL NO. — DESCRIPTION ___ MAX. 15,000
PIECE PART NO. 424 Panel door for
ASSEMBLY NO. — gear box MIN. 6,000

19—		Details	In	Out	Balance
Jan.	8	From machine shop	6,250		6,250
	10	" " "	4,000		10,250
	16	To Abart Plating		3,100	7,150
	24	" " "		500	6,650
		From machine shop	3,300		9,950
		" " "	2,000		11,950
	27	To Abart Plating		5,000	6,950
	28	From machine shop	2,500		9,450

The charges to the accounts with the base materials and purchased piece parts are made from the invoices covering their purchase. The charges to the accounts with the made piece parts and assemblies are made from the production reports covering their delivery to the storeroom. The credits to the accounts with the base materials, piece parts, and subassemblies are made from the requisitions directing their issue to the fabricating departments or to outside processors. The credits to the accounts with the final assemblies are made from the orders directing their delivery to the shipping room.

[Fig. 94]

WORK IN PROCESS INVENTORY

PIECE PART NO. 424 TEST COUNTED 10/7; 1/28;
ASSEMBLY NO. _____

MACHINE SHOP

19—		Dr. In.	Cr. Out	Balance
Jan.	8	14,500		
	7		8,000	6,500
	16	8,000		14,500
	21		5,000	9,500
	28		50	9,450

BURRING

19—		Dr. In.	Cr. Out	Balance
Jan.	7	8,000		8,000
	9		2,000	6,000
	11	5,000		11,000
	24		7,000	4,000
	28		25	3,975

19—

ACCOUNT

DESCRIPTION Panel door for gear box

OUTSIDE PROCESSORS

19—		Name	Dr. In.	Cr. Out	Balance
Jan.	11	Abart Plating	4,500		4,500
	13	Chicago Plating	1,500		6,000
	16	Abart Plating		2,000	4,000
	28	Chicago Plating	7,500		11,500

For *in-process* piece parts and assemblies, book inventories, even in quantities only, are difficult to maintain. The small size of many of the piece parts makes counting them difficult and losses in their handling inevitable. Further, it is expensive to record their many transfers among the departments and outside processors. If a book inventory *in quantities* for the piece parts and assemblies in process is attempted, an in-process inventory form such as illustrated by Fig. 94 is used. This kind of inventory form shows for each department and outside processor in which the item is worked upon: (1) Debit—the quantity transferred in; (2) Credit—the quantity transferred out; (3) Balance—the quantity on hand. Entries in the account for *transfers* are made by the stores ledger clerk from the information shown by inventory *transfer memos* such as is illustrated in Fig. 95.

[Fig. 95]

INVENTORY TRANSFER MEMO

DATE 1/7/— TRANSFERRING DEPT. Machine Shop

DELIVERED 8,000 UNITS OF PIECE PART 424 ASSEMBLY —

TO Burring RECEIVED DELIVERY B. Gollub

Foreman—Burring

The correctness of the information on the inventory transfer memo is signed for by the foreman of the department receiving the transfer.

When a transfer memo discloses delivery to the storeroom of a completed assembly, the credit to the involved in-process piece part or subassembly accounts is for the quantity of each required to make that number of the assembly. Thus, if 500 of subassembly #430, whose cost sheet appears in Fig. 96, are delivered to the storeroom, charge is made for 500 units to the inventory account with subassembly #430 and credit is made for 500 units each to the in-process inventory accounts of subassembly #424, piece part #429, and so on.

168. Spot-check physical counts to supplement the book inventories. However carefully the book inventory records are kept, it is difficult when the inventory items are small and frequently transferred to keep them completely accurate. As a supplement to the book records, it is therefore desirable to make occasional spot-check physical counts of the inventory items. A few items are counted each day, and within, say, a 90-day period, each item in the book inventory is corrected at least once to a physical

[Fig. 96]

BELL, INC.
ASSEMBLY COST SHEET

ASSEMBLY NO. 430

DESCRIPTION Gear Box

Particulars	TEST RUN AVERAGE COST PER 1,000					
	Jan.	Feb.	Mar.	Oct.	Nov.	Dec.
PIECE PART COMPONENTS:						
#424—Panel door	95.04	96.95	97.85	95.52	93.48	92.67
425—Casement	430.76	427.18	427.49	431.46	433.15	430.29
426—Hinge	16.85	17.02	17.15	16.96	17.01	16.98
429—Knob	14.41	14.87	14.64	15.02	14.85	14.62
Total parts cost	557.06	556.02	557.13	558.96	558.49	554.56
ASSEMBLY LABOR OPERATIONS:						
#430-1—Fitting door to casement	13.43	14.16	13.12	14.75	15.02	14.26
430-2—Hinging door to casement	26.37	25.18	27.13	26.85	25.14	24.86
430-4—Affixing knob on door	9.86	9.27	10.03	11.05	10.26	9.92
430-9—Inspection	15.22	16.03	15.91	15.60	14.98	14.89
Total labor cost	149.42	166.16	159.12	164.13	158.26	150.94
BURDEN AT 100% OF LABOR	149.42	166.16	159.12	164.13	158.26	150.94
TOTAL FACTORY COST	855.90	888.34	875.37	887.22	875.01	856.44

count. A form suitable for use in the spot-check physical inventory count procedure is illustrated by Fig. 97.

The *stores ledger clerk* lists the inventory items to be counted and the book quantity of each. The *inventory checker* makes the physical counts, records the quantities in the physical count column, and returns the form to the stores ledger clerk. The stores ledger clerk fills in the "over or short" column, makes the ledger entries necessary to adjust the book inventories of the items listed to their physical counts, and then sends the form to the cost division. In the cost division, the "over or short" column is priced and submitted for review by a cost executive. If he finds that the daily inventory counts show sizable and continuous shortages, he looks into the cause.

Obviously, the spot-check physical count of the inventories procedure described in this section is also applicable with advantage to systems of cost accounting other than the operational one.

[Fig. 97]

SPOT-CHECK PHYSICAL INVENTORY COUNTS

DATE 1/18— COUNTS BY Sunde ACCOUNTS CORRECTED RWR

Part or Assembly #	QUANTITIES PER		Over or (Short)	Cost Per 1,000	Cost of Overage or (Shortage)
	Book Account	Physical Count			
848	8,485	8,460	(25)	$10.00	$ (.25)
949	17,145	17,140	(5)	40.00	(.20)
918	4,300	4,305	5	20.00	.10
867	1,800	1,798	(2)	15.00	(.03)
537	20,400	18,000	(2,400)	5.00	(12.00)
487	42,900	40,900	(2,000)	8.16	(16.32)
961	8,400	8,600	200	6.50	1.30
819	7,600	7,600	—	—	—
Totals					$(71.46)

169. Taking and pricing a physical inventory.

The base materials, piece parts, and assemblies located in the storeroom or warehouse are counted and listed in the usual way and priced at the then-prevalent test run costs. For items in process, it is necessary in the listing to note *through what operation the item has been processed.* Pricing of the item is then made at its prevalent test run cost *through that point of completion* as disclosed by the item's test run cost sheet, thus:

[Fig. 98]

WORK IN PROCESS INVENTORY SHEET

CALLED BY Reiker SHEET NO. 94 PRICED BY Lewin

LISTED BY Sunde DATE 1/31/— EXTENDED & FOOTED BY Schulze

Part #	Thru. Oper. #	Description	Quantity	Materials	Labor	Burden at 100% of Labor
424	2	Panel door	2,000	$ 2.42	$ 8.52	$ 8.52
424	4	Panel door	3,000	3.63	18.97	18.97
822	5	Ratchet	5,460	21.36	84.15	84.15
824	8	Gear binder	4,750	19.87	39.88	39.88
Sheet totals				$946.13	$1,841.16	$1,841.16

Reference to the piece part cost sheet of Fig. 91 shows that the January 19— cost per 1,000 of piece part #424 through operation #2 was $5.47, made up of:

Material		$1.21
Labor Operation #1	$1.96	
Labor Operation #2	2.30	4.26

From this information, the cost of the 2,000 part #424's through operation #2 is extended on the in-process inventory sheet as:

Material—2,000 at $1.21 per 1,000 =	$2.42
Labor—2,000 at $4.26 per 1,000 =	8.52
Burden—100% of direct labor =	8.52

170. Pricing the book inventories for use in interim statements.

For *interim statements*, the base material, piece part, and assembly quantities shown by the book records are priced at the then-prevalent test run costs. Items in process are customarily priced at the sum of:

1. Their test run costs through the departments they have completed using, plus
2. Half the test run costs of their scheduled operations in the department in which they were being processed when inventoried.

The premise in this pricing plan is that, on the average, the items in process in a department are about half through using it. This is, of course, not always true, but for practical purposes no better pricing plan is easily available.

171. Variation between the actual production cost outlays and the value of the production at the test run costs.

If the test run costs were exactly accurate, the value of the production priced at the test run costs would precisely equal the sum of the actual material, labor, and burden outlays. Since the test run costs are not exactly accurate, some variation always exists between the actual cost outlays and the value of the production priced at the test run costs. The amount, by each cost element, of this variation is developed by charging and crediting the general ledger *Material in Process*, *Labor in Process*, and *Burden in Process* accounts as follows:

[Fig. 99]

MATERIAL IN PROCESS

The actual cost of the materials used in the period... $28,080—	
	The material content of the goods completed in the period priced at the test run cost current at the date of completion of each product lot
	$25,000—
	The material content of the closing in-process inventory priced at the then-current test run cost
	2,000—

LABOR IN PROCESS

The actual direct labor costs in the period..... $48,300—	
	The labor content of the goods completed in the period priced at the test run cost current at the date of completion of each product lot
	$40,000—
	The labor content of the closing in-process inventory priced at the then-current test run cost
	6,000—

BURDEN IN PROCESS

The actual factory burden costs in the period..... $36,570—	
	The burden content of the goods completed in the period priced at the test run cost current at the date of completion of each product lot
	$30,000—
	The burden content of the closing in-process inventory priced at the then-current test run cost
	4,500—

The charges to the in-process accounts for the *actual cost outlays* in the period are effected in the same way as such charges are made to those accounts in job-lot cost accounting. The credits to the in-process accounts for the cost at test run of the goods completed in the period are effected by posting the material, labor, and burden column footings of a Finished Goods Journal in which the goods as completed were recorded at their then-current test run cost. Since the in-process inventory sheets (see Fig. 98) show the element makeup of the uncompleted goods, the credits to the in-process accounts for the closing in-process inventory are made by recording the grand footings of the in-process inventory sheets with an entry such as follows:

Closing Work in Process Inventory	$12,500	
Material in Process		$2,000
Labor in Process		6,000
Burden in Process		4,500

To record the closing in-process inventory at its value at current test run cost. For detail see the summary of the in-process inventory sheets.

After the in-process accounts have been charged and credited in the manner described, the balance in each measures the variation in the period for that element of the actual from the test run cost of the production. The in-process accounts are then closed and the variations from test run cost recorded in a separate ledger account with an entry such as follows:

Variation from Test Run Costs	$ 5,450	
Material in Process		1,080
Labor in Process		2,300
Burden in Process		2,070

The in-process account (Fig. 99) shows:	Material	Labor	Burden
The *debits* for the *actual cost* outlays in the period to be	$28,080	$48,300	$36,570
The *credits for* the value at *test run cost* of the goods completed and closing in-process inventory to be	27,000	46,000	34,500
The *variation* of the actual from the test run costs is, therefore, the *balance of the in-process account*, or	$ 1,080	$ 2,300	$ 2,070

If it is desired to know, by cost element, the per cent as well as the amount of the variation of actual from test run cost, the *per cent of variation* is computed as follows:

[Fig. 100]

$$\text{Material} = \frac{\text{Variation from Test Run Cost } \$\ 1,080}{\text{Production at Test Run Cost } \$27,000} = 4\%$$

$$\text{Labor} = \frac{\text{Variation from Test Run Cost } \$\ 2,300}{\text{Production at Test Run Cost } \$46,000} = 5\%$$

$$\text{Burden} = \frac{\text{Variation from Test Run Cost } \$\ 2,070}{\text{Production at Test Run Cost } \$34,500} = 6\%$$

The production in the period consists of the goods completed plus the closing in-process inventory. Thus, for material, at test run cost, the production in the period is shown by the credits in the Material in Process account (See Fig. 99) to have been $27,000.

172. Finished goods and cost of sales accounts under operational costs. The *Finished Goods* account is debited in operational cost accounting for the cost at test run of the goods completed in the

period by posting from a Finished Goods Journal in which the goods as completed were recorded at their then-current test run costs, thus:

Finished Goods	$95,000	
Materials in Process		$25,000
Labor in Process		40,000
Burden in Process		30,000

Posting summary of the finished goods journal.

The *Cost of Goods Sold* account is charged and the *Finished Goods* account is credited in operational cost accounting for the cost at test run of the goods sold in the period by posting from the cost column of a sales journal in which the items as sold were recorded at their then-current test run cost, thus:

Cost of Goods Sold	$76,000	
Finished Goods		$76,000

Posting summary of the cost column of the sales journal.

After posting entries such as illustrated above, the *Finished Goods* and *Cost of Goods Sold* accounts appear as follows:

[Fig. 101]

FINISHED GOODS

Goods completed priced at test run cost	$95,000	$76,000	Goods sold priced at test run cost

COST OF GOODS SOLD

Goods sold priced at test run cost	$76,000

173. Significance of the variations from test run cost.

If the variations between the actual cost outlays and the value of the production at the test run costs are small, the indication is that, on the whole, the test run costs are accurate. If the variations are large, investigation should be made to ascertain whether the variations stem mainly from:

1. Incorrect test run costs, or
2. Inaccurate production and inventory quantity statistics.

If the test runs for cost purposes are made under most favorable rather than under representative operating conditions, the test run costs are too low, and the actual cost of the production will exceed its value at those too-low test run costs. Again, if 10,000 units are produced but the production statistics include only 8,000 of them, the actual cost of the 10,000 units produced

will exceed the test run cost value of the 8,000 units recorded as produced.

174. Disposition of the variations from test run cost.

When the variations from test run cost are small, the common practice is to close them into:

1. *Cost of goods sold,* if the variation is believed to be due to factors reasonably within the control of the factory management, as, for instance, slack labor discipline, poor scheduling of work, or inefficient utilization of material.
2. *Profit and loss,* if the variation is believed to be due to factors outside the reasonable control of the factory management, as, for instance, idle time due to lack of sales or strikes.

If (1) the variations from the test run costs are sizable, (2) much of the production is included in the closing inventory, and (3) it is believed that the test run costs are not representative, the best practice is to prorate the variations from test run cost between the closing inventories and the cost of goods sold with entries such as follows:

Closing Work in Process Inventory	$ 650	
Variation from Test Run Costs		$ 650

In Process Element	Value at Test Run Cost	Variation from Test Run Cost: Per Cent	Variation from Test Run Cost: Amount
Material	$ 2,000	4	$ 80
Labor	6,000	5	300
Burden	4,500	6	270
Totals	$12,500		$650

Finished Goods Inventory	$ 960	
Cost of Goods Sold	3,840	
Variation from Test Run Costs		$4,800

Total variation from test run costs	$5,450	
Allocated to closing in-process inventory	650	
Balance to finished goods and cost of sales	$4,800	
Allocated to—		
Finished goods 20% or	$ 960	
Cost of goods sold 80% or	3,840	
Total 100% or	$4,800	

The variation divisible between closing *Finished Goods Inventory* and *Cost of Goods Sold* is allocated to them on the basis of their *relative values at test run cost.* In this instance, at test run cost:

Closing finished goods inventory is	$19,000
Cost of goods sold is	76,000
Total	$95,000

The per cent, therefore, of the variation from test run cost allocated to:

Finished goods inventory is $\frac{\$19,000}{\$95,000}$ or 20%.

Cost of goods sold is $\frac{\$76,000}{\$95,000}$ or 80%.

ASSIGNMENT 15

Problem 40.

The operational cost system of the Brandon Company shows the average test run per-unit costs of its three products to have been as follows in 19—:

	Product		
Cost Element	#1	#2	#3
Materials	$ 2	$ 3	$4
Labor	6	9	3
Factory burden	4	6	2
Total	$12	$18	$9

The Company's 19— opening and closing inventories, as determined by careful physical counts, priced at the then-current test run costs were as follows:

Particulars	Jan. 1, 19—	Dec. 31, 19—
Raw materials	$8,000	$6,000
Material in process	6,250	6,500
Labor in process	8,270	8,400
Burden in process	6,920	5,600

Production and sales of finished units in the year are shown by the production records to have been:

Product	Number of Units	
No.	Made	Sold
1	4,000	3,200
2	3,000	2,500
3	6,000	5,400

For the year, the bookkeeping records show the manufacturing expenditures to have been for:

(a) Materials purchased	$44,000
(b) Direct labor costs	73,000
(c) Factory burden items	55,000

It is asked that, using the foregoing information, you:

1. Present in "T" form the accounts with Materials, Material in Process, Labor in Process, Burden in Process, Finished Goods, and Cost of Goods Sold.

2. Submit the journal entry to record, by cost element, the variation of actual from test run cost.

3. Compute, by cost element, the per cent of variation of actual from test run cost.

4. Submit the journal entries necessary to prorate the variations of actual from test run costs between cost of goods sold and the closing inventories.

5. Explain two other methods of disposing of the variations from test run cost and the premise underlying each of those methods.

6. Comment on the significance of the variations of the actual from the test run costs and the factors which might account for the variations.

Question 131.

Explain some of the merits of operational cost accounting.

Question 132.

Explain the use in operational cost accounting of each of these forms:

(*a*) Inventory transfer memo.
(*b*) Notice of change in manufacturing processes.
(*c*) Spoilage report.
(*d*) Rework job cost sheet.

Question 133.

Is it conceivable that the variation of actual from test run costs might not be disposed of in the same way for all the elements of cost?

Additional Work

Problem 41.

The Maremont Cloak Company uses an operational cost system. In December 19— the actual costs of the production were as follows:

Materials	$720.00	greater than test run
Labor	180.00	" " " "
Factory Expense	240.00	less " " "

The goods completed in the month and the ending work in process inventory at test run cost values were as follows:

Cost Element	Included In: Goods Completed	Included In: In-Process Inventory
Materials	$7,600.00	$1,400.00
Labor	4,000.00	500.00
Factory Burden	2,800.00	200.00

In the month, 75 per cent of the goods completed were sold to customers on credit for $21,000.

From the foregoing information as to cost outlays, production, and sales, it is asked that you:

(1) Present these accounts in "T" account form and clearly label the items appearing in each of them:

(*a*) Materials in Process Inventory.
(*b*) Labor in Process Inventory.
(*c*) Burden in Process Inventory.
(*d*) Finished Goods Inventory.
(*e*) Cost of Goods Sold.
(*f*) Variation from Test Run Cost.

(2) Compute the per cent of variation of actual from test run cost for each of the cost elements.

(3) Submit the journal entries required to apportion the variation of actual from test run between cost of goods sold and the inventories.

(4) Explain the theory which underlies each of three possible ways of disposing of the variations from test run cost.

Question 134.

Under an operational cost system, how are the book inventories priced for purposes of the interim statements?

Question 135.

Describe the procedure employed in taking and pricing a physical inventory under an operational cost system.

Question 136.

Is the operational plan of cost accounting an interlocking cost system? Give the reasons for your answer.

Question 137.

Referring to the data of Problem 40, present the actual cost in 19— of Product #1. Explain why the actual cost you compute for Product #1 may not be a reliable cost.

Question 138.

In what ways do spoilage reports and rework job cost sheets, such as illustrated in Figures 90 and 92, aid management in controlling the manufacturing costs?

Question 139.

Why is it necessary under an operational cost system to supplement the book inventories with frequent physical test counts of the inventory items?

Question 140.

What are the necessary conditions for a successful test run of costs under an operational cost system?

Question 141.

Price the following in-process inventory of Piece Part #496, referred to in Problem 37, taken at June 30, 19—. The anodizing operation is performed immediately following the burring operation.

Completed Through Operation No.	Quantity	Remarks
496-1	1,580	
496-2	2,350	
496-3	3,190	
496-4	3,250	Not yet anodized
496-4	4,100	Anodized

Question 142.

Referring to Question 141, how would you price Piece Part #496 completed partly but not entirely through operation #3?

Question 143.

Explain whether the account balance variation of actual from test run costs includes the expense of spoilage.

CHAPTER 16

Cost Standards

175. Responsibility for increase or decrease in material or labor costs. Increase or decrease in the per-unit material cost of a piece part may be due to:

a. Increase or decrease in the *price* of the material,
b. Increase or decrease in the *quantity* used of the material,
c. A combination of change in the price and quantity used of the material.

Similarly, increase or decrease in the per-unit cost of a labor operation may be due to:

a. Increase or decrease in the *price* of the labor,
b. Increase or decrease in the *quantity* used of the labor,
c. A combination of change in the price and quantity used of the labor.

The factory management cannot control the market prices it pays for material and labor. Therefore, cost changes due solely to increased or decreased material or labor *prices* cannot be ascribed to factory efficiency. If raw cotton which cost 10 cents a pound advances to 20 cents, factory efficiency is not to blame because a cotton sheet which had a 30-cent material cost now has a 60-cent one.

Conversely, the factory management, through its direction of the manufacturing methods, has complete control of the *quantities* of material and labor used per unit of output. Therefore, increases or decreases in the per-unit costs due wholly to larger or smaller quantities of material or labor used are ascribable solely to factory efficiency. Thus, lower factory efficiency is to blame if the cost of labor operation "A" is higher solely because it now takes more time to perform it.

176. Inadequacies of the usual per-unit cost data.

A main purpose of cost accounting is to develop unit costs which can be used by the factory management to:

1. Measure changes in production efficiency.
2. Judge the adequacy of production performance.

The unit costs of the usual job-lot, process, or operational cost plan are unsatisfactory for measuring changes in *production efficiency* because increases or decreases in them are due not only to *production efficiency* (more or less material or labor *quantities* used), but also to *market factors* (higher or lower material or labor *prices*). Thus, an increase in the per-unit cost of labor operation "A" could be due to any one of these combinations:

1. The time used was the same but the price per hour increased; that is, higher prices caused the entire cost rise.
2. The time used increased but the price per hour was the same; that is, lower production efficiency caused the entire cost rise.
3. The time used and the price per hour both increased; that is, both lower production efficiency and higher prices contributed to the cost rise.
4. The time used decreased but the price per hour increased; that is, better production efficiency decreased the cost, but this was more than offset by the cost rise caused by the higher price of labor.
5. The time used increased but the price per hour decreased; that is, lower production efficiency increased the cost, but this was partly offset by the cost decrease caused by the lower price of labor.

Because a change in cost due to the efficiency factor of more or less time used may be accentuated or obscured by a change in cost due to the market factor of higher or lower labor prices, increase or decrease in a labor operation's cost is not a clear, and therefore usable, indicant of change in the efficiency with which the operation was performed.

The unit costs determined under the usual job-lot, process, or operational cost system are also unsatisfactory for judging the *adequacy of production performance*, because they provide for purposes of comparison no indication of what the cost should be if the factory operates efficiently. Thus, the per-unit costs of labor operation "A" on which the rate per hour has been constant were as follows:

July	$2.00
August	1.90
September	1.82

Study of the successive labor operation "A" costs shows their direction to be satisfactory, but whether even $1.82 measures an adequate performance is not determinable because it is not known what the cost should be if the operation were performed efficiently.

177. Making the costs completely usable by factory management.

To make the unit costs completely usable by the management for (1) measuring changes in production efficiency and (2) judging the adequacy of production performance, many factories use, in the cost accounting for material and labor, (*a*) *fixed prices* and (*b*) scientifically developed *quantity norms.*

The use of *fixed prices* causes the changes in the per-unit material or labor costs to arise solely from changes in the quantity of material or labor used, and, therefore, to measure exactly the changes in production efficiency. Thus, if at the same $1.00-per-hour rate, the successive per-unit costs of labor operation "A" are:

July	$2.00
August	1.92
September	1.80

it can be incontestably concluded that efficiency in the use of labor is improving and that between July and September the labor time used to perform labor operation "A" decreased $.20 ÷ $2.00, or 10 per cent.

The scientifically determined *norms* for material and labor quantities to be used per unit of product give to factory management the basis for judging accurately the adequacy of production performance. If one hour is scientifically determined to be sufficient time to perform labor operation "B," and at the fixed price of $1.00 per hour the per-unit cost of the operation is:

July	$2.00
August	1.90
September	1.82

the clear conclusion is that, while production performance on labor operation "B" is improving, the best cost so far ($1.82) falls far short of the $1.00 cost which the labor quantity norm shows should be attained.

178. Cost standards; standard costs.

The *fixed prices* and *quantity norms* used to improve the usefulness of the cost data to factory management are termed *cost standards*. The *fixed prices* are referred to as *price standards*, and the *quantity norms* as *quantity standards*. The unit costs determined by pricing the standard quantities at the standard prices are termed *standard costs*. Thus, if for labor operation "C" the labor quantity standard is two hours, and if the price standard for that kind of labor is \$1.50 per hour, the standard cost of labor operation "C" is $2 \times \$1.50$, or \$3.00. Similarly, if for piece part "D" the material quantity standard is three pounds of tool steel of standard price \$.80 a pound, the standard material cost of piece part "D" is $3 \times \$.80$, or \$2.40.

179. Arriving at the standard costs.

Every manufactured product, however simple or intricate, is made up of one or more *piece parts*. The cost of each piece part consists of the sum of the costs of:

a. The one bit of *base material* from which it is made, and
b. The *fabricating labor operations* required to fashion it from the base material.

Similarly, the cost of the product consists of the sum of the costs of:

a. The *piece parts* which compose it, and
b. The *assembly labor operations* required to put the piece parts together.

If subassemblies are intermediate in the manufacture of the final product, the cost of each subassembly is the sum of the costs of:

a. The piece parts which compose it, and
b. The *assembly labor operations* required to put the piece parts together;

and the cost of the final product is the sum of the costs of:

a. The *piece parts* and *subassemblies* which compose it, and
b. The *assembly labor operations* required to put the piece parts and subassemblies together.

To arrive at the various *standard costs*, the usual procedure is as follows:

1. Determine the quantity and price standards for (*a*) each piece part material and (*b*) each labor operation.

2. Compute the standard cost of (*a*) each *piece part material* and (*b*) each *labor operation* by pricing the standard quantity at the standard price.

3. Compute the standard cost of each *piece part* by adding the standard costs of the included (*a*) piece part material and (*b*) fabricating labor operations.

4. Compute the standard cost of each *subassembly* by adding the standard costs of the included (*a*) piece parts and (*b*) assembly labor operations.

5. Compute the cost of the *final product* by adding the standard costs of included (*a*) piece parts, (*b*) subassemblies, and (*c*) assembly labor operations.

180. Determining the required piece parts and labor operations.

In operating with cost standards, the factory's production division *predetermines* for each product:

1. The required assemblies.
2. The piece parts constituting each assembly.
3. The base material making up each piece part.
4. The labor operations required to fashion each piece part and put together each assembly.
5. The tools and personnel needed to perform each fabricating and assembly labor operation.

These data concerning the production are, as developed, reduced to writing in the forms of (*a*) piece-part and assembly drawings and (*b*) production layout sheets. The functions of these drawings and layout sheets will be described.

181. Piece-part and assembly drawings.

A drawing is made of each piece part, subassembly, and final assembly. The drawing of each piece part shows:

1. The part's form and dimensions.
2. The kind and quality of material from which the part is made.

Similarly, the drawing of each sub- or final assembly describes:

1. The included piece parts and/or subassemblies.
2. How the parts or subassemblies are put together.
3. The appearance of the completed assembly.

Copies of the piece-part and assembly drawings are obtained by blueprinting them. Such copies of the drawings are termed *blueprints.*

182. Production layout sheets.

A production layout sheet is made for each piece part, subassembly, and final assembly. This production layout sheet shows:

1. The labor operations required to fashion the piece part or put together the assembly in the order in which those operations should be performed.
2. The kind of personnel and tools needed to perform each labor operation most effectively.

Figure 102 following illustrates a typical form of production layout sheet.

[Fig. 102]

PRODUCTION LAYOUT SHEET

PIECE PART No. 424 DRAWING No. A-P-424

ASSEMBLY No. APPROVED 8/16/—

(If this layout cannot be followed, notify the engineering dept.)

Dept.	Operation	Machine or Tool	Personnel
A	1 Spot .265″-dia. hole.	$1\frac{7}{64}$″ power drill	Line labor
A	2 Drill .265″ hole $1\frac{9}{32}$ deep.	$\frac{1}{4}$″ power drill	Line labor
A	3 Ream .265″ hole ± .002.	$\frac{1}{4}$″ power drill	Line labor
A	4 Countersink .136″ hole.	$\frac{3}{16}$″ power drill	Line labor
A	5 Tap S-32 per E.S.88.	Smyth-automatic	Tool man
B	6 Remove burrs.	Rat-tail file	Line labor
C	7 Inspect.	Gauge RT-4726	Govt. inspector

183. Setting the piece part material quantity standards.

The parts drawings show the piece parts to be made and for which, therefore, quantity standards in terms of weight, volume, or area of the base material to be used must be set. These piece-part material-quantity standards are set by the company's engineers, taking into consideration:

1. The material and material grade which should be used best to achieve the purpose of the part. Thus, a piston pin is in normal use subject to exceptional strain. It is, therefore, specified under standard to be made of the best-grade chrome steel.
2. The product layout which will minimize the amount of scrap material. Thus, in paper-box manufacture, it is specified

under standard to blank out razor blade and spice carton forms from space on the sheets which would otherwise be unused in blanking out large carton forms.

A piece-part material-quantity standard set in this way measures the material quantity which should be used per unit of the part made if the company employs the best production methods available to it.

184. Setting the operation labor and burden-quantity standards.

The production layout sheets disclose the fabricating and assembly operations to be performed and for which, therefore, labor and burden quantity standards in terms of time must be set.

Ideally, the *labor-quantity standard* for each fabricating and assembly operation is set by the company's engineers through a combination of job, motion, and time studies. The purpose of the *job study* is to determine the kind of *machinery and personnel* needed to perform the operation most expeditiously. The *motion study* is made to determine the *movements* the worker should make to execute the operation most effectively. The *time study* is undertaken to determine the *time required* to perform the operation when using the best available methods disclosed by the job and motion studies. The time determined by the time study as reasonably necessary to perform the operation when using the best available methods constitutes its *labor-quantity standard.*

If burden is distributed as a rate per direct labor hour, the *burden-quantity standard* of each fabricating and assembly operation is determined when the standard time allowed to perform it is set. If fifteen minutes is the labor-quantity standard for an operation, fifteen minutes is also the burden-quantity standard for that operation.

185. Performance level of the quantity standards.

The quantity standards for material, labor, and burden are usually and preferably based on the level of the *good performance* rather than the ideal one. In line with this good- rather than ideal-performance basis, the material-quantity standards include an allowance for reasonable wastage and spoilage, and the labor-quantity standards include a reasonable allowance for time lost unavoidably.

It is sometimes argued that the quantity standards should be based on the *ideal* rather than just the good performance. In

such a case, it is reasoned, the standard will represent an *ultimate goal,* and the variation between the actual and standard cost will measure the extent to which the actual performance falls short of what is theoretically possible. The objections to ideal performance as the basis for the quantity standards are that in such a case:

1. The standards are not attainable.
2. The variations from standard fail to measure avoidable waste.

Experience shows that, when the standards are clearly unattainable, the employees fail to take them seriously. The attitude is that, since the standards cannot be attained, why strive toward them?

When the variations from standard fail solely to measure avoidable waste, the problem of correctly disposing of the cost of the variations of the actual from the standard quantities is complicated. In such a case, the cost of the unfavorable variations of the actual from the standard quantities cannot correctly be either:

1. *Closed to profit and loss as the expense of avoidable waste,* since the variation will not then solely measure such an item, or
2. *Prorated between inventories and cost of sales as an adjustment of costs,* since, to the extent that the variations were reasonably avoidable, their cost is not an element of inventory value.

186. Variations from the quantity standards.

In practical operations, the actual quantities of material, labor, and burden used in the production will vary from those allowed for that production under the quantity standards. The dollar amount of such *quantity variations* is computed by extending the *excess or saved quantities at the standard prices.* Thus, if, in obtaining the production, 10,000 more units of material are used than allowed by standard, and the standard price of material is 18 cents a unit, the unfavorable *material-quantity variation* is 10,000 × 18 cents, or $1,800. Again, if, in obtaining the production, 1,000 more labor hours than allowed by standard are used, and the standard price of labor is $1.60 per hour, the unfavorable *labor-quantity variation* is 1,000 × $1.60, or $1,600. Finally, if the normal burden rate is $1.50 per direct labor hour, and 1,000 more hours than allowed by standard are used for the

production, the unfavorable *burden-quantity variation* is 1,000 × $1.50, or $1,500.

The quantity variations from standard arise from operating above or below the efficiency contemplated under standard. If the quantity standards are correct, failure to adhere to the manufacturing methods specified under standard causes the unfavorable variations, while improvements in manufacturing methods initiated since the quantity standards were set cause the favorable variations.

Where it is believed that the quantity standards are correct, unfavorable quantity variations are periodically written off to Profit and Loss as the expense of wasted material, labor, and burden. If the quantity variations are favorable, the conservative practice is to prorate their amount between the inventories and the cost of sales to avoid stating the inventories at an amount exceeding their expenditure cost. This procedure is also followed if the unfavorable quantity variations are believed due to incorrect quantity standards.

187. Revisions of the quantity standards.

Revisions of the quantity standards are made at reasonable intervals, usually yearly, to reflect changes in:

a. The design of the product.
b. The manufacturing methods.

If revisions were not made to reflect such changes, the quantity standards would fail to refer to the items as they were actually manufactured. An obvious objection to too-frequent revision of the quantity standards is the substantial expense that revision entails.

188. Development of the price standards.

The price standard for each kind of material used is usually set by the purchasing division on the basis of its estimate of the price which will prevail in the ensuing period if the item is bought in the quantities and through the channels specified as standard.

The price standard for each kind of labor employed is set by the personnel division on the basis of its estimate of the rate of pay which will prevail in the ensuing period. Often, the rate is that set by contract with the labor unions.

The price standard for an hour of burden is the normal burden rate as determined by dividing the estimated normal burden amount by the estimated normal number of direct labor hours.

The price standards are set on the basis of a *forecast of future market conditions.* The quantity standards are set on the basis of a *measurement of existing physical factors.* It is possible to measure physical factors such as material quantities and labor time with accuracy. It is impossible to forecast market prices with accuracy. It follows, therefore, that the price standards cannot be as accurate and, therefore, as reliable as the quantity standards.

189. Variations from the price standards.

In practical experience, the prices actually paid for material and labor often differ from those set as standard. Such differences between the actual and standard material and labor prices are termed *price variations from standard.* The amount of the price variation from standard in the period for material or labor is, using assumed figures, computed thus:

Actual quantities purchased at actual prices	$8,100
Actual quantities purchased at standard prices	7,400
Price variation from standard	$ 700

The variation is unfavorable if the actual exceed the standard prices; it is favorable if the standard prices exceed the actual ones.

For applied factory burden, no price variation exists. The burden rate used to apply burden in the period is the normal burden rate, and, as explained in Section 188, the normal burden rate is the price standard for applied burden.

For material, the main causes of price variation from standard are:

1. *Market conditions.* Economic forces frequently cause unforeseeable increases or decreases in material prices.

2. *Irregular purchase quantities.* The specification under standard may be for the item to be purchased in carload lots. If actual purchase is in less-than-carload lots, the price is usually higher.

3. *Irregular purchase channels.* The specification under standard may be for the item to be bought from the manufacturer. If actually the item is purchased from a jobber, the price is usually higher.

4. *Substitutions.* In the absence of Material "A" of standard price 50 cents, Material "B" of standard price 60 cents may be used.

For labor, the main causes of price variation from standard are:

1. *Market conditions.* Economic forces may cause unforeseeable labor as well as material price increases and decreases.
2. *Substitutions.* Thus, a master mechanic of standard wage rate $2.60 per hour may be used for an operation for which the apprentice wage rate of $1.25 is the standard labor price.

Price variations due to market conditions are beyond any one company's control. They are, therefore, *unavoidable variations* which really measure the extent to which the price standards were incorrect, because prices cannot be accurately forecast. In line with the view that price variations due to market conditions are the result of incorrect price standards, their amounts are usually prorated between inventories, quantity variations, and cost of sales to adjust those items to what they would have been had the price standards originally been correctly set.

Price variations due to irregular purchases or substitutions are within the company's control. They are, therefore, avoidable variations which measure the expense of wasteful purchasing and personnel practices. Since wasteful purchasing and personnel practices add nothing to the value of the inventories, price variations from standard due to them are usually closed to Profit and Loss.

If the selling prices of the products made fail to vary with changes in the prices of their material and labor costs, many cost accountants favor writing off even the unavoidable material and labor price variations to Profit and Loss. Their reasoning is that, since the material and labor price variations have not altered the realizable value of the inventories, they should not affect their balance sheet value. Another reason why so many cost accountants favor writing off all price variations to Profit and Loss is that to prorate price variations between the inventories and cost of sales is often burdensome clerically.

190. Revisions of the price standards.

The material and labor price standards are revised whenever that is necessary to reflect substantial changes in the prices. Revision of the price standards at too-short intervals is not desirable, because, when the price standards are changed, costs computed at the new standard prices are not comparable for purpose of judging the trend of costs with those computed at the previous standard prices. The reason is that the higher or lower

new costs are due not only to changed production efficiency, but also to the changed material and labor prices.

191. The variable burden budget as a cost standard.

For the whole factory, the necessary or standard factory burden at a particular operating level is given by the variable burden budget. Variations from the standard burden at level for the whole factory or department are those of:

1. *Expense excess or saving,* computed as the difference between the actual and standard burden at level.
2. *Idle-time cost or overtime gain,* computed as the difference between the applied burden and standard burden at level.

The expense variation from standard burden at level is caused by either or both:

1. Higher or lower prices of the burden items than contemplated under standard.
2. Larger or smaller quantities used of the burden items than contemplated under standard.

Thus, actual Power cost may be more than standard power at level partly because the price of energy was 6 cents instead of 5 cents per kilowatt-hour and partly because 6,000 instead of 5,000 kilowatt-hours were used at level.

The idle-time variation from standard burden at level is due to non-use of factory facilities owing to either: (*a*) slack business or (*b*) faulty production scheduling. Only overtime operations can cause an overtime variation from standard burden at level.

The usual practice is to close expense excess and idle-time variations from standard burden to Profit and Loss as wastes not properly a part of inventory cost value. This is done for practical reasons, even though part of the expense excess is due to unavoidably higher prices. For balance sheet purposes, to avoid stating the inventories at more than their expenditure cost, the expense saving and overtime variations from standard burden at level are often prorated between the inventories and cost of goods sold.

192. The standard cost card.

For each piece part and assembly, the facts as to the standard material, labor, and burden costs are set out on a *standard cost card* such as is illustrated in Figure 103 following.

[Fig. 103]

STANDARD COST CARD

Piece Part 745
Assembly —
Std. Run 1000 units

Description: Wash machine cylinder; Woodrow design; triple bead; flanged ends; style "A"

MATERIAL: Amount

1 sheet 16-gauge hot rolled steel; size 84" x 26" $2.00

LABOR AND BURDEN:

Operation No.	Nature	Hours Allowed	Departmental Cost			
			Labor		Burden	
			Machine	Welding	Machine	Welding
21	Cutting	.03	$.040	$ —	$.030	$ —
24	Stamping	.02	.020	—	.015	—
26	Rolling	.02	.020	—	.015	—
31	Welding	.06	—	.090	—	.045
28	Beading	.05	.060	—	.045	—
29	Flanging	.05	.060	—	.045	—
	Totals	.23	$.200	$.090	$.150	$.045

After Labor Operation No.	Accumulated Standard Cost		
	Material	Labor	Burden
21	$2.00	$.040	$.030
24	2.00	.060	.045
26	2.00	.080	.060
31	2.00	.170	.105
28	2.00	.230	.150
29	2.00	.290	.195

To facilitate the pricing of the in-process inventories, the standard cost card shows by cost element the accumulated standard cost of the item after each labor operation. Thus, Figure 103 shows that after labor operation #28 the standard cost value of piece part #745 is: material, $2.00; labor, $.23; and burden, $.15.

193. The expense of the cost standards.

To set reliable quantity and price standards in the manner described in this chapter is expensive. It may cost $20 to set the labor-quantity standard of an operation which costs only 5 cents to perform. If the operation is performed several hundred thousand times, the per-unit cost of the $20 spent to set the standard is negligible and even a minute saving in the 5-cent cost of performing the operation due to efficiencies developed in

setting the standard will save many times its $20 expense. If the operation is performed only a few times, the $20 expense of setting the standard is prohibitive because even a substantial reduction in the 5-cent cost of performing the operation due to efficiencies developed in setting the standard will not save $20.

It is often stated that the development of cost standards increases the expense of cost finding. Such a statement overlooks the fact that the purpose of the cost standards is not to aid in finding out what the per-unit costs are, but to determine, prescribe, and enforce the operating methods and conditions under which the per-unit costs must be satisfactory. The expense of the cost standards is not one of cost accounting but of effective management control of production.

A factory may have 200 products, each product may average 20 piece parts, and each piece part may average 15 labor operations. Is it then necessary to set cost standards for 200 × 20, or 4,000, piece parts and 4,000 × 15, or 60,000, labor operations? The answer is, usually not, for these reasons:

1. The 200 products may each consist of 20 parts but many of those parts may be common to dozens of the products. Thus, the 200 products may easily not include more than 500 different parts.
2. The 500 different parts may each consist of 15 labor operations, but some of the operations may be common to many of the parts. Thus, the 500 parts may not involve more than 3,000 different labor operations.

Further, once the standards are set, the expense incident to them is reduced to that attendant to the relatively few which may require revision. Thus, in the example considered, of the 500 piece parts and 3,000 labor operations, only 100 piece-part material and 600 labor-operation standards may need to be revised each year.

Much, and sometimes far more than all, of the expense of setting the cost standards is offset by savings in the expense of cost accounting incident to operating with cost standards. Among the savings effected are:

1. No job cost sheets need be or are kept.
2. No test runs for cost are usually necessary.
3. All inventories are kept in quantities only. As desired, the inventory dollar amounts are obtained by pricing the book quantities at standard.

194. Cost standards under varying operating conditions.

Businesses adapted to operational cost accounting are ideally suited to operating with cost standards. The individual piece parts, labor operations, and assemblies are known. Also, the operations are performed and the piece parts and assemblies are made in sufficient numbers to warrant the expense of setting the cost standards.

Process businesses are also well suited to operating with cost standards. The individual processes performed not only are known, but they do not change for long periods of time. Further, the processes are performed on enough units to warrant the expense of setting the cost standards.

Job lot businesses lend themselves to the use of cost standards to the extent that the piece parts are made and the labor operations performed often enough to warrant the expense of setting the cost standards. This is the case more often than is generally realized. Although a concern may make printing presses solely to the customers' specifications, it may easily be that most of the parts and assembly operations are common to all the presses made.

ASSIGNMENT 16

Problem 42.

The Burden in Process account of the Drew Company in 19— consisted of the following entries:

Debit....for actual burden	$16,200
Credit....for allowed burden at standard in units finished and unfinished	15,000

The variable budget of factory burden for the plant per year is as follows:

Activity Rate	Budgeted Factory Burden
120%	$17,500
110%	16,800
100%	16,000
90%	15,400
80%	14,900
70%	14,200

At 100 per cent of normal activity, the direct labor hours number 16,000. In 19— the actual direct labor hours were 17,600.

Required:

1. Compute the quantity, expense, and idle-time variations from standard burden.

2. Explain how you would dispose of each of the variations from standard burden.

Problem 43.

Assuming that in Problem 42 the actual direct labor hours of the Drew Company in 19— were 15,200 rather than 17,600 for the production and at the expense stated:

1. Compute the amount of each of the variations from standard factory burden.
2. Explain why the variations computed in (1) are probably less accurate than those computed in Problem 42.

Question 144.

The works manager of the Dresser Corporation is interested in improving cost control, and he asks that you explain to him:

1. What is meant by a cost standard.
2. The kinds of cost standards.
3. The purpose of each kind of cost standard.
4. The distinction between a cost standard and a standard cost.

Question 145.

In operating with cost standards, what are the items for which *standard costs* are determined?

Question 146.

What is the price standard for an hour of factory burden?

Question 147.

In operating with cost standards, upon whom must the company rely for setting the standards for:

(*a*) Material and labor quantities.
(*b*) Material and labor prices.
(*c*) Total factory burden at each of the various activity levels.

Question 148.

Explain the extent to which it is practical to set scientifically: (*a*) quantity standards; (*b*) price standards.

Question 149.

Distinguish between price and quantity variations from standard. Over which of these two kinds of variations does the management have the most control? Why?

Question 150.

What could be some of the causes for each of the following variations from standard:

(*a*) Price variation—labor?
(*b*) Quantity variation—burden?
(*c*) Quantity variation—material?
(*d*) Volume variation—burden?
(*e*) Expense variation—burden?
(*f*) Price variation—material?

Question 151.

Explain how the variable burden budget functions as a cost standard.

Question 152.

How would you dispose of these variations from the cost standards:

(*a*) Material—price variation?
(*b*) Labor—quantity variation?
(*c*) Burden—expense excess?
(*d*) Burden—overtime?

Give full reasons for your answers and consider alternative possibilities.

Question 153.

Discuss the practicability of operating with the use of cost standards under conditions suited to:

(*a*) Operational cost accounting.
(*b*) Process cost accounting.
(*c*) Job lot cost accounting.

Additional Work

Problem 44.

The Dixiana Company operates with cost standards. The standard cost card of its one product is as follows:

STANDARD COST

Material	10 feet	@ 20¢	$2.00
Labor	10 hours	@ 50¢	5.00
Burden	10 hours	@ 50¢	5.00
Total unit cost			$12.00

At the close of the period, the Materials in Process and Labor in Process accounts appear as follows:

Materials in Process

1,300 feet used at 19¢ a foot	$247	120 units finished at $2	$240

Labor in Process

1,100 hours used at 55¢ an hour	$605	120 units finished at $5	$600

At the close of the period no inventory of work in process exists, the balances in the in-process accounts representing solely variations from the standard cost of production.

Compute the extent to which (*a*) price and (*b*) quantity factors contributed to the difference between the actual and standard cost of production for each cost element.

Question 154.

Distinguish between a standard unit cost and a standard cost card.

Question 155.

Write a letter to the superintendent of the Mack Manufacturing Company answering the following questions he has asked concerning standard costs:

(*a*) What is the purpose of standard unit costs?
(*b*) Do the standard unit costs represent realizable costs?
(*c*) When are the standard unit costs revised?
(*d*) Are standard unit costs practicable for all factories?

Question 156.

What is gained by using standard instead of actual prices in factory cost accounting?

Question 157.

Does the fact that a concern uses a normal burden rate mean that it is operating with cost standards?

Question 158.

Why is a cost accountant often required to be able to read blueprints? Under which methods of cost accounting is that ability on the part of the cost accountant more essential?

Question 159.

How does operating with cost standards reduce the expense of cost accounting?

Question 160.

When is it practical to develop reliable cost standards?

Question 161.

Explain the procedure in setting cost standards for each of the following:

(*a*) Material quantities.
(*b*) Labor quantities.
(*c*) Material prices.
(*d*) Labor prices.

Question 162.

Describe the role of job, motion, and time studies in setting the quantity standards for labor.

Question 163.

What should be the efficiency-level basis of the material and labor-quantity standards?

Question 164.

When should the quantity standards be revised? The price standards?

Question 165.

What kind of variation from standard is one resulting solely from the use of substitute material or labor?

Question 166.

What are the main arguments for closing the amounts of all the variations from the cost standards to Profit and Loss?

Question 167.

In terms of what unit is factory burden quantity measured?

Question 168.

Why is there no price variation from standard burden?

Question 169.

Explain how operating with the use of cost standards represents an engineering rather than a cost accounting program.

Question 170.

What are the objections to frequent revisions of the price and quantity standards?

Question 171.

The Bearton Company makes printing presses to the specifications of the customer. Does this mean that the Bearton Company cannot profitably develop cost standards?

CHAPTER 17

Cost Accounting with the Use of Cost Standards

195. General.

The value to management of cost standards is greatest if they are integrated into the company's cost accounting system. The ideal integration of the cost standards into the cost accounting system is one which results in:

1. Daily and periodical information as to the dollar effect of:
   (*a*) Variation of the actual from the standard material and labor prices.
   (*b*) Variation of the actual from the standard material, labor, and burden quantities.
2. Periodical information as to the dollar effect of:
   (*a*) Variation of the actual from the standard burden at level.
   (*b*) Variation of the actual from the normal production volume.

Sections 196–214 will describe such an integration of the cost standards into the cost system of an operational-type manufacturing business. Sections 215 and 216 will explain how the described procedures differ in process and job-lot manufacturing businesses.

196. The inventory accounts in operations with cost standards.

In operating with cost standards, the best plan is to so charge and credit the general ledger material, in-process, and finished goods accounts as to cause their closing balances to reflect the inventories at standard cost value. In accord with this method:

1. *Materials inventory* is charged with the actual quantities of material bought priced at standard, and is credited with the actual quantities of materials used priced at standard.

2. *In-process inventories* are charged at standard prices for the quantities of material, labor, and burden *allowed at standard* for the production, and are credited for goods finished at their standard cost value.

3. *Finished goods inventory* is charged with the standard cost value of the units produced, and is credited with standard cost value of the units sold.

The amounts of the differences between the actual and standard prices are channelled into price-variation accounts, and the amounts of the differences priced at standard between the actual and allowed quantities are channelled into quantity variation accounts. Sections 197–206 following describe practicable procedures by means of which:

1. The inventories are charged and credited at standard.
2. Price and quantity differences between actual and standard are channelled into variation from standard accounts.

197. Material purchases; material price variation.

When materials are bought, the vendor's invoice shows the actual quantities bought at the actual prices. A clerk then records at the side of the actual prices the value of the items at their standard prices and computes the price variation as the difference between the invoice's actual and standard price totals, thus:

[Fig. 104]

No. 4276 DATE 5/1/—

VENDOR'S INVOICE

TO: Harris, Inc.

		At Standard Prices
100 units of "A" at $1.40	$140	$130
200 units of "B" at 2.10	420	410
150 units of "E" at 1.60	240	220
Totals	$800	$760
	760	
Price variation—debit	$ 40	

If the actual price total exceeds the standard price total, a debit (or unfavorable) price variation is indicated. If the standard price total exceeds the actual price total, a credit (or favorable) price variation is denoted.

The actual price, standard price, and variation from standard price data shown on each material purchase invoice are recorded in a Purchases Journal such as is illustrated in Figure 105:

[Fig. 105]

PURCHASES JOURNAL

19—		Vendor	F	Cr. Accounts Payable	Price Variation Dr.	Price Variation Cr.	Dr. Materials Inventory
May	1	Harris, Inc.	√	$ 800	$ 40	$	$ 760
		Dow Bros.	√	645		20	665
		C. W. Barnes.....	√	1,003	28		975
	3	Carlson Company	√	325	25		300
	31	Barr & Sax	√	750		10	760
				$20,085	$860	$275	$19,500

At the close of each day, the purchases journal clerk prepares a Daily Purchases Report, such as is shown in Figure 106, from the information recorded that day in the Purchases Journal:

[Fig. 106]

DAILY PURCHASES REPORT
5/1/—

Actual cost amount of invoices recorded.....	$2,448
Standard cost amount of invoices recorded.....	2,400
Price variations:	
Unfavorable	68
Favorable.....	20

At the month-end, the footing postings from the Purchases Journal to the affected general ledger accounts are equivalent to a journal entry such as follows:

(1)

Materials Inventory.....	$19,500	
Materials—Price Variations.....	860	$ 275
Accounts Payable.....		20,085

The Daily Purchases Report gives to the factory executives timely information upon which they may act promptly to:

1. Curb unnecessary unfavorable price variations arising from unstandard purchase lots or supply channels;
2. Adjust selling prices of the products to reflect unavoidable market changes in material prices.

The effect of the end-of-the-month footing postings from the Purchases Journal is to:

1. Charge *Materials Inventory* with the standard cost value of the materials bought.
2. Credit *Accounts Payable* with the actual cost of the materials bought.
3. Divert to the *Materials—Price Variations* account the differences between the actual and standard costs of the materials bought.

198. Material issues; material quantity variations.

In accounting for material issues in operations with cost standards, these four forms are used:

1. Standard material requisition.
2. Excess material requisition.
3. Materials saved credit memo.
4. Indirect material requisition.

The material quantities appearing on each of the forms are priced at standard. Usually, to distinguish them readily, the forms are of different colors.

When a specific job or lot run is undertaken, a *Standard Materials Requisition* is issued for the exact quantity of material needed at standard to complete it. The sum of the amounts of the standard material requisitions is the charge to *Materials in Process* for the material cost allowed at standard for the production of the period.

If the quantities issued under the standard material requisition prove insufficient to complete the job, the necessary additional material is issued on the authority of an *Excess Materials Requisition.* The sum of the amounts of the excess material requisitions is the unfavorable materials quantity variation from standard cost in the period. In space provided for the purpose on the form, the storeroom clerk writes the reason for the additional material issue.

If some of the materials issued under the standard material requisition prove unnecessary, they are returned to the storeroom and a *Materials Saved Credit Memo* is made out. The sum of the amounts of the materials saved credit memos is the favorable materials quantity variation from standard cost in the period. In a space provided for the purpose on the form, the storeroom clerk writes the reason for the return of the material.

Materials chargeable to factory burden accounts are issued on the authority of *Indirect Materials Requisitions.*

At the close of each day, the materials storeroom clerk makes out a Daily Material Issues Report such as that shown in Figure 107.

[Fig. 107]

DAILY MATERIAL ISSUES REPORT
5/1/—

Standard material requisitions	$1,200
Excess material requisitions	40
Materials saved credit memos	(4)
Indirect material requisitions	80
Total material issues	$1,316

The amounts at the standard prices of the standard material requisitions, excess material requisitions, materials saved credit memos, and indirect material requisitions are then recorded in a Materials Requisition Journal such as is illustrated in Figure 108.

[Fig. 108]

MATERIALS REQUISITION JOURNAL

19—		Materials In Process	Quantity Variation		Factory Burden	Materials Inventory
			Dr.	Cr.		
May	1	$ 1,200	$ 40	$ 4	$ 80	$ 1,316
	2	850	24	13	37	898
	30	650	27	3	23	697
		$16,400	$746	$164	$900	$17,882

At the month-end, the footing postings from the Materials Requisition Journal are equivalent to that of an entry such as follows:

(2)

Materials in Process	$16,400	
Materials—Quantity Variations	746	$ 164
Factory Burden—Actual	900	
Materials Inventory		17,882

Each day, on the basis of information furnished by the Daily Material Issues Report, the factory executives can act promptly to:

1. Curb unnecessary unfavorable material quantity variations.

2. Judge the merit, as evidenced by the resulting material quantity variations, of changes in the manufacturing methods.

At the month-end, the effect of the footing postings made from the Materials Requisition Journal is to:

1. Charge *Material in Process* with the material cost allowed at standard for the production.
2. Charge *Factory Burden—Actual* with the material cost chargeable to the various factory burden accounts.
3. Credit *Materials Inventory* with the standard cost value of the materials used.
4. Divert to *Materials—Quantity Variations* account the difference at standard prices between the actual and the allowed at standard quantities of material used.

199. Labor costs; labor price and quantity variations.

Labor costs chargeable to factory burden accounts are accumulated on *Indirect Labor Time Tickets*, and their actual cost amounts are posted daily to those accounts.

In cost accounting for direct labor in operations with cost standards, the key form is the *Direct Labor Time Ticket*, a typical form of which appears in Figure 109 following:

[Fig. 109]

DIRECT LABOR TIME TICKET

NAME Ben Smith OPER. NO. 424-3
DATE 5/1/—

Standard time	4.00 Hr.
Standard rate	$1.50
Actual time	5.00 Hr.
Actual rate	$1.60
Actual time at actual rate	$8.00
Actual time at standard rate	$7.50
Standard time at standard rate	$6.00

Remarks First time Smith performed the operation.

When a worker is assigned to a task, the *dispatcher* records on the time ticket:

1. The worker's name.
2. The operation to be performed.
3. The standard time for the task.
4. The standard rate per hour for the task.

When the worker finishes the task, the dispatcher records on the time ticket the actual labor time and rate, and writes in the "Remarks" section the apparent reason for the quantity variation. In the payroll office the time tickets are completely extended. Then adding-machine tapes are taken from the time tickets to show for all of them together the:

Actual time at the actual rates, say	$920
Actual time at the standard rates, say	875
Standard time at the standard rates, say	840

The amount of the *labor price variation* from standard for the day is then computed, as:

Actual time at the actual rates	$920
Actual time at the standard rates	875
Labor price variation from standard	$ 45

And the amount of the labor quantity variation from standard is computed, as:

Actual time at the standard rates	$875
Standard time at the standard rates	840
Labor quantity variation from standard	$ 35

Each day the *labor costs and variation* amounts are recorded in a Labor Cost Record such as is shown in Figure 110:

[Fig. 110]

LABOR COST RECORD

19—		Dr. Labor in Process	Dr. Factory Burden	Price Variation		Quantity Variation		Cr. Accrued Payroll
				Dr.	Cr.	Dr.	Cr.	
May	1	$ 840	$ 60	$ 45	$	$ 35	$	$ 980
	2	730	33	31		21		815
	3	680	27		13		4	690
	31	912	41	16		34		1,003
		$21,400	$1,860	$1,150	$325	$950	$75	$24,960

Every day the payroll clerk forwards to the responsible factory official a Daily Labor Report such as is illustrated in Figure 111:

[Fig. 111]

DAILY LABOR REPORT
5/1/—

Standard direct labor cost	$840
Labor—Price variation—unfavorable	45
Labor—Price variation—favorable	—
Labor—Quantity variation—unfavorable	35
Labor—Quantity variation—favorable	—
Indirect labor cost	60
Total labor cost	$980

At the month-end, the footing postings from the Labor Cost Record are equivalent to an entry such as follows:

(3)

Labor in Process	$21,400	
Factory Burden—Actual	1,860	
Labor—Price Variation	1,150	$ 325
Labor—Quantity Variation	950	75
Accrued Payroll		24,960

The information supplied by the Daily Labor Report enables the factory executive to:

1. Promptly curb unnecessary unfavorable price and quantity variations from standard labor cost.
2. Judge the merit, as evidenced by the resulting labor quantity variations, of changes in the manufacturing methods.

At the month-end, the effect of the footing postings made from the Labor Cost Record is to:

1. Charge *Labor in Process* with the labor cost allowed at standard for the production.
2. Charge *Factory Burden—Actual* with the labor cost chargeable to the various factory burden accounts.
3. Credit *Accrued Labor* with the liability for labor costs incurred.
4. Divert to the *Labor—Price Variations* account the amount of the differences between the actual and standard labor rates.
5. Divert to the *Labor—Quantity Variations* account the difference at standard prices between the actual time and the time allowed at standard for the production.

200. Direct labor hours record; burden quantity variation.

Each direct labor time ticket shows for the task it refers to: (*a*) the actual time taken, and (*b*) the time allowed at standard.

Each day totals are determined of these data for all the time tickets to show the:

1. Actual burden time taken for the day's production, say 830 hours.
2. Standard burden time allowed for the day's production, say 790 hours.

The excess or saved burden time is then computed as the difference between the actual time and the time allowed at standard for the production. In this case, the excess burden time is 830 minus 790, or 40 hours.

The data on the allowed, excess, saved, and actual direct labor time are recorded in a Direct Labor Hours Record such as is illustrated in Figure 112:

[Fig. 112]

DIRECT LABOR HOURS RECORD

19—	Particulars	Direct Labor Hours			
		Allowed	Excess	Saved	Actual
May 1		790	40	—	830
2		680	25	8	697
31		755	27	9	783
Total Hours		18,480	765	85	19,160
Normal Burden Rate		$ 1	$ 1	$ 1	$ 1
Extensions		$18,480	$765	$85	$19,160

At the month-end, the hours shown by the Direct Labor Hours Record column footings are priced at the normal burden rate per direct labor hour, and the extensions are journalized with an entry such as follows:

(4)

Burden in Process	$18,480		
Burden—Quantity Variation	765	$	85
Factory Burden—Applied			19,160

The allowed hours priced at the normal burden rate is the allowed burden at standard for the production of the period. The excess and saved hours priced at the normal burden rate are, respectively, the unfavorable and favorable burden quantity variations for the period. The actual hours priced at the normal burden rate is the factory burden applied in the period at the normal burden rate.

If a machine-hour rather than a direct labor-hour burden rate is used to distribute the factory burden, the Direct Labor Hours Record is replaced by a Machine Hours Record, which has the same hour columns: Allowed; Excess; Saved; Actual. If a per cent of direct labor cost is used to distribute the factory burden, the hours record is eliminated and:

1. *Burden chargeable to in-process* is computed by multiplying the allowed labor cost at standard by the normal burden per cent.
2. *Burden quantity variation* is computed by multiplying the labor quantity variation by the normal burden per cent.
3. *Factory burden applied at the normal rate* is computed by adding the burden chargeable to in-process and the burden quantity variation.

In the case where a per cent of prime cost is used to distribute the factory burden:

1. *Burden chargeable to in-process* is computed by multiplying the allowed material and labor cost at standard by the normal burden per cent.
2. *Burden quantity variation* is computed by multiplying the total of the material and labor quantity variations by the normal burden per cent.
3. *Burden applied at the normal rate* is computed by adding the burden chargeable to in-process and the burden quantity variation.

201. Actual factory burden costs.

The actual factory burden is accumulated in the same way in operations with cost standards as in any other method of cost accounting, that is, through the Requisitions Journal, Payroll Record, Disbursements Book, and General Journal. Entries (2) and (3) have shown the charges to Factory Burden—Actual from the Requisitions Journal and Payroll Record. The postings to Factory Burden—Actual from the Disbursements Book and General Journal are, using assumed amounts, equivalent to an entry such as follows:

(5)

Factory Burden—Actual	$18,740	
Cash		$12,300
Accrued Taxes		2,440
Reserve for Depreciation		4,000

202. Expense and volume variations from standard burden.

The ledger shows, at the close of the period, the amounts of (*a*) Factory Burden—Actual (in this case, $21,500) and (*b*) Factory Burden—Applied at the normal burden rate (in this case, $19,160). The variable burden budget shows the necessary or standard burden at level (in this case, say, $20,800). The expense and volume variations from standard burden are then computed from these data in the manner shown by the explanations to the following entries which journalize their amounts:

(6)

Burden—Expense Variation		$ 700	
Factory Burden—Applied			$ 700
Actual burden at level	$21,500		
Standard burden at level	20,800		
Expense variation	$ 700		

(7)

Burden—Volume Variation		$ 1,640	
Factory Burden—Applied			$1,640
Standard burden at level	$20,800		
Applied burden at normal rate	19,160		
Volume variation	$ 1,640		

After the entries which record the expense and volume variations from standard burden have been posted, the balances in Factory Burden—Actual and Factory Burden—Applied are identical in amount and are closed against each other with an entry such as follows:

(8)

Factory Burden—Applied	$21,500	
Factory Burden—Actual		$21,500

203. Price variations due to substitutions.

Price variations from standard sometimes are due solely to substitutions. Thus, Grade "A" cloth of standard cost $1.50 a yard may be used where the specification is for Grade "B" cloth of standard cost $1.00 a yard. Again, a master mechanic of standard rate $2.20 an hour may be used where the specification is for the use of an apprentice mechanic of standard rate $1.40 an hour.

In the case of a material substitution, the storeroom clerk makes out the standard or excess material requisition in the regular way. He then, in addition, makes out a *Materials Substitution Memo* such as is illustrated in Figure 113 for the difference

between the standard price of the material used and the standard price of the material which should have been used, thus:

[Fig. 113]

MATERIALS SUBSTITUTION MEMO

DATE 5/2/— LOT NO. 7483

10 yards of "A" used at $1.50 standard price	$15
10 yards of "B" specified at $1.00 standard price	10
Price variation due to the substitution	$ 5

REASON Temporarily out of Grade "B" and this lot was to fill a rush order.

In the case of a labor substitution, the dispatcher makes out the direct labor time ticket in the regular way. He then, in addition, makes out a *Labor Substitution Memo* such as is illustrated in Figure 114 for the difference between the standard price of the labor used and the standard price of the labor which should have been used, thus:

[Fig. 114]

LABOR SUBSTITUTION MEMO

DATE 5/3/— LOT NO. 7564

5 Hours of class "A" used at $2.20 standard price	$11
5 Hours of class "B" specified at $1.60 standard price	8
Price variation due to the substitution	$ 3

REASON No grade "B" labor available at the time, and the production line was being held up.

Each day, the material and labor substitution memos are forwarded to the responsible factory executives for study by them. At the month-end, totals are determined of the respective amounts of these memos; the price variations they measure, using assumed amounts, are then journalized with entries such as follow:

(9)

Materials—Price Variation	$100	
Materials in Process		$100

(10)

Labor—Price Variation	$225	
Labor in Process		$225

The in-process accounts are credited in accord with this reasoning: The material requisitions and direct labor time tickets were made out in the regular way at the standard prices of the kinds of materials and labor *actually used.* Therefore, the in-process accounts were charged more by those variation amounts than they will be credited when the goods are completed and trans-

ferred to Finished Goods at the standard prices of the kinds of materials and labor which *should have been used.*

204. Quantity variations represented by irreparable spoilage.

The quantity variations represented by repairable spoilage are covered by the excess material requisitions and direct labor time tickets issued incident to the repair work. When goods are irreparably spoiled, a *Spoilage Report*, such as is illustrated in Figure 115, is made out.

[Fig. 115]

SPOILAGE REPORT

PIECE PART NO. 494 DATE 5/1/—
ASSEMBLY NO. — REASON Bevel off-line; due to
SPOILED IN OPER. NO. 494-4 faulty machine set-up.

Particulars	Material	Labor	Burden
Per unit cost through spoilage point	$ 2.00	$ 1.00	$ 1.20
Units spoiled	10	10	10
Cost of the spoilage	$20.00	$10.00	$12.00

At the time the spoilage occurs, the foreman records on the spoilage report:

1. The piece part or assembly number.
2. The labor operation during which the spoilage occurred.
3. The apparent reason for the spoilage.

In the accounting office, through reference to the item's standard cost card, the standard cost of the spoilage, broken down into its material, labor, and burden elements, is determined and recorded on the report. Each day totals are determined of the material, labor, and burden amounts on the spoilage reports. An entry is then made for the quantity variation from standard which the irreparable spoilage constitutes in a Spoilage Record such as is illustrated in Figure 116:

[Fig. 116]

SPOILAGE RECORD

19—		QUANTITY VARIATION			IN-PROCESS		
		Material	Labor	Burden	Material	Labor	Burden
May	1	$ 20	$ 10	$ 11	$ 20	$ 10	$ 11
	3	14	5	4	14	5	4
	31	8	15	14	8	15	14
		$285	$195	$160	$285	$195	$160

At the month-end, the footing postings from the Spoilage Record are equivalent to a journal entry such as follows:

(11)

Materials—Quantity Variation	$285	
Labor—Quantity Variation	195	
Burden—Quantity Variation	160	
Materials in Process		$285
Labor in Process		195
Burden in Process		160

If the irreparable spoilage is sold as scrap, the proceeds are usually treated as a credit to Materials—Quantity Variation.

205. Completion of goods.

When a batch of product is completed, the foreman in charge records, on a *Goods Completed Ticket* such as is shown in Figure 117:

1. The description of the assembly.
2. The number of units completed in the batch.

[Fig. 117]

GOODS COMPLETED TICKET

TICKET NO. 4284 DATE 5/1/— ASSEMBLY NO. 447

DESCRIPTION 4 H.P.—Electric Motor—Model "E"—

Particulars	Total	Materials	Labor	Burden
Standard Cost Per Unit	$ 17	$4.00	$7.00	$6.00
Units Completed	60	60	60	60
Cost of Goods Completed	$1,020	$ 240	$ 420	$ 360

He then forwards the ticket, together with the completed items, to the finished goods warehouse. The warehouse clerk compares the goods received with the quantities shown on the completed goods ticket, makes the necessary quantity entries in the finished goods ledger, and then forwards the ticket to the accounting office. In the accounting office, the ticket is, by reference to the item's standard cost card, priced to show the standard cost by element of the batch. The cost data then shown on the goods completed ticket are recorded in a Finished Goods Journal such as is illustrated by Figure 118 on page 243. The month-end footing postings of the finished goods journal to the affected inventory accounts are equivalent to a journal entry such as follows:

(12)

Finished Goods Inventory	$48,940	
Materials in Process		$14,100
Labor in Process		18,600
Burden in Process		16,240

[Fig. 118]

FINISHED GOODS JOURNAL

19—		Ticket No.	Finished Goods	In-Process		
				Material	Labor	Burden
May	1	4284	$ 1,020	$ 240	$ 420	$ 360
		4285	810	220	300	290
	30	4412	850	350	270	230
		4413	430	160	160	110
			$48,940	$14,100	$18,600	$16,240

206. Sales and cost of goods sold.

On the company's duplicate of the sales invoice are recorded not only the sales price of each item, but also its standard cost value, thus:

[Fig. 119]

SALES INVOICE

NO. 7436 DATE 5/1/—

TO—Barr and Company

		Standard Cost
10 units of "A" at $2.10	$21	$14
20 units of "E" at 2.50	50	32
Totals	$71	$46

The data shown on each invoice are recorded in a Sales Journal such as is illustrated in Figure 120:

[Fig. 120]

SALES JOURNAL

19—		Customer	Invoice No.	F	Dr.—Customers / Cr.—Sales	Dr.—Cost of Sales / Cr.—Finished Goods
June	1	Barr & Company	7436		$ 71	$ 46
		Carson Bros.	37		194	103
		C. W. Braham	38		349	225
	30	R. K. Swan	7743		127	84
					$67,400	$41,300

The month-end footing postings from the sales journal to the affected general ledger accounts are the equivalent of a journal entry such as follows:

(13)

Customers—Control	$67,400	
Cost of Goods Sold	41,300	
Finished Goods		$41,300
Sales		67,400

207. Appearance of the ledger accounts.

After posting entries (1)—(13) preceding the affected general ledger accounts appear as follows:

[Fig. 121]

Materials Inventory				Materials in Process				Labor in Process			
①	19,500	17,882	②	②	16,400	100	⑨	③	21,400	225	⑩
						285	⑪			195	⑪
						14,100	⑫			18,600	⑫

Burden in Process				Factory Burden—Actual				Factory Burden—Applied			
④	18,480	160	⑪	②	900	21,500	⑧	⑧	21,500	19,160	④
		16,240	⑫	③	1,860					700	⑥
				⑤	18,740					1,640	⑦

Finished Goods				Cost of Goods Sold				Materials—Price Variation			
⑫	48,940	41,300	⑬	⑬	41,300			①	860	275	①
								⑨	100		

Materials—Quantity Variation				Labor—Price Variation				Labor—Quantity Variation			
②	746	164	②	③	1,150	325	③	③	950	75	③
⑪	285			⑩	225			⑪	195		

Burden—Quantity Variation				Burden—Expense Variation				Burden—Volume Variation			
④	765	85	④	⑥	700			⑦	1,640		
⑪	160										

Accounts Payable				Accrued Payroll				Cash			
		20,085	①			24,960	③			12,300	⑤

Accrued Taxes				Reserve for Depreciation				Customers—Control			
		2,440	⑤			4,000	⑤	⑬	67,400		

Sales			
		67,400	⑬

208. Taking and pricing the physical inventories.

In operating with cost standards, the material and finished goods inventory quantities are counted in the same way as under any other method of cost accounting, and then are priced at their standard costs. In taking the in-process inventories, not only are the quantities counted, but note is made on the

inventory sheet of the last labor operation through which the item has been processed. Reference to the item's standard cost card shows by element the per-unit standard cost of the item through that operation. The quantities are then extended at those costs. A useful form of work-in-process inventory sheet for use with standard costs is shown in Figure 122:

[Fig. 122]

WORK IN PROCESS INVENTORY SHEET

PIECE PART NO. 424 COUNTED BY E.R.P.
ASSEMBLY NO. — VERIFIED BY A.L.C.

Quantity	Through Oper. No.	St'd Unit Cost—Per Cost Card			Inventory at St'd Cost		
		Material	Labor	Burden	Material	Labor	Burden
60	2	$2.00	$.60	$.50	$120	$36	$30
40	3	2.00	.85	.60	80	34	24

209. Adjusting the book to the physical closing inventories.

After all postings have been completed, the balances of the material, in-process, and finished goods accounts reflect the inventory per books of material, work in process, and finished goods. At the period-end, the book inventory amounts are adjusted to the physical inventory amounts by a journal entry such as follows to the factory burden account *Inventory Shrinkage and Overage:*

Inventory Shrinkage and Overage	$93	
Materials Inventory		$18
Materials in Process		15
Labor in Process		20
Burden in Process		40

To adjust the book to the physical inventory amounts as follows:

Details	Book Inventory	Physical Inventory	Shortage
Material	$ 1,618	$ 1,600	$18
Material in Process	1,915	1,900	15
Labor in Process	2,380	2,360	20
Burden in Process	2,080	2,040	40
Finished Goods	7,640	7,640	—
Totals	$15,633	$15,540	$93

The differences between the book and physical inventory amounts should be small. If they are large, one or more of these serious situations is indicated:

1. The quantity variations are not being reported accurately in the excess material requisitions, direct labor time tickets, and spoilage reports.
2. Theft and/or loss of inventory items is taking place.
3. The physical inventories are inaccurate.

If it is believed that the material and in-process inventory differences are mainly due to inaccuracies in reporting quantity variations, an entry such as follows is made to adjust the book material and in-process inventories to the physical inventory amounts:

(14)

Materials—Quantity Variation	$33	
Labor—Quantity Variation	20	
Burden—Quantity Variation	40	
Materials Inventory		$18
Materials in Process		15
Labor in Process		20
Finished Goods		40

The charge to Materials—Quantity Variation is the sum of the materials and materials in process shortages.

210. Analysis of the quantity variations.

The quantity variations from standard for material, labor, and burden are evidenced by:

1. The excess material requisitions.
2. The direct labor time tickets.
3. The spoilage reports.

On each of those forms, in a space provided for the purpose, is noted the reason for the variation as determined at the time the variation occurred. The reasons so noted are studied by the factory administrators responsible. Often a change in manufacturing method, better worker training, or sharp worker admonishment will eliminate or reduce a cause of quantity variation from standard.

211. Analysis of the price variations.

The material and labor substitution memos disclose daily the amount and reasons for price variations due to substitutions. The administrators responsible study them to determine how such substitutions can be minimized.

The material purchase invoices are periodically analyzed to determine by *class of material* the material price variations due to:

1. Unavoidable changes in market prices.
2. Avoidable unstandard purchasing practices.

The factory executive responsible studies this analysis and then takes the steps necessary to curb substandard purchasing practices.

The direct labor time tickets show the price variations for labor. Analysis of these time tickets can be made periodically to show by *class of labor* the labor price variation due to (*a*) unavoidable and (*b*) avoidable changes from standard in the labor rates. With these data available, the administrator can act to reduce the avoidable labor price changes.

212. Disposition of the variations.

If the cost standards are believed to be accurate, unfavorable variations which were avoidable or which fail to add to the realizable value of the inventories are closed to Profit and Loss. Such variations include:

1. Unfavorable material, labor, and burden quantity variations.
2. Burden expense excess and burden idle-time variations.
3. Substitution and other avoidable material and labor price variations.

Unavoidable price variations, being deemed corrections of the original price standards, are theoretically proratable among the inventories, cost of sales, and certain variations to adjust them to what they would have been had the price standards been correct originally. This is done, for an assumed $195 unavoidable materials price variation, by a computation such as follows:

[Fig. 123]

Material Purchases In	At Standard Cost	Unavoidable Price Variations	
		Per Cent	Amount
Materials Inventory	$ 1,600	1%	$ 16
Materials in Process	1,900	1	19
Burden in Process (Indirect Material)	900	1	9
Finished Goods	2,600	1	26
Cost of Goods Sold	11,500	1	115
Materials Quantity Variation	900	1	9
Materials Price Variation (Substitutions)	100	1	1
Total	$19,500	1%	$195

The $100 of materials price variation due to substitutions is included in Figure 123 because it is one of the applications to

which the $19,500 of material purchased at standard prices was put. The same is true of the $900 of material charged at standard prices to the various burden accounts. The division of the $14,100 of material at standard in goods completed between finished goods ($2,600) and cost of goods sold ($11,500) is an assumed one.

The journal entry made to record such a proration of the unavoidable material price variations among the inventories, cost of sales, and variations as is shown in Figure 123 would be as follows:

Materials Inventory	$ 16	
Materials in Process	19	
Burden in Process	9	
Finished Goods	26	
Cost of Goods Sold	115	
Materials—Quantity Variation	9	
Materials—Price Variation	1	
Materials—Price Variation		$195

Sometimes, to avoid stating the inventories at more than their expenditure cost, each favorable variation is prorated between the inventories and the cost of goods sold. This is done, to illustrate for an assumed $555 favorable quantity variation, by a computation such as follows:

[Fig. 124]

Particulars	Material	In Process		Finished Goods	Cost of Sales	Total
		Material	Burden			
MATERIALS:						
At standard cost	$1,600	$1,900	$900	$2,600	$11,500	$18,500
Favorable quantity variation						$ 555
Per cent of standard cost						3%
Cost adjustment	$ 48	$ 57	$ 27	$ 78	$ 345	$ 555

The journal entry to record the proration of a favorable materials quantity variation such as is made in Figure 124 would be as follows:

Materials—Quantity Variation	$555	
Materials Inventory		$ 48
Materials in Process		57
Burden in Process		27
Finished Goods		78
Cost of Goods Sold		345

To prorate the variations among the inventories and cost of goods sold is usually burdensome. It involves not only tedious mathematical computations, but also the expense of a system for determining the material, labor, and burden make-up of the

finished goods inventory and the cost of goods sold. For these reasons, many cost accountants, as a practical expedient, favor closing all the variations from standard to Profit and Loss.

213. The unprorated variations on the financial statements.

The unprorated variations from standard cost are usually shown as an adjustment of the cost of goods sold at standard to their actual cost as follows:

[Fig. 125]

COST OF GOODS SOLD:			
Standard cost			$41,300
Variations from standard cost:			
Materials	—Price	$ 685	
	—Quantity	900	
Labor	—Price	1,050	
	—Quantity	1,070	
Burden	—Quantity	840	
	—Expense	700	
	—Volume	1,640	6,885
Actual cost			$48,185

Sometimes, however, the variations from standard are exhibited as items at the bottom of the Profit and Loss Statement, thus:

[Fig. 126]

NET PROFIT BEFORE VARIATIONS FROM STANDARD			$26,890
VARIATIONS FROM STANDARD COST:			
Materials	—Price	$ 685	
	—Quantity	900	
Labor	—Price	1,050	
	—Quantity	1,070	
Burden	—Quantity	840	
	—Expense	700	
	—Volume	1,640	6,885
NET PROFIT TO SURPLUS			$20,005

An obvious criticism of the Figure 125 method of exhibiting the variations is that if closing inventories exist, the variation amounts do not apply solely to cost of goods sold.

214. Changes in the cost standards.

When the cost standards are changed, the inventories in the storeroom and in process, as determined by a physical count, are adjusted to their value at the new standard costs by an entry such as follows:

Variation Due to Change in Cost Standards	$460	
Materials Inventory		$100
Material in Process		160
Labor in Process		80
Burden in Process		120

Inventory	At Standard Cost		Difference
	Old	New	
Materials Inventory.....	$1,600	$1,500	$100
Materials in Process.....	1,900	1,740	160
Labor in Process.....	2,380	2,300	80
Burden in Process.....	2,080	1,960	120
Totals.....	$7,960	$7,500	$460

The materials then in the storeroom and in process will, as material issues or as completed goods, be credited to materials inventory or to the in-process inventories at the new standard costs although they were originally charged thereto at the old standard costs. If the entry adjusting the materials and in-process inventories to their value at the new standard costs were not made, the variation due to the change in the cost standards would show up as an inventory shortage when physical inventories of materials and in-process were taken and compared with the book inventory amounts.

The variation due to change in the cost standards is periodically closed to Cost of Goods Sold account. This adjusts Cost of Goods Sold to the amount it would have been if the entry adjusting the inventories to their value at the new cost standards had not been made.

215. Operating with cost standards in process businesses.

In a process business, the material price variations due to purchases or substitutions are determined in the same way as in the operational-type business. The labor price variation is determined as often as desired by means of a computation such as follows:

Labor time tickets priced at the actual labor rates, say.....	$427
Less—Labor time tickets priced at the standard labor rates, say..	413
Labor price variation from standard.....	$ 14

The burden expense and volume variations are determined in the same way as in the operational-type business.

In process industries, specific lots of production cannot be practicably identified. Therefore, in such industries, the material, labor, and burden quantity variations are not determined *daily* through excess material requisitions, direct labor time tickets, and spoilage reports. Instead, the material, labor, and burden quantity variations are computed *periodically* by comparing the actual production valued at standard with the charges at standard prices in the period for the actual quantities of material, labor, and burden used in the production. The

period-end computation to determine the material, labor, and burden quantity variations from standard is, using assumed figures, made for each process as follows:

[Fig. 127]

CHARGED TO IN-PROCESS AT STANDARD:	Material	Labor	Burden
Opening inventory of work in process	$ 4,000	$ 3,400	$ 2,900
Actual quantities used in the period	30,800	24,800	21,300
Totals	$34,800	$28,200	$24,200
PRODUCTION AT STANDARD IN PERIOD:			
Goods finished in the period	$29,700	$23,400	$20,300
Closing inventory of work in process	3,700	3,100	2,900
Totals	$33,400	$26,500	$23,200
QUANTITY VARIATION FROM STANDARD	$ 1,400	$ 1,700	$ 1,000

From a study of Figure 127, it is seen that in process cost accounting, with the use of cost standards:

1. Work in process is charged with the actual quantities of material, labor, and burden used priced at standard.
2. Work in process is credited with the value at their standard costs of the units finished.
3. The quantity variation from standard is the difference between the book inventory of work in process and the physical inventory of work in process valued at standard cost.

216. Operating with cost standards in job-lot businesses.

If cost standards are used for some of the items made in a job-lot business, the favored procedure is to operate concurrently with two costing methods:

1. The procedures described in Sections 196–214 of this chapter for those items for which cost standards exist.
2. The usual job-lot plan for those items for which no cost standards exist.

All the items for which the costs are standard eventually are used in assemblies costed under the usual job-lot plan. When so used, these standard items are charged to the job cost sheets at their standard cost values.

In job-lot businesses, all purchased materials are charged to Materials Inventory at their actual cost. At the time of issue of the material, the entry, if the material is charged to a job cost sheet, is as follows:

Materials in Process	$15	
Materials Inventory		$15

If the material is for an item whose cost is accounted for with the use of standards, the entry at issue is such as follows:

Materials in Process	$14	
Materials—Price Variation	1	
Materials Inventory		$15

From the foregoing it is seen that, in job-lot concerns, the materials price variation is determined at the time of issue rather than at the time of purchase of the material.

217. Cost accounting with standards based on principle of exceptions. The plan in operating with cost standards is to determine what the prices and quantities should be, and then to direct the cost accounting toward bringing daily and periodically to the attention of the responsible administrators variations from those standards. By working on such reported variations, the time of the executives is concentrated on the few items which are off-standard rather than dissipated among the multitude of items which are being produced as they should be.

Because cost accounting with the use of cost standards is concerned with determining, studying, and eliminating exceptions to the standards, it is often described as based on the *principle of exceptions*. Scientific management engineering is often stated to be concerned with determining and dealing with the exceptions to set standards. For this reason, cost accounting with the use of cost standards is sometimes considered an engineering rather than an accounting approach to the control of manufacturing costs.

ASSIGNMENT 17

Problem 45.

The Marbro Company operates with cost standards. The standard cost card of its one product is as follows:

STANDARD COST

Material—10 feet @ 40¢	$ 4
Labor —10 hours @ $1.00	10
Burden —10 hours @ $1.00	10
Total	$24

The necessary burden at each of the more common levels of factory activity is estimated to be as follows:

Activity Rate	Necessary Burden
50%	$1,040
75	1,125
100	1,200
125	1,350

At 100 per cent of normal activity, the plant's direct labor hours number 1,200.

In June 19—, the data on the manufacturing outlays, production and sales of the company were as follows:

1. Purchases—2,000 feet of material at 44¢ $880
2. Requisitioned for use in manufacturing—1,600 feet of material
3. Direct labor payroll—1,500 hours @ $1.10 ..... $1,650
4. Factory burden incurred ($300 for depreciation) $1,425
5. Production:
   120 units completely finished
   20 units all done as to material; half done as to labor
6. Sales—90 units at $35 each.

Submit in simple journal form the entry required in operating with cost standards to record each of the following:

1. Materials purchased for production.
2. Materials used in production.
3. Direct labor payroll.
4. Factory burden incurred.
5. Factory burden applied to in-process.
6. Burden—quantity variation.
7. Burden—expense variation.
8. Burden—volume variation.
9. Cost of goods completed.
10. Sales and cost of goods sold.

As part of each journal entry explanation, show all your computations. Also indicate at the side of each entry the journal of which it represents the summary posting or in which it would be recorded.

Problem 46.

The budget at standard of the Castings Department of the Buckeye Metals Company for the calendar year 19— is as follows:

VARIABLE COSTS:	
Molten steel from Melting Department—3,000 tons at $84 ...	$252,000
Less—300 tons of remeltable scrap and defectives at $40	12,000
Net metal cost	$240,000
Labor at $1.50 per hour	90,000
Supplies	8,000
Power	12,000
FIXED COSTS:	
Supervision	12,000
Building expense	18,000
Machinery repairs and maintenance	6,000
Machinery depreciation	14,000
TOTAL COSTS	$400,000
TONS OF GOOD CASTINGS TO BE PRODUCED	2,500
PER-TON COST OF GOOD CASTINGS	$ 160

The Castings Department normally operates only fifty weeks a year, and its budget at standard is, therefore, prepared on that basis.

In the week ended August 9, 19—, the actual costs of the Castings Department were:

Molten steel from Melting Department—40 tons at $90	$3,600
Labor at $1.65 per hour	1,485
Supplies	180
Power	230
Supervision	260
Building expense	365
Machinery repairs and maintenance	135
Machinery depreciation	300

In the week, 40 tons of metal were poured, with a yield of 30 tons of goods castings and 6 tons of remeltable scrap and defectives.

Required:

1. Statement comparing by element the standard cost per ton of good castings with the actual cost per ton in the week ended August 9, 19—.
2. Computation of the total and per-ton amounts in the week ended August 9, 19— of each of these variations from standard:

   (*a*) Material—price and quantity.
   (*b*) Labor—price and quantity.
   (*c*) Burden—expense, quantity, and volume.

3. Comment on the adequacy of the division of the costs between only fixed and variable.
4. Explain how division of the costs between only fixed and variable affects the accuracy of the variations from standard burden computed in (2) preceding.

Problem 47.

The Direct Labor Hours Record of the Ball Company shows for the month of August 19—:

Allowed hours	67,000
Excess hours	3,500
Saved hours	500

The actual factory expense of the company in the month was $109,400. The variable burden budget of the company for August 19— shows the following:

Direct Labor Hours	Estimated Necessary Burden
60,000	$102,000
80,000	108,000
100,000 (Normal)	120,000
120,000	126,000

Submit the entries required to record the following for August, 19—:

1. Factory burden chargeable to in-process.
2. Quantity variation from standard burden.
3. Expense variation from standard burden.
4. Volume variation from standard burden.

As part of the journal entry explanations, show your computations.

Question 172.

For purpose of accumulating the standard cost value of the production and the various variations therefrom, sketch what would be a satisfactory form for each of the following records:

(*a*) Purchases Journal.
(*b*) Materials Requisition Journal.
(*c*) Labor Cost Record.
(*d*) Spoilage Record.
(*e*) Direct Labor Hours Record.

Question 173.

Referring to Question 172, name for each record the business form which furnishes the information used for making entries in it.

Question 174.

Using assumed figures, submit in simple journal form the entry summarizing the posting from each of the records you drafted in answer to Question 172.

Question 175.

As respects materials and labor, sketch the business forms needed to develop the data as to:

(*a*) Price variations from standard.
(*b*) Quantity variations from standard.

Question 176.

Explain how, under operations with the use of cost standards, the management is given daily information on plant performance as compared to standard for (*a*) materials and (*b*) labor.

Question 177.

Explain what is meant when it is said that cost accounting with the use of standards is based on the principle of exceptions.

Question 178.

In operating with cost standards, tell what business form furnishes the data for computing each of these variations from the standard:

(a) Materials—price.
(b) Labor—price.
(c) Materials—quantity.
(d) Burden—quantity.
(e) Labor—quantity.

Question 179.

Describe for (a) materials and (b) labor how the dollar amount of each of the causes of price and quantity variation from standard is determined.

Question 180.

What is the reason for having the standard cost card of an item show by element its accumulated standard cost through each labor operation?

Question 181.

Describe the procedure used to take and price a physical inventory of the work in process of a concern operating with standard costs.

Question 182.

The physical and book in-process inventories of the Krugel Company, which operates with cost standards, compare as follows:

Inventory of	Per Books	Physical
Materials in process	$16,114	$15,688
Labor in process	15,400	14,900
Burden in process	7,700	7,450
Totals	$39,214	$38,038

What factors might cause the difference between the book and physical inventories, and what entry would you make to dispose of the differences?

Additional Work

Problem 48.

The Snodgrass Company operates a standard cost system. The standard cost card of its one product is as follows:

MATERIAL:		
A—40 pounds @ 25¢	$10.00	
B—20 pounds @ 30¢	6.00	$16.00
LABOR OPERATIONS:		
#1—2 hours @ 1.50	$ 3.00	
2—3 hours @ 1.50	4.50	
3—3 hours @ 1.50	4.50	
4—4 hours @ 1.50	6.00	18.00
BURDEN—12 hours @ 1.00		12.00
Total		$46.00

Material "B" does not enter the product until midway through labor operation #3. The budget of factory burden at various levels of factory activity is as follows:

Rate of Activity	Estimated Necessary Burden
60%	$26,200
70%	27,000
80%	28,300
90%	29,100
100%	30,000
110%	31,400
120%	32,600

At 100% of normal activity, the plant's direct labor hours number 30,000.

For 19— the data as to the manufacturing outlays, production, and sales of the company are as follows:

Purchases:	
Material "A"—98,000 pounds at 31¢	$30,380
Material "B"—45,000 pounds at 36¢	16,200
Material requisitioned for use in manufacturing operations:	
A—86,800 pounds	
B—41,200 pounds	
Direct labor payroll—22,500 hours at $1.60	$36,000
Factory burden incurred:	
Indirect labor	$ 4,200
Depreciation	3,400
Utilities	2,400
Taxes	4,800
Other items	18,700
Production:	
1,100 units entirely completed	
400 units completed through labor operation #2	
250 units completed two-thirds through labor operation #3	
250 units completed one-half through labor operation #4	
Sales in 19—: 800 units at $70 each.	

Submit in simple journal form the entry required in operating with cost standards to record each of the following:

1. Materials purchased for production.
2. Materials used in production.
3. Direct labor payroll.
4. Factory burden incurred.
5. Factory burden applied to in-process.
6. Burden—quantity variation.
7. Burden—expense variation.
8. Burden—volume variation.
9. Cost of goods completed.
10. Sales and cost of goods sold.

As part of each journal entry explanation, show all your computations. Also indicate at the side of each entry the journal of which it represents the summary posting or in which it would be recorded.

Problem 49.

The Bradley Company makes one product, which consists of three parts: A, B, and C. Parts A and B are made by the company, while Part C is purchased. Part A is made in Department 1, Part B in Department 2, and the three parts are assembled in Department 3. The standard cost card of the product is as follows:

STANDARD COST CARD

Part—"A":		
Material	$4.00	
Labor—3 hours at $1.25	3.75	
Burden—100% of labor	3.75	$11.50
Part—"B":		
Material	$2.00	
Labor—2 hours at $1.50	3.00	
Burden—75% of labor	2.25	7.25
Part—"C"—(Purchase price)		3.00
Assembly labor—1 hour at $1.00	$1.00	
Assembly burden—50% of labor	.50	1.50
Total		$23.25

The variable budget of burden per annum for the departments is as follows:

	UNITS OF OUTPUT						
Dept.	24,000	22,000	20,000	18,000	16,000	14,000	12,000
1	$ 80,000	$ 78,000	$ 75,000	$ 71,500	$ 68,000	$ 65,000	$ 60,000
2	49,500	48,000	45,000	43,500	41,000	38,500	36,000
3	11,100	10,600	10,000	9,500	9,100	8,800	8,400
Totals	$140,600	$136,600	$130,000	$124,500	$118,100	$112,300	$104,400

The normal production of each department is estimated at 20,000 units per annum. The inventories at January 1, 19— *priced at standard* were as follows:

Raw materials:	
Dept. #1	$ 2,000
Dept. #2	3,000
In process:	
Part "A"—6,000 units (completely done)	69,000
Part "B"—6,000 units (completely done)	43,500
Finished product—4,000 units	93,000

Following are the transactions of the company for the calendar year 19—:

1. Materials purchased:	Dept. #1	Dept. #2	Dept. #3	Total
Priced at actual	$101,400	$42,300	$66,700	$210,400
Priced at standard	97,000	38,000	63,000	198,000

2. Materials requisitioned priced at standard:

Department #1	$ 94,600
Department #2	36,720
Department #3 (Part C)	61,560
Total	$192,880

3. Direct labor costs of the departments:

#1 ..... 68,000 hours	$ 91,800
#2 ..... 38,000 hours	63,840
#3 ..... 18,000 hours	19,800
Total	$175,440

4. Factory burden outlays of the departments:

#1	$ 78,400
#2	44,200
#3	9,380
Total	$131,980

5. Production of the departments in addition to the completed units on hand at January 1, 19—·

Particulars	Wholly Completed Units	Partly Completed Units		
			Completed as to	
		Quantity	Material	Labor
Dept. #1..Part A.....	20,000	3,000	½	⅓
Dept. #2..Part B.....	16,000	4,000	¼	½
Dept. #3..Completed assemblies.....	15,000	4,000	All	¼

6. Sales: 18,500 finished assemblies at $28.00 each.
7. Selling and administrative expenses ..... $ 27,400

Required:

1. The summary journal entries to record the foregoing transactions under a plan of operating with cost standards. The various variations from standard are to be recorded *by departments* as are the factory burden incurred and the factory burden applied.
2. Present in "T" form the in-process and finished goods inventory accounts and prove the accuracy of the balance of each.
3. Comment on the adequacy of the company's practice of basing the variable budget of burden on the number of units produced.

Problem 50.

Referring to Problem 49, an analysis for Department #1 of the price variations from standard on materials purchased and labor payroll in 19— shows them to be due to:

Material purchases:	
Substitutions	$ 735
Irregular purchases	755
Uncontrollable market conditions	2,910
Total	$4,400
Labor payroll:	
Substitutions	$1,700
Negotiated wage increases	5,100
Total	$6,800

The quantity standards have in previous years been regularly attained by the department.

Submit the entries you deem proper to dispose of the variations from the standard costs for Department #1 which you determined in your solution to Problem 49. Assume that, for balance sheet purposes, the company uses the FIFO method of pricing the inventories.

Problem 51. (Adapted from A.I.A. Examination Problem)

The Ladour Company makes article "T". Manufacture of the item requires materials "A" and "B" and labor operations T-1, T-2, and T-3. The company operates with cost standards which are integrated into its cost accounting system. The company's book inventory accounts are kept at standard cost, differences between the actual and standard costs being channelled into variation accounts as the manufacturing transactions are recorded. The standard cost card of article "T," based on a normal production volume of 12,000 units a month, is as follows:

Particulars	Quantity		Amount
	Units	Hours	
Material:			
A—Applied in operation T-1	1		$ .50
B—Applied in operation T-2	1		2.00
Labor:			
T-1		½	.75
T-2		½	.75
T-3		1	1.50
Burden:			
Variable			.60
Fixed			.90
Total			$7.00

The inventories of article "T" at June 1, 19—, as determined by a physical count to which the book records were adjusted, were as follows:

Material—"A"—1,000 units; "B"—1,100 units.
In process—160 units completed through labor operation T-2.
Finished goods—500 units.

The June 19— transactions of the company were as follows:

1.	Material purchases:	
	A—12,000 units at $.45	$ 5,400
	B—11,500 units at $2.20	25,300
2.	Payroll:	
	Direct labor, 25,200 hours at $1.60	$40,320
	Indirect labor and supervision	3,800
3.	Other manufacturing overhead	$15,800
4.	Excess material requisitions:	
	A	$ 130
	B	470
5.	Units completed and transferred to finished goods	11,500
6.	Units sold at average price of $9.50	11,700
7.	Selling and administrative expenses	16,500

At June 30, 19—, physical counts disclosed these inventory quantities:

Material:
A—800 units
B—1000 units
In process—400 units done through operation T-1.
Finished goods—300 units.

Required:

1. In simple journal form, the entries for the June 19— transactions affecting the Ladour Company's inventory and variations from standard accounts.
2. In "T" form the material, in-process, and finished goods inventory accounts.
3. Alternative journal entries adjusting the book inventory balances to the physical inventory amounts at June 30, 19—.
4. Profit and loss statements showing alternative methods of exhibiting thereon the variations from standard cost.

Question 183.

Illustrate, using your own figures, how you would compute for factory burden the amount of the:

(*a*) Expense excess or saving.
(*b*) Idle-time cost or overtime profit.
(*c*) Quantity variation.

Indicate in each computation the *source* of each of the amounts used in it.

Question 184.

Explain the purpose of spoilage reports in cost accounting with the use of standards.

Question 185.

If the per-cent-of-direct-labor-cost method of burden distribution is used, how is the quantity variation from standard burden determined? If the per-cent-of-prime-cost method of burden distribution is used?

Question 186.

If a machine-hour-rate method of burden distribution is used, what record should, in operating with cost standards, displace the Direct Labor Hours Record?

Question 187.

How may the variations from standard cost be exhibited in the financial statements?

Question 188.

The Gorre Company makes 4,000 products. Each product averages 30 piece parts, and each piece part averages 20 operations. The company's president questions the practicability of a proposal to operate with cost standards, on the ground that doing so will require setting cost standards for 4,000 assemblies, 120,000 piece parts, and 2,400,000 labor operations. Explain whether the president's estimate of the number of cost standards necessary is apt to be correct.

Question 189.

Describe some savings in cost accounting expense which are incidental to operating with the use of cost standards.

Question 190.

Present in "T" form the charges and credits to the in-process accounts when operating with the use of cost standards.

Question 191.

Submit three kinds of entries involving debits to the materials quantity variation account.

CHAPTER 18

Cost Accounting for Residuals and By-Products

218. Waste and scrap residuals.

In many lines, after the main fabricating processes are completed, there remain leftovers or *residuals*. If these residuals have no salable value or even involve removal expense, they are termed *waste*. Examples of *waste residuals* are the chips in a cut-stone works, or the cinders in a power plant. These residuals accumulate as an unavoidable incident of plant operation, have no realizable value, and usually entail *dumping expense*.

If the residuals have some salable value *as is*, that is, without being further processed, they are termed *scrap*. Examples of *scrap residuals* are the shearings in a sheet metal works or the cuttings in a garment factory. These residuals also accumulate as an unavoidable incident of plant operation, but in sufficient quantity they have a salable value as junk without being further processed. Usually the value of scrap is small in comparison with that of a similar quantity of the material from which it arose.

219. Scope of the accounting for waste and scrap.

A share of the material, labor, and burden costs of manufacture is charged to a resultant of the fabricating processes only if:

1. The item has a value sufficiently large to absorb such charges, or
2. It is the purpose of the production to make such item.

Since residuals lack significant value and it is not the purpose of the manufacturing to produce them, no attempt is made to apportion any of the material, labor, or burden costs of manufacture to either waste or scrap. Instead, the accounting for these residuals is limited in its scope to:

1. Correctly charging the expense of disposing of waste, and
2. Correctly crediting the net proceeds from the sale of scrap.

The accepted plans for charging the expense of removing waste and for crediting the net proceeds from the sale of scrap will be considered.

220. Charging the expense of removing waste residuals.

A burden item can be distributed among the costing points only through an arbitrary rate which is applied to all jobs whether or not each benefited from that item. It follows, therefore, that accuracy in cost accounting is attained only as the cost outlays are distributed as *direct charges*. Thus, the cost of an item charged to a specific job as direct material is more accurately distributed than the cost of a similar item charged to factory burden and from thence distributed to the cost of all the jobs. Again, an expense item charged to the burden of a specific department is more accurately distributed than it would be if charged to general factory overhead. In the first case, the item is charged only to jobs processed in the department in which the expense occurred. In the second instance, jobs processed in departments in which the expense did not occur unjustly share in its amount.

In accord with the principle of charging costs as directly as possible, the methods of charging the expense of removing waste are, in the order of their probable accuracy, as follows:

1. Charge as the *direct expense* of a specific job.
2. Charge as an item in the *burden of a specific department.*
3. Charge as an item in the *general factory burden.*

Thus, a contractor will handle the expense of removing the rubbish incidental to a construction job as a direct charge to that project. Again, in a company producing its own power, the expense of removing the cinders is charged solely to the Power department. Finally, the expense of removing the intermingled sweepings of an entire factory is charged to a general factory burden account and from thence distributed on some equitable basis among all the factory departments contributing to the waste.

The waste may represent irreparably spoiled items previously taken out of in-process inventory by an entry such as follows:

Spoilage Expense	$450	
Materials in Process Inventory		$320
Labor in Process Inventory		65
Burden in Process Inventory		65
To remove from inventory the cost of the irreparably spoiled pottery of June, 19—.		

In such a case, the expense of removal of the waste is correctly handled as an additional charge to Spoilage Expense account.

221. Crediting the net proceeds from the sale of scrap.

The net proceeds from the sale of scrap are computed as the sales price of the scrap less the incidental handling and selling expenses, thus:

[Fig. 128]

Sales Price of the Scrap	$400
Less—Incidental Handling and Selling Expenses	40
Net Proceeds of the Scrap	$360

Cost credits, like cost charges, are more accurately distributed if they are handled as *direct items.* In accord with this costing axiom, the plans for crediting the net proceeds from the sale of scrap are, in the order of their probable accuracy, as follows:

1. Credit to the material cost of a *specific job.*
2. Credit to the burden cost of a *specific department.*
3. Credit to the general factory *burden cost.*

Thus, a contractor will handle the net proceeds from the sale of scrap incidental to a construction job as a credit to the material cost of that job. Again, if the cinders incidental to power plant operation are sold, their net sales price is best handled as a reduction of the cost of producing the power. Finally, if the intermingled metal sweepings of an entire factory bring a small net sales price, its amount is necessarily credited to a general burden account and from thence distributed on some equitable basis as a reduction of the burden costs of all the factory departments contributing to the scrap.

If the scrap represents the salvage realized from items previously taken out of in-process inventories as charges to *Spoilage Expense,* the net proceeds from its sale are correctly handled as a credit to that Spoilage Expense account, thus reducing its balance to an amount measuring the net expense of spoiled work.

222. By-products; kinds and distinguishing features.

By-products are minor items which are manufactured by a concern as a means of either:

1. Disposing more profitably of scrap, or waste residuals, or
2. Obtaining some recovery on the fixed costs applicable to excess plant capacity.

Thus, a plant which has been selling sheet-metal scrap for $5 a ton may find that by applying $100 of additional material and conversion effort to the scrap, it will, in the form of toy cutlery, bring $150 a ton, a net gain of $45 per ton over the $5 price previously realized from the scrap. Again, a company which has much idle capacity may find that spending $10,000 for material, labor, and variable factory expense to make a line of by-products will return $15,000, and thus result in recovering $5,000 of the company's, say, $12,000 of unabsorbed burden arising from unused capacity.

The by-product is characterized by the fact that it can be made profitably only if:

1. Scrap provides the bulk of its material content, or
2. Unused plant capacity provides the bulk of its burden content.

An item is not a by-product if, although now made of scrap or with otherwise unused factory facilities, it would continue to be made even if it would be necessary to buy new material or build additional plant facilities for the purpose.

Since by-products are made only from scrap or with otherwise unusable plant facilities, it follows that not only sales possibilities but also the quantity of the available scrap or unused plant facilities limit the volume of by-product manufacture. Thus, a concern making a by-product to obtain a partial recovery of unabsorbed burden would curtail manufacture of the by-product as increased production of its regular line of goods reduced such unabsorbed burden. Similarly, a sheet-metal concern making steel washers from scrap cuttings could increase the production of such washers only as expanded output of its regular line enlarged the supply of scrap, and would have to decrease the production of such washers as reduced activity in its regular line lessened the supply of scrap.

223. Cost accounting for by-products made to utilize residuals.

The aim in making by-products from residuals is to obtain a better price for the residuals than would be received if they were sold as scrap. In accord with this concept, the by-product is charged with only (1) the additional material and conversion costs required to fashion it from the scrap and (2) the expenses of marketing it. The net margin on the sale of the by-product is then computed as:

[Fig. 129]

Net sales of the by-product		$8,750
Less—Additional material at regular prices	$ 400	
—Direct labor at regular rates	3,100	
—Factory burden at regular rates	1,650	
—Marketing expenses at actual cost	1,500	6,650
Net margin on sales of the by-product		$2,100

In this way, the net margin on the by-product measures the price obtained for the residual by processing it into a minor product. Thus, if previously the residual sold as scrap realized only $200, now as a by-product Figure 129 shows it to bring $2,100.

In line with the view that the net margin on a by-product made from a residual measures only the better disposal price of scrap, it is customary to reflect that net margin on the financial statements as a reduction of Cost of Goods Sold, thus:

[Fig. 130]

Net Sales of Main Products		$50,000
Cost of Goods Sold of Main Products	$38,100	
Less—Net Margin on By-Product	2,100	36,000
Gross Profit on Sales		$14,000

The net margin on the by-product is not a true profit on sales because the cost of the by-product fails to include any charge for its basic scrap material. The net margin on the by-product is probably also not a true sales price of scrap, because it includes the profit on the separate material, labor, burden, and marketing costs applied to make the scrap into by-product.

For a by-product made solely to utilize residuals, factory burden is charged at the regular rates, on the ground that, if the factory facilities were not used to make the by-product, they could be used to make regular products.

224. Cost accounting for by-products made to utilize excess factory capacity.

The aim in making a by-product to utilize excess factory capacity is to recover thereby as much as possible of the unabsorbed burden which measures the fixed costs applicable to that idle capacity. In accord with this view, a by-product of this kind is charged with:

1. The material used at regular prices.
2. The labor used at regular prices.
3. The *variable factory expenses* incident to its production.
4. The actual selling expenses incurred in its marketing.

The difference between a by-product cost consisting of the foregoing elements and the sales price of the by-product is a by-product margin which measures the extent to which manufacture of the by-product resulted in recovery of the fixed expenses applicable to the excess factory capacity.

Since the margin on the by-product measures a reduction of the loss due to unabsorbed burden, it is most accurately handled if credited to the Unabsorbed Burden account. In this way, the balance in the Unabsorbed Burden account measures the *net cost* of excess plant capacity.

ASSIGNMENT 18

Problem 52.

Owing to a generally overbuilt condition in the industry, the Attlee Gear Company is at present operating at only 60 per cent of capacity. Estimates of the necessary factory burden of the company at various levels of plant activity are as follows:

Operating Level	Estimated Necessary Factory Burden
40%	$ 90,000
60%	98,000
80%	108,000
100%	120,000
120%	150,000

To utilize the idle capacity, the company can do some machining work for a large mail order company. This work will be:

1. For a contract period of five years.
2. Invoiced to the mail order company at $100,000 per year.
3. Entail prime costs of $60,000 per year.
4. Involve variable administrative and selling costs of $4,000 per year.
5. Utilize 40 per cent of the plant capacity.

The company's regular line sells for 50 per cent above normal factory cost, and sales expense (75 per cent variable) is about 20 per cent of the selling price. At the present 60 per cent rate of activity, the company's sales in a year will be about $432,000. The work done for the mail order company would in no way compete with the company's regular line, but it must be taken on an all-or-none basis; that is, the company must at all times devote 40 per cent of its capacity to this specialty work. At the 100 per cent operating level, the prime cost is about 75 per cent of the total factory cost.

The company's president believes that, with the undoubted expansion of the general market for gear products, the company, although now working at 60 per cent, can reasonably expect to average an 80 per cent operating level over the next five years.

Given the foregoing information, it is asked that, as cost consultant to the company, you present figures showing whether or not it would be desirable to take on the mail order company's business.

Problem 53.

The Holly Metal Works, in cutting a specialty item out of a standard-size steel sheet, shears a steel strip of size 24 by 5 inches. For many years, it sold this shearing as scrap for a nominal amount. Recently it found that it could punch each of the scrap strips into three license plates. On the by-product basis, the cost per license plate would be:

Scrap material	$0
Paint and screws at cost	.01
Labor at regular rates	.03
Burden at regular rates	.03
Total	$.07

Upon inquiry, the company finds that other license-plate manufacturers have about the same paint, screw, labor, and burden costs but pay 16¢ for the metal content of each plate. The company's president, therefore, concludes that because of its metal cost advantage, the Holly Metal Works should easily be able to obtain a national monopoly of the license-plate business.

Is the Holly Metal Works' president correct in his conclusion? Give full reasons. What kind of a by-product is the Holly Metal Works making?

Question 192.

What are some of the reasons that would influence a company to undertake the manufacture of by-products?

Question 193.

Distinguish between residuals, waste, and scrap.

Question 194.

Article X is made from new material, but its manufacture was undertaken only to utilize otherwise idle factory facilities. Is article x a by-product?

Question 195.

What factors limit the volume of manufacture of a by-product?

Additional Work

Problem 54. (Adapted from A.I.A. Examination Problem)

The National Fiber Corporation's operations consist of mining and processing a fibrous mineral. At December 31, 1950, the inventory

amounted to 25,000 tons of fiber, all produced in 1950. This inventory was valued by the corporation at $19.88 per ton, the average cost per ton produced in 1950.

The following information was procured from the company's accounts and records:

Tons Produced and Average Costs

Year	Tons Produced	Cost Per Ton
1947	170,000	$14.65
1948	180,000	14.85
1949	175,000	15.06
1950	110,000	19.88

Production Data

Particulars	Total		Per Ton	
	1949	1950	1949	1950
Tons produced	175,000	110,000	175,000	110,000
Direct Labor	$472,500	$401,500	$ 2.70	$ 3.65
Indirect Labor	346,500	286,000	1.98	2.60
Supplies & other production expenses	708,750	479,600	4.05	4.36
Depletion	262,500	165,000	1.50	1.50
Salaries (superintendents, plant clerks, watchmen)	217,000	233,200	1.24	2.12
Depreciation	227,500	247,500	1.30	2.25
Other fixed expenses	400,750	374,000	2.29	3.40
Totals	$2,635,500	$2,186,800	$15.06	$19.88

For the purposes of this problem, indirect labor and supplies and other production expenses are considered as variable costs and there are no semi-variable costs. Depletion is provided at $1.50 per ton mined, and depreciation on machinery and equipment is computed at the usual rates by the straightline method. Owing to an extended slow-down strike in 1950, much less of the mineral was mined and processed in that year than during the three preceding years in which production was considered normal. The rise in the 1950 unit labor costs was explained as the effect of general increases in the hourly wage rates, ranging from 33 to 40 per cent. The increase in the unit cost of supplies and other production expenses is accounted for by an increase in prices of about 10 per cent. All of these advances date from the beginning of the year.

(*a*) Is the pricing of the closing inventory at December 31, 1950 at $19.88 per ton acceptable for financial-statement purposes? Discuss fully.

(*b*) Assuming that the closing inventory at $19.88 per ton is not acceptable for financial-statement purposes, how should it be adjusted? Present calculations in full and state how the adjustment should be dealt with in the statements.

(*c*) Criticize briefly the classifying of the company's costs into only fixed and variable types.

Question 196.

Explain briefly each of the following terms as they are used in cost accounting:

1. Waste.
2. Scrap.
3. Spoilage.
4. Residual.
5. By-product.

Question 197.

Is it possible for waste to develop into scrap or scrap into a by-product? Vice versa? Give specific illustrations if you can.

Question 198.

Comment on the correctness of the following:

"The net margin on the sales of a by-product measures not only the amount realized from the sale of the scrap material or unused factory facilities, but also the profit on the separate material, labor, burden and marketing costs applied on the by-product."

Question 199.

What is meant by *direct charging*, and why does that practice result in more accurate unit costs?

CHAPTER 19

Cost Accounting for Joint Products

225. Definition and examples of joint products.

Joint products are two or more items or grades of an item, each of significant value, made from a common raw material. Examples of joint products representing *different items* are:

(*a*) Cotton fiber and cotton seed.
(*b*) Gas and coke.
(*c*) Gasoline and kerosene.
(*d*) Meats and hides.

Examples of joint products representing *varying grades of the same item* are:

(*a*) The different sizes of coal in a colliery.
(*b*) The several cuts of lumber in a sawmill.

The nature of joint products is usually such that one cannot be made without also producing the other. Thus, to raise cotton fiber, it is also necessary to accept cotton seed. Again, the production of gas or coke inevitably results in the availability of the other. In most instances, the joint products are produced simultaneously in a common processing operation. Thus, in cotton manufacture the common ginning operation results in the production of both cotton fiber and cotton seed; while in meat packing the common slaughtering operation results in the availability of both meat and hides. Sometimes, however, the joint products are items obtained by successive treatments of an original material. This is true, for example, in petroleum refining and coal-tar products.

The *break-off point* is the place where the separate items or grades emerge from the common raw material as a result of a common processing operation. Thus, in cotton processing, the separate items, cotton fiber and cotton seed, emerge at the end of the common ginning operation. Again, in tobacco processing, as the result of the common cleaning and sorting operations, the separate grades emerge.

Sometimes the joint product is marketed in the form in which it emerges from the break-off point. This is true, for example, of both gas and coke in the utility line and of the varying sizes of coal in a colliery. Frequently, however, after the break-off point, the resultant items are further processed separately before being marketed. This is true, for example, of meat and hides in the packing line and of the various grades in tobacco processing.

The relationship between joint products is fundamentally different from the relationship between a main product and its by-product. In the case of joint products, the several items or grades are considered to be of relatively equal importance, and it is the object of the business to make them all. In the case of a main product and its by-product, the latter is made only to utilize some leftover incidental to the manufacture of the main product, and of itself would not be an object of manufacture.

Since industry is not static, it is possible for an item to develop from a by-product to a joint-product status, or to fall from a joint- to a by-product classification. Thus, in petroleum refining, gasoline, once a by-product, is now a joint product, while kerosene, once a joint product, is now only a by-product.

226. The basic problem in joint product cost accounting.

The basic problem in cost accounting for joint products is to divide among them equitably their common material and processing costs. Thus, $2,000 worth of raw cotton and $1,000 of ginning expense result in, say, 10,000 pounds of cotton fiber worth, if purchased as such, $2,500, and 15,000 pounds of cotton seed worth, if purchased as such, $1,500. The costing problem is to divide equitably the $3,000 of common material and conversion cost between the resultant cotton fiber and cotton seed. Among the bases for prorating such common costs among the resultant joint products are:

1. *Physical factors,* such as relative weight, area, bulk, or chemical content.
2. *Relative market value* at the point of break-off.
3. *Relative sales price* after the items have been separately processed.

The applicability of each of these methods will be briefly considered. The cotton fiber and cotton seed described in this section as the joint products of the common ginning process will be the basis for all the illustrations.

227. Common costs prorated on the basis of physical factors.

On the basis of *relative weight*, the $3,000 common costs of the cotton fiber and cotton seed would be charged to:

[Fig. 131]

1. Cotton fiber..... $\frac{10,000}{25,000}$ of $3,000, or $1,200.
2. Cotton seed..... $\frac{15,000}{25,000}$ of $3,000, or $1,800.

Obvious defects of physical factors as a basis for prorating the common costs among the joint products are that:

1. If the products are altogether different items, there is no physical factor on the basis of which they are really comparable. Thus, in this case, the physical factor weight is the proration basis. But a pound of cotton fiber is not the same as a pound of cotton seed. The weights are the same but the substances are not.
2. If the products are different grades of the same item, it is exceptional for their values to be in exact proportion to any physical factor. Thus, in collieries, a ton of screenings does not have the same value as a ton of lump coal. Again in plate glass manufacture, the larger-size sheets have a much larger per-square-foot value than the smaller ones.
3. It often results in misleading profit-and-loss showings on the various joint products. Thus, on a weight basis, all grades of coal would be assigned the same value per ton. Matching this uniform cost per ton against the markedly varying sales prices per ton of the several coal grades would misleadingly show the high-grade coals to be extremely profitable and the low-grade ones to be losing items.

228. Proration on basis of separate product values at break-off point.

On the basis of the relative market values of the separate products at the break-off point, the $3,000 common costs of the cotton fiber and cotton seed would be allocated to:

[Fig. 132]

1. Cotton fiber..... $\frac{2,500}{4,000}$ of $3,000, or $1,875.
2. Cotton seed..... $\frac{1,500}{4,000}$ of $3,000, or $1,125.

Among the clear merits of relative market value at break-off point as a method for prorating the common costs among the joint products are that:

1. The method is applicable whether the joint products are different items or different grades of the same item. Dollar values are comparable where physical factors may not be.

2. The assigned costs align with the separate market values of the joint products. If the joint products become base materials for further manufacture, this method apportions equitably among them the saving made or greater cost incurred by manufacturing rather than purchasing them. If the joint products are sold in the form in which they emerge at the break-off point, this method causes them to realize identical gross profit rates.

229. Proration on basis of joint-product sales price after separate processing.

Assume that after application of $4,200 of separate processing costs, the cotton fiber, as cotton cloth, sells for $10,000; and that after $300 of separate processing cost, the cotton seed, as cottonseed oil, sells for $2,000. On the basis of the relative sales prices of the final cloth and oil products, the $3,000 of common costs would be allocated to:

[Fig. 133]

1. Cotton fiber..... $\frac{10,000}{12,000}$ of $3,000, or $2,500.
2. Cotton seed..... $\frac{2,000}{12,000}$ of $3,000, or $ 500.

Sales prices after separate processing as a basis for prorating the common costs among the joint products assumes that the final sales prices of the joint products are proportionate to the value of their base materials at split-off point. This patently is not true if the separate processing and sales costs of the products vary markedly. If $7 is expended in processing and selling a $1 base material, it should normally sell for at least $6 more than if only $1 were so expended. Under the final-product sales-price basis of prorating joint material costs, the article on which the $7 was expended will be charged with some of the material cost of the product on which only $1 was expended. Thus, if each of the products referred to in the preceding sentence is sold at its cost price, the portion of their $2 combined material cost absorbed by the product selling for:

$8.00 is $\frac{8}{10}$ of $2.00, or $1.60.
$2.00 is $\frac{2}{10}$ of $2.00, or $ .40.

Since it was, in this case, specifically assumed that each product used the same amount and kind of base material, it is seen that the effect of the final-sales-price-of-the-product basis of joint-

cost proration is to penalize the products on which the separate processing and selling costs are heaviest. To avoid this error, the following variant of the final-sales-price-of-product method is frequently employed:

[Fig. 134]

Particulars	Cloth	Oil	Together
Final selling price	$10,000	$2,000	$12,000
Less—Separate processing and selling costs	$ 4,400	$ 400	$ 4,800
—Normal 25% profit on processing and selling	1,100	100	1,200
—Total	$ 5,500	$ 500	$ 6,000
Estimated sales price value of joint base material	$ 4,500	$1,500	$ 6,000
Actual cost of the joint base material			$ 3,000
Charged to:			
Cotton cloth	$\frac{4,500}{6,000}$ of $3,000, or		$2,250
Cottonseed oil	$\frac{1,500}{6,000}$ of $3,000, or		$ 750

The obvious merit of the method of prorating the common costs illustrated in Figure 133 is that it recognizes that (1) the processing and selling, as well as the base-material costs, influence the selling price of a product, and (2) profits are made not only on the material costs, but also on the conversion and selling efforts.

As variants of the relative-market-value-at-split-off-point plan, the methods of joint-cost proration illustrated in Figures 133 and 134 are acceptable in those instances where the joint products have no determinable values at the split-off point. Proration strictly on the basis of the final sales prices of the joint products is probably satisfactory only in those few instances where either (1) the joint products are not separately processed, or (2) all the joint products are subject to about the same amount of separate processing and selling costs.

230. Proration on basis of estimated cost to produce separately.

Sometimes the nature of the joint products is such that they could be separately produced. In such a case, their cost as produced jointly may be equitably prorated on the basis of their estimated cost to produce separately. Thus, in a public works project a dam constructed across a river is especially designed to make possible:

1. River navigation,
2. Irrigation, and
3. Power production.

The per-annum depreciation, interest, and maintenance costs of this triple-purpose dam are $3,000,000. It is estimated that the per-annum depreciation, interest, and maintenance costs of a dam designed solely to make possible:

1. River navigation.....would be.....	$1,000,000
2. Irrigation.....would be.....	1,500,000
3. Power production.....would be.....	2,500,000
Total.....	$5,000,000

On the basis of the estimated cost to produce the services separately, the $3,000,000 annual cost entailed by the multiple-purpose dam is prorated as follows among the three kinds of service produced:

1. River navigation.....	$\frac{1,000,000}{5,000,000}$	of $3,000,000, or	$ 600,000
2. Irrigation.....	$\frac{1,500,000}{5,000,000}$	of $3,000,000, or	$ 900,000
3. Power production.....	$\frac{2,500,000}{5,000,000}$	of $3,000,000, or	$1,500,000

The equity of cost to produce separately as a basis for proration of the joint production costs is unquestioned. The great difficulty is, when the services or products are not actually produced separately, to determine what it would cost to so produce them.

231. Proration on basis of contribution to the fixed and variable costs. In certain lines, the joint products often consist of the same services rendered to different classes of customers at varying levels of plant utilization. Thus, a power company's 10,000,000 kilowatt-hours of output are sold to:

Domestic users.....	40%
Industrial customers.....	30%
Street railways.....	20%
Other utility companies.....	10%

At peak load, the per cent of output taken by each customer group is as follows:

Domestic users.....	60%
Industrial customers.....	25%
Street railways.....	15%
Other utility companies.....	0%

The power-production costs of the company consist of these elements:

Fixed costs	$400,000
Variable costs	200,000
Total	$600,000

Since the fixed costs are mainly those necessary to provide facilities for the maximum load, they are prorated among the customer groups on the basis of contribution to demand at maximum load. Since the variable costs arise solely from the kilowatt-hours of production, they are allocated among the customer groups on the basis of kilowatt-hour consumption. Using these bases, the per-kilowatt-hour cost of each class of service is computed as follows:

[Fig. 135]

	SHARE OF						
Group	Maximum Load	K.W.H. Consumed	Fixed Costs	Variable Costs	Total Cost	K.W.H. Used	Cost per K.W.H.
Domestic users	60%	40%	$240,000	$80,000	$320,000	4,000,000	$.080
Industrial customers	25	30	100,000	60,000	160,000	3,000,000	.033
Street railways	15	20	60,000	40,000	100,000	2,000,000	.050
Other utility companies	0	10	—	20,000	20,000	1,000,000	.020
Totals	100%	100%	$400,000	$200,000	$600,000	10,000,000	.060

232. Inadequacies of joint-product costs based on common cost prorations.

Obvious inadequacies of joint-product costs, whatever the basis for prorating the common expenses among them, are that:

1. The product costs cannot be proved.
2. Increases or decreases in the product costs do not clearly reflect changes in production efficiency.

The joint-product costs cannot be proved because ceasing to make one of the products does not eliminate its share of the common costs. The raw cotton and the ginning operation cost the same even if the cotton seed is to be dumped.

Increases and decreases in the product costs of items made jointly fail clearly to reflect changes in production efficiency because the increases or decreases may be partly or wholly due to the basis used to prorate the common costs. Thus, if the common costs are prorated among the products on the basis of their market values, an increase in a product's relative market value enlarges its share of the common costs.

To distinguish change in joint-product cost due to production efficiency from change due to an altered proration of the common costs, the joint-product cost data are desirably presented as follows:

[Fig. 136]

Particulars	Per-Unit Cost of Joint Product		
	May	June	July
Share of common cost through split-off point	$10	$12	$ 8
Separate costs after split-off point	20	18	22
Total cost	$30	$30	$30

The increase or decrease in the cost *after split-off* shows the change in joint-product cost due to manufacturing efficiency.

233. Charging for joint-product base materials at current market values.

Often the joint products resulting from a common process become base materials for further manufacturing operations. Thus, the cotton fiber and cotton seed resulting from the ginning operation become the base materials for making cotton cloth and cottonseed oil. In such a case, an attractive practice which (1) eliminates prorating the common costs and (2) develops the profit of each activity as though it were a separate business is to handle the costs and sales values as follows:

1. Charge the common material and processing costs to a joint-operation profit and loss account, thus:

[Fig. 137]

Ginning Profit and Loss

Process costs:	
Raw cotton $2,000	
Labor and burden .. 1,000	

2. Credit the joint-operation profit and loss account with the current market value of the base materials produced and make contra debits for the same amounts to the profit and loss accounts of the products made from those base materials. For the cotton and cotton seed, the appearance of the several profit and loss accounts after this step is as follows:

[Fig. 138]

Ginning Profit and Loss

Process costs:	Value at market of the production:
Raw cotton $2,000	Cotton fiber $2,500
Labor and burden 1,000	Cotton seed 1,500

Cotton Cloth Profit and Loss

Process costs:	
Cotton fiber $2,500	

Cottonseed Oil Profit and Loss

Process costs:	
Cotton seed $1,500	

The balances in the profit and loss accounts now show, as though the divisions were separate businesses,

1. The $1,000 profit made on the ginning activity.
2. The $2,500 base material cost of cloth manufacture.
3. The $1,500 base material cost of seed oil production.

3. Charge the profit and loss account of each product made from the jointly produced base materials for its separate additional costs and credit it with the sales of the product. Using assumed additional cost and sales amounts, the profit and loss accounts for the cotton cloth and cottonseed oil appear as in Figure 139, and their balances show, as though the divisions were separate businesses,

1. The $3,300 profit on cotton cloth manufacture.
2. The $400 loss on cottonseed oil production.

[Fig. 139]

Cotton Cloth Profit and Loss

Process costs:		Sales of:	
Cotton fiber	$2,500	Cotton cloth	$10,000
Additional material	400		
Labor and burden	3,800		

Cottonseed Oil Profit and Loss

Process costs:		Sales of:	
Cotton seed	$1,500	Cottonseed oil	$2,000
Additional material	100		
Labor and burden	800		

If the divisional profit and loss accounts consistently show profits to be made on ginning and cotton cloth production and losses to be incurred on cottonseed oil manufacture, the management may well consider whether cottonseed oil manufacture should be discontinued.

234. Accounting procedures must not inflate the profits.

It must be emphasized that a procedure such as that explained in Section 233 to handle joint-product costs and sales values must not result in profits being included in the financial statements on goods that have not been sold. Such inflation of the inventory and profits is avoided by eliminating from the inventory and income accounts that amount of the profit on inter-division transfers which applies to the goods unsold at the balance sheet date. Thus, referring to the data of Figures 138 and 139, and assuming that at the balance sheet date half the cotton cloth and

cotton seed are unsold and included in the inventory at these amounts:

Cotton cloth (50% of the $6,700 total cotton cloth division costs)	$3,350
Cotton seed (50% of the $2,400 total cottonseed oil division costs)	1,200

The adjusting entry necessary to eliminate the unrealized inter-division gross profit from the inventories and profit would be:

Ginning Profit and Loss	$500	
Reserve for Unrealized Inter-division Profits		$500
Ginning profit on transfers to manufacturing divisions	$1,000	
Portion of goods transferred still in inventories	50%	
Unrealized gross profits included in the inventories	$ 500	

The Reserve for Unrealized Inter-division Profits is exhibited in the balance sheet as a deduction from inventories, thus:

Inventories	$4,550	
Less—Reserve for Unrealized Inter-division Profits	500	$4,050

At each balance sheet date, the balance in the Reserve for Unrealized Inter-division Profits is adjusted through Profit and Loss to the estimated amount of inter-division profit then included in the inventories.

If only 10 per cent of the cotton cloth and 20 per cent of the cottonseed oil produced were unsold and included in the inventory, the per cent of the $1,000 ginning profit to be transferred to the Reserve for Unrealized Inter-division Profits would be computed as follows:

[Fig. 140]

Total transfers from ginning to cloth and seed-oil divisions	$4,000
Transfers from ginning included in the closing inventories:	
10% of $2,500 cotton cloth transfers from ginning	$ 250
20% of $1,500 cottonseed oil transfers from ginning	300
Total	$ 550
Per cent of the $4,000 transfers from ginning included in the closing inventories and, therefore, the per cent of the $1,000 ginning profits to be eliminated from the inventories is $550 ÷ $4,000, or	13.75%

235. Composite purchases a kind of joint-cost problem.

Sometimes a number of inventory or fixed asset items are purchased for a lump sum. Such acquisitions are termed *composite purchases.* For all practical purposes, the lump sum paid for the several items constitutes the common cost of joint products, and it is usually best prorated among them on the basis of their market values. Thus, four dwellings of appraised value

$8,000, $12,000, $14,000, and $18,000 are purchased by a real estate agent for $39,000. On the basis of the appraisal values, the $39,000 cost is prorated among the four dwellings as follows:

Dwelling #1	$\frac{8,000}{52,000}$ of $39,000, or	$ 6,000
Dwelling #2	$\frac{12,000}{52,000}$ of $39,000, or	9,000
Dwelling #3	$\frac{14,000}{52,000}$ of $39,000, or	10,500
Dwelling #4	$\frac{18,000}{52,000}$ of $39,000, or	13,500
Total lump-sum cost prorated		$39,000

The costs assigned to the compositely purchased items at acquisition on the basis of their then-market values are considered to be their invoice costs, and they are not altered to accord with subsequent changes in the relative market values of the items.

ASSIGNMENT 19

Problem 55.

The Marley Cigar Company manufactures three grades of cigars. Raw tobacco for production is bought at auction in unsorted bulk form. It is then cleaned, seasoned, and sorted into the three grades processed. For the first year of the company's operation, the following information is available:

Bought in bulk 100,000 pounds of raw tobacco	$40,000
Cleaning, seasoning, and sorting costs	20,000
Total	$60,000

After cleaning, seasoning, and sorting, there was obtained from the year's bulk tobacco purchases:

12,000 pounds of Grade "A" tobacco, which, if purchased as such, would have cost $30,000.
18,000 pounds of Grade "B" tobacco which, if purchased as such, would have cost $22,500.
55,000 pounds of Grade "C" tobacco which, if purchased as such, would have cost $27,500.

Costs, exclusive of the tobacco itself, applied separately in the year to each of the grades were as follows:

Grade	Foil, Bands, and Boxes	Labor	Burden
A	$1,000	$10,000	$ 4,000
B	2,000	15,000	6,000
C	4,000	20,000	8,000
Totals	$7,000	$45,000	$18,000

None of the foil, bands, and boxes, but 10 per cent of the Grade "A" labor and 5 per cent of the Grades "B" and "C" labor, is applicable to the tobacco still in process at the year's end.

Production and sales of each grade of cigars in the year were as follows:

Grade	Sales	Number of Boxes Produced	Number of Boxes Sold
A	$22,500	2,400	1,800
B	32,750	5,700	3,800
C	35,250	14,200	7,100
Totals	$90,500	22,300	12,700

Closing inventories (in pounds) of raw and in-process tobacco were as follows at the year-end:

Grade	Raw	In-Process
A	1,200 lb.	1,600 lb.
B	2,400 "	2,000 "
C	5,000 "	6,000 "
Totals	8,600 lb.	9,600 lb.

Because of the shrinkage incidental to manufacture, it is estimated that the tobacco in process is only 80 per cent of its original weight.

The company maintains a "Bulk Purchases and Handling Operations" account to which it charges the actual costs of tobacco purchases, seasoning, and sorting, and which it periodically clears with an entry like this:

Grade "A" Tobacco Inventory	at values if purchased as such	$x,xxx	
Grade "B" Tobacco Inventory		x,xxx	
Grade "C" Tobacco Inventory		x,xxx	
Bulk Purchases and Handling Operations			$x,xxx
Profit on Bulk Purchases and Handling Operations			x,xxx

The tobacco grades as used are then charged into production at the values so established.

Required:

1. Statement showing the per-box cost (correct to two decimal places) of each grade of cigar produced.
2. Statement showing the gross profit or loss on each grade of cigar.
3. Computation of: (*a*) the unrealized and (*b*) the realized profit on bulk purchases and handling operations.
4. Entry to eliminate from the inventory amounts reflected by the company's records the unrealized profit on bulk purchases and handling.
5. Comment on: (*a*) the desirability and (*b*) the admissibility of the company's accounting methods.

Question 200.

What kind of an account is the "Reserve for Unrealized Interdivision Profits"? How is the account (1) periodically adjusted to correct amount and (2) exhibited on the financial statements?

Question 201.

The Peoton Power and Railways Company produces power which it either (*a*) sells to domestic and industrial users or (*b*) uses to operate its own street railways system. For 19—, the costs, sales, and contributions to peak load are estimated to be as follows:

Costs:	
Depreciation, taxes, supervision, and other fixed costs	$440,000
Coal, supplies, and other variable costs	320,000
K.W.H. Sales—to (000's omitted):	
Industrial users	27,000
Domestic users	36,000
Street railways	11,000
Contribution to Maximum Load:	
Industrial users	35%
Domestic users	55%
Street railways	10%

As cost accountant, compute the estimated cost per kilowatt-hour to be used by the company as a basis for setting power rates for each of its customer groups.

Question 202.

How do composite purchases present cost accounting problems similar to those of joint products?

Additional Work

Problem 56.

The Morey Manufacturing Company, which makes but one product, uses a process cost system. The cost outlays of the various departments and other data for the calendar year 19— were as follows:

Cost Data	Dept. A	Dept. B	Dept. C
Materials	$13,000	$ 1,620	$ 2,720
Direct Labor	6,300	9,160	6,000
Manufacturing Expenses	6,450	1,840	3,500
Totals	$25,750	$12,620	$12,220
Production Data			
Units finished and transferred	100,000	80,000	60,000
Units finished and remaining in the department	20,000	10,000	—
Units unfinished	12,000	8,000	20,000
Units lost due to spoilage	—	2,000	—
Work in Process Data			
Materials	5/6 Done	1/2 Done	1/6 Done
Labor	1/2 "	1/6 "	3/4 "
Manufacturing Expense	3/4 "	1/4 "	1/2 "

From the information given you, prepare in good form:

1. Schedule showing the per-unit cost of the product *by element through each department.*
2. Proof of the 19— production costs.

Question 203.

Is it possible for a by-product to develop into a joint product? Vice versa? Give specific illustrations if you can.

Question 204.

What methods may be used to prorate common costs among joint products?

Question 205.

What is meant by the term "break-off point," as it is used with reference to joint products?

Question 206.

Is the distribution of factory burden a problem in the distribution of joint costs?

Question 207.

Why is it difficult to rely completely on the accuracy of the costs of joint products?

Question 208.

Criticize the following quotation:

"In certain manufacturing lines, one processing operation produces two or more base materials, end products, or services each of significant value. Such base materials, end products, or services are termed *joint products.*"

Question 209.

A composite purchase of feathers was made February 4, 19— and the total actual cost was prorated among the several grades on the basis of their relative market value at the time. At December 31, 19— some of the feathers are still in inventory. Since the relative values of the several grades have changed substantially since February 4, 19—, the cost department asks whether it is necessary, in order to have correct cost values for inventory purposes, to re-apportion the costs among the various grades.

CHAPTER 20

Using the Cost Accounting in Formulating the Business Policies

236. Introductory.

In practical experience, the business policy is determined by a compound of fact, custom, and the social philosophy of the management. If, as ought to be the case, facts dominate in the determination of the business policy, the cost accounting, by presenting the facts on the production costs, importantly influences the business decisions.

The use of facts furnished by the cost accounting in the formation of the business policies will be illustrated with respect to the points of:

1. Whether to make or to buy an article.
2. The weight to give to "decreasing costs" in the sales and production program.
3. The elements which the sales price should cover.
4. Depreciation expense in the manufacturing costs.

237. Whether to make or to buy an article.

The current cost per unit to Moore and Company of making article x consists of the following:

Direct Material	$ 2
Direct Labor	8
Normal Factory Burden	8
Total	$18
Supplementary Factory Burden	2
Actual Cost	$20

Since the company can regularly buy the article for $17 from reliable outside sources, the question for executive decision is whether to make or buy article x.

Purchase instead of manufacture of article x would be preferable if a *real saving* resulted thereby. A real saving would

result if the $20 cost of article x consisted of completely variable expense which would disappear with discontinuation of manufacture of the article. But, insofar as factory burden is an element in the manufacturing cost, this is rarely the case; and for article x, the factory burden is $10, or 50 per cent of the actual manufacturing cost. If the factory-burden cost of Moore and Company is even 50 per cent fixed, only $15 of expenditure could be saved by ceasing to make article x. It is clearly not profitable to expend $17 for purchases to save $15 in manufacturing outlay.

A real saving would also result if it were possible to use the factory facilities heretofore applied on article x to make some other item—that is, if present production volume so taxes the manufacturing capacity that ceasing to produce one item merely makes available capacity for producing another. The fact that *supplementary factory burden*, an item that mainly arises from idle time, is an element in the actual cost of article x shows that this situation is not true of Moore and Company.

The conclusion to be drawn from analysis of the cost facts is that, for the present at least, the manufacture of article x should be continued.

238. Decreasing costs as a factor in the production and sales program.

As was explained in Section 67, because of the influence of the fixed costs, a decrease in the volume of manufacturing does not result in a proportional decrease in the total manufacturing expenditures. Conversely, within certain limits, and also because of the influence of the fixed costs, an increase in the volume of manufacturing does not proportionately increase the total manufacturing expenditures. The result is that, in most

[Fig. 141]

Units Produced	Total Cost	Additional Outlay Cost of the Last 1,000 Units	Per-Unit Cost: Average for Total Production	Per-Unit Cost: Last 1,000 Units	Sales Price at Which the Whole Production Will Move: Per Unit	Sales Price at Which the Whole Production Will Move: Total	Net Profit or *Loss*
1,000	$30,000	$30,000	$30.00	$30.00	$20.00	$20,000	*$10,000*
2,000	36,000	6,000	18.00	6.00	17.00	34,000	*2,000*
3,000	42,000	6,000	14.00	6.00	15.00	45,000	3,000
4,000	49,000	7,000	12.25	7.00	14.00	56,000	7,000
5,000	57,000	8,000	11.40	8.00	13.00	65,000	8,000
6,000	66,000	9,000	11.00	9.00	12.50	75,000	9,000
7,000	75,250	9,250	10.75	9.25	12.00	84,000	8,750
8,000	85,250	10,000	10.28	10.00	11.50	92,000	6,750
9,000	96,000	10,750	10.67	10.75	11.25	101,250	5,250
10,000	111,000	15,000	11.00	15.00	11.00	110,000	*1,000*

manufacturing concerns, each additional lot of production effects a decrease in the *average per-unit cost.* Thus, Fig. 141 shows that for Moore and Company:

1. Making 1,000 units results in an average per-unit cost of $30.00.
2. Making another 1,000 units reduces the average per-unit cost to $18.00.
3. Making a third 1,000 units further decreases the average per-unit cost to $14.00.

Decrease in the *average* per-unit cost continues until such time as the entire factory capacity is being used. At that point acquisition of additional factory facilities, not all of which can be immediately utilized, causes the average per-unit cost to increase. For Moore and Company, Fig. 141 shows that the average per-unit cost ceases to decrease somewhere beyond the 8,000-unit point of production.

Goods are manufactured only if it is believed that they can be sold at a profit. The general experience is that increasing quantities of a good can be sold only by either one or a combination of:

1. A decrease in the per-unit selling price.
2. An increase in the per-unit selling expense.

In any case, the *net selling price* per unit is reduced. The policy of an alert management would be to increase production and sales only as long as the average per-unit production cost decreased more than the average per-unit net selling price. Thus, for Moore and Company, Fig. 141 shows that, up to 6,000 units, the average per-unit production cost decreases more than the average per-unit net selling price; and, hence, that up to that point each increase in production increases the net profit.

Fig. 141 shows a lowered net profit to result for Moore and Company at a point beyond 6,000 units of production. Yet Fig. 141 also shows that for the first 1,000 units beyond that point the *out of pocket* per-unit cost of production is $9.25, as compared to a realizable net selling price of $12.00 per unit. The reason for the lowered net profit is that the 1,000 × $2.75, or $2,750, of profit on the seventh 1,000 units is more than offset by the 50 cents per-unit lower selling price applied to the 6,000 units previously made. If, somehow, only the last units made were sold at the lowered selling price, increase in production and sales could profitably continue until, somewhere past the 8,000-unit mark,

the additional outlay unit cost of production exceeded the obtainable net selling price. Two courses are sometimes availed of to effect this purpose:

1. *Handling an unbranded as well as a branded line.* The branded goods are sold at the top prices. The unbranded goods are sold at any price exceeding their *additional outlay cost.* A danger of the plan is that, if the company's customers learn of the practice, it may become difficult to sell the branded product.

2. *Developing an export market.* In the foreign market, the goods are sold for any price exceeding their *additional outlay cost.* Considerations of shipping costs and import duties prevent the foreign buyer from reselling them in the domestic market in competition with the company's same goods offered at higher prices. The practice of selling at a lower price in the foreign than in the domestic market is usually referred to as "dumping."

Another possibility is to use the excess factory capacity to make an altogether unrelated line of products. Any excess of the selling price of these products above the additional-outlay cost they entail adds, of course, to the company's net profit. The risk in this plan is that the company will be underselling those concerns whose main activity is to make that other line. If they retaliate by making and selling Moore and Company's regular line on an additional-outlay-cost basis, a "price war" ruinous to all the companies may easily result.

239. The elements which the sales price should cover.

A main management purpose is to price the merchandise so as to obtain the best profit results. To do this, it is necessary to decide what elements the selling price may reasonably cover under varying sets of circumstances.

In a manufacturing business, the selling price of an item normally includes the following factors:

1. Manufacturing cost.
2. Selling and administrative costs.
3. Profit.

The manufacturing, selling, and administrative cost factors included in the selling price of an article each consist of variable and fixed expenses.

The variable expense can be saved by not making and selling the article. The fixed expense continues whether the article is

made and sold or not. The extent to which (1) variable and (2) fixed expense contribute to the manufacturing, selling, and administrative costs of an item is disclosed by an adequate cost accounting system.

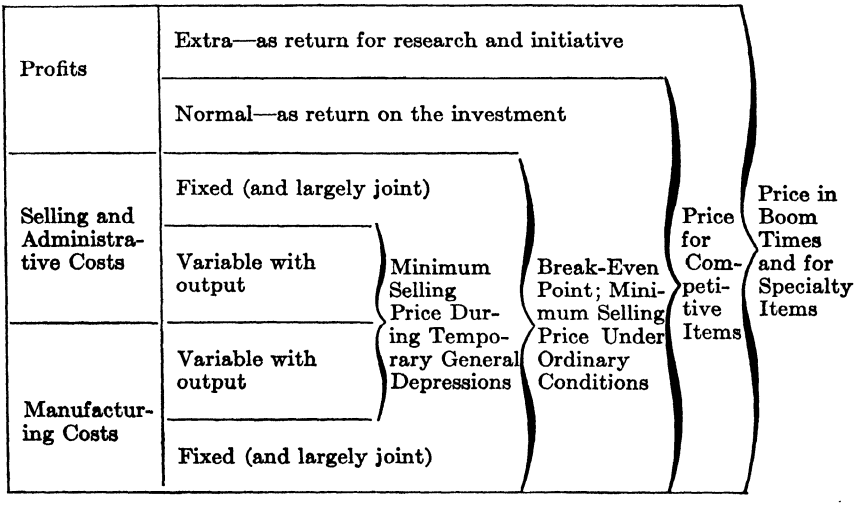
The fact that some expenses are variable, whereas others are fixed, makes this order of increase in the element make-up of an article's selling price logical:

1. Variable manufacturing, selling, and administrative costs.
2. Full manufacturing, selling, and administrative costs.
3. Full costs plus a fair profit.
4. Full costs plus an extraordinary profit.

The sum of the *variable manufacturing, selling, and administrative costs* is the lowest price at which an item can be offered on a cost basis, since at any lower price less is lost by not making and selling it. This price can be considered only in time of short but very severe business depression. In such an instance no more is lost by accepting such a price than by closing the plant, and some advantage is gained in that operating the business avoids (1) loss of contact with customers and sources of supplies and (2) the drift of skilled workmen to other concerns and localities. To the extent that the selling price exceeds the variable manufacturing, selling, and administrative expenses, some recovery is made of the fixed expenses, and thus the net loss is reduced. As a long-term price basis for the entire production, the sum of

[Fig. 142]

ELEMENTS IN THE SELLING PRICE OF AN ARTICLE



the variable manufacturing, selling, and administrative costs is impossible, since meeting the loss occasioned by the fixed manufacturing, selling, and administrative costs will ultimately bankrupt the business.

The *full manufacturing, selling, and administrative costs* is the lowest aggregate price at which the whole production could be indefinitely offered. Since no loss occurs at this price level, no inroad into the company's capital would result. However, the basis is not a practical one, since concerns would not normally care to operate permanently on merely a "break-even" basis.

The *full costs plus a fair profit* is the usual basis for the pricing of competitive goods and over a long period of time will probably be found to approximate closely the market price for the goods determined by competitive forces. A fair profit would be that rate of return on the investment considered normal for the industry. For that great majority of concerns engaged in competitive lines, full costs plus a fair profit is probably the normal price basis.

The *full costs plus an extraordinary profit* is practical only as a price basis for specialty articles or in times of extreme business boom. It usually fails as a permanent pricing policy, because the high prices thus established invite price-cutting competition and turn the customers to substitute articles.

In graphic form, the several graduations in the element make-up of an article's selling price are as shown in Fig. 142.

The governing pricing principle emphasized by Fig. 142 is that the selling price of an article should never be less than the variable costs which would be saved by not making and selling it, and should be as much more to cover the fixed costs and profit as the market conditions warrant.

240. Depreciation expense in the manufacturing costs.

All the items of manufacturing cost except depreciation represent expenditures of the current accounting period, and at *actual cost* they are therefore charged to production at substantially the *current-period prices.*

In a long-established business, it is improbable that all the depreciable assets were bought in the current accounting period. If depreciation expense is computed on the actual cost of those assets, it follows that, unlike the other items of manufacturing cost, depreciation is not charged for at current-period prices.

If depreciation expense is a minor item in the manufacturing costs, or if the actual cost of the depreciable fixed assets is not

far from their *present replacement cost*, the dilution by depreciation of current-period prices as the basis for manufacturing costs is negligible and can be ignored. However, if depreciation expense is a substantial factor in the manufacturing costs, and if a wide difference exists between the actual and present replacement cost of the depreciable fixed assets, the management must decide whether to allow depreciation to distort the current price basis of the manufacturing costs. If the decision is that depreciation must also be charged for at substantially the current-period prices, the fixed assets are appraised on a *present replacement cost* basis, and depreciation expense is computed on that value instead of on actual cost. In this way, a $150,000 depreciation charge based on actual cost of the depreciable fixed assets of $3,000,000 may be reduced to a $75,000 charge based on an estimated present replacement cost of $1,500,000 or increased to $300,000 based on an estimated present replacement cost of $6,000,000.

Basing the current depreciation charge on the present replacement cost, rather than on actual cost of the fixed assets, does not constitute a questionable policy of *juggling the costs*, but rather a commendable one of *adjusting the costs* to the current conditions. There is no good reason, for example, why a disadvantageous purchase or a fall in the price of fixed assets should burden the production costs of a score of future years.

If, to find costs more suitable for basing selling prices, the depreciation charge is computed on some basis other than the actual cost, it is necessary in preparing the financial statements to adjust the depreciation to that based on actual costs. This would be done by an entry such as follows:

Reserve for Depreciation			$10,000	
Cost of Goods Sold				$8,500
Inventories				1,500
Depreciation charged to burden based on replacement costs of the fixed assets		$50,000		
Depreciation based on actual costs		40,000		
Difference		$10,000		
Estimated as applicable to:				
Cost of goods sold—85%	$8,500			
Inventories—15%	1,500	10,000		

ASSIGNMENT 19

Problem 57.

The monthly cost budget of the Marcy Company for operations at its normal capacity of 5,000 identical units of product is as follows:

Variable Costs:		
Direct materials	$ 80,000	
Direct labor	160,000	
Royalties	20,000	$260,000
Semi-fixed Costs (⅔ fixed; ⅓ variable):		
Indirect labor	$ 36,000	
Repairs and maintenance	9,000	
Supplies	12,000	
Heat, light, and power	15,000	72,000
Fixed Costs:		
Depreciation	$ 17,000	
Supervision	11,000	
Taxes	9,000	
Rent	7,000	44,000
Total		$376,000

In August 19—, the company expects to operate at 40 per cent of normal capacity. It is asked that you compute for that month, from the information given, three different kinds of per-unit costs and explain the purpose for which each of those per-unit costs would be useful.

Problem 58.

1. Complete the costs, sales, income, and profits schedule of Good & Company shown on Form Page 75 of your workbook.
2. State what appears to be the company's most profitable operating rate, and explain how and why your answer would differ if the sales price were a constant $13.75 per unit.
3. Explain why the average per-unit cost does not decrease indefinitely as production increases.
4. Explain why the average per-unit sales price tends to decrease as unit sales increase.

Question 210.

What is meant by "decreasing costs," and what influence may recognition of them have on the business policies?

Question 211.

Are "decreasing costs" a problem of selling and administrative as well as of manufacturing costs? Explain fully.

Question 212.

The buildings and equipment of the Portnoy Corporation used in manufacturing originally cost $8,000,000. Their present replacement cost is estimated at only $3,000,000. Upon what amount should the current-year depreciation charge to manufacturing costs be based? Give full reasons for your answer.

Question 213.

The current cost of manufacture of article y is disclosed by the cost sheets to consist of the following:

Direct Material	$32
Direct Labor	44
Normal Burden	44
Total	$120
Supplementary Burden	22
Actual Cost	$142

A mail order company has offered to purchase 4,000 units at a price of $126 each. Write your opinion on whether the offer should be accepted, and tell whether you think acceptance of an offer of $112 each for a further 3,000 units should be seriously considered. Give full reasons for your opinions.

Index

A

Actual burden rate:
  defects, 75–76
  meaning, 75
Actual costs, 75
Allocated costs, 108
Applied factory burden:
  computation of, 81
  entry to record, 83–84
  final disposition of account balance, 119
Apportionment:
  of expense variation from standard burden, 221
  of factory burden, 66–70
  of price variations from standard cost, 220, 247
  of quantity variations from standard cost, 218, 247
  of specific expenses, 93
  of variations from test-run costs, 205–206
  of volume variation from standard burden, 221
Assembly:
  costs, 10–12
  cost sheet, 180–181, 185
  labor operation, 179

B

Bases:
  for distribution of cost through break-off point, 226
  for distribution of factory burden, 66–70
  for distribution of specific expenses, 93
Blanket burden rate, 89
Book inventory:
  finished goods, 138–141
  in operating with cost standards, 223, 229–230
  in operational cost accounting, 196–200
  in process cost accounting, 164–166
  materials, 35–42
  work in process, 25
Break-even point, 290, 291
Break-off point:
  apportioning cost through, on basis of:
    contribution to fixed and variable costs, 277–278
    estimated cost to produce separately, 276–277
    physical factors, 274
    sales price after separate processing, 275–276
    separate product value at break-off, 274–275
  meaning of, 272
Budget, variable, 107–109
Burden (*see* Factory burden)
By-products:
  cost accounting for, 266–268
  kinds and distinguishing features, 265–266

C

Closing entries, 150
Comparative expense statement, 109–111
Composite purchases, 281–282
Conversion cost:
  development in process costs, 161–163
  meaning, 2, 159
  significance, 169
Conversion rate, machine-hour, 99
Cost:
  allocated, 108
  conversion, 2, 159
  factory, 2
  fixed, 105–106
  manufacturing, 1
  nature and uses of, 10–17
  prime, 2
  standard, 213
  test-run, 178
  unit, 10
Cost accounting, 10
  systems of, 16–17
  value of, to management, 14–16
Cost file of unit production cost, 137–138
Cost-finding:
  job-order costs, 16–17, 20–26
  joint-product costs, 272–282

Cost-finding (*cont.*):
operational costs, 177–206
process costs, 157–171
standard costs, 210–252
Costing points, 10–14
Cost of goods made statement, 6
Cost of goods sold:
account, 136
adjustments to for variations from standard cost, 247–250
adjustments to for variations from test-run cost, 205–206
credit to for margin on by-products, 267
Cost sheet, 20–22, 25, 98, 100–101, 159–160, 180–181, 195–196, 199
Cost standards:
expense of, 222–223
practicality under varying operating conditions, 224
price, 213, 218–221
procedures in operating with:
adjusting the book to the physical closing inventories, 245–246
analysis of the price variations, 246–247
analysis of the quantity variations, 246
burden expense and volume variations, 239
burden quantity variation, 236–238
changes in the cost standards, 249–250
charging and crediting the inventory accounts, 229–230
completion of goods, 242–243
daily reports, 231, 233
disposition of the variations, 247–249
labor costs, 234–236
labor price and quantity variation, 234–236
material issues, 232–234
material price variation, 230–232
material purchases, 230–232
material quantity variation, 232–234
price variations due to substitutions, 239–241
procedures in job-lot businesses, 251–252
procedures in process businesses, 250–251
quantity variations due to irreparable spoilage, 241–242
sales and cost of sales, 243–244
taking and pricing the physical inventories, 244–245
variations in the financial statements, 249
purposes, 212
quantity, 215–218
Cost statements, 6-7, 147–148, 159–160, 167–168
Cost systems:
job-order, 16–17, 20–26
operational, 177–206
process, 157–171
standard, 210–252
Cost test runs:
for labor operations, 184–185
for piece-part materials, 182–183
frequency of, 185–186
necessary conditions for, 186–187
requests for, 186
Cross-referencing of financial statements, 149–150

D

Decreasing costs, 287–289
Deductions from wages, 52–55
Departmental burden rates, 89
elements in computing, 91–92
merits and defects, 89
procedure to determine, 92–97
when unnecessary, 89–91
Departmental time summary, 96–97
Departments:
producing, 95
service, 95–96
Direct expenses, 94–95
Direct labor, 50–53
Direct labor cost burden rate, 68–69, 100–101
Direct labor hour burden rate, 67–68
Direct material, 1–2, 33
Distribution of factory burden, 66–70, 89–101

E

Equivalent units of production, 168–169
Estimating normal burden, 81–83
Expense:
allocated, 108
behavior of, 105–107
control of, 105–111
depreciation, 291–292
direct, 94–95
excess, 120
fixed, 105–106
joint, 93–95
saving, 120

Expense (*cont.*):
semi-fixed, 105–106
variable, 105–106

F

Fabricating labor operation, 179
Factory activity:
influence on actual burden rate, 77–78
measurement of, 112–113
Factory burden, 2, 62
accumulation of, 63–66
actual, 75, 84
applied, 83–85
charging of, to job cost sheets, 23–24
comparison of actual and necessary, 109–111
departmental, 89–101
estimating, 81–83
expense excess, variation due to, 120–122
expense variation from standard, 239
idle time, variation due to, 120–122
in-process, 24–25, 84
joint, 93–95
methods of distributing, 66–70
nature of, 62–63
necessary at level, 109
normal, 75–85
overabsorbed, 118–127
quantity variation from standard, 217, 236–238
underabsorbed, 118–127
variable budget of, 107–109
volume variation from standard, 239
Factory Burden Actual—Control account, 84
final disposition of, 119
source of charges to, 63–66
subsidiary ledger of, 63, 84
Factory burden ledger, 63–66
Factory capacity, measurement of, 66
Factory cost, elements of, 190–191
Factory payroll record, 55–57
FIFO inventory:
evaluation, 37–38
procedure, 36
Financial statements:
balance sheet, 148–149
comparative expense statement, 109–111
cost of goods made and sold statement, 147–148
cross-referencing of, 149–150
manufacturing statement, 6–7
profit and loss statement, 148
Finished goods:
accounts, 138–141
Finished goods (*cont.*):
journal, 135–136
ledger, 138–141
Finished parts, 11–12
First-in, first-out inventory method, 35–36, 37–38
Fixed expense, 105–106
influence on costs, 77–78, 287–289
Fluctuations in factory activity:
causes of, 76–77
effect of, on the burden rate, 77–78

I

Idle time:
calculation of costs of, 120–121
nature of, 76–78
Indirect labor, 2, 50
Inter-use of service departments, 170–171
Inventory:
average cost, 39
book, 35–42, 138–141, 196–200
FIFO, 35–38
finished goods, 3, 138–141
LIFO, 36–37, 38–39
materials, 35–42
minimum-maximum quantities, 39–40
pricing of, 36–39, 200–201
work in process, 2–3

J

Job cost sheet, 20–22, 25, 98, 100–101
Job-lot costs, 16–17, 20–26, 157–158
Joint burden costs:
bases for proration of, 93
minimizing amount of, 94–95
procedure for proration of, 93–94
Joint products, 272
accounting for as though separate businesses, 279–281
break-off point in, 272
methods of prorating costs at break-off, 273–280
nature of, 272–273
Journal:
finished goods, 135–136, 242–243
materials requisition, 43–44, 232–234
purchases, 230–232
sales, 136–137, 243–244

L

Labor, 50
cost accounting for, 50–58
direct, 2, 50

Labor (*cont.*):
hours record, 83
indirect, 2, 50
overtime cost of, 58
time ticket, 51
Labor operation, costing for:
cost card, 184–185
cost test-run ticket, 184
Ledger:
factory burden, 63, 84
finished goods, 138–141
materials, 34–42
work-in-process, 25
Leftovers, 263
LIFO inventory:
evaluation, 38–39
procedure, 36–37

M

Machine-hour:
burden rate, 98–99
conversion cost rate, 99
sold rate, 99–100
Management use of costs, 14–16, 286–292
Manufacturing:
costs, 1–7
entries to reflect, 3–4
expense (*see* Factory burden)
statements, 6–7, 147–148
steps in, 3
Materials, 1, 33
accounting for issuance of, 34–45
book inventory of, 40–45
composite, 281–282
cost elements, 33–34
direct, 1–2, 33
indirect, 2, 50
ledger, 34–42
price variation from standard, 219–220, 247–248
pricing of, 35–39
quantity variation from standard, 217–218, 232–238, 246, 247–249
requisition, 3, 20, 22, 42–43
requisitions, journal for, 43–44, 232–234
Merchandise inventories (*see* Inventory)
Minimum-maximum inventory quantities, 39–40

N

Necessary burden at level, 109
as basis for predetermined burden rate, 111–112
as kind of cost standard, 221
computation of, 107–109, 122
Normal burden rate:
advantages of, 80–81
calculation of, 81–83
theory of, 79–80
Normal direct labor hours, 82–83

O

Operational cost accounting:
cost forms in, 180–186
definition of terms used in, 178–179
develops better costs, 187–188
develops more detailed costs, 187
field for, 177–178
frequency of cost test runs in, 185–186
further merits of, 188–189
keeping the book inventories under, 196–200
main characteristics, 178
notices of changes in manufacturing, 192–193
pricing the inventories for the interim statements, 201
spoilage costs, 192–196
spot checks to supplement the book inventory, 198–200
variation of actual from test-run costs, 201–203, 204–206
Operations with cost standards (*see* Cost standards)
Outside operations, costing for, 183–184
Overabsorbed factory burden, 118–119
disposition of, 125–126
factors entering into, 119–122
position of, on statements, 125–126
Overhead (*see* Factory burden)
Overtime:
calculation of profits of, 120–121
nature of, 76–78
Overtime labor cost, 58

P

Payroll:
entries for, 55–57
record, 55–57
Perpetual inventory (*see* Book inventory)
Piece part, 178
cost card, 182
cost sheet, 180–181
made, 178, 182–183
purchased, 178, 182
Price cost standards:
cause of variation from, 219–220
development of, 218–219
disposition of variation from, 220
purpose, 212
revisions, 220–221

Prime cost, 2
Process costs:
  conversion costs, 159, 161–162, 163
  costing points, 159–160
  data on production and transfers, 164–165
  inventory transfers in, 165–166
  problems and procedures in, 160–161
  proof of production costs, 166, 169
  shrinkage loss and its absorption in, 166–167
  work sheets, 160, 168
Process industries:
  characteristics of, 158–159
  important examples of, 17
Producing department, 95
Production layout sheet, 214, 215
Purchased piece part, 178
  cost card, 182
Purchases:
  composite, 281–282
  journal, 230–232
  procedure in, 42, 230–232
Purposes of costs, 14–16, 211

Q

Quantity cost standards:
  causes of variations from, 217–218
  disposition of variations from, 218, 247–248
  how determined, 215–216
  performance level of, 216–217
  purpose, 212
  revisions of, 220–221

R

Raw materials (*see* Materials)
Request for cost test runs, 186
Requisition journal, 43–44, 232–234
Requisitions (*see* Materials requisition)
Residuals, 263
Rework job cost sheet, 194–195
Rulings of accounts, 151–152

S

Sales book, 136–137, 243–244
Sales price, elements of, 289–291
Scrap, 263
  crediting the net proceeds of, 265
  scope of accounting for, 263–264
Semi-fixed expense, 105–106
Service departments:
  in departmental burden costs, 95–96
  in process cost accounting, 162–163
  inter-use of, 170–171
Service departments (*cont.*):
  standard rates for, 169–170
  unabsorbed expense of, 170
Sold-hour rate, 99–100
Spoilage:
  disposition of costs of, 192–196, 241–242
  forms for handling, 194–195, 241
  kinds of, 193–194
  record of, 241
Standard costs, 213
  card, 221–222
  items for which determined, 213–224
  procedure in arriving at, 213–214
Statements (*see* Financial statements)
Stores control, 34–35
Supplementary burden rate, 126
  computation of, 126
  merits and defects, 127

U

Underabsorbed expense of service departments, 170
Underabsorbed factory burden, 118–119
  analysis of, by burden items, 122–123
  computation of, 118–119
  factors entering into, 119–120
  final disposition of, 125–126
  interim handling of, 126
  position of, on statements, 126
Unit production cost file, 137–138
Use of cost accounting in formation of policy, 286–292

V

Variable burden budget, 107–109
Variable expenses, 105–106
Variations:
  from budgeted expense, 119–120
  from necessary burden, 119–120
  from standard prices, 219–220
  from standard quantities, 217–218
  from test-run costs:
    computation of percentages of, 203
    development of amounts of, 201–203
    disposition of, 205–206
    significance of, 204–205
  investigation into, 111

W

Waste, 263
  charging expense of, 264–265
Work in process, 263–264