

Survey of Accounting, 9e

Carl S. Warren and
Amanda G. Farmer



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SURVEY OF ^{9E}
ACCOUNTING
WITH WARREN'S METRIC ANALYSIS

CARL S. WARREN
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Chapter 10

Accounting Systems for Manufacturing Operations

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Learning Objectives

- Describe the nature of managerial accounting
- Describe and illustrate manufacturing operations, including different types and classifications of costs
- Describe types of cost accounting systems
- Describe and illustrate a job order cost accounting system for manufacturing operations

Learning Objectives (continued)

- Describe a job order cost accounting system for service operations
- Describe just-in-time manufacturing processing
- Describe and illustrate activity-based costing
- Describe and illustrate the use of cost per unit for managerial decision making and performance analysis

Learning Objective 1

Describe the nature of managerial accounting

Managerial Accounting

- Focuses on preparing information that is useful for management
 - Reported information is not recorded using generally accepted accounting principles
- Provides useful information for addressing certain questions

Exhibit 1: Financial and Managerial Accounting Differences

	Managerial Accounting	Financial Accounting
Type of information	Information that is useful to management for its decision making, which varies by type of decision and is not restricted by specific rules such as generally accepted accounting principles (GAAP).	Transactions and events recorded and reported using generally accepted accounting principles.
When reported	As needed by management for its decision making.	Required to be reported annually but may be reported monthly or quarterly.
Focus of report	Varies by type of decision and may be an employee, manufacturing unit or process, or product as well as the company as a whole or segments within the company.	Company as a whole or segments within the company.

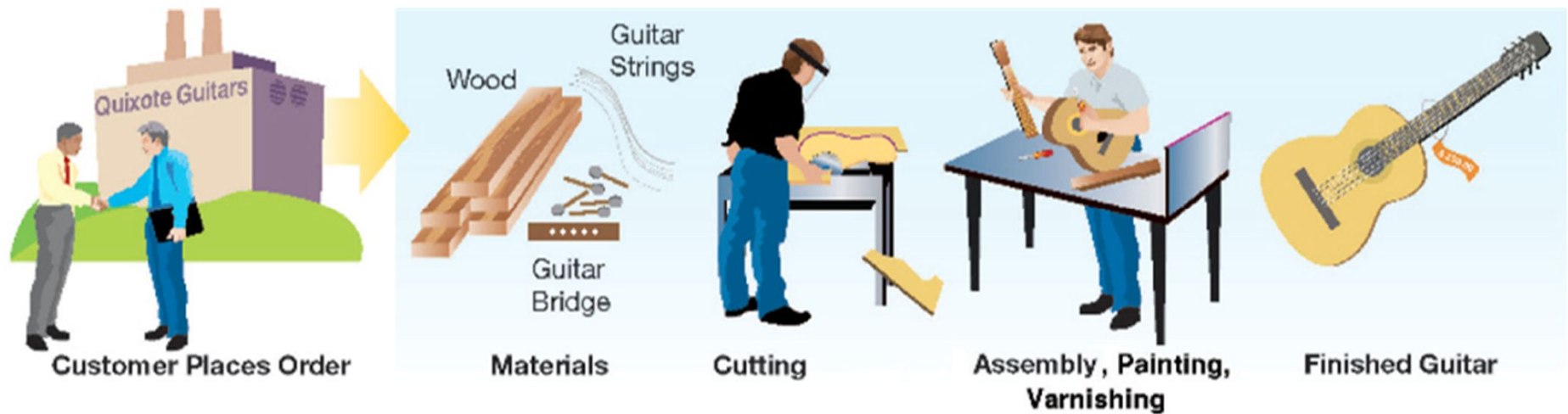
Learning Objective 2

Describe and illustrate manufacturing operations, including different types and classifications of costs

Manufacturing Operations and Costs

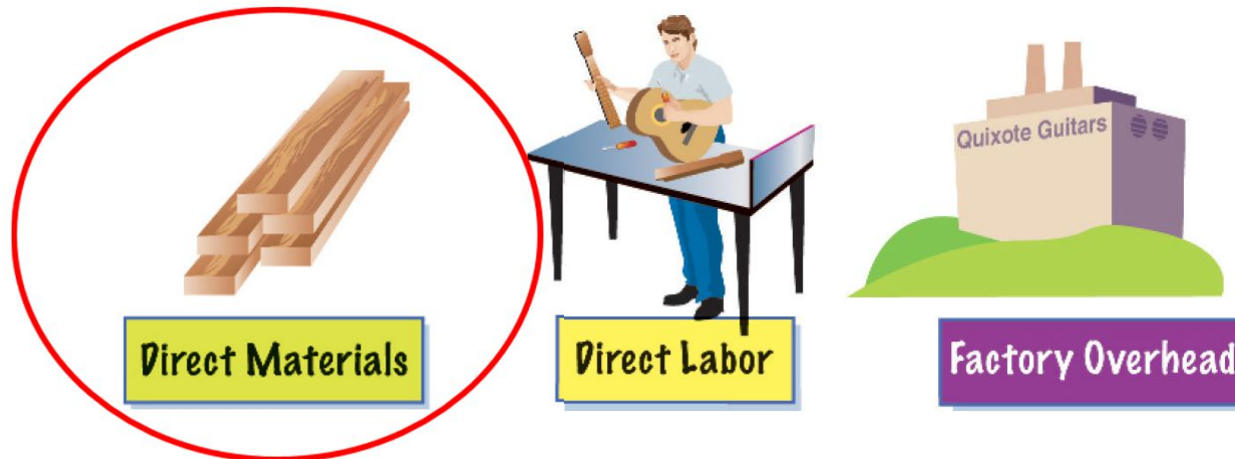
- Objective of managerial accounting: Accurately accounting for manufacturing costs
- **Cost:** Payment of cash or its equivalent or the commitment to pay cash in the future for purposes of generating revenues
 - Classified according to the decision-making needs of management
 - Cost of a manufactured product includes:
 - Cost of materials used
 - Cost of converting the materials into a finished product

Exhibit 2: Guitar Making Operations of Quixote Guitars



Direct Materials Cost

- Includes the cost of any material that is an integral part of the finished product
- Cost must meet both of the following conditions:
 - Should be an integral part of the finished product
 - Should form a significant portion of the total cost of the product



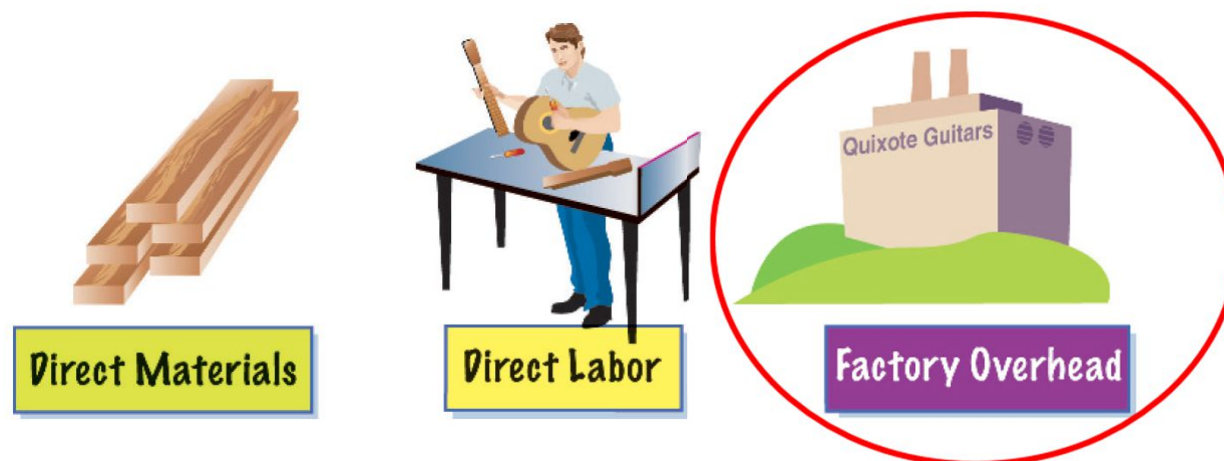
Direct Labor Cost

- Includes the cost of employee wages that is an integral part of the finished product
 - Indirect labor costs: Costs that are not a significant part of the finished product



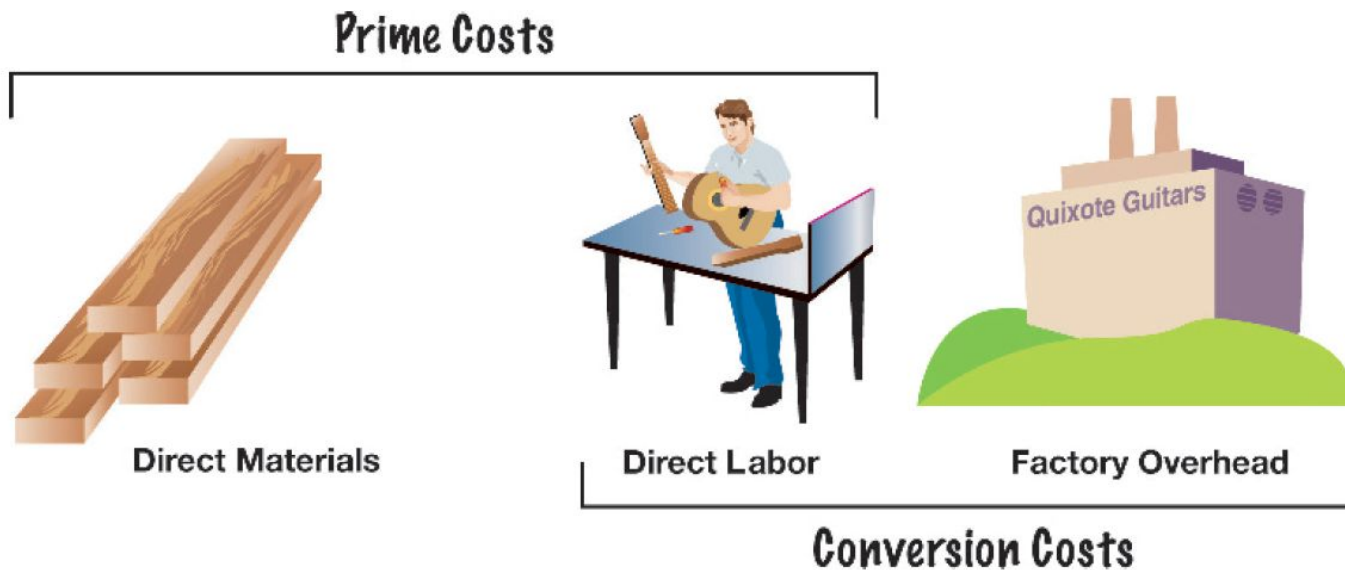
Factory Overhead Cost

- Costs that do not enter directly into the finished product
 - Known as manufacturing overhead or factory burden
- Costs other than direct materials cost and direct labor cost incurred in the manufacturing process



Prime Costs and Conversion Costs

- **Prime costs:** Direct material and direct labor costs
- **Conversion costs:** Direct labor and factory overhead costs



Product Costs and Period Costs

- **Product costs:** Consist of manufacturing costs
- **Period costs:** Consist of selling and administrative expenses
 - Selling and administrative expenses may be reported by level of responsibility to facilitate control

Exhibit 4: Examples of Product Costs and Period Costs— Quixote Guitars

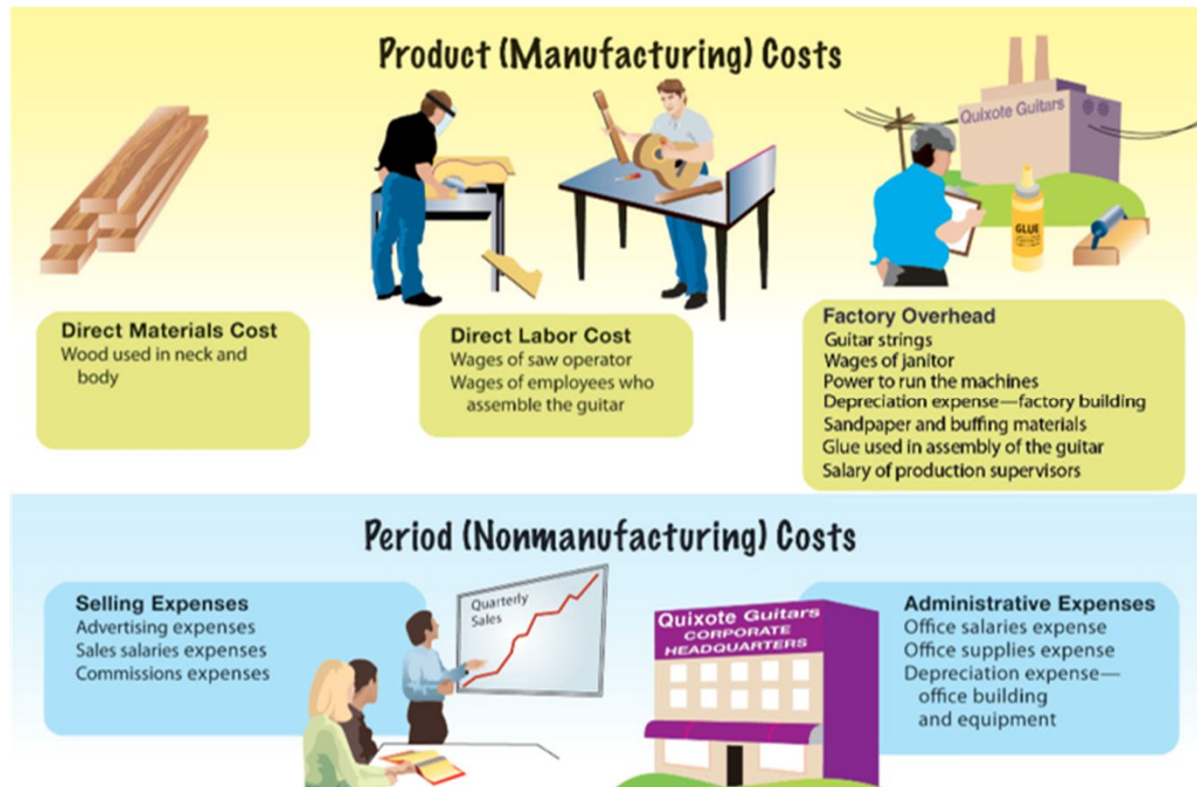
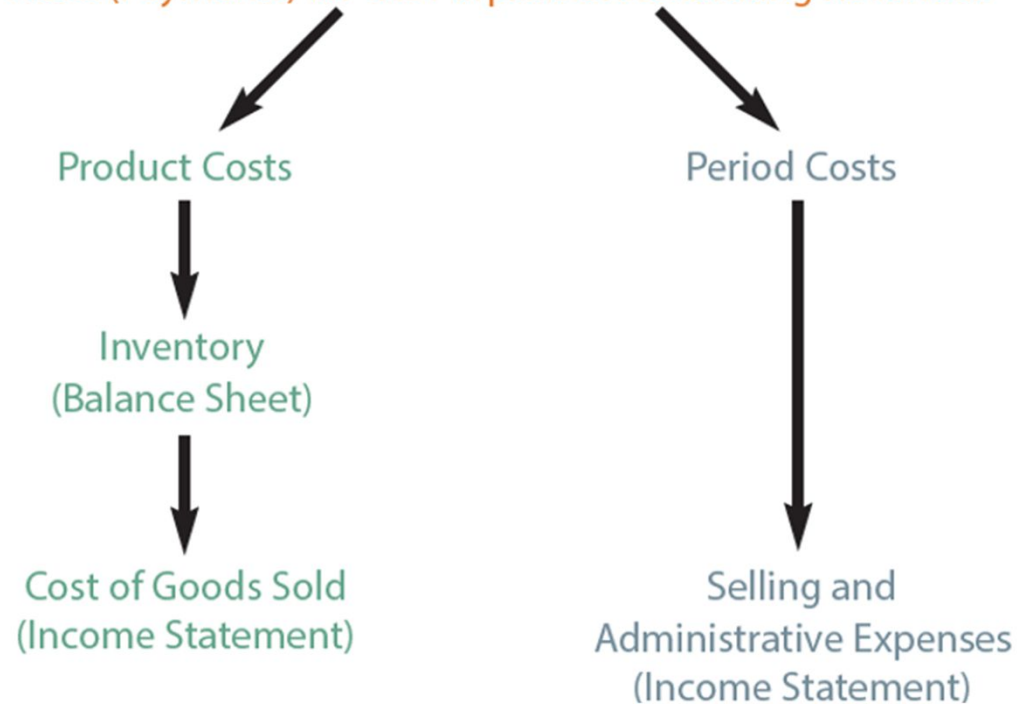


Exhibit 5: Product Costs, Period Costs, and the Financial Statements

Costs (Payments) for the Purpose of Generating Revenues



Learning Objective 3

Describe types of cost accounting systems

Cost Accounting Systems

- Measure, record, and report product costs
- Used to:
 - Set product prices
 - Control operations
 - Develop financial statements
- Types
 - **Job order cost systems**
 - **Process cost systems**

Learning Objective 4

Describe and illustrate a job order cost accounting system for manufacturing operations

Job Order Cost Systems

- Record and summarize manufacturing costs by jobs
- Consist of the following types of inventory:
 - **Materials inventory**
 - **Work-in-process inventory**
 - **Finished goods inventory**
- Perpetual inventory records are maintained for inventories

Exhibit 6: Flow of Manufacturing Costs

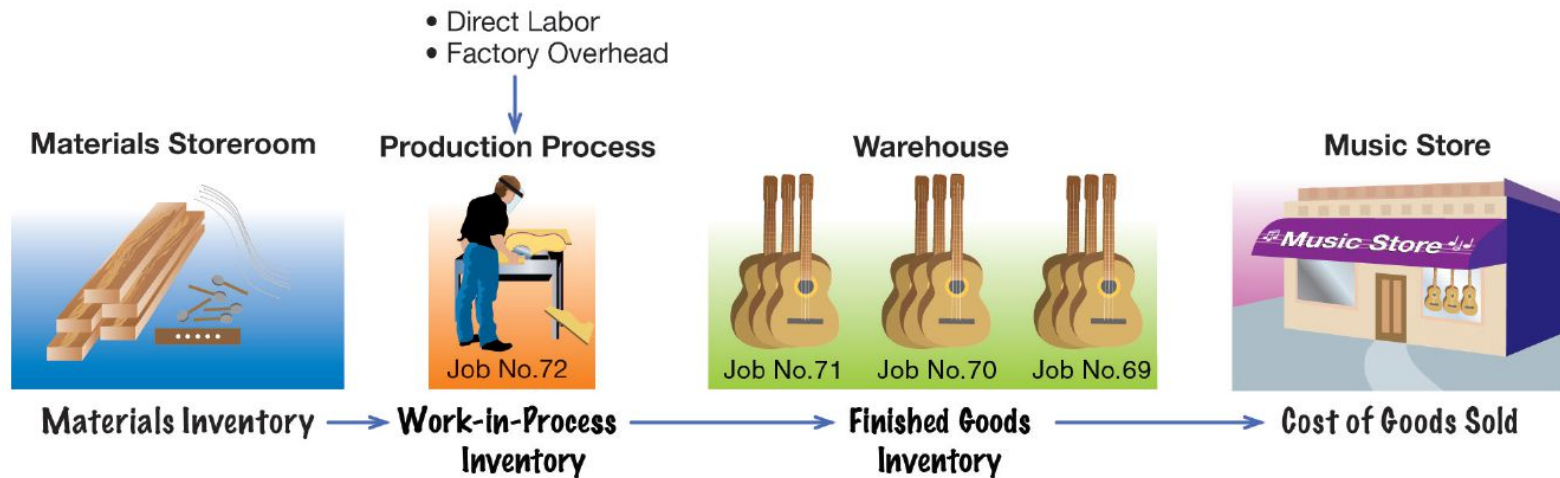
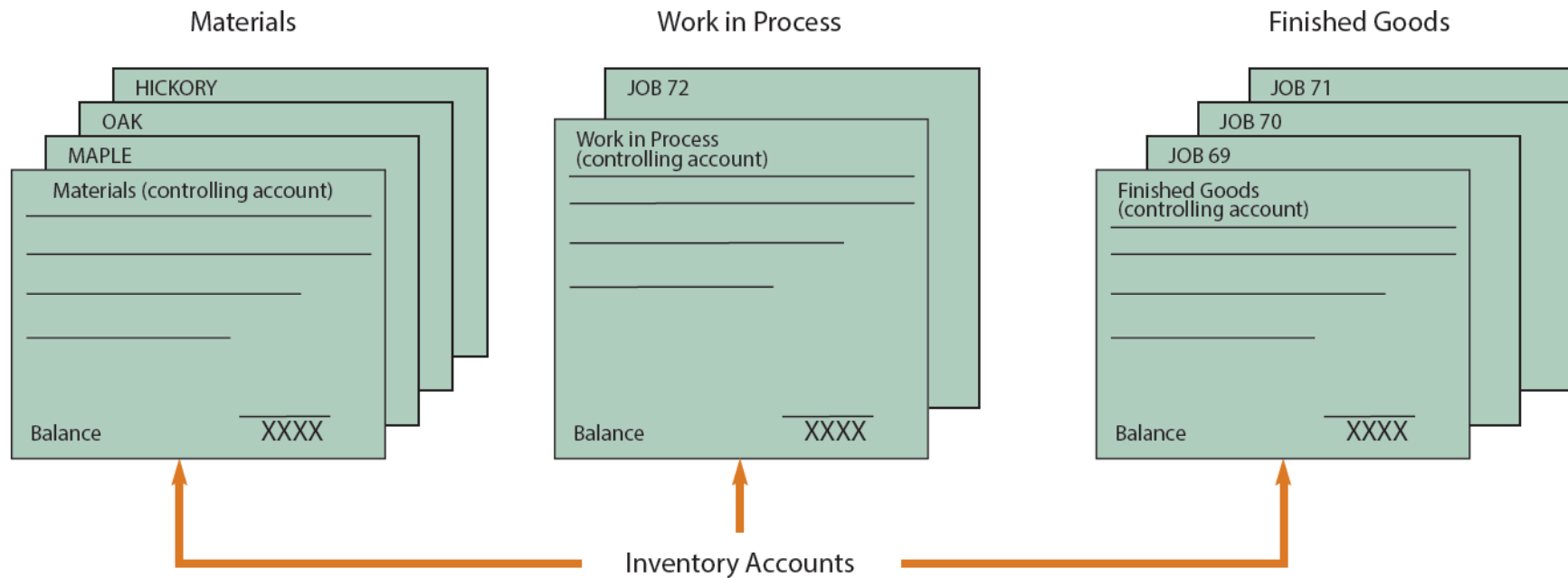


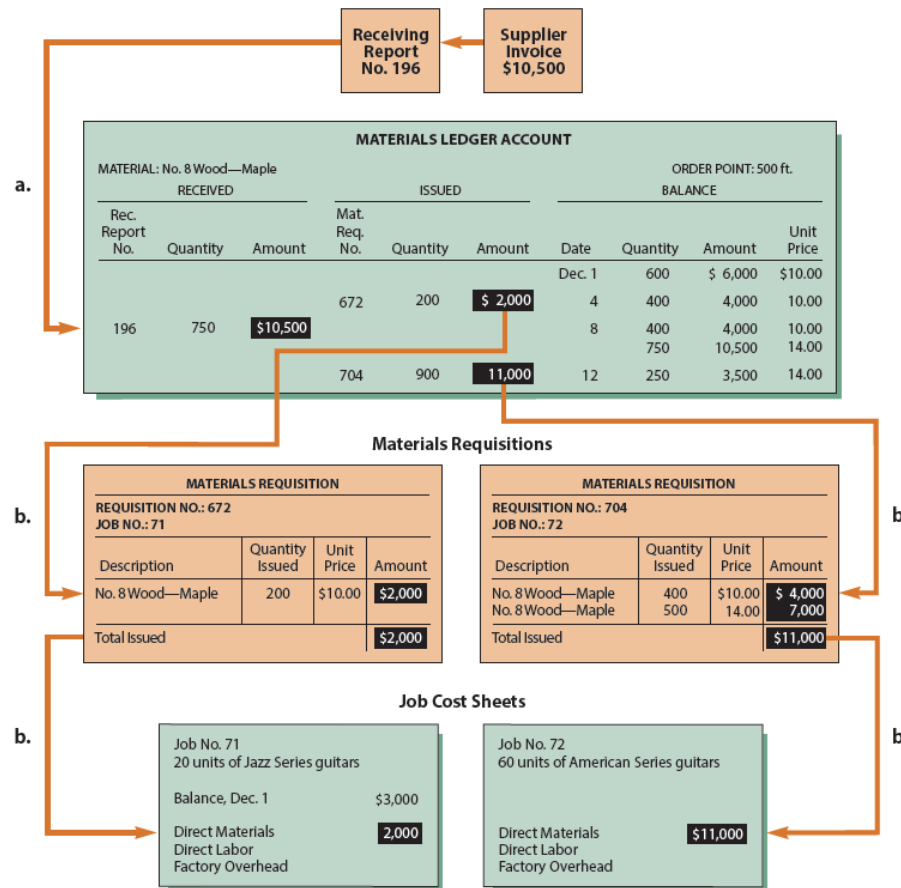
Exhibit 7: Inventory Ledger Accounts



Materials Cost

- Materials account is a controlling account
 - Separate account is maintained for each type of material in a subsidiary **materials ledger**
- **Receiving report:** Prepared when materials that have been ordered are received and inspected
- Storeroom releases materials for use in manufacturing when a **materials requisition** is received
 - Quantities and amounts for direct materials from the materials requisitions are recorded on **job cost sheets**

Exhibit 8: Materials Information and Cost Flows



Financial Statement Effects: Transaction (a)

- Recording purchase made based on Receiving Report No. 196 and supplier's invoice for \$10,500

BALANCE SHEET			
Assets	=	Liabilities	+ Stockholders' Equity
Materials	=	Accounts Payable	
a.		10,500	
		10,500	

STATEMENT OF CASH FLOWS

INCOME STATEMENT

Financial Statement Effects: Transaction (b)

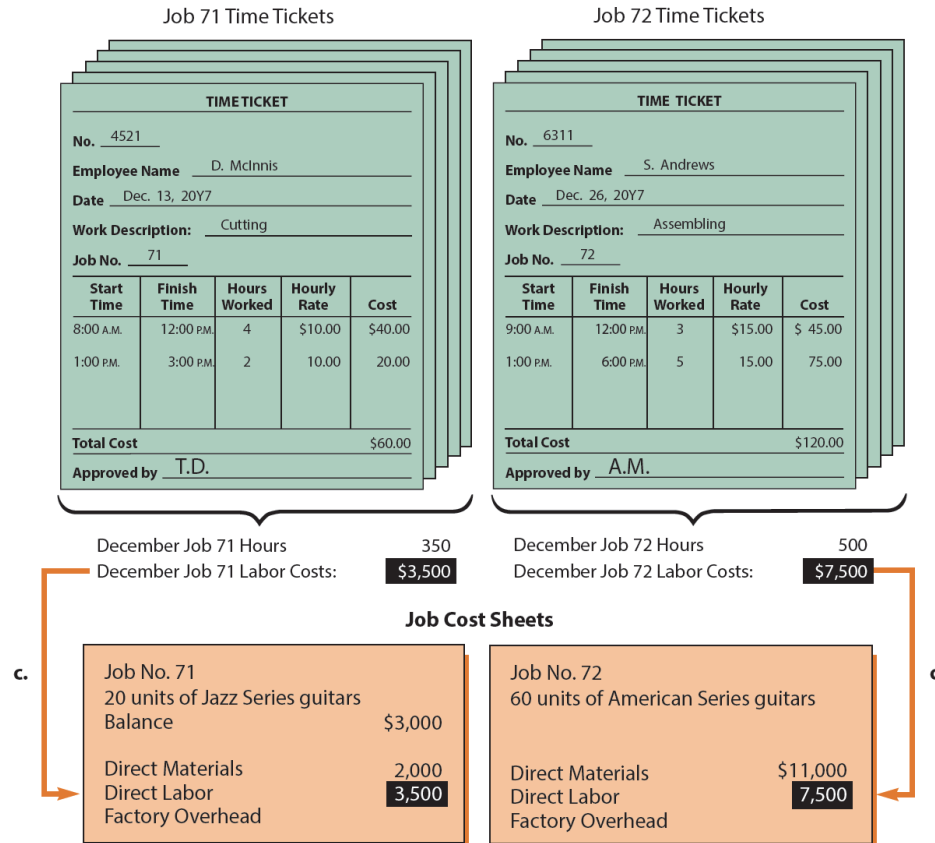
- Recording materials used in December based on materials requisitions
 - Requisition No. 672 for \$2,000
 - Requisition No. 704 for \$11,000

BALANCE SHEET			
Assets		=	Liabilities + Stockholders' Equity
Materials	Work in Process		
b.	(13,000)	+	13,000

STATEMENT OF CASH FLOWS

INCOME STATEMENT

Exhibit 9: Labor Information and Cost Flows



Financial Statement Effects: Transaction (c)

- Recording direct labor of \$11,000 (\$3,500 + \$7,500) for December

BALANCE SHEET			
Assets	=	Liabilities	+ Stockholders' Equity
Work in Process	=	Wages Payable	
c. 11,000	=	11,000	

STATEMENT OF CASH FLOWS

INCOME STATEMENT

Factory Overhead Cost: Sources

- Indirect materials: Comes from a summary of materials requisitions
- Indirect labor: Comes from the salaries of production supervisors and the wages of other employees such as janitors
- Factory power: Comes from utility bills
- Factory depreciation: Comes from the Accounting Department computations of depreciation

Financial Statement Effects: Transaction (d)

- Quixote Guitars incurred \$4,600 of factory overhead in December
 - Indirect materials of \$500, factory depreciation of \$1,200, indirect labor of \$2,000, and factory utilities of \$900

BALANCE SHEET					
Assets			=	Liabilities	+ Stockholders' Equity
Materials	+ Factory Overhead	- Accumulated Depreciation	=	Wages Payable	+ Utilities Payable
d.	(500)	4,600	(1,200)	2,000	900

STATEMENT OF CASH FLOWS	INCOME STATEMENT

Allocating Factory Overhead

- Factory overhead costs are allocated to jobs using an **activity base**
 - **Cost allocation:** Process by which factory overhead or other costs are assigned to a cost object
 - Activity bases used to allocate overhead should reflect the consumption or use of factory overhead costs

Predetermined Factory Overhead Rate

- Rate at which factory overhead costs are normally allocated or applied to jobs

$$\text{Predetermined Factory Overhead Rate} = \frac{\text{Estimated Total Factory Overhead Costs}}{\text{Estimated Activity Base}}$$

- Quixote Guitars estimates total factory overhead cost of \$50,000 for the year and an activity base of 10,000 direct labor hours

$$\text{Predetermined Factory Overhead Rate} = \frac{\$50,000}{10,000 \text{ direct labor hours}} = \$5 \text{ per direct labor hour}$$

Use of Predetermined Overhead Rates

- Timely information is needed by managers to estimate product costs of each job
 - Waiting until the end of a period when overhead costs are known would be accurate, but not timely
- Many companies use **activity-based costing** for accumulating and allocating factory overhead costs

Exhibit 10: Applying Factory Overhead to Jobs

Job 71 Time Tickets

TIME TICKET				
No. 4521				
Employee Name D. McInnis				
Date Dec. 13, 20Y7				
Work Description: Cutting				
Job No. 71				
Start Time	Finish Time	Hours Worked	Hourly Rate	Cost
8:00 A.M.	12:00 P.M.	4	\$10.00	\$40.00
1:00 P.M.	3:00 P.M.	2	10.00	20.00
Total Cost				\$60.00
Approved by T.D.				

Job 71 total hours = 350

Job 72 Time Tickets

TIME TICKET				
No. 6311				
Employee Name S. Andrews				
Date Dec. 26, 20Y7				
Work Description: Assembling				
Job No. 72				
Start Time	Finish Time	Hours Worked	Hourly Rate	Cost
9:00 A.M.	12:00 P.M.	3	\$15.00	\$ 45.00
1:00 P.M.	6:00 P.M.	5	15.00	75.00
Total Cost				\$120.00
Approved by A.M.				

Job 72 total hours = 500

350 hours
× \$5 per direct
labor hour

500 hours
× \$5 per direct
labor hour

\$1,750

\$2,500

e.

Job Cost Sheets																											
<table style="width: 100%;"> <tr> <td>Job No. 71</td> <td></td> </tr> <tr> <td>20 units of Jazz Series guitars</td> <td></td> </tr> <tr> <td>Balance</td> <td style="text-align: right;">\$ 3,000</td> </tr> <tr> <td>Direct Materials</td> <td style="text-align: right;">2,000</td> </tr> <tr> <td>Direct Labor</td> <td style="text-align: right;">3,500</td> </tr> <tr> <td>Factory Overhead</td> <td style="text-align: right;">1,750</td> </tr> <tr> <td>Total Job Cost</td> <td style="text-align: right;"><u>\$10,250</u></td> </tr> </table>	Job No. 71		20 units of Jazz Series guitars		Balance	\$ 3,000	Direct Materials	2,000	Direct Labor	3,500	Factory Overhead	1,750	Total Job Cost	<u>\$10,250</u>	<table style="width: 100%;"> <tr> <td>Job No. 72</td> <td></td> </tr> <tr> <td>60 units of American Series guitars</td> <td></td> </tr> <tr> <td>Direct Materials</td> <td style="text-align: right;">\$11,000</td> </tr> <tr> <td>Direct Labor</td> <td style="text-align: right;">7,500</td> </tr> <tr> <td>Factory Overhead</td> <td style="text-align: right;">2,500</td> </tr> <tr> <td>Total Job Cost</td> <td style="text-align: right;"><u>\$21,000</u></td> </tr> </table>	Job No. 72		60 units of American Series guitars		Direct Materials	\$11,000	Direct Labor	7,500	Factory Overhead	2,500	Total Job Cost	<u>\$21,000</u>
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Direct Materials	\$11,000																										
Direct Labor	7,500																										
Factory Overhead	2,500																										
Total Job Cost	<u>\$21,000</u>																										

Financial Statement Effects: Transaction (e)

- Applying \$4,250 of factory overhead to production

BALANCE SHEET			
Assets		=	Liabilities + Stockholders' Equity
	Work in Process + Factory Overhead		
e.	4,250 + (4,250)		

STATEMENT OF CASH FLOWS

INCOME STATEMENT

Actual Overhead versus Applied Overhead

- Actual factory overhead costs incurred will likely differ from the estimated overhead costs
- **Underapplied factory overhead:** Positive balance that occurs when the applied overhead is less than the actual overhead incurred
- **Overapplied factory overhead:** Negative balance that occurs when the overhead applied exceeds the actual overhead incurred
- Large underapplied or overapplied balances of factory overhead need to be investigated

Disposal of Factory Overhead Balance

- Balance in the factory overhead account
 - Carried forward and reported as a positive or negative amount on the monthly (interim) balance sheets during the year
 - Disposed of by transferring it to the cost of goods sold account at the end of the year

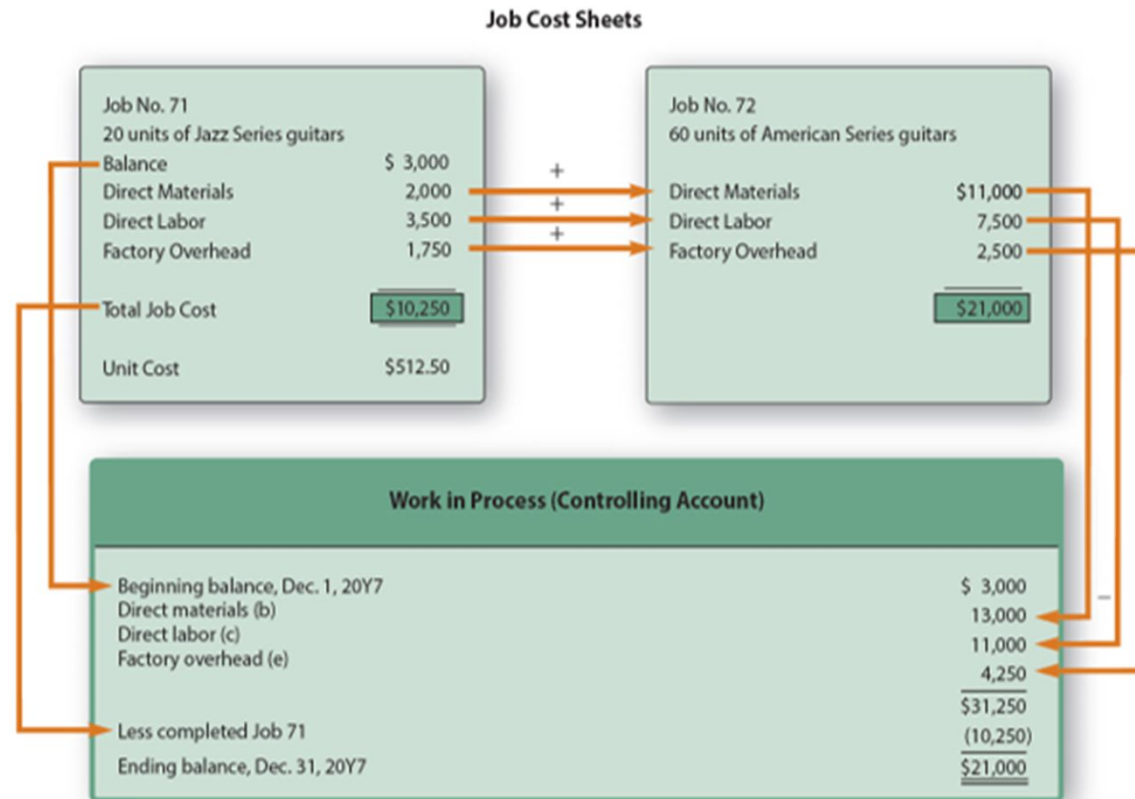
Financial Statement Effects: Transaction (f)

- Eliminating an underapplied (positive) overhead balance of \$150 at the end of the year

BALANCE SHEET			
Assets	=	Liabilities	+ Stockholders' Equity
Factory Overhead	=		Retained Earnings
f. (150)			(150)

STATEMENT OF CASH FLOWS	INCOME STATEMENT
	f. Cost of goods sold (150)

Exhibit 11: Job Cost Sheets and the Work-in Process Controlling Account



Financial Statement Effects: Transaction (g)

- Job 71 was transferred from Work in Process to Finished Goods after completion
 - Total cost of Job 71: \$10,250

BALANCE SHEET			
Assets		=	Liabilities + Stockholders' Equity
Work in Process	+ Finished Goods		
<i>g.</i>	(10,250)		10,250

STATEMENT OF CASH FLOWS

INCOME STATEMENT

Exhibit 12: Finished Goods Ledger Account

ITEM: <i>Jazz Series guitars</i>									
Manufactured			Shipped			Balance			
Job Order No.	Quantity	Amount	Ship Order No.	Quantity	Amount	Date	Quantity	Amount	Unit Cost
						Dec. 1	40	\$20,000	\$500.00
			643	40	\$20,000	9	—	—	—
71	20	\$10,250				31	20	10,250	512.50

Financial Statement Effects: Transaction (h)

- Quixote Guitars sold 40 Jazz guitars for \$850 per unit
 - Cost per unit: \$500

BALANCE SHEET				
Assets		=	Liabilities	+ Stockholders' Equity
Accounts Receivable	+ Finished Goods	=		Retained Earnings
<i>h.</i>	34,000		(20,000)	14,000

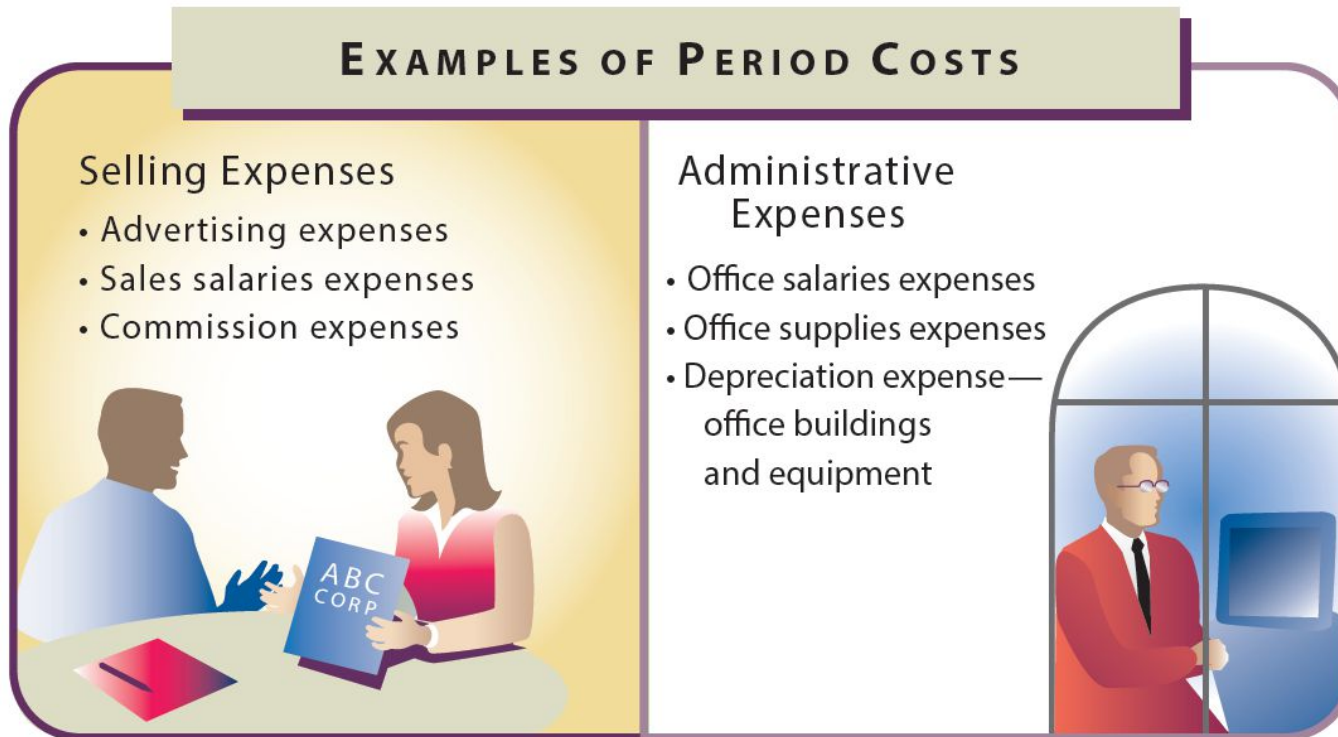
STATEMENT OF CASH FLOWS	

INCOME STATEMENT	
<i>h.</i> Sales	34,000
Cost of goods sold	(20,000)

Period Costs

- Costs used in generating revenue during the current period
- Not involved in the manufacturing process
- Categories
 - Selling expenses: Incurred in marketing the product and delivering sold products to customers
 - Administrative expenses: Incurred in managing the company
 - Not related to manufacturing or selling functions

Exhibit 13: Examples of Period Costs



Financial Statement Effects: Transaction (i)

- Quixote Guitars incurred sales salaries of \$2,000 and office salaries of \$1,500

BALANCE SHEET			
Assets	=	Liabilities +	Stockholders' Equity
		Salaries Payable +	Retained Earnings
<i>i.</i>		3,500	(3,500)

STATEMENT OF CASH FLOWS	

INCOME STATEMENT	
<i>i.</i> Sales salaries exp.	(2,000)
Office salaries exp.	(1,500)

Summary of Cost Flows for Quixote Guitars

- Balances of materials, work in process, and finished goods are supported by their subsidiary ledgers
 - The balances are as follows:

Controlling Account	Balance and Total of Related Subsidiary Ledger
Materials	\$ 3,500
Work in Process	21,000
Finished Goods	10,250

Exhibit 15: Income Statement of Quixote Guitars

Quixote Guitars Income Statement For the Month Ended December 31, 20Y7

Sales		\$ 34,000
Cost of goods sold		<u>(20,150)</u>
Gross profit		\$ 13,850
Selling and administrative expenses:		
Sales salaries expense	\$2,000	
Office salaries expense	<u>1,500</u>	
Total selling and administrative expenses		<u>(3,500)</u>
Operating income		<u><u>\$ 10,350</u></u>

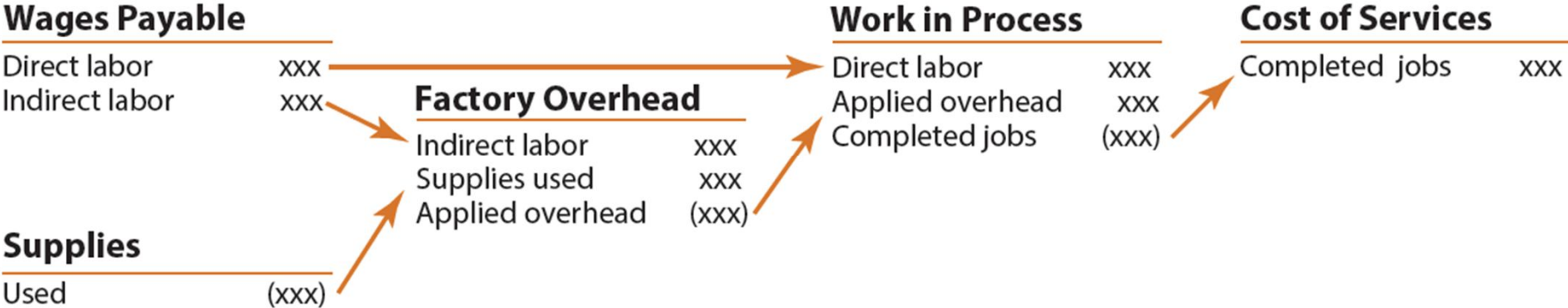
Learning Objective 5

Describe a job order cost accounting system for service operations

Job Order Cost Systems for Service Businesses

- May be used for a professional service business
 - Costs are accumulated and reported to the client
- Direct labor and overhead costs of rendering services to clients are accumulated in a work-in-process account
 - Work-in-Process account is supported by a cost ledger with a job cost sheet for each client
 - Once a job is completed and the client is billed, the costs are transferred to a cost of services account

Exhibit 16: Flow of Costs through a Service Business



Learning Objective 6

Describe just-in-time manufacturing processing

Just-in-Time (JIT) Processing

- Management approach that focuses on reducing time and cost and eliminating poor quality within manufacturing processes
- Achieves efficiencies and flexibility by reorganizing traditional production processes

Exhibit 17: Traditional Production



Just-in-Time Production Process

- Processing functions are combined into work centers
 - Known as **manufacturing cells**
 - Objective: To increase the efficiency of operations by eliminating waste and simplifying the production process
- Workers are cross-trained to perform more than one function
- Service activities may be assigned to individual work centers, rather than to centralized service departments

Exhibit 18: Just-in-Time Processing



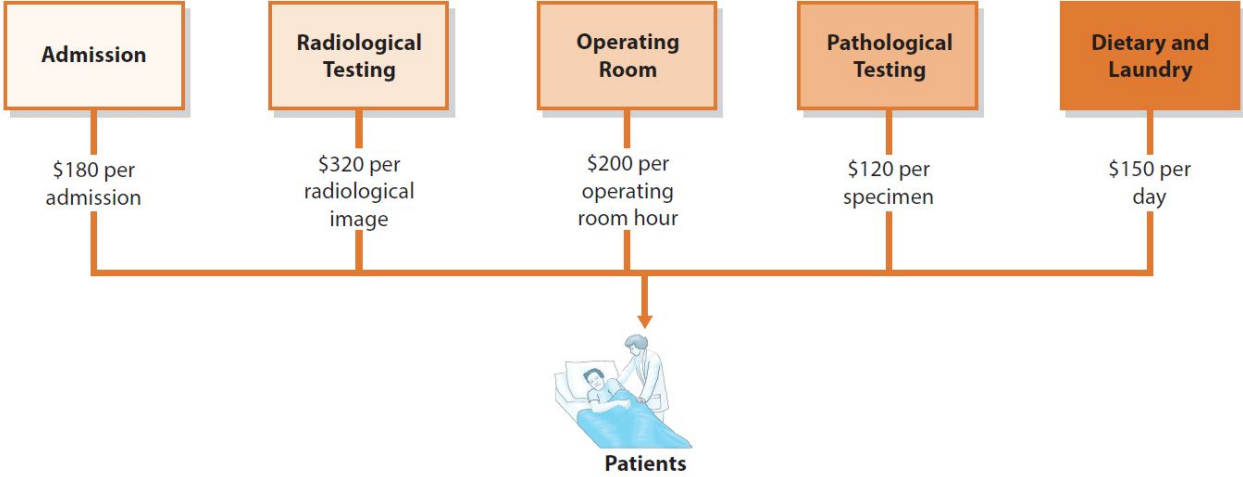
Learning Objective 7

Describe and illustrate activity-based costing

Activity-Based Costing (ABC)

- Helps avoid distortion in product costs
- Uses multiple overhead rates to allocate factory overhead more accurately than using a single, plant-wide overhead rate
- Uses cost of activities to determine product costs
 - Factory overhead costs are initially accounted for in **activity cost pools**

Exhibit 19: Activity-Based Costing Method—Hopewell Hospital



Calculation of Activity Rate

- Assume the following data for radiological testing:

Budgeted costs	\$960,000
Total estimated activity-base usage	3,000 images

$$\begin{aligned}\text{Radiological Testing Activity Rate} &= \frac{\text{Budgeted Activity Cost}}{\text{Activity-Base Usage}} \\ &= \frac{\$960,000}{3,000 \text{ images}} = \$320 \text{ per image}\end{aligned}$$

Allocation of Activity Costs to Patients

- Activity Cost Allocated to Patient = Patient Activity Usage × Activity Rate
- Hospital overhead services (activities) performed for Mia Wilson

	Patient (Mia Wilson) Activity Usage
Admission	1 admission
Radiological testing	2 images
Operating room	4 hours
Pathological testing	1 specimen
Dietary and laundry	7 days

Exhibit 20: Overhead Allocation Using Activity-Based Costing

	A	B	C	D	E	F
1	Patient Name: Mia Wilson					
2		Activity-Base		Activity		Activity
3	Activity	Usage	×	Rate	=	Cost
4						
5	Admission	1 admission		\$180 per admission		\$ 180
6	Radiological testing	2 images		\$320 per image		640
7	Operating room	4 hours		\$200 per hour		800
8	Pathological testing	1 specimen		\$120 per specimen		120
9	Dietary and laundry	7 days		\$150 per day		1,050
10	Total					<u>\$2,790</u>
11						

Exhibit 21: Patient Profitability Report

Hopewell Hospital Patient (Customer) Profitability Report For the Period Ending December 31, 20Y5				
	Adcock, Kim	Birini, Brian	Conway, Don	Wilson, Mia
Revenues	<u>\$9,500</u>	<u>\$21,400</u>	<u>\$5,050</u>	<u>\$3,300</u>
Less patient costs:				
Drugs and supplies	\$ 400	\$ 1,000	\$ 300	\$ 200
Admission	180	180	180	180
Radiological testing	1,280	2,560	1,280	640
Operating room	2,400	6,400	1,600	800
Pathological testing	240	600	120	120
Dietary and laundry	<u>4,200</u>	<u>14,700</u>	<u>1,050</u>	<u>1,050</u>
Total patient costs	<u>\$8,700</u>	<u>\$25,440</u>	<u>\$4,530</u>	<u>\$2,990</u>
Operating income	<u>\$ 800</u>	<u>\$ (4,040)</u>	<u>\$ 520</u>	<u>\$ 310</u>

Learning Objective 8

Describe and illustrate the use of cost per unit for managerial decision making and performance analysis

Metric-Based Analysis: Cost per Unit

- Job order cost accounting system accumulates and records product costs by jobs
 - Resulting total and unit product costs can be compared to similar jobs, compared over time, or compared to expected costs
 - Used by managers for cost evaluation, decision making, and performance analysis

Exhibit 22: Quixote Guitars Direct Materials Cost per Unit

Job 54

Item: 40 Jazz Series guitars

	Materials Quantity (board feet)	Materials Price	Materials Amount	Materials per Guitar
Direct materials:				
No. 8 Wood—Maple	400	\$10.00	\$4,000	\$100

Job 63

Item: 40 Jazz Series guitars

	Materials Quantity (board feet)	Materials Price	Materials Amount	Materials per Guitar
Direct materials:				
No. 8 Wood—Maple	500	\$10.00	\$5,000	\$125

End of Chapter 10