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Chapter 2
Job-Order Costing for Manufacturing and Service Companies

QUESTIONS

1. Manufacturing costs include all costs associated with the production of goods. Examples of manufacturing costs are: labor costs of workers directly involved with manufacturing goods, cost of all materials directly traced to products, indirect factory labor, indirect materials used in production, depreciation of production equipment, and depreciation of the manufacturing facility.

   Nonmanufacturing costs are all costs that are not associated with the production of goods. These typically include selling costs and general and administrative costs.

2. Product costs are assigned to goods produced. Product costs are assigned to inventory and become an expense when inventory is sold. Period costs are not assigned to goods produced. Period costs are identified with accounting periods and are expensed in the period incurred.

3. Two common types of product costing systems are (1) job-order costing systems and (2) process costing systems.

   Job-order costing systems are generally used by companies that produce individual products or batches of unique products. Companies that use job-order costing systems include custom home builders, airplane manufacturers, and ship-building companies.

   Process costing systems are used by companies that produce large numbers of identical items passing through uniform and continuous production operations. Process costing tends to be used by beverage companies and producers of chemicals, paints, and plastics.

4. A job cost sheet is a form that is used to accumulate the cost of producing a job. The job cost sheet contains information on direct materials, direct labor, and manufacturing overhead related to a particular job.

5. Actual overhead is not known until the end of the accounting period. If managers used actual overhead rates to apply overhead to jobs, they would have to wait until the end of the period to determine the cost of jobs. In order to make timely decisions, managers need to know the cost of jobs before the end of the accounting period.

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6. An important characteristic of a good overhead allocation base is that it should be strongly related to overhead cost. Assume that setup costs are classified as manufacturing overhead. The number of setups that a job requires would be a better allocation base for setup costs than would the number of direct labor hours worked on that job. Number of setups is more closely related to setup costs than is the number of direct labor hours and, therefore, number of setups is a better allocation base.

7. In highly automated companies where direct labor cost is a small part of total manufacturing costs, it is unlikely that overhead costs vary with direct labor. Further, in such companies, predetermined overhead rates based on direct labor may be quite large. Thus, even a small change in labor (the allocation base) could have a large effect on the overhead cost allocated to a job.

   Companies that are capital-intensive should consider using machine hours as an allocation base (or better still, they should consider the use of an activity-based costing system, which is discussed in more detail in Chapter 6).

8. It is necessary to apportion over- or underapplied overhead among Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold accounts if the amount in the Manufacturing Overhead account is material whether a debit or credit balance. This assumes that the balances in Work in Process and Finished Goods are relatively large. If a company used a just-in-time systems and these balances were quite small, then it would be reasonable to just close over- or underapplied overhead to Cost of Goods Sold.

9. An unexpected increase in production would typically result in overhead being overapplied. Overhead is applied using a predetermined rate which equals estimated total overhead cost (including variable and fixed overhead) divided by the estimated level of the allocation base. Overhead applied equals the predetermined rate times the actual use of the allocation base. An unexpected increase in production means that the fixed component of the predetermined overhead rate will be multiplied by a larger number than anticipated. Thus, more fixed overhead will be applied than the company is likely to incur.

10. As companies move to computer-controlled manufacturing systems and greater use of robotics, direct labor will likely decrease (due to decreased need for workers) and manufacturing overhead will likely increase (due to higher depreciation costs associated with the computer-controlled systems).

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EXERCISES

E1. [LO 4] Managers at Company A will perceive that overhead cost allocated to jobs increases with the amount of direct labor used. If they are evaluated on how well they control the cost of jobs, they will try to cut back on labor, which not only reduces labor costs but also overhead allocated to jobs they supervise. Following similar logic, managers at Company B will cut back on machine time and managers at Company C will make a special effort to control material costs (by reducing waste, searching for lower prices, etc). Note that the measure of performance (reduction in job costs) combined with the approach to allocating overhead drives managers to focus on different factors—this is a good example of "You get what you measure!"

E2. [LO 5, 7] If over- or underapplied overhead is large, we typically allocate it to Work in Process, Finished Goods and Cost of Goods Sold based on the relative balances in these accounts. However, if a company uses JIT, the balances in Work in Process and Finished Goods are likely to be quite small compared to the balance in Cost of Goods Sold. Thus, there will be only a small difference between assigning all of the over- or underapplied overhead to cost of goods sold versus apportioning it among the three accounts based on their relative balances.

E3. [LO 4, 5] The predetermined overhead rate at Precision Custom Molds is $100 per direct labor hour ($20,000,000 ÷ 200,000). Given Job 525 has 25 direct labor hours, $2,500 of overhead would be applied to it ($100 x 25).

E4. [LO 3]

a. P
b. P
c. J
d. J
e. P
f. J

E5. [LO 1, 2]

a. Y
b. N
c. Y
d. Y
e. N
f. Y
g. Y
h. N

E6. [LO 2, 4] Note that direct materials are charged to Work in Process Inventory while indirect materials are charged to Manufacturing Overhead.

Work in Process Inventory	200,000	
Raw Materials Inventory		200,000
Manufacturing Overhead	10,000	
Raw Materials Inventory		10,000

E7. [LO 2, 4] Note that direct materials are charged to Work in Process Inventory while indirect materials are charged to Manufacturing Overhead.

Work in Process Inventory	1,500	
Raw Materials Inventory		1,500
(250 + 350 + 400 + 500 = 1,500)		
Manufacturing Overhead	100	
Raw Materials Inventory		100

E8. [LO 2, 4] Note that direct labor is charged to Work in Process Inventory while indirect labor is charged to Manufacturing Overhead.

Work in Process Inventory	70,000	
Wages Payable		70,000
Manufacturing Overhead	50,000	
Wages Payable		50,000

E9. [LO 2, 4]

a. **Job No. 201**

110 hrs. × $10/hr	$1,100
90 hrs. × $21/hr.	1,890
40 hrs. × $12/hr.	480
Total	$3,470

Job No. 202

50 hrs. × $20/hr.	$1,000

Job No. 203

70 hrs. × $18/hr.	$1,260

b. Labor Report for the month of February (by job):

Job	Time Ticket	Hours	Rate	Cost
201	2101	110	10.00	$1,100
201	2102	90	21.00	1,890
201	2103	40	12.00	480
		240		3,470
202	2104	50	20.00	1,000
203	2105	70	18.00	1,260
	Total labor charges			$5,730

Work in Process Inventory	5,730	
Wages Payable		5,730

E10. [LO 5]

(1) Predetermined overhead allocation rate based on direct labor hours:
$900,000 ÷ 60,000 DLH = $15 per direct labor hour

(2) Predetermined overhead allocation rate based on direct labor costs:
$900,000 ÷ $1,800,000 = $0.50 per dollar of direct labor

(3) Predetermined overhead allocation rate based on machine hours:
$900,000 ÷ 30,000 machine hours = $30 per machine hour

E11. [LO 4, 5, 6]

a. The use of predetermined overhead rates makes it possible to cost jobs immediately after they are completed. If a company used an actual overhead rate, then job costs would not be available until the end of the accounting period. If Franklin Computer Repair charges customers based on actual job cost, it would be detrimental to customer service and company cash flows to have to wait until the end of the accounting period to bill customers.

b. The overhead rate is:
$500,000 ÷ $800,000 = $0.625 per dollar of technician wages.

Total job cost = $200 + $100 + ($100 x $0.625) = $362.50

E12. [LO 4, 5]

a. Predetermined overhead rates:

Allocation base	Predetermined Overhead Rate
Direct labor hours	$1,000,000 ÷ 40,000 DLH = $25 per direct labor hour
Direct labor cost	$1,000,000 ÷ $625,000 = $1.60 per dollar of direct labor cost
Machine hours	$1,000,000 ÷ 20,000 MH = $50 per machine hour
Direct material cost	$1,000,000 ÷ $800,000 = $1.25 per dollar of direct material

b. Cost of Job No. 253 using different allocation bases:

Cost	DLH	DL cost	MH	DM cost
Direct Materials	$3,000	$3,000	$ 3,000	$3,000
Direct labor	1,800	1,800	1,800	1,800
Manufacturing Overhead*	3,750	2,880	7,500	3,750
Total	$8,550	$7,680	$12,300	$8,550

*Overhead rates in “a” above x actual activity.

E13. [LO 2, 4, 5]

a. Overhead applied is equal to $3 × $100,000 of direct labor = $300,000.

Work in Process Inventory	$300,000	
Manufacturing Overhead		$300,000

b. Actual overhead is $260,000

Manufacturing Overhead	260,000	
Raw Materials Inventory		40,000
Wages Payable		80,000
Utilities Payable		25,000
Accumulated Depreciation		60,000
Repairs Payable		55,000

E14. [LO 5, 7]

a. Overhead applied is $300,000 while actual overhead is $260,000. Thus, Manufacturing Overhead has a $40,000 credit balance. The journal entry to close the account to Cost of Goods Sold is:

Manufacturing Overhead	40,000	
Cost of Goods Sold		40,000

b. Closing the balance in Manufacturing Overhead leads to product costs that are consistent with actual overhead costs rather than estimated overhead costs.

c. Because Star Plastics uses a just-in-time inventory system, the balances in Work in Process and Finished Goods are likely to be quite small compared to Cost of Goods Sold. Thus, there is not likely to be a significant difference between charging the entire amount of overapplied overhead to Cost of Goods Sold versus apportioning it among Work in Process, Finished Goods and Cost of Goods Sold.

E15. [LO 4, 5]

Cost Summary: Job 325	
Direct Material	$10,000
Direct Labor (250 hours x $16/hour)	4,000
Manufacturing Overhead:	
($25 per direct labor hour x 250 hours)	6,250
Total	$20,250

E16. [LO 4, 5, 6]

Estimated overhead = $210,000 which is allocated based on cost of attorney and paraprofessional time.

Budgeted salaries: (5 × $100,000) + (9 x $50,000) = $950,000

Predetermined overhead rate = $210,000 ÷ $950,000 = $0.22 per dollar of attorney and paraprofessional time.

If client services require $45,000 in salaries, then indirect costs assigned are:

$45,000 × $0.22 = $9,900.

E17. [LO 5] Since the Manufacturing Overhead account has an ending credit balance (before adjustment), manufacturing overhead for the period is overapplied. The problem states that the balance is material—this suggests that we prorate the balance among Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold.

Accounts	Balance	% of Total	Total Overapplied	Adjustment
Work in Process Inventory	$ 500,000	25	$90,000	$22,500
Finished Goods Inventory	600,000	30	90,000	27,000
Cost of Goods Sold	900,000	45	90,000	40,500
Total	$2,000,000			$90,000

Manufacturing Overhead	90,000	
Work in Process Inventory		22,500
Finished Goods Inventory		27,000
Cost of Goods Sold		40,500

E18. [LO 7] Examples of negative events that would require a company holding inventory are as follows:

1. Strikes at a supplier would interrupt delivery of critical materials.
2. Unanticipated machine break-downs would interrupt production.
3. Natural disasters or terrorist attacks would interrupt the delivery of materials.

E19. [LO 4] Estimated manufacturing overhead was $2,000,000 and eighty percent was fixed. When the sequence of material movements was changed and 30,000 of machine hours were saved, $1,600,000 (80% of $2,000,000) would remain unchanged. If variable manufacturing overhead is approximately $4 per hour ($400,000÷100,000) the new variable portion would be $280,000 ($4 x (100,000 – 30,000)) which would make the total overhead about $1,880,000. The savings is only $120,000 or $4 per hour, much less than $20 per hour.

E20. *Student answers will vary. See below for possible ideas.*

One concept is the calculation of cost of goods manufactured and cost of goods sold. This concept is very important to someone who is an accountant for a manufacturing company. Accountants will need accurate information about direct materials, direct labor, and manufacturing overhead in determining the cost of manufactured products. From there, accountants can calculate the company's cost of goods sold. It is important for these numbers to be calculated correctly since an overstatement of cost of goods sold will lead to an understatement of net income and vice versa. Accountants have a responsibility to gather correct information and communicate this information to others who rely on it. Thus, accountants must make sure that accurate cost records are kept throughout each year.

PROBLEMS

P1. [LO 3]

a.

Satterfield's Custom Glass
Schedule of Cost of Goods Manufactured
For the Year Ended December 31, 2017

Beginning balance in work in process inventory		$ 210,000
Add current manufacturing costs:		
Direct material	$2,500,000	
Direct labor	3,000,000	
Manufacturing overhead	1,700,000	7,200,000
Total		7,410,000
Less ending balance in work in process inventory		300,000
Cost of goods manufactured		$7,110,000

b.

Satterfield's Custom Glass
Income Statement
For the Year Ended December 31, 2017

Sales		$8,500,000
Less cost of goods sold:		
Beginning finished goods inventory	$ 500,000	
Add cost of goods manufactured	7,110,000	
Cost of goods available for sale	7,610,000	
Less ending finished goods inventory	400,000	7,210,000
Gross profit		1,290,000
Less nonmanufacturing expenses:		
Selling & admin. expenses		1,350,000
Net income (loss)		($ 60,000)

P2. [LO 3]

a.

Terra Cotta Designs
Schedule of Cost of Goods Manufactured
For the Year Ended December 31, 2017

Beginning balance in work in process inventory			$ 650,000
Add current manufacturing costs:			
Direct material:			
Beginning balance	$ 450,000		
Purchases	1,500,000		
Ending balance	(200,000)	$1,750,000	
Direct labor		2,500,000	
Manufacturing Overhead		650,000	4,900,000
Total			5,550,000
Less ending balance in work in process inventory			350,000
Cost of goods manufactured			$5,200,000

b.

Terra Cotta Designs
Income Statement
For the Year Ended December 31, 2017

Sales		$7,000,000
Less cost of goods sold:		
Beginning finished goods inventory	$ 750,000	
Add cost of goods manufactured	5,200,000	
Cost of goods available for sale	5,950,000	
Less ending finished goods inventory	350,000	5,600,000
Gross profit		1,400,000
Less nonmanufacturing expenses:		
Selling expenses	500,000	
General & admin. expenses	850,000	1,350,000
Net income		$ 50,000

P3. [LO 4]

a. **Cost of Jobs:**

	1005	**1006**	**1007**	**1008**	**1009**	**1010**
Direct materials	$ 650	$ 850	$ 1,550	$ 650	$ 450	$ 350
Direct labor	1,600	2,000	3,300	1,400	900	700
Mfg. overhead	2,880*	3,600	5,940	2,520	1,620	1,260
Total	$5,130	$6,450	$10,790	$4,570	$2,970	$2,310

*$1,600 x 180%

b.

Raw Material Inventory	5,500	
Accounts Payable		5,500
(To record purchase of steel)		
Raw Material Inventory	2,400	
Cash		2,400
(To record purchase of supplies)		
Work in Process Inventory	4,500	
Manufacturing Overhead	1,000	
Raw Material Inventory		5,500
(To record materials used in production)		
Work in Process Inventory	9,900	
Manufacturing Overhead	6,500	
Wages Payable		16,400
(To record labor)		
Work in Process Inventory	17,820	
Manufacturing Overhead		17,820
(To record overhead applied to production)		
Finished Goods Inventory	26,940	
Work in Process Inventory		26,940
(To record cost of jobs completed)		
Accounts Receivable	40,410	
Cost of Goods Sold	26,940	
Sales		40,410
Finished Goods Inventory		26,940
(To record the sale of finished goods)		

P4. [LO 2, 3, 4]

a.

The beginning balance in Work in Process is $14,500:

Job 258	$5,000
Job 259	6,000
Job 260	3,500
Total	$14,500

The ending balance in Work in Process Inventory is $8,400:

Job 345	$2,500
Job 346	5,900
Total	$8,400

b.

The beginning balance in Finished Goods Inventory is $9,000:

Job 257	$9,000

The ending balance in Finished Goods Inventory is $11,700:

Job 341	$ 1,500
Job 342	3,300
Job 343	2,400
Job 344	4,500
Total	$11,700

c.

Cost of goods sold is determined as follows:

Beginning balance in work in process inventory		$ 14,500
Add current manufacturing costs:		
Direct material	$ 750,000	
Direct labor	1,650,000	
Manufacturing overhead	2,150,000	4,550,000
Total		4,564,500
Less ending balance in work in process inventory		8,400
Cost of goods manufactured		$4,556,100
Beginning finished goods inventory		$ 9,000
Add cost of goods manufactured		4,556,100
Cost of goods available for sale		4,565,100
Less ending finished goods inventory		11,700
Cost of goods sold		$4,553,400

Job 257 through Job 340 likely relate to the balance of Cost of Goods Sold.

P5. [LO 4, 5]

a. Predetermined overhead rate based on labor hours:

$12,000,000 ÷ 300,000 hours = $40 per labor hour

Overhead assigned to the model K25 shoe based on labor hours:

$40 x 11,000 hours = $440,000

Predetermined overhead rate based on labor cost:

$12,000,000 ÷ $4,800,000 = $2.50 per labor dollar

Overhead assigned to the model K25 shoe based on labor cost:

$2.50 x $165,000 = $412,500

b. Direct labor cost is the preferred allocation base because workers paid a higher rate work on more complex jobs, and more complex jobs lead to more overhead cost.

P6. [LO 4, 5]

a. Predetermined overhead rate based on direct labor cost:

$200,000 ÷ $300,000 labor cost = $0.67 per labor dollar

Predetermined overhead rate based on direct labor hours:

$200,000 ÷ 25,000 hours = $8.00 per labor hour

Predetermined overhead rate based on machine hours:

$200,000 ÷ 8,000 machine hours = $25 per machine hour

b.

Overhead based on labor cost

	Job 9823	Job 9824
Direct material	$ 1,000	$2,000
Direct labor	1,400	1,400
Mfg. overhead	938	938
Total	$3,338	$4,338

Overhead based on labor hours

	Job 9823	Job 9824
Material	$ 1,000	$ 2,000
Labor	1,400	1,400
Overhead*	1,200	1,040
Total	$ 3,600	$ 4,440

*Actual direct labor hours x $8

Overhead based on machine hours

	Job 9823	Job 9824
Material	$1,000	$ 2,000
Labor	1,400	1,400
Overhead*	3,250	6,750
Total	$5,650	$10,150

*Actual machine hours x $25

c. Given that depreciation on equipment accounts for 75 percent of applied overhead costs, an allocation based on machine hours seems reasonable. However, users of the job cost information should keep in mind that the applied overhead portion of job cost is not an incremental cost.

P7. [LO 5]

a. Net Income, if over-applied overhead is immaterial and assigned to Cost of Goods Sold.

OH applied = .75 x $700,000 =	$525,000
Actual OH =	450,000
	$ 75,000

Therefore, overhead was over-applied by $75,000

Sales	$2,500,000
CGS ($1,000,000 - $75,000)	925,000
Gross Profit	1,575,000
Selling & Admin. Expenses	1,000,000
Net Income	$ 575,000

b. Net Income, if over applied overhead is material and prorated among appropriate accounts.

	Balance	Proportion	Adjustment	Adjusted Balance
WIP Inventory	$ 80,000	0.071	$ 5,325	$ 74,675
FG Inventory	48,000	0.043	3,225	44,775
COGS	1,000,000	0.886*	66,450	933,550
Total	$1,128,000	1.000	$75,000	$1,053,000

*Rounded so total equals 1.000

Sales	$2,500,000
CGS	933,550
Gross Profit	1,566,450
Selling Expenses	400,000
Admin Expenses	600,000
Net Income	$ 566,450

c. Charging the entire amount of overapplied overhead to Cost of Goods Sold results in higher net income than prorating overapplied overhead among Work in Process, Finished Goods, and Cost of Goods Sold.

P8. [LO 5]

a. If overapplied overhead is assigned to Cost of Goods Sold, the adjusted balance will be:

$440,000 - $50,000 = $390,000.

b. If overapplied overhead is assigned to Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold, the adjusted balances will be:

	Balance	Proportion	Adjustment	Adjusted Balance
WIP Inv.	$ 66,000	0.12	$ 6,000	$ 60,000
FG Inv.	44,000	0.08	4,000	40,000
COGS	440,000	0.80	40,000	400,000
Total	$550,000	1.00	$50,000	$500,000

P9. [LO 4, 5, 6]

a. Indirect cost per hour of service is $65:

50 professionals × 1,600 hours = 80,000 hours per year.

$5,200,000 indirect cost ÷ 80,000 hours = $65 per hour.

b. Estimated cost of services for a potential client:

Average salary per billable hour = $120,000 per year ÷ 1,600 hours = $75 per hour.

Professional service (100 hours × $75 per hour)	$ 7,500
Indirect costs (100 hours × $65 per hour)	6,500
Total	$14,000

P10. [LO 2, 4]

a. $30,000 + $40,000 -$15,000 = $55,000

b. $80,000 + $55,000 +$45,000 + $63,000 - $82,000 = $161,000

c. $95,000 + $161,000 - $110,000 = $146,000

d. $70,000 - $60,000 = $10,000

P11. [LO 4, 5]

a. The predetermined overhead rate is $2.57 per direct labor dollar ($9,000,000 ÷ 3,500,000 = $2.57).

b. Work in Process Inventory 5,750,000
Raw Materials Inventory 5,750,000

c. Work in Process Inventory 4,000,000
Wages payable 4,000,000

d. Work in Process Inventory 10,280,000
Manufacturing Overhead 10,280,000
($4,000,000 × $2.57 = $10,280,000)

e. Cost of Goods Sold 720,000
Manufacturing overhead 720,000
($11,000,000 - $10,280,000 = $720,000)

P12. [LO 4, 5]

a.	Job 201	$17,000 × $3.25 =	$ 55,250
	Job 202	$20,500 × $3.25 =	66,625
	Job 203	$9,000 × $3.25 =	29,250
			$ 151,125

b.	Job 201	$9,500 × $3.33 =	$ 31,635
		$3,000 × $4.76 =	14,280
		$4,500 × $2.40 =	10,800
			56,715
	Job 202	$5,000 × $3.33 =	16,650
		$6,500 × $4.76 =	30,940
		$9,000 × $2.40 =	21,600
			69,190
	Job 203	$2,000 × $3.33 =	6,660
		$5,000 × $4.76 =	23,800
		$2,000 × $2.40 =	4,800
			35,260
	Total		$161,165

c. It appears that the relation between overhead and labor cost is different in the three production departments. Thus, it is preferable to use separate overhead rates for each.

P13. [LO 2, 4, 5]

a. Confectioners' sugar (2,100 lbs. × $0.80)	$1,680
Granulated sugar (2,300 lbs. × $0.90)	2,070
Chocolate (900 lbs. × $4.00)	3,600
Caramel (300 lbs. × $1.50)	450
Eggs (60 doz. × $0.85)	51
Paraffin (90 lbs. × $0.50)	45
	$7,896

Raw Materials Inventory	7,896	
Accounts payable (various)		7,800
Cash		96
(To record purchase of sugar, chocolate, caramel, eggs, & paraffin)		
Work in Process Inventory	5,400	
Wages Payable		5,400
(To record direct labor cost)		
Manufacturing Overhead	2,500	
Wages Payable		2,500
(To record indirect labor cost)		
Manufacturing Overhead	6,150	
Utilities Payable		400
Rent Payable		750
Accounts Payable		5,000
(To record overhead costs incurred)		
Work in Process Inventory	6,896	
Raw Materials Inventory		6,896
(To record raw materials used: $2,500 + 7,896 - $3,500 = $6,896)		
Work in Process Inventory	7,650	
Manufacturing Overhead		7,650
(To record overhead cost applied to jobs = $17 × 450 hours)		
Finished Goods Inventory	21,446	
Work in Process Inventory		21,446
(To record production of finished goods: $6,500 + $5,400 + $6,896 + $7,650 – $5,000 = $21,446)		
Accounts Receivable	35,000	
Sales Revenue		35,000
(To record sales)		
Selling & Admin. Expenses	9,000	
Accounts Payable		9,000
(To record nonmanufacturing expenses incurred)		

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Cost of Goods Sold	24,446	
Finished Goods Inventory		24,446

(To record cost of sales: $9,000 + $21,446 - $6,000)

Cost of Goods Sold	1,000	
Manufacturing Overhead		1,000

(To record allocation of underapplied overhead to CGS)
(6,150 + 2,500 - 7,650 = 1,000)

b.

Lane Confectioners
Income Statement for the Month of March

Revenue	$35,000	
Cost of goods sold	25,446	($24,446 + $1,000)
Gross margin	9,554	
Selling & Admin. Exp.	9,000	
Net income (loss)	$ 554	

P14. [LO 4, 5] Approximately 66 percent of overhead costs ($160,000 + $135,000) ÷ $450,000 are related to machinery. Without additional information, it appears that machine hours would be an appropriate overhead allocation base.

The predetermined overhead allocation rate = $450,000 ÷ 15,000 machine hours = $30 per machine hour.

P15. [LO 5, 6]

Overhead is overapplied

Applied overhead ($6 x 35,000)	$210,000
Actual overhead	200,000
Overapplied overhead	$ 10,000

P16. [LO 5, 6]

a. The predetermined overhead rate is $17 per repair technician hour ($170,000 ÷ 10,000 = $17).

b. Overhead applied = $17 × 7,000 = $119,000

Overhead applied is $119,000 while actual overhead is $140,000. Thus, overhead is underapplied by $21,000
($119,000 – $140,000 = $21,000)

c. The journal entry to close the account to Cost of Goods Sold is:

Cost of Goods Sold	21,000	
Manufacturing Overhead		21,000

P17. [LO 4, 5, 6]

a. The predetermined overhead rate is $2,750 per hour of operating room use.

($5,500,000 ÷ 2,000 hours = $2,750). The total overhead charge to Candice for 3 hours of operating room usage is $8,250 ($2,750 x 3 hours).

b. The total cost of the knee surgery is $24,250:

Pharmacy	$ 450
Sterile supply	1,500
Supplies other	4,500
OR services	4,500
Anesthesia	1,500
Anesthesiologist	3,500
OR overhead charges	8,250
	$24,200

Case 2-1. [LO General chapter concepts and ethics]

BRIXTON SURGICAL DEVICES

Summary

The COO and CFO of a public company are coming up with "schemes" to manage earnings up in an effort to beat an aggressive earnings target which determines their bonus compensation.

- Indicates how profit can be "boosted" by overproduction.
- Indicates how channel stuffing can boost profit.
- Raises the interesting question "Does compliance with GAAP equate to ethical behavior?"

Questions to ask students

1. What's the situation at Brixton Surgical Devices?

2. How do Ed and Robin plan to increase profit?

3. Are their planned methods ethical and how will they affect shareholder value?

Discussion

Ed (the COO) and Robin (the CFO) realize that their company is not likely to meet their earnings target and, in consequence, they won't receive bonuses. To increase profit, they plan to offer discounts to customers for orders in October and November that can be shipped in December. This strategy is sometimes referred to as "channel stuffing" since the sales channel is being "stuffed" with merchandise. In reality, the company is simply moving sales that would have taken place next year into the current year. Arguably, this does not violate GAAP, since the company has actual orders that are shipped before year-end. However, this would require complete footnote disclosure in the annual report or shareholders might be misled and think there is a permanent increase in revenue. And, they may react quite negatively when profit is down in the first quarter of the next year.

The second strategy, increasing production to lower unit costs and bury fixed production costs in inventory, also, most likely, does not violate GAAP. But it certainly hurts shareholder value. The company is using shareholders' money to make an investment in inventory that is not really needed.

Are these two strategies ethical? The answer to this question is, of course, subjective. Based on the ethical framework presented in chapter 1, I believe the strategies are not ethical. Consider questions 3 and 5 from the 7 question framework:

3. Will an individual or an organization be harmed by any of the alternatives?

5. Would someone I respect find any of the alternatives objectionable?

Shareholders are harmed by the buildup in inventory and they will be misled by channel stuffing unless there is full disclosure (which would not suit the aims of the COO and CFO). Also, it seems quite likely that someone the COO and CFO respect will find the strategies objectionable.

Case 2-2. [LO 4. 5, 6]

YSL MARKETING RESEARCH

Summary
Marketing research firm is bidding on a job and is considering various costs.

- Requires calculation of full cost and consideration of incremental costs including opportunity costs.

- Brings up the importance of factors that are difficult to quantify.

Questions to ask students
1. Summarize the situation facing YSL Marketing Research.

2. What is the expected full cost of the Surenex engagement?

3. What is the lowest amount that Connie Bachmann, a partner at YSL, can bill without hurting company profit?

4. What should Connie consider in addition to the amount just calculated?

Discussion
Begin the discussion by asking a student to summarize the situation facing YSL Marketing Research. The company has been asked to conduct a survey for Surenex—a firm that has the potential to be a valued long-run client. However, Surenex is not currently willing to pay YSL's normal billing rates, due to its current cash-flow challenges.

a. A student is then asked to calculate the full cost of the project.

Full Cost

Partner salary (40 hours × $120)	$4,800
Staff salary (100 hours × $40)	4,000
Direct charges	3,000
Overhead (.31 × $8,800)	2,728
Total	$14,528

Overhead calculation

Estimated overhead	$ 496,000
÷ Estimated professional compensation	1,600,000
Overhead rate	$ 0.31

b. What is the lowest amount that Connie can bill on this engagement without hurting company profit? The point of this question is to show that the answer is neither the full cost ($14,528) nor the variable cost of the job (assuming the

variable costs are salaries and direct charges). To answer the question, students must consider the fact that if the Surenex job is undertaken, YSL will need to turn down business for which it can bid 1.5 times compensation plus out-of-pocket costs. That is, students must consider opportunity cost. If the company takes on the Surenex job, it will miss out on billing $13,200 (1.5 x $8,800) of professional compensation on some other job. In addition, to avoid hurting profit, the company must cover out-of-pocket costs. Thus, the lowest amount that Connie can bill is $16,200.

Professional compensation	$4,800
	4,000
	$8,800

Salaries ($8,800 × billing at 1.5 times)	$13,200
Plus: Direct out-of-pocket costs	3,000
Total	$16,200

c. The discussion concludes with the question, "What should Connie consider in addition to the amount just calculated?" Hopefully, a student will recognize that our previous analysis was short sighted in that we did not consider the fact that Surenex may end up being a hot company with "premium billing opportunities." Therefore, YSL may be better off in the long-run by setting a relatively low price on the current job. Even a price that does not cover salaries and direct charges could be warranted if the prospect for future profit, from working for Surenex, is very high.

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Case 2-3. [LO 4, 5]

DUPAGE POWDER COATING

Summary

A company has bought a computer-controlled, electrostatic powder coating system. The result is overhead has increased (due to depreciation of the system) and labor hours have decreased. Since labor hours is the overhead allocation base, the overhead rate has increased. It now appears that small jobs, which still use the old manual system, are more costly than they were in the prior year—even though they are processed using the same equipment and labor as in the prior year.

- Indicates how costs can be distorted by overhead allocation.

Questions to ask students

1. What's the situation at DuPage Powder Coating?

2. What would the job have cost in the prior year and what did it cost this year?

3. Why have the cost of small jobs increased?

4. Should the company increase the prices of small jobs since costs have increased?

Discussion

a. The cost of the job in the current year is:

Direct material	$500
Direct labor (7 hours x $20)	140
Manufacturing overhead (7 labor hours x $22.15)	155
Total cost	$795

b. The cost of the job in the prior year was:

Direct material	$500
Direct labor (7 hours x $20)	140
Manufacturing overhead (7 labor hours x $12))	84
Total cost	$724

The new overhead rate is determined as follows:

Expected total overhead	$1,440,000
÷ Expected labor hours	65,000
Overhead rate	$22.15

c. The fact that the cost of this job has increased from $724 to $795 does not indicate that the company is less efficient at handling small jobs in the current year. The increase is due to the purchase of the new equipment (which this job does not even use), which increased overhead and reduced labor, resulting in a large increase in the overhead rate.

d. The decision to raise the price of small jobs should not be affected by the apparent increase in the cost of small jobs—that increase is artificial in that small jobs don't even use the equipment that led to the higher overhead rate. A price increase should be determined based on an analysis of capacity and opportunity costs.

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CHAPTER 2
JOB-ORDER COSTING FOR MANUFACTURING AND SERVICE COMPANIES

LEARNING OBJECTIVES

1. Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

2. Discuss the three inventory accounts of a manufacturing firm and describe the flow of product costs in a manufacturing firm's accounts.

3. Discuss the types of product costing systems and explain the relation between the cost of jobs and the Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold accounts.

4. Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

5. Explain the role of a predetermined overhead rate in applying overhead to jobs and explain the treatment of the difference between actual overhead and overhead allocated to jobs using a predetermined rate.

6. Explain how service companies can use job-order costing to calculate the cost of services provided to customers.

7. Discuss modern manufacturing practices and how they affect product costing.

CHAPTER REVIEW

1. This chapter introduces the manufacturing costs: direct material, direct labor, and manufacturing overhead. The job-order costing system is discussed in detail, including source documents, cost flows, journal entries, applied overhead, and under- or overapplied overhead. Also discussed is how service companies can use job-order costing. Also presented is how modern manufacturing practices, i.e., JIT, CAM, and TQM systems, can affect product costing.

Cost Classifications for Manufacturing Firms

2. (L.O.1) Manufacturing costs (also known as product costs) are the costs associated with producing the final product. They consist of:

   a. Direct Materials: These are the primary materials that are directly and easily traceable to the final product. For example: the wood in a table.

   b. Direct Labor: These are the labor costs that are directly and easily traceable to the end product. For example: the production line workers labor.

   c. Manufacturing Overhead: These are all of the other production costs other than direct materials and direct labor. They are also referred to as the indirect production costs. Examples include:

      (1) Indirect materials or supplies.
      (2) Indirect labor.
      (3) Depreciation on plant and factory equipment.
      (4) Factory utilities.

3. **Nonmanufacturing costs (also known as period costs)** consist of the selling, and general and administrative costs. Examples include:
   a. Sales commissions.
   b. Depreciation on automobiles and office equipment.
   c. Office salaries.
   d. Warehousing costs of finished products.

4. **Product costs** are the manufacturing costs, i.e., direct materials, direct labor, and manufacturing overhead. They are carried as assets until sold and then are expensed through the Cost of Goods Sold account.

5. **Period costs** are the nonmanufacturing costs, i.e., selling and general and administrative costs. They are expensed as incurred.

6. For financial reporting purposes GAAP requires that work in process, finished goods, and cost of goods sold be reflected at **full cost**, i.e., direct materials, direct labor, variable overhead, and fixed overhead.

   For internal decision making purposes, however, incremental analysis is appropriate. When choosing between decision alternatives, the analysis should concentrate only on those costs that will differ between the alternatives. In many instances, the fixed costs will not change, and can therefore be ignored.

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Balance Sheet Presentation of Product Costs

7. (L.O.2) A manufacturing company has three inventory accounts reflected in the current assets section of the balance sheet.
   a. **Raw Materials Inventory**: This account includes both direct and indirect materials.

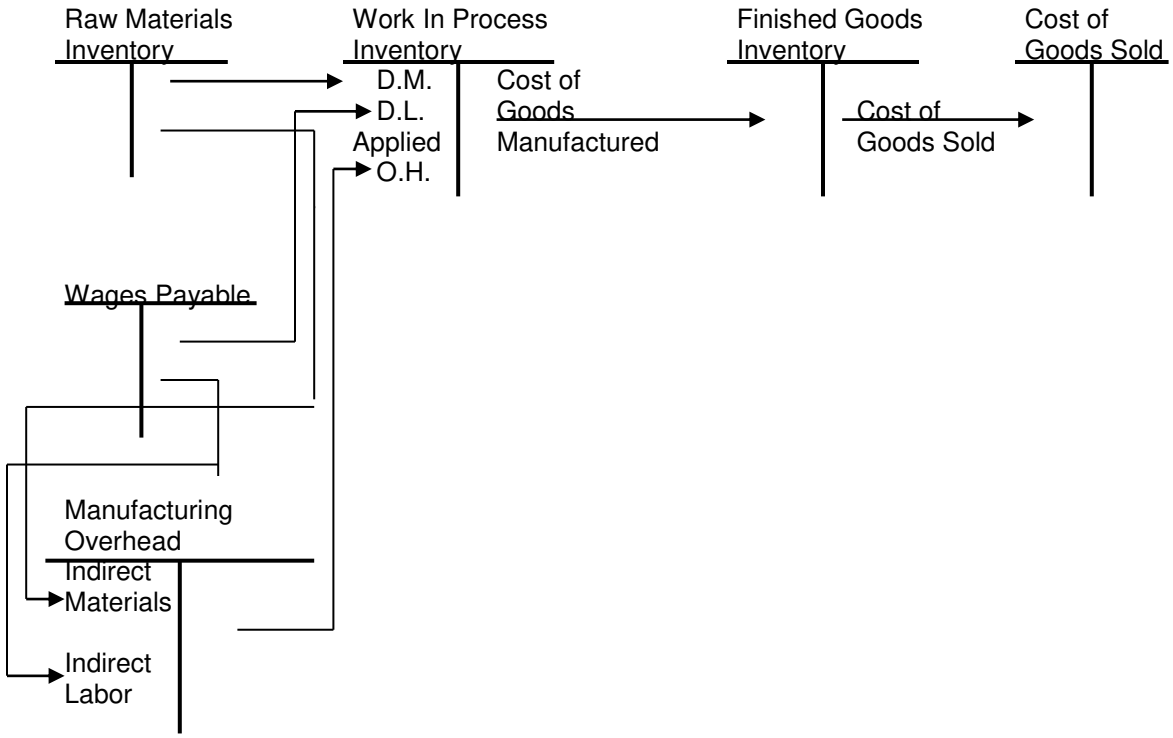
   b. **Work in Process Inventory:** This account contains the direct material, direct labor, and manufacturing overhead costs incurred on those jobs that are not finished at the end of the reporting period.

   c. **Finished Goods Inventory:** This account includes the direct material, direct labor, and manufacturing overhead costs incurred on those jobs completed, but not sold, during the period.

Flow of Product Costs in Accounts

8. (L.O.2) In a manufacturing firms product costs flow from the product cost accounts to work in process, then finished goods, and finally into cost of goods sold.

9. The cost flows are as follows:



Income Statement Presentation of Product Costs

10. The **cost of goods manufactured** represents the costs attached to those units completed during the current period. It is the cost transferred out of work in process into finished goods. These costs are summarized on the Schedule of Cost of Goods Manufactured.

Schedule of Cost of Goods Manufactured

Beginning work in process		$ 20,000
Add: Current manufacturing costs		
Direct material used	$ 700,000	
Direct labor	300,000	
Manufacturing overhead	100,000	1,100,000
Total		1,120,000
Less: Ending work in process		50,000
Cost of Goods Manufactured		$ 1,070,000

11. The cost of goods manufactured is combined with the change in finished goods inventory to compute the cost of goods sold section of the income statement.

Partial Income Statement

Sales		$ 1,300,000
Less: Cost of goods sold		
Beginning finished goods	$ 40,000	
Add: Cost of goods manufactured	1,070,000	
Cost of goods available for sale	1,110,000	
Less: Ending finished goods	30,000	1,080,000
Gross profit		220,000

Types of Costing Systems

12. (L.O.3) There are two major types of product costing systems. The system used depends on the type of manufacturing done.

    a. **Job-order costing systems** are used when a firm manufactures goods to a customer's unique requirements. In this type of system costs are accumulated by job, i.e., by individual product or batch, so the costs can be matched against the revenues generated. Examples include:

        (1) Construction companies
        (2) Printing companies

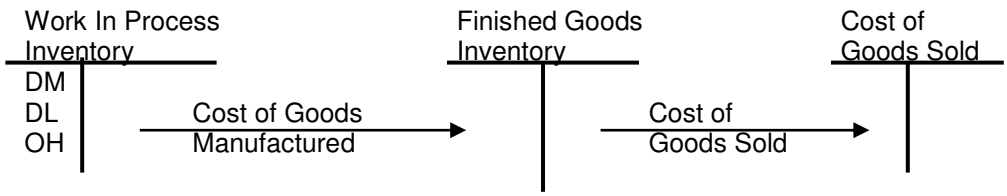
    b. **Process costing systems** are used when a firm manufactures large quantities of a homogeneous product. Costs are accumulated by process (department), and unit costs are derived by dividing total costs by the total units produced. Chapter 3 will expand on process costing systems. Examples include:

        (1) Chemical producing companies
        (2) Paint producing companies
        (3) Cement producing companies

Overview of Job Costs and Financial Statement Accounts

13. (L.O.3) In a job-order costing systems, product costs (direct materials, direct labor, and overhead) flow into work in process while a job is being worked on. When the job is completed, the costs flow out of work in process, into finished goods. And, when the job is sold, the costs flow out of finished goods into cost of goods sold.

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Job-Order Costing System

14. (L.O.4) Various source documents are prepared to reflect the materials, labor, and overhead costs incurred on each job.

    a. A **material requisition** form is used to withdraw materials, direct and indirect, from the raw materials inventory.

    b. A **time ticket** is prepared by each employee to account for the labor expended on each job or for indirect activities.

    c. A **job-cost sheet** is used to summarize all product costs on each job. The file of job cost sheets on incomplete jobs serves as a subsidiary ledger to the work-in-process inventory account.

15. Manufacturing overhead is assigned (applied) to each job using a predetermined overhead rate.

    a. Overhead allocation rate = $\frac{\text{Estimated overhead costs}}{\text{Estimated quantity of allocation base}}$

    b. Applied overhead = Overhead allocation rate × actual quantity of allocation base

16. The journal entries used to record the product cost flows in a job-order costing system are as follows:

    a. To purchase raw materials

Raw Materials Inventory	X X	
Cash or Accounts Payable		X X

    b. To release materials to production

Work in Process Inventory (for direct materials)	X X	
Manufacturing Overhead (for indirect materials)	X X	
Raw Materials Inventory		X X

    c. To record labor costs

Work in Process Inventory (for direct labor)	X X	
Manufacturing Overhead (for indirect labor)	X X	
Wages Payable		X X

    d. To record any actual overhead costs

Manufacturing Overhead	X X	
Various Accounts		X X

    e. To record applied overhead

Work in Process Inventory	X X	
Manufacturing Overhead		X X

f. To record completed jobs

Finished Goods Inventory	X X	
Work in Process Inventory		X X

g. To record the Cost of Goods Sold

Cost of Goods Sold	X X	
Finished Goods Inventory		X X

h. To record a credit sale

Accounts Receivable	XX	
Sales		XX

17. The overhead allocation base chosen should be strongly correlated with overhead costs.

    a. "You get what you measure." Manufacturing managers will try to reduce costs because it reflects well on their managerial skills.
    b. If the allocation base is reduced, applied overhead will be reduced. But, will actual overhead costs be reduced?

        - If overhead is primarily fixed, a reduction in the allocation base will not result in reduced overhead.

18. **Activity-based costing (ABC)** is a method of applying overhead costs to products using a number of different allocation bases.

    a. Costs are grouped into cost pools by activity.

    b. Each pool has its own overhead rate, calculated by dividing the amount of the cost pool by the corresponding cost driver.

Predetermined Overhead Rates

19. (L.O.5) Overhead rates are based on annual estimates of overhead costs and estimates of the level of the allocation base.

    a. Actual overhead costs are not used to develop overhead rates because they would not be known until the end of the year. This would make it impossible to cost the jobs being worked on during the year.

    b. Annual overhead rates are used to smooth out the fluctuations that occur from month to month. Also, to smooth out the amount of fixed overhead applied each month.

Eliminating Overapplied or Underapplied Overhead

20. (L.O.5) At the end of each year the Manufacturing Overhead account is closed in order to adjust the inventory accounts and the Cost of Goods Sold account to reflect actual costs.

    a. If the Manufacturing Overhead account has a debit balance, it is referred to as underapplied overhead.

    b. If the Manufacturing Overhead account has a credit balance, it is referred to as overapplied overhead.

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c. If the under- or overapplied overhead amount is considered immaterial, it is closed to the Cost of Goods Sold. For underapplied overhead the entry would be:

Cost of Goods Sold	X X	
Manufacturing Overhead		X X

d. If the under-or overapplied overhead amount is considered significant, it is allocated to Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold based on their respective balances. For underapplied overhead the entry would be:

Work in Process Inventory	X X	
Finished Goods Inventory	X X	
Cost of Goods Sold	X X	
Manufactured Overhead		X X

Job-Order Costing for Service Companies

21. (L.O.6) Service companies may use job-order costing to keep track of the costs incurred for each patient, client, or vehicle. Examples include:
    - Hospitals, law firms, consulting companies, and repair shops.

22. Each patient, client, or vehicle is treated as a job.
    a. A document similar to a job cost sheet is used to accumulate the costs incurred.

    b. Overhead may be applied using a predetermined overhead rate, similar to that used in a manufacturing company, or

    c. In the case of repair shops, the cost of labor and materials is marked up to cover overhead and generate a profit.

Modern Manufacturing Practices and Product Costing Systems

23. (L.O.7) Changes in the manufacturing environment have affected the types of costs incurred and the way costs are recorded in a product costing system.
    a. **Just-in-Time (JIT)** systems are used to reduced inventory levels. Raw materials are delivered from suppliers only when they are needed. And, production is only scheduled when a customer order has been received.

        (1) JIT systems also are used to improve quality, eliminate production breakdowns, and prevent missed delivery deadlines.

        (2) Job-Order costing systems can be adapted for JIT by combining the Raw Materials and Work in Process accounts into a new account called Raw-and-in-Process Inventory (RIP).

    b. **Lean manufacturing** is closely related to JIT. However, lean manufacturing focuses on eliminating waste across the value chain, while JIT focuses on inventory management.

    c. **Computer-controlled manufacturing systems** are used to control equipment and increase the flexibility and accuracy of the production process.

    Highly mechanized companies have traded equipment for direct labor, resulting in a reduction of variable costs and an increase in fixed costs.

    d. **Total quality management (TQM)** programs are used by companies to ensure that their products are of the highest quality and their production processes are efficient.

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(1) There is no agreement on the "right" way to implement a TQM program. However, most companies stress listening to customers, making products right the first time, and encouraging workers to continuously improve their production processes.

(2) TQM affects product costs by reducing the need to track scrap and rework costs.

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LECTURE OUTLINE

The material in this chapter can be covered in three class periods. Students will have the most difficulty with overhead. When discussing this topic make sure they understand why overhead must be applied, how to calculate applied overhead, and how to differentiate between actual and applied overhead.

A. (L.O. 1) Cost classifications for manufacturing firms.

1. Manufacturing or Product costs.

   a. **Direct materials**: Materials directly and easily traceable to the end product.

   b. **Direct labor**: The hands on labor in the production process.

   c. **Manufacturing overhead**: All other manufacturing costs other than direct materials and direct labor.

   d. Inventoried until sold and then expensed through cost of goods sold.

2. Nonmanufacturing or period costs

   a. Selling, general, and administrative costs.

   b. Expensed as incurred.

B. GAAP requires inventories be carried at **full cost**.

1. Direct materials, direct labor, variable overhead, and fixed overhead.

2. Decision making relies on incremental analysis.

   - If fixed costs don't change between alternatives, they are not incremental or relevant.

C. (L.O. 2) Balance sheet presentation of product cost

1. Direct materials inventory

2. Work in process inventory

3. Finished goods inventory

D. (L.O. 2) Flow of product costs

1. Product costs flow into work in process inventory until the job is completed.

2. Product costs flow out of work in process inventory into finished goods inventory when the job is completed.

   - Cost of goods manufactured

3. Product costs flow out of finished goods inventory into cost of goods sold when the job is sold.

E. Income statement presentation of product costs.

F.

1. Cost of goods manufactured = Beginning work in process + current manufactured costs – ending work in process.

2. Cost of goods sold = Beginning finished goods + cost of goods manufactured - ending finished goods.

F. (L.O. 3) Types of costing systems

1. **Job – order costing system**:

   a. Manufactures product to unique customer specification.

   b. A job is an individual product or batch for which a company needs cost information.

   c. Examples include:

      (1) Construction companies
      (2) Shipbuilders
      (3) Printing companies
      (4) CPA firms

2. **Process costing systems:**

   a. Used by companies producing large quantities of identical items

   b. Items pass through uniform and continuous production operations

   c. Examples include:

      (1) Paint and plastic manufacturers
      (2) Chemical producers
      (3) Metal producers

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G. (L.O. 3) Job costs and financial statement accounts.

1. Work in Process Inventory represents the costs of all incomplete jobs.
2. Finished Goods Inventory represents the costs of all completed, but not sold, jobs.
3. Cost of Goods Sold represents the costs of all jobs sold during the period.

G. (L.O. 4) Job – order costing system.

1. Source documents
   a. Job cost sheet
   b. Material requisition form
   c. Time tickets
2. Journal entries
   a. Material purchases
   b. Material usage
   c. Direct labor costs
   d. Overhead
      (1) Actual overhead
      (2) Applied overhead
   e. Completed jobs
   f. Cost of goods sold
3. Cost flows

I. (L.O. 5) Allocating overhead to jobs.

1. Actual overhead costs are not used, because they may not be known until after the job is completed and sold.
2. Predetermined overhead rate = $\frac{\text{Estimated overhead costs}}{\text{Estimated level of allocation base}}$
3. Allocation base should be positively correlated to overhead costs.

4. Overhead application rates are based on annual estimates to smooth the month-to-month variations.

J. (L.O. 5) Eliminating over- or underapplied overhead.

1. Closed out to either:

   a. Cost of Goods Sold, if immaterial, or

   b. Work in Process, Finished Goods, and Cost of Goods Sold, if material.

K. (L.O. 6) Service companies use job-order costing systems, too.

L. (L.O. 7) Modern manufacturing practices and product costing systems.

1. Just-in-time (JIT) production

   a. Reduce inventory levels

   b. Improve quality

   c. Streamline production facilities

   d. Improve on-time delivery to customers

2. Lean manufacturing

   a. Related to JIT

   b. Focuses on eliminating waste in value chain

3. **Computer-controlled manufacturing**

   a. Replace workers with machines/computers

   b. Causing a change in companies cost mix to more fixed costs and fewer variable costs

4. Total quality management (TQM)

   a. Raised product quality

   b. Increase production efficiency

   c. Continuous improvement at all levels

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ILLUSTRATION 2-1

COST- FLOWS

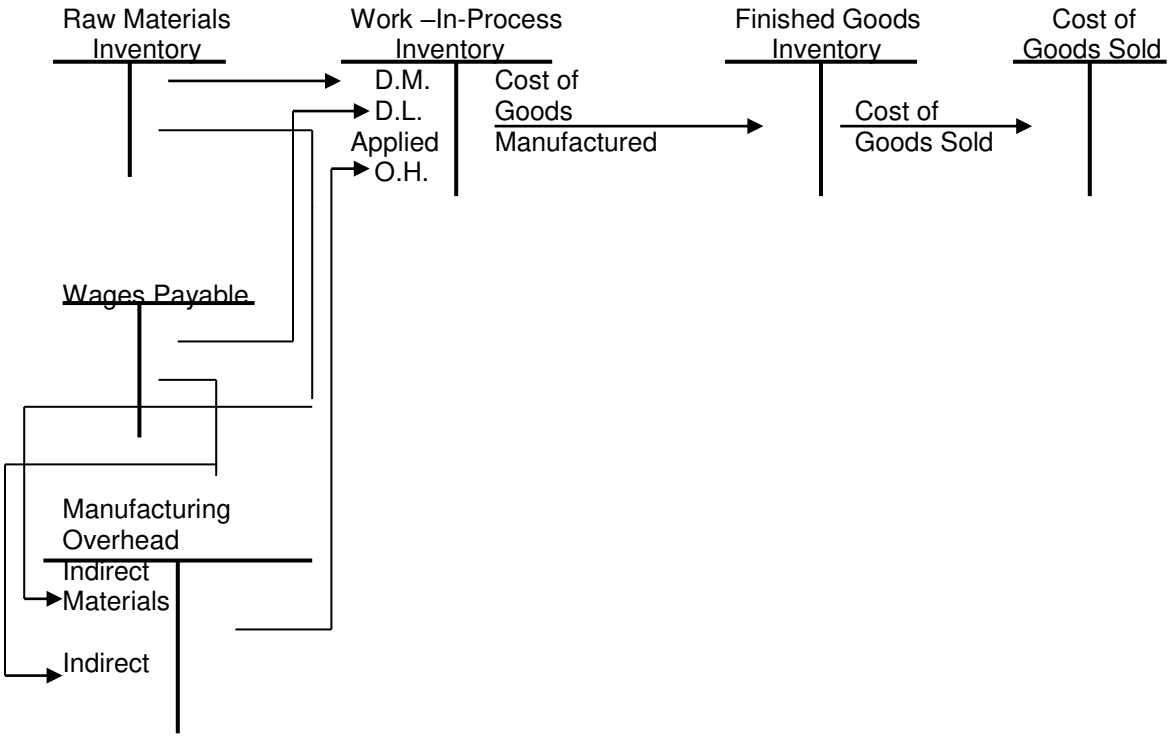


ILLUSTRATION 2-2

SCHEDULE OF COST OF GOODS MANUFACTURED

Beginning balance, Work in Process			$ XX
Add: Current manufacturing costs:			
Direct materials		$ XX	
Direct labor		XX	
Manufacturing overhead:			
Indirect materials	$ XX		
Indirect labor	XX		
Factory utilities	XX		
Factory depreciation	XX		
Other	XX	XX	XX
Total costs in Work in Process			XX
Less: Ending balance, Work in Process			XX
Cost of Goods Manufactured			$ XX

ILLUSTRATION 2-3

INCOME STATEMENT

Sales		$ XX
Less Cost of goods sold:		
Beginning balance, Finished goods	$ XX	
Add: Cost of goods manufactured	XX	
Cost of goods available for sale	XX	
Less: Ending balance, Finished goods	XX	XX
Gross Profit		XX
Less Nonmanufacturing expenses:		
Selling expenses	XX	
General and administrative expenses	XX	XX
Net Income (Loss)		$ XX

ILLUSTRATION 2-4

JOB-COST JOURNAL ENTRIES

Material Purchases

Raw Materials Inventory	XX	
Cash or Accounts Payable		XX

Materials Issued to Production

Work in Process (direct materials)	XX	
Manufacturing Overhead (indirect materials)	XX	
Raw Materials Inventory		XX

Production Labor Costs

Work in Process (direct labor)	XX	
Manufacturing Overhead (indirect labor)	XX	
Wages Payable		XX

Other Actual Overhead Costs

Manufacturing Overhead	XX	
Various Accounts		XX

Applied Overhead

Work in Process	XX	
Manufacturing Overhead		XX

Completed Jobs

Finished Goods	XX	
Work in Process		XX

Job Sold

Cash or Accounts Receivable	XX	
Cost of Goods Sold	XX	
Sales Revenue		XX
Finished Goods		XX

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ILLUSTRATION 2-5

APPLYING OVERHEAD

Estimated overhead	$ 1,000,000
Estimated machine hours	500,000
Actual overhead	980,000
Actual machine hours	495,000

Calculate the predetermined overhead rate

$$\frac{\$\ 1,000,000}{500,000\ MH} = \$2 / MH$$

Calculate the overhead applied

495,000 MH × $2/MH = $990,000

Determine the under-or-overapplied overhead

Manufacturing Overhead			
(Actual)	980,000	990,000	(Applied)
		10,000	(Overapplied)

ILLUSTRATION 2-6

ELIMINATING OVER-OR-UNDER APPLIED OVERHEAD

Case A:	Overapplied overhead	$ 10,000	
Case B:	Underapplied overhead	$ 15,000	
	Work in Process	500,000	
	Finished Goods	500,000	
	Cost of Goods Sold	1,000,000	

Case A: Overapplied overhead immaterial

Manufacturing Overhead	10,000	
Cost of Goods Sold		10,000

Case B: Underapplied overhead is material

		%				
Work in Process	$ 500,000	25	×	$ 15,000	=	$ 3,750
Finished Goods	500,000	25	×	15,000	=	3,750
Cost of Goods Sold	1,000,000	50	×	15,000	=	7,500
Totals	$ 2,000,000	100			=	$ 15,000

Work in Process	3,750	
Finished Goods	3,750	
Cost of Goods Sold	7,500	
Manufacturing Overhead		15,000

MATCHING – A

Match the following terms to the statements shown below. Use capital letters for your answers. Each term can only be used once.

A. Activity-based costing
B. Cost driver
C. Direct labor
D. Full cost
E. Job cost sheet
F. Manufacturing costs
G. Overapplied overhead
H. Period costs
I. Process costing system
J. Selling costs

_____ 1. The costs associated with securing and filling customers orders.
_____ 2. Required under GAAP for valuing inventory on the balance sheet.
_____ 3. Assigns overhead costs to products using a number of different allocation bases.
_____ 4. Actual overhead costs are less than applied overhead.
_____ 5. A form used to accumulate the product costs of each job.
_____ 6. Used by companies that produce large quantities of identical items.
_____ 7. The activity used as the basis for developing an overhead rate.
_____ 8. Consists of direct material, direct labor, and overhead.
_____ 9. Represents cost of workers directly involved in the production of a job.
_____ 10. Costs that are expensed as incurred.

MATCHING – B

Match the following terms to the statements shown below. Use capital letters for your answers. Each term can only be used once.

A. Allocation base
B. Cost of goods manufactured
C. Cost pool
D. Indirect labor cost
E. Job-order costing system
F. Just-in-time manufacturing
G. Manufacturing overhead
H. Lean Manufacturing
I. Product cost
J. Underapplied overhead

_____ 1. Used by companies that produce individual products or batches of products that that are unique

_____ 2. Involves minimizing inventory levels

_____ 3. When actual overhead exceeds applied overhead

_____ 4. The cost of the jobs completed during the period

_____ 5. Includes the cost of production supervisors

_____ 6. Is not expensed until the related product is sold

_____ 7. Consists of the cost of a major activity

_____ 8. Focuses on eliminating waste throughout the value chain

_____ 9. A characteristic used to develop the overhead allocation rate

_____ 10. The overhead cost that flows into work in process

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MULTIPLE CHOICE – A

_____ 1. Which of the following is **not** a product cost?
A. Direct materials
B. Depreciation on finished goods warehouse
C. Insurance on factory building
D. Indirect labor

_____ 2. Which of the following is **not** a period cost?
A. Overtime premium
B. Commissions
C. Advertising costs
D. General office salaries

_____ 3. GAAP requires that inventories and cost of goods sold be reported at full cost. Which of the following is defined as full cost?
A. Direct materials, Direct labor, and Variable overhead
B. Direct materials, Direct labor, and Fixed overhead
C. Direct materials, Direct labor, and other Variable costs
D. Direct materials, Direct labor, and Total overhead

_____ 4. The schedule of cost of goods manufactured is an analysis of which account?
A. Finished goods
A. Cost of goods sold
B. Work in process
C. Direct materials

_____ 5. Which of the following companies would use a job-order costing system?
A. Construction
B. Metal producer
C. Chemical producer
D. Plastic producer

_____ 6. Which of the following documents would serve as a subsidiary ledger to the Work in Process account?
A. Materials requisition
B. Times sheets
C. Job cost sheet
D. Overhead budget

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_____ 7. The overhead allocation rate is calculated by dividing:
A. actual overhead costs by the actual quantity of the allocation base.
B. the actual overhead costs by the estimated quantity of the allocation base.
C. the estimated overhead costs by the actual quantity of the allocation base.
D. the estimated overhead costs by the estimated quantity of the allocation base.

_____ 8. Applied overhead is debited to which account?
A. Manufacturing Overhead
B. Work in Process
C. Cost of Goods Sold
D. Finished Goods

_____ 9. Which of the following is **not** included in manufacturing overhead?
A. Indirect materials
B. Factory employee benefits
C. Depreciation of plant
D. Clerical supplies

_____ 10. Which of the following is a method of applying overhead?
A. Just-in-time production
B. Activity-based costing
C. Total quantity management
D. Computer-controller manufacturing systems

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MULTIPLE CHOICE – B

_____ 1. Which of the following is **not** a manufacturing cost?
A. Direct materials
B. Manufacturing overhead
C. Accounting department costs
D. Direct labor

_____ 2. Which of the following is a selling cost?
A. Property taxes on factory
B. Janitorial costs for administrative offices
C. Indirect labor costs
D. Depreciation on finished goods warehouse

_____ 3. Which of the following is added directly to Work in Process?
A. Indirect labor
B. Indirect materials
C. Factory depreciation
D. Direct labor

_____ 4. Which of the following costs is expensed as incurred?
A. Direct materials
B. Sales salaries
C. Indirect labor
D. Factory depreciation

_____ 5. Which of the following companies would use a process costing system?
A. Paint producer
B. Shipbuilding company
C. Construction company
D. Printing company

_____ 6. The cost of goods manufactured is credited to which of the following accounts?
A. Cost of Goods Sold
B. Finished Goods
C. Work in Process
D. Raw Materials

_____ 7. The cost of goods sold is credited to which of the following accounts?
A. Cost of Goods Manufactured
B. Work in Process
C. Cost of Goods Sold
D. Finished Goods

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_____ 8. An immaterial amount of underapplied overhead is debited to which of the following accounts?
A. Manufacturing Overhead
B. Cost of Goods Sold
C. Work in Process
D. Finished Goods

_____ 9. A material amount of overapplied overhead is debited to which of the following accounts?
A. Manufacturing Overhead
B. Work in Process
C. Finished Goods
D. Cost of Goods Sold

_____ 10. The reduction of inventories is an objective of:
A. total quality management.
B. just-in-time production.
C. activity-based costing.
D. computer-controlled manufacturing systems.

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ANSWER SHEET

MATCHING-A	MATCHING-B	MULTIPLE CHOICE-A	MULTIPLE CHOICE-B
1. J	1. E	1. B	1. C
2. D	2. F	2. A	2. D
3. A	3. J	3. D	3. D
4. G	4. B	4. C	4. B
5. E	5. D	5. A	5. A
6. I	6. I	6. C	6. C
7. B	7. C	7. D	7. D
8. F	8. G	8. B	8. B
9. C	9. A	9. D	9. A
10. H	10. H	10. B	10. B

Prepared by
Debby Bloom-Hill, CMA, CFM



SIXTH EDITION

Managerial Accounting

James Jiambalvo

WILEY

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CHAPTER 2

Job-Order Costing for Manufacturing & Service Companies

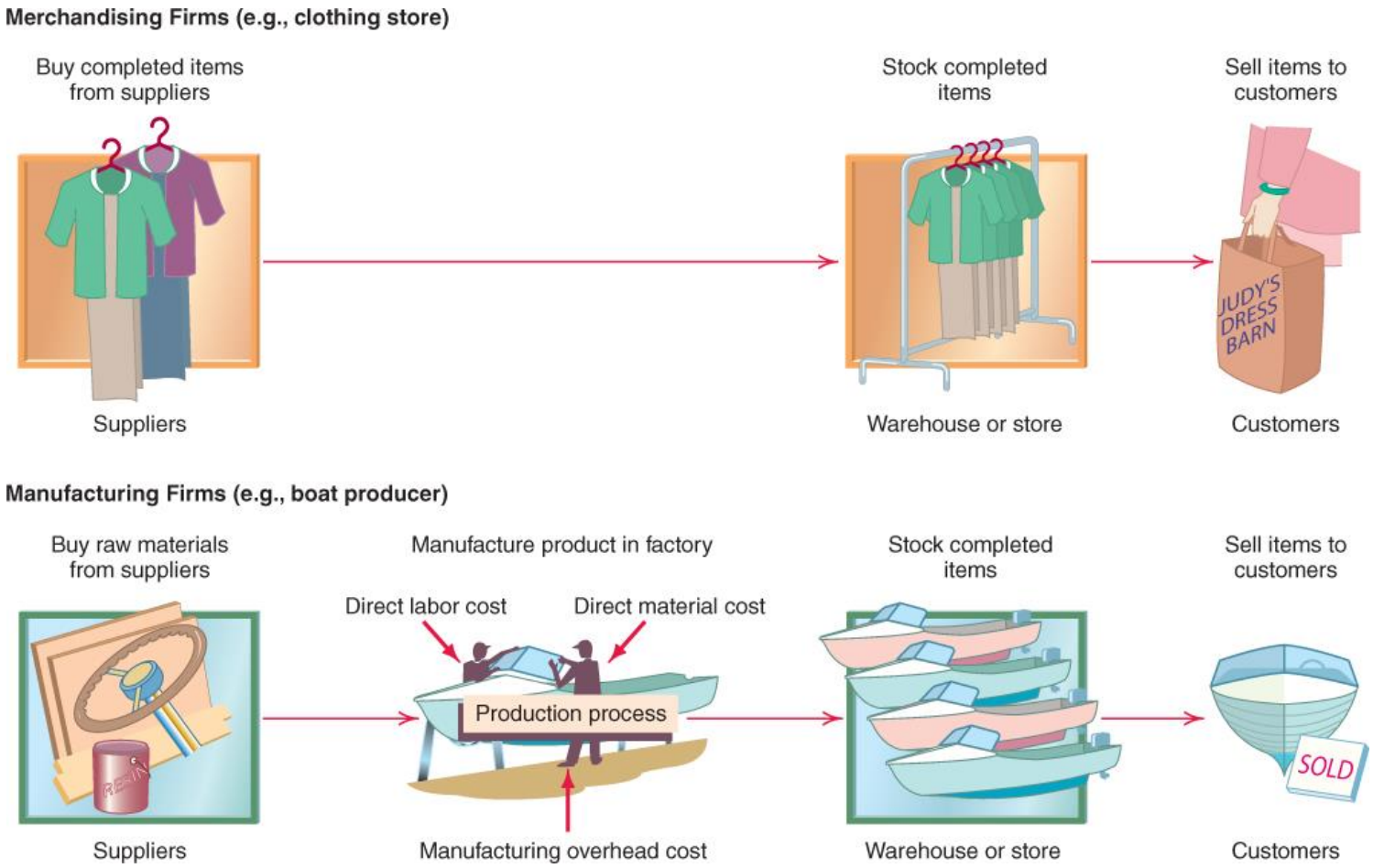
Manufacturing Costs

- **Direct Materials**
  - Cost of materials directly traceable to items produced
  - Materials not directly traceable are indirect materials
- **Direct Labor**
  - Cost of labor directly traceable to items produced
  - Labor costs not directly traceable are indirect labor
- **Manufacturing Overhead**
  - Cost of manufacturing activities other than direct materials and direct labor

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

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Merchandising and Manufacturing Firms



Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

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Common Manufacturing Overhead Costs (Illustration 2-2)

- Indirect factory labor
- Indirect material
- Overtime premium
- Nightshift premium
- Vacation and holiday pay for factory workers
- Social Security and Medicare taxes for factory workers
- Health insurance for factory workers
- Power, heat, and light in the factory
- Depreciation of factory equipment
- Depreciation of plant
- Insurance on plant and factory equipment
- Repair of factory equipment
- Maintenance of factory building and grounds
- Property taxes related to the factory

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

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Nonmanufacturing Costs

- **Nonmanufacturing costs (also known as period costs) are all costs that are not associated with the production of goods**
  - **Selling Costs**
    - **Costs associated with securing and filling customer orders e.g. advertising, sales salaries, depreciation of sales equipment**
  - **General and Administrative Costs**
    - **Costs associated with the firm's general management e.g. human resources, accounting, corporate headquarters and other support costs**

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

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Product and Period Costs

- **Product Costs**
  - **Costs assigned to goods produced (i.e. direct materials, direct labor, and manufacturing overhead)**
  - **Included in inventory until goods sold**
- **Period Costs**
  - **Costs identified with accounting periods (i.e. selling and administrative expenses)**
  - **Expensed in period incurred**

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

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Relationships Among Cost Categories (Illustration 2-3)

	Type of Cost	When Expensed
	Product costs	
Manufacturing costs	Direct material Direct labor Manufacturing overhead	Expensed when goods are sold
	Period costs	
Nonmanufacturing costs	Selling cost General and Administrative cost	Expensed in period in which they are incurred

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

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Test Your Knowledge 1

Which of the following is not a product cost?

a. Depreciation on manufacturing equipment
b. Indirect materials
c. Insurance on manufacturing equipment
d. Bonus compensation to the company president ←

Answer:

d. Bonus compensation to the company president (administrative expense)

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

Test Your Knowledge 2

Which of the following is a period cost?

a. Raw materials costs
b. Manufacturing plant maintenance
c. Depreciation on plant equipment
d. Depreciation on salespersons' laptops ←

Answer:
d. Depreciation on salespersons' laptops (selling expense)

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

Test Your Knowledge 3

Which of the following is a direct materials cost?

a. Steel for a ship builder ←
b. Postage and supplies in the mailroom
c. Factory rent
d. Wages for production line workers

Answer:

a. Steel for a ship builder

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

Product Cost Information in Financial Reporting/Decision Making

- Manufacturing companies use product costs to prepare financial statements and for managerial decisions
  - Often the cost information needed is different for the two purposes
    - Decision making relies on incremental analysis – an analysis of the revenues and expenses that will actually increase or decrease as a result of the decision
    - You will need to separate the variable and fixed costs to do an incremental analysis

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

Decision Making/ Incremental Analysis

- **Incremental analysis**
  - **Bob Williams, the owner of Eastlake Motorboat Company, is considering taking out an advertisement in Wooden Boat magazine**
    - **The ad will cost $25,000**
    - **Bob believes it will result in at least one additional order for a custom boat**
    - **On average, Eastlake boats sell for $90,000**
    - **He expects $90,000 of incremental revenue and $25,000 of incremental costs related to the ad**
    - **Bob also needs to consider the incremental production costs**

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

Decision Making/ Incremental Analysis

- **Incremental analysis**
  - **Direct materials and direct labor are incremental**
  - **Only 10% of overhead ($3,000) is incremental**
  - **Incremental revenue exceeds incremental cost by $17,000. Thus, Bob should place the ad.**

Incremental Revenue		$90,000
Incremental cost:		
Cost of advertisement		(25,000)
Incremental production costs		
Direct material	$25,000	
Direct labor	20,000	
Manufacturing overhead	3,000	(48,000)
Incremental profit		$17,000

Learning objective 1: Distinguish between manufacturing and nonmanufacturing costs and between product and period costs.

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Balance Sheet Presentation of Product Costs

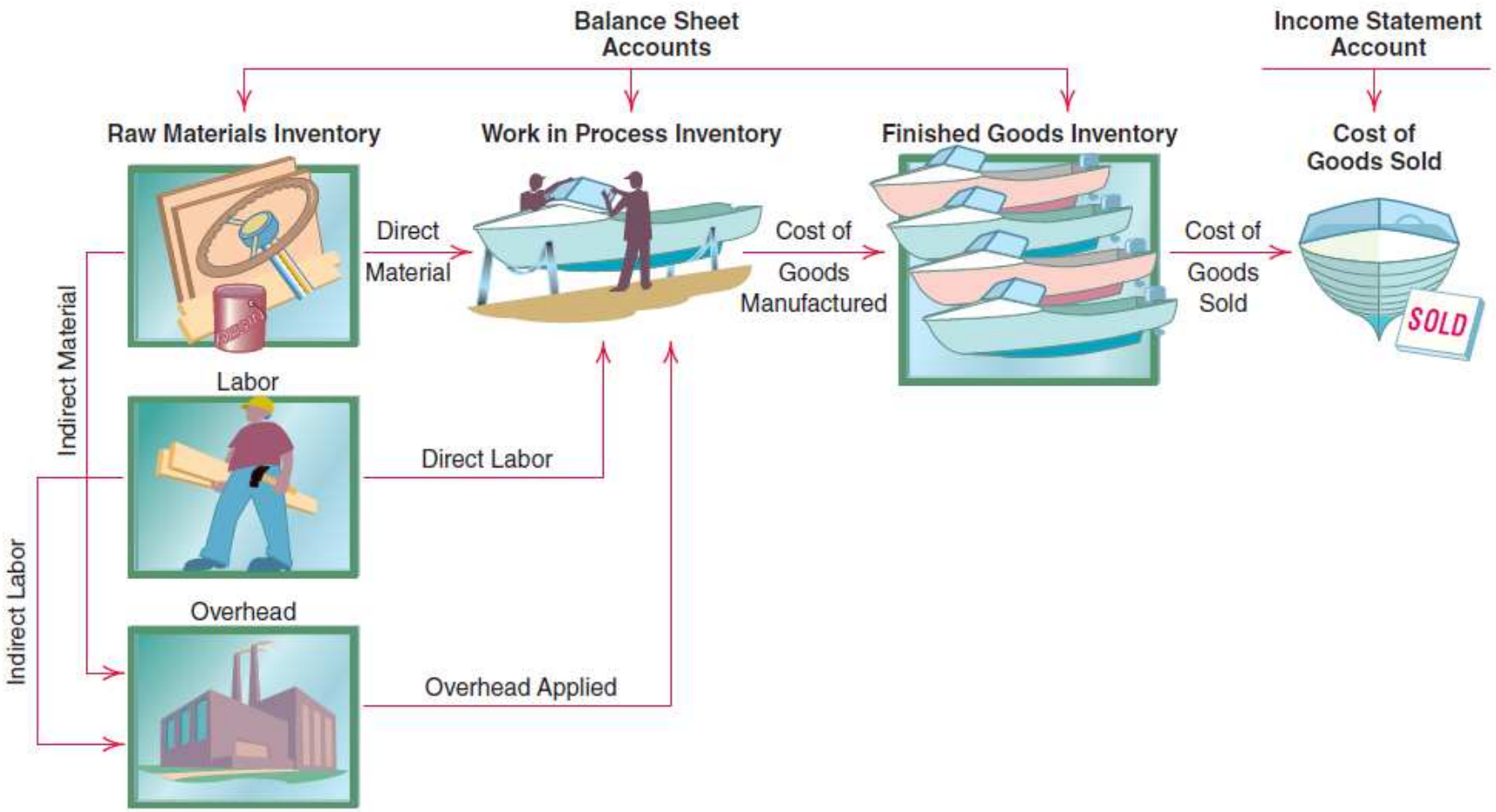
Eastlake Motorboat Company		
Partial Balance Sheet		
As of December 31, 2017		
Assets		
Cash		$20,000
Accounts receivable		40,000
Inventory		
Raw Material	$30,000	
Work in Process	50,000	
Finished Goods	100,000	180,000
Equipment(net)		400,000
Total assets		$640,000

- **Raw materials inventory**
  - **Includes cost of materials on hand**
- **Work in process inventory**
  - **Includes goods partially complete**
- **Finished goods inventory**
  - **Includes cost of items ready for sale**

Learning objective 2: Discuss the three inventory accounts of a manufacturing firm and describe the flow of product costs in a manufacturing firm's accounts.

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Flow of Product Costs

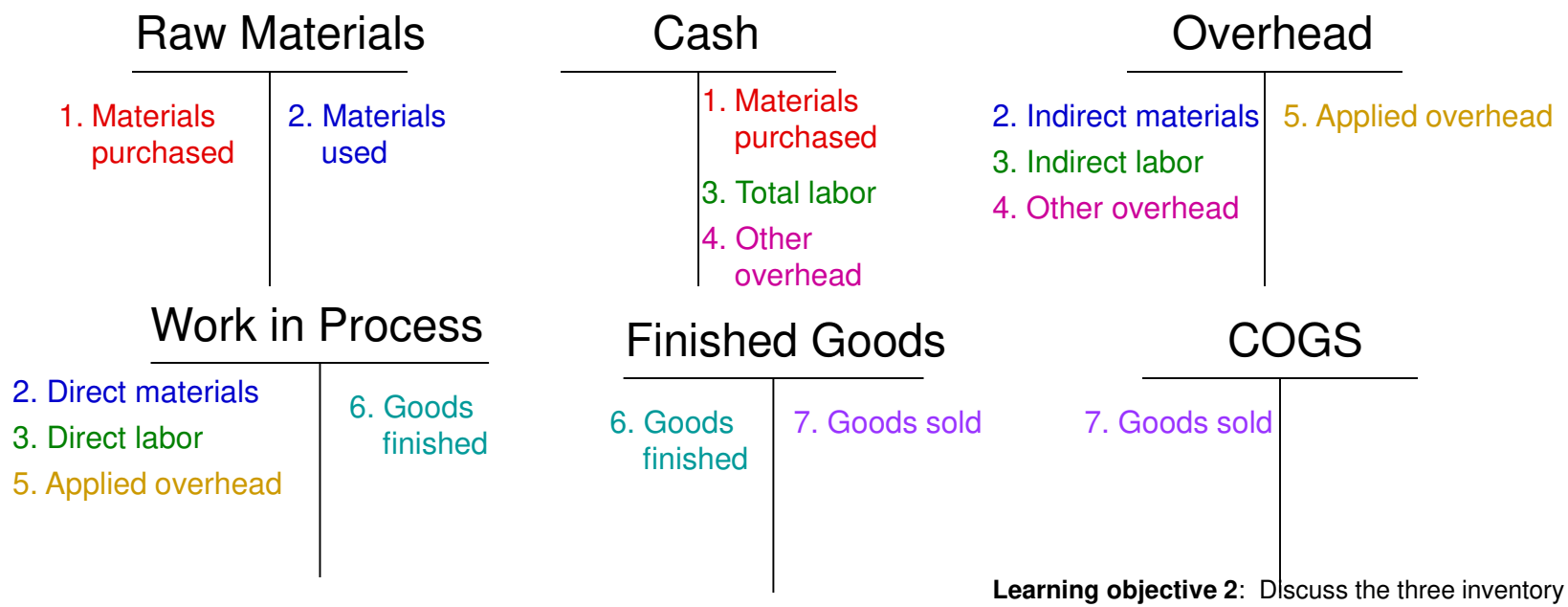


Learning objective 2: Discuss the three inventory accounts of a manufacturing firm and describe the flow of product costs in a manufacturing firm's accounts.

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Flow of Product Costs in Accounts

1. Purchased materials
2. Requisitioned direct and indirect materials
3. Incurred and paid for direct and indirect labor
4. Incurred and paid other overhead costs
5. Overhead applied
6. Completed goods transferred to finished goods inventory
7. Finished goods sold



Learning objective 2: Discuss the three inventory accounts of a manufacturing firm and describe the flow of product costs in a manufacturing firm's accounts.

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Test Your Knowledge 4

Star Plastics had requisitions for $250,000 of materials related to specific jobs and $20,000 of indirect materials. Prepare the journal entry to record the issuance of materials.

Work in Process----------250,000

Manufacturing Overhead---20,000

Raw Materials----------270,000

You could also prepare two separate journal entries.

Learning objective 2: Discuss the three inventory accounts of a manufacturing firm and describe the flow of product costs in a manufacturing firm's accounts.

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Income Statement Presentation of Product Costs

Eastlake Motorboat Company

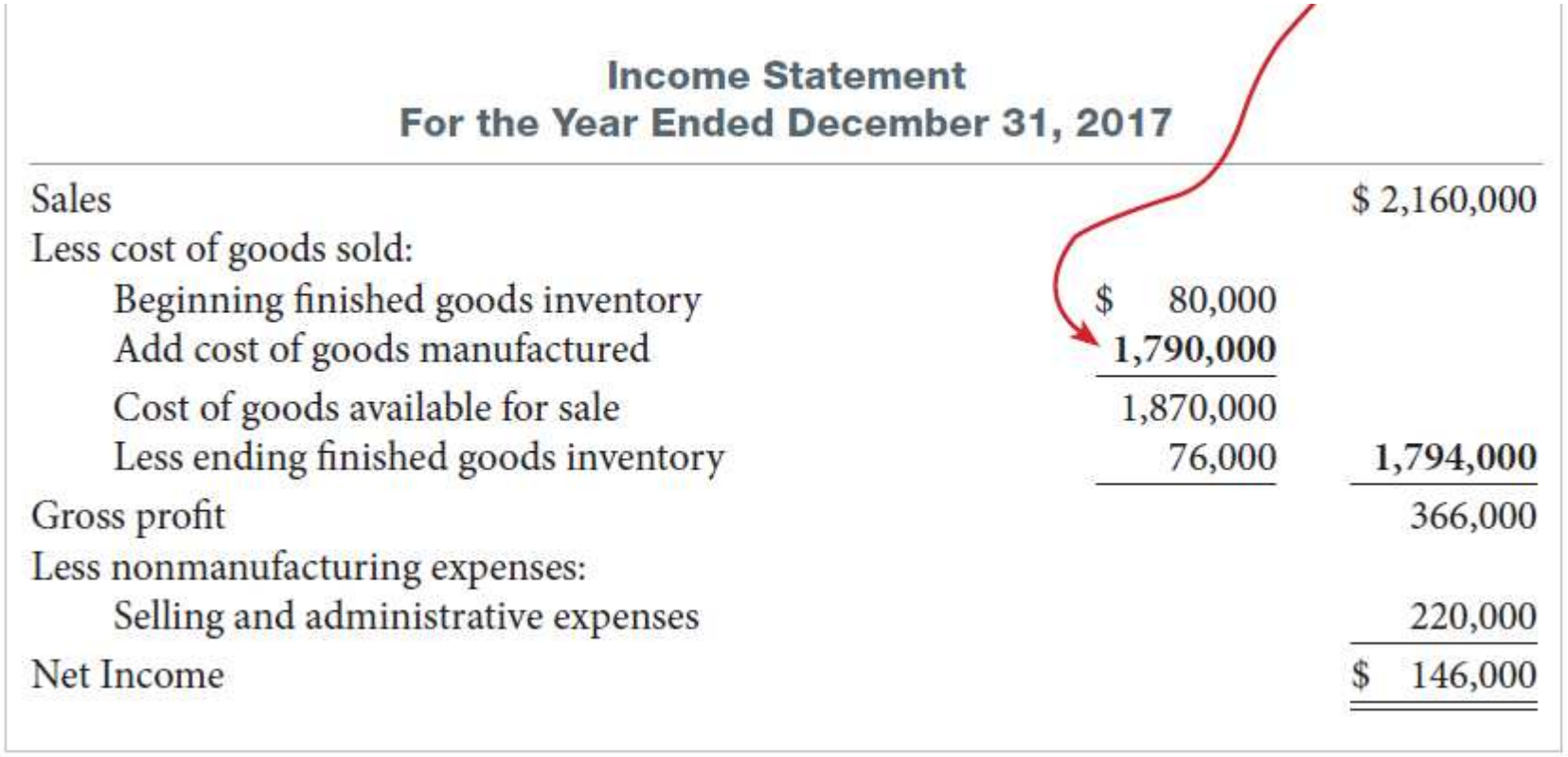
Schedule of Cost of Goods Manufactured
For the Year Ended December 31, 2017

Beginning balance in Work in Process Inventory			$ 40,000
Plus current manufacturing costs:			
Direct material		$ 600,000	
Direct labor		480,000	
Manufacturing overhead			
Heat, light, and power	$ 15,000		
Rent for production facility	45,000		
Depreciation of equipment	50,000		
Supervisor Salary	150,000		
Other	460,000	720,000	1,800,000
Total			1,840,000
Less ending balance in Work in Process Inventory			50,000
Cost of goods manufactured			$1,790,000

Learning objective 2: Discuss the three inventory accounts of a manufacturing firm and describe the flow of product costs in a manufacturing firm's accounts.

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Income Statement Presentation of Product Costs



Income Statement
For the Year Ended December 31, 2017

Sales		$ 2,160,000
Less cost of goods sold:		
Beginning finished goods inventory	$ 80,000	
Add cost of goods manufactured	**1,790,000**	
Cost of goods available for sale	1,870,000	
Less ending finished goods inventory	76,000	**1,794,000**
Gross profit		366,000
Less nonmanufacturing expenses:		
Selling and administrative expenses		220,000
Net Income		$ 146,000

Learning objective 2: Discuss the three inventory accounts of a manufacturing firm and describe the flow of product costs in a manufacturing firm's accounts.

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Test Your Knowledge 5

The formula to determine cost of goods sold is:

a. **Beginning Work in Process + Cost of Goods Manufactured – Ending Finished Goods**

b. **Beginning Work in Process + Cost of Goods Manufactured – Ending Finished Goods**

c. **Beginning Finished Goods + Cost of Goods Manufactured – Ending Finished Goods** ←

d. **Beginning Work in Process + Current Manufacturing Cost – Ending Work in Process**

Answer:

c. Beginning Finished Goods + Cost of Goods Manufactured – Ending Finished Goods

Learning objective 2: Discuss the three inventory accounts of a manufacturing firm and describe the flow of product costs in a manufacturing firm's accounts.

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Test Your Knowledge 6

Cost of Goods Manufactured is $200,000, beginning Finished Goods is $50,000, ending Finished Goods is $100,000, and ending Work in Process is $10,000. What is the Cost of Goods Sold?

a. $100,000
b. $250,000
c. $50,000
d. $150,000 ←

Answer:

d. $150,000 ($50,000 + $200,000 – $100,000)

Learning objective 2: Discuss the three inventory accounts of a manufacturing firm and describe the flow of product costs in a manufacturing firm's accounts.

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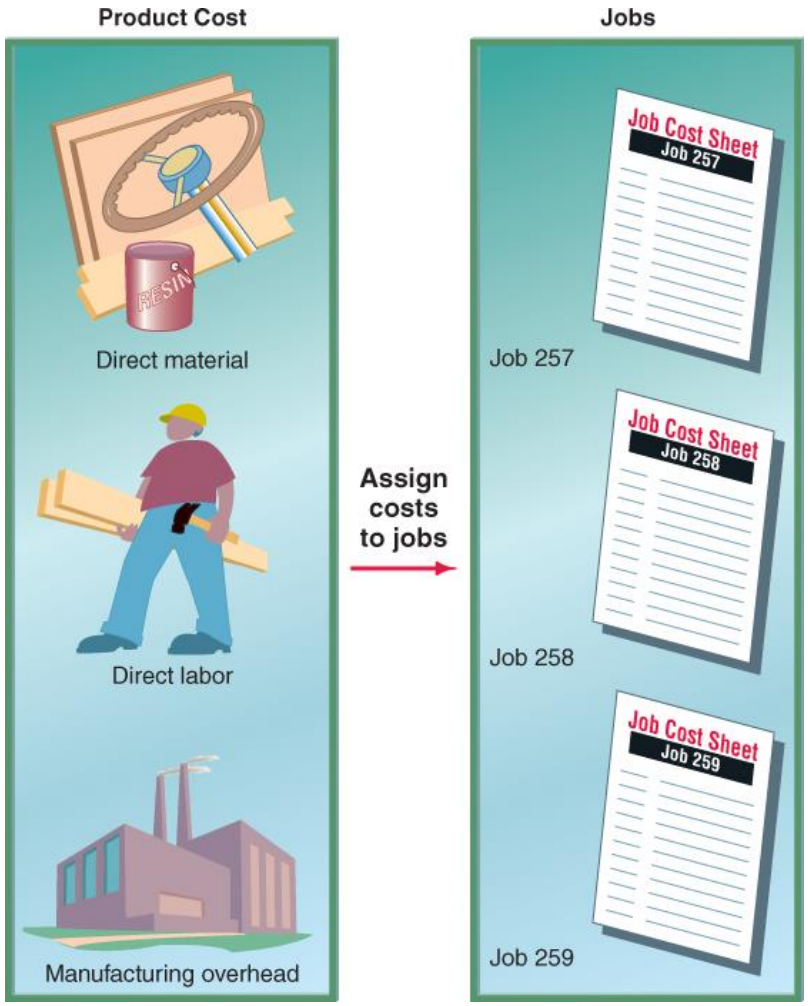
Job Order versus Process Costing

- **Job Order Costing**
  - Companies produce goods to a customer's unique specifications
  - Cost of job accumulated on job cost sheet
- **Process Costing**
  - Companies produce large quantities of identical items
  - Cost accumulated by each operation
  - Unit cost of items determined dividing costs of production by number of units produced

Learning objective 3: Discuss the types of product costing systems and explain the relation between the cost of jobs and the Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold accounts.

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Relating Product Costs to Jobs



Learning objective 3: Discuss the types of product costing systems and explain the relation between the cost of jobs and the Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold accounts.

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Job Costs and Financial Statement Accounts

- The inventory accounts of a manufacturing company that will appear on the balance sheet
  - Work in Process Inventory
    - Cost of jobs being worked on
  - Finished Goods Inventory
    - Cost of jobs completed but not yet sold
  - Cost of Goods Sold
    - Cost of jobs sold

Learning objective 3: Discuss the types of product costing systems and explain the relation between the cost of jobs and the Work in Process Inventory, Finished Goods Inventory, and Cost of Goods Sold accounts.

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Job Order Costing System

- Job order costing begins when a company decides to produce a specific product
- A job cost sheet accumulates the cost of the item or items and contains detailed information on the three categories of product costs
  - Direct materials
  - Direct labor
  - Manufacturing overhead
- The next slide shows an example of a job cost sheet

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Job Cost Sheet

Eastlake Motorboat Company

65 Shore Place
Kirkland, Washington 98006

Job number: 20126 Requested Delivery Date: 5/30 Date Started: 4/15 Date Completed: 5/25

Customer: Mary and John Hughes, 647 Circle Drive, Redmond, Washington 98042

Description: 18-foot runabout, mahogany hull, 75 h.p. inboard, deluxe interior (cream/maroon)

	Direct Materials		Direct Labor			Manufacturing Overhead
Date	Requisition number	Cost	Labor report number	Hours	Cost	$57.60 per direct labor hour
4/15	255	1,542.68	105	24	880.00	$1,362.40
4/16	261	5,450.00	106	12	432.00	691.20
4/17	266	4,225.42	107	15	576.00	864.00
4/18	272	1,820.65	108	7	262.50	403.20
4/19	282	436.80	109	9	297.50	518.40
4/22	289	854.64	110	4	140.00	230.40
4/23	295	1,620.22	111	5	175.00	288.00
			(last page of job cost report)			
5/25	382	655.50	133	4	160.00	230.40
		Total 24,500.50		Total 568	21,025.30	Total 32,716.80

Cost summary

Direct materials	$24,500.50
Direct labor	21,025.30
Manufacturing overhead	32,716.80
	$78,242.60

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Job Costs – Direct Materials

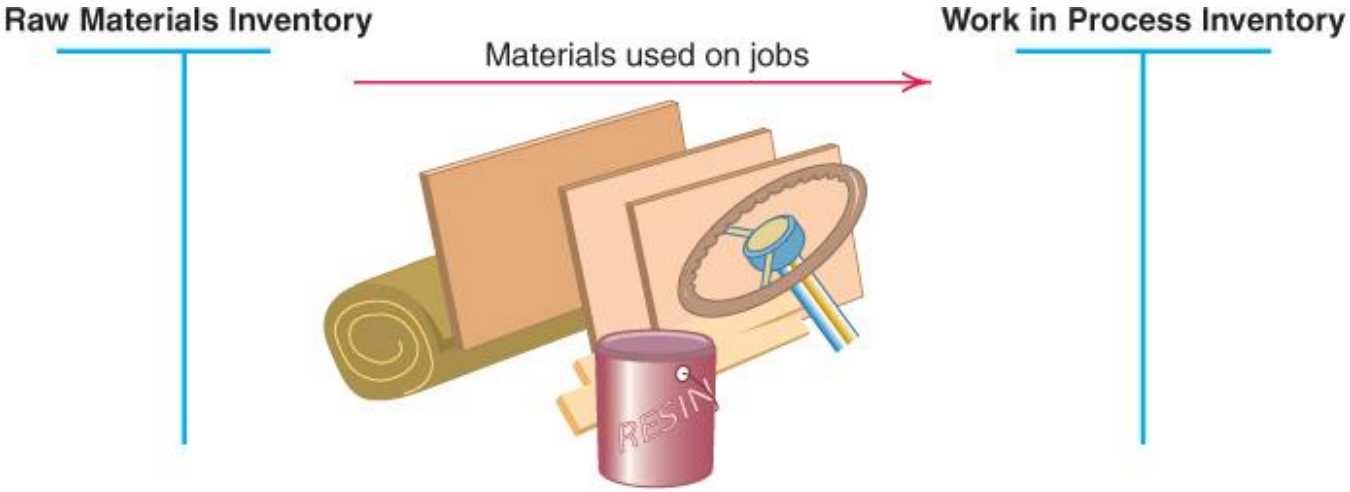
- A materials requisition form is used to request the release of materials from a company's storage area
- Removal of materials from storage for use on a specific job decreases Raw Materials and increases Work in Process Inventory
  - The next slide illustrates the journal entry and general ledger postings assuming $60,000 of materials are issued to specific jobs

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Job Costs – Direct Materials

Requisition of raw materials for use on a specific job



(date)	Work in Process Inventory	60,000.00	
	Raw Materials Inventory		60,000.00
	To record raw materials used		

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Job Costs – Direct Labor

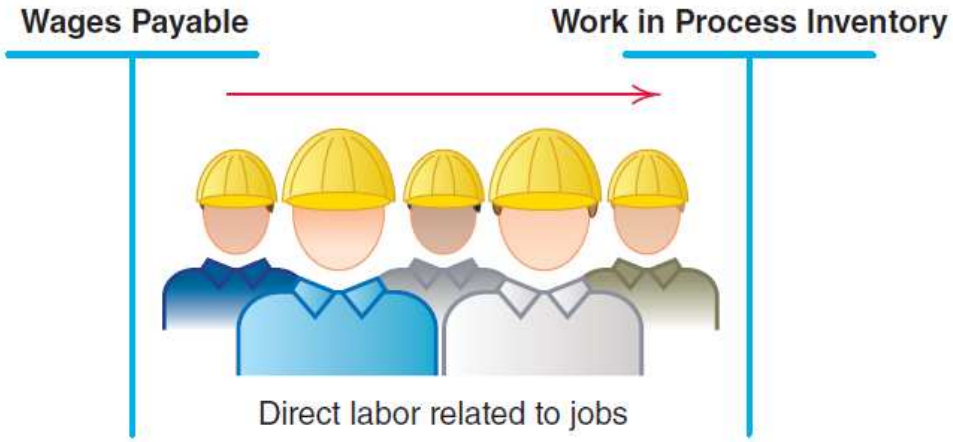
- Workers in a company that uses a job-order costing system fill out time tickets to keep track of the amount of time spent on each job
- Incurring direct labor costs increases Work in Process Inventory and increases Wages Payable
  - The next slide illustrates the journal entry and general ledger postings assuming $10,000 of direct labor cost is incurred

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Job Costs – Direct Labor

Cost of direct labor related to a particular job



(date)	Work in Process Inventory	40,000.00	
	Wages Payable		40,000.00
	To record direct labor cost		

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Job Costs – Manufacturing Overhead

- **Apply manufacturing overhead to jobs**
  - **Choose an allocation base, for example direct labor hours or direct labor cost**
  - **Calculate overhead allocation rate**
    - **Estimated overhead divided by estimated quantity of the allocation base**
  - **Use rate to apply overhead to jobs based on actual quantity of base used**

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Test Your Knowledge 7

Lollah Mfg Company expects annual mfg. overhead to be $800,000, 50,000 direct labor hours costing $1,600,000 and machine run time of 25,000 hours. Calculate overhead allocation rates based on direct labor hours, direct labor cost, and machine time.

Overhead allocation rate based on direct labor hours

$800,000 / 50,000 = $16 per direct labor hour

Overhead allocation rate based on direct labor cost

$800,000 / $1,600,000 = 50% of direct labor cost

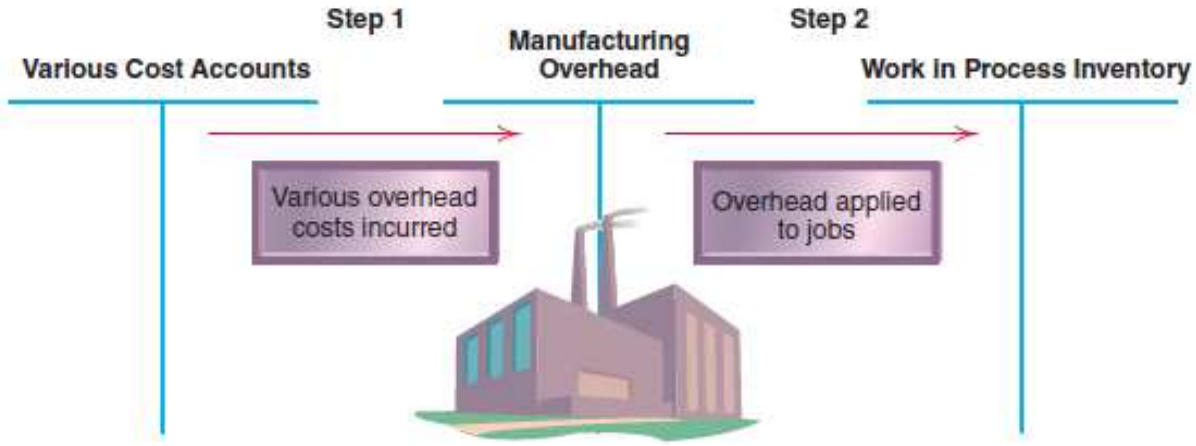
Overhead allocation rate based on machine time

$800,000 / 25,000 = $32 per machine hour

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Job Costs – Manufacturing Overhead



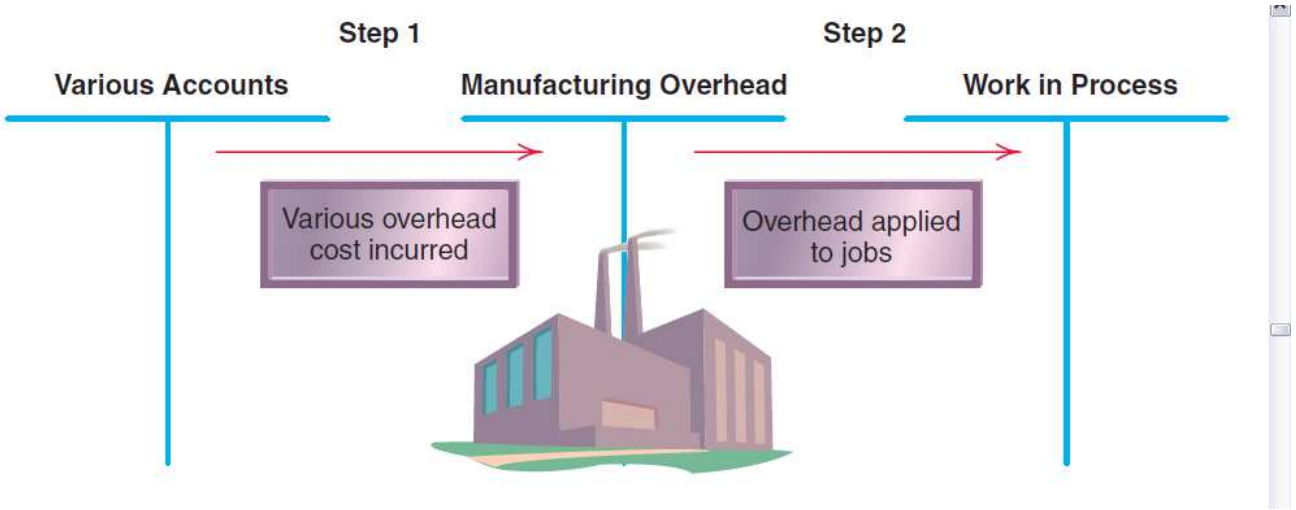
Step 1. Overhead costs include depreciation of manufacturing equipment, utilities related to manufacturing, indirect materials, and a variety of other costs. Therefore, the credit side of the entry to record manufacturing overhead can include a large number of accounts. Suppose $4,000 of depreciation, $1,000 of utility costs, $1,000 of indirect materials, and $60,000 of various other overhead costs are incurred. The journal entry to record these costs is:

(date)	Manufacturing Overhead	66,000	
	Accumulated Depreciation		4,000
	Utilities Payable		1,000
	Raw Materials Inventory		1,000
	Accounts Payable		60,000
	To record overhead costs incurred		

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Job Costs – Manufacturing Overhead



Step 2. The total amount of estimated overhead costs applied to jobs is calculated periodically, and an entry is made to take the cost out of Manufacturing Overhead and debit it to Work in Process. Suppose $60,000 of overhead is applied to jobs. The journal entry is:

(date)	Work in Process Inventory	60,000.00	
	Manufacturing Overhead		60,000.00
	To record overhead costs applied to jobs		

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Decision Making / Incremental Analysis

- **Actual cost of Job 20124 is $31,600 + $25,200 + $39,816 = $96,616**
- **Suppose the customer is only willing to pay $115,000. Should the sale be turned down? Probably not.**
  - **Assuming 10% of overhead is variable and the remainder is composed of fixed costs such as depreciation, the incremental costs are $31,600 + $25,200 + $3,982 = $60,782**

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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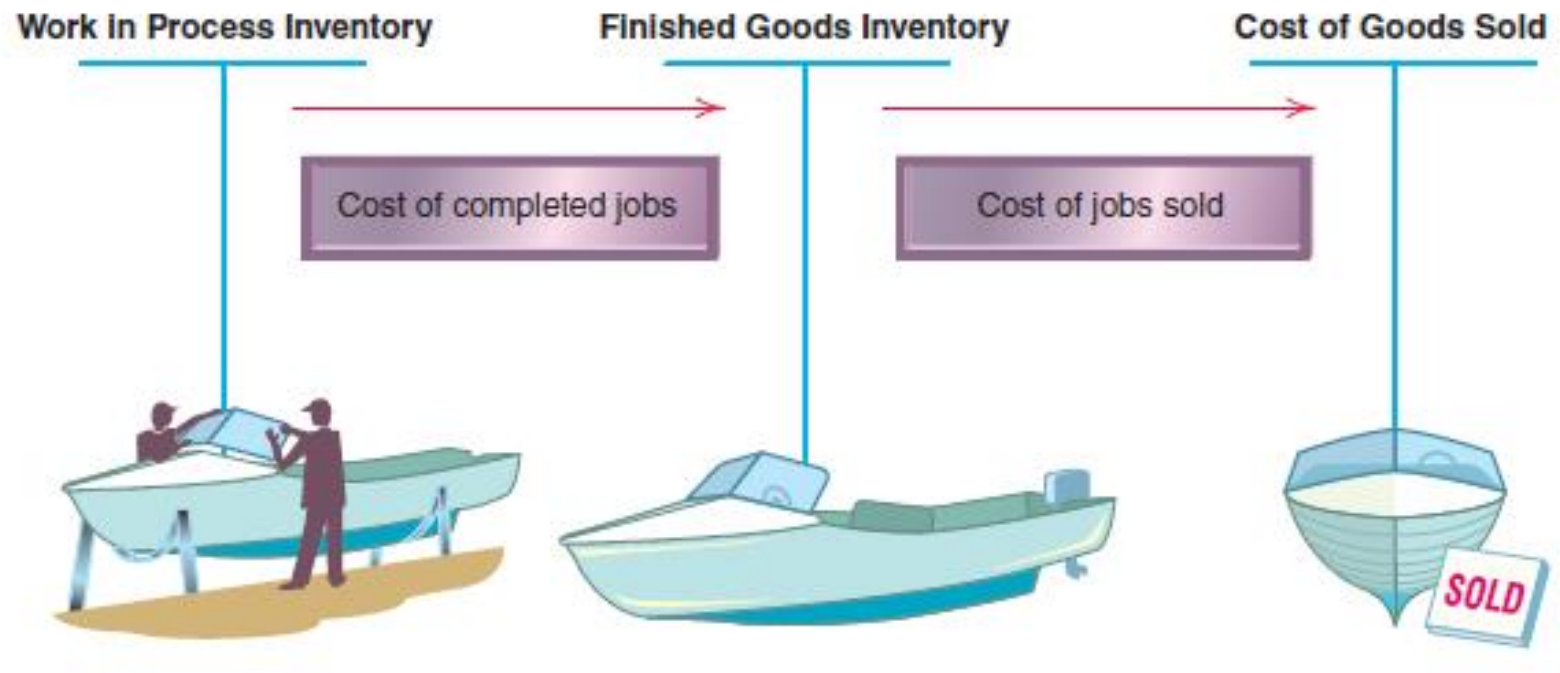
Decision Making / Incremental Analysis

- The incremental profit of the job is $54,218, which is the $115,000 the customer will pay minus the incremental cost of $60,782
- Turning the job down would hurt financial performance
  - The incremental revenues are higher than the incremental costs

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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The Flow of Costs in Work in Process, Finished Goods and Cost of Goods Sold



Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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The Flow of Costs in Work in Process, Finished Goods and Cost of Goods Sold

- **Suppose the cost of jobs completed is $160,000 and the cost of jobs sold is $85,000. The journal entries are:**

(date)	Finished Goods Inventory	160,000	
	Work in Process Inventory		160,000
	To record cost of jobs completed		
(date)	Cost of Goods Sold	85,000	
	Finished Goods Inventory		85,000
	To record cost of goods sold expense		

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Overhead Allocation Rates

- Overhead is made up of cost items indirectly related to jobs produced
- Need to develop means of assigning overhead to jobs
  - The rate is calculated as overhead cost divided by allocation base
  - A company had $50,000 of overhead cost and used 10,000 labor hours
    - Its rate is $50,000 / 10,000 = $5 per labor hour

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Overhead Allocation Bases

- **Choices of allocation bases include:**
  - **Direct labor hours**
  - **Direct labor cost**
  - **Machine hours**
  - **Direct material cost, among others**
- **Jobs with greater quantities of an allocation base will receive larger allocations of overhead**
- **The allocation base used should be strongly associated with overhead cost**

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Activity Based Costing (ABC)

- Most firms use a single overhead rate
- Activity Based Costing (ABC) assigns overhead costs to products using a number of allocation bases
  - The major activities which create overhead costs are identified and grouped (pools)
  - Multiple rates calculated by dividing each pool by its corresponding activity (driver)

Learning objective 4: Describe how direct material, direct labor, and manufacturing overhead are assigned to jobs.

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Predetermined Overhead Rates

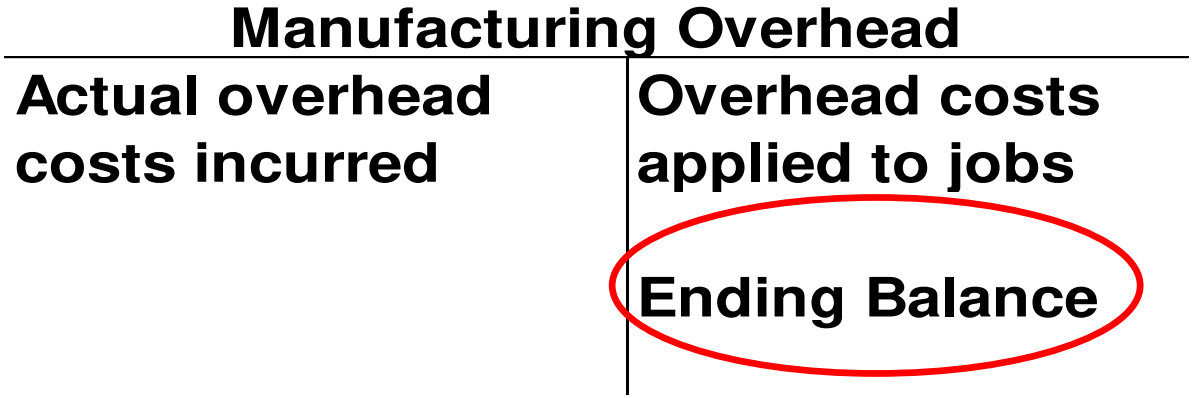
- **Companies can develop rates using actual overhead and quantities of the base**
  - **Most do not do this because actual costs are not known until the end of the period**
- **Overhead rates are typically based on estimates of overhead cost and the base**
  - **Overhead rates calculated this way are called predetermined overhead rates**

$$\text{Predetermined overhead rate} = \frac{\text{Estimated total overhead cost}}{\text{Estimated level of allocation base}}$$

Learning objective 5: Explain the role of a predetermined overhead rate in applying overhead to jobs, and explain the treatment of the difference between actual overhead and overhead allocated to jobs using a predetermined rate.

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Overapplied Overhead



- If applied overhead is greater than actual overhead, overhead is overapplied
- Overapplied overhead is eliminated at the end of the period as follows:
  - If a small amount, debit Manufacturing Overhead and credit Cost of Goods Sold
  - If relatively large amount, apportion and close to Work in Process, Finished Goods and COGS

Learning objective 5: Explain the role of a predetermined overhead rate in applying overhead to jobs, and explain the treatment of the difference between actual overhead and overhead allocated to jobs using a predetermined rate.

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Underapplied Overhead

Manufacturing Overhead	
Actual overhead costs incurred	Overhead costs applied to jobs
Ending Balance	

- If actual overhead is greater than applied overhead, overhead is underapplied
- Underapplied overhead is eliminated at the end of the period as follows:
  - If a small amount, debit Cost of Goods Sold and credit Manufacturing Overhead
  - If a relatively large amount, apportion and close to Work in Process, Finished Goods and COGS

Learning objective 5: Explain the role of a predetermined overhead rate in applying overhead to jobs, and explain the treatment of the difference between actual overhead and overhead allocated to jobs using a predetermined rate.

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Test Your Knowledge 8

Overapplied overhead is:

a. Overhead applied to production greater than actual overhead ←

b. Overhead in excess of standard overhead

c. Equal to the predetermined overhead rate

d. Overhead in excess of the amount in the previous period

Answer:

a. Overhead applied to production greater than actual overhead

Learning objective 5: Explain the role of a predetermined overhead rate in applying overhead to jobs, and explain the treatment of the difference between actual overhead and overhead allocated to jobs using a predetermined rate.

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Test Your Knowledge 9

Actual overhead was $1,500.000. The predetermined overhead rate was $17 per direct labor hour, and there were 100,000 direct labor hours. Overhead was:

a. Underapplied by $200,000
b. Overapplied by $200,000 ←
c. Underapplied by $20,000
d. Overapplied by $20,000

Answer:
b. Applied overhead = 100,000 X $17 = $1,700,000. Actual minus applied = $1,500,000 – $1,700,000 = $200,000 overapplied

Learning objective 5: Explain the role of a predetermined overhead rate in applying overhead to jobs, and explain the treatment of the difference between actual overhead and overhead allocated to jobs using a predetermined rate.

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Eliminating Overapplied or Underapplied Overhead

- **Suppose a company had $50,000 of actual overhead and applied $48,000**
  - **Overhead is underapplied by $2,000**
  - **The journal entry to close manufacturing overhead**

(date)	Cost of Goods Sold	2,000.00	
	Manufacturing Overhead		2,000.00
	To close manufacturing overhead and eliminate underapplied overhead		

Learning objective 5: Explain the role of a predetermined overhead rate in applying overhead to jobs, and explain the treatment of the difference between actual overhead and overhead allocated to jobs using a predetermined rate.

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Eliminating Overapplied or Underapplied Overhead

- **The amount of under- or overapplied overhead should be apportioned among Work in Process, Finished Goods and Cost of Goods Sold**
  - **Accomplished based on relative costs in the accounts**
  - **The company from the previous slide has Work in Process of $10,000, Finished Goods $10,000 and Cost of Goods Sold $20,000**
    - **Rate is 2,000 / (10,000 + 10,000 + 20,000) = $0.05 per dollar in the account**

Learning objective 5: Explain the role of a predetermined overhead rate in applying overhead to jobs, and explain the treatment of the difference between actual overhead and overhead allocated to jobs using a predetermined rate.

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Eliminating Overapplied or Underapplied Overhead

- **The amount applied to each account is:**
  - **Work in Process $10,000 * 0.05 = $500**
  - **Finished Goods $10,000 * 0.05 = $500**
  - **Cost of Goods Sold $20,000 * 0.05 = $1,000**
- **The journal entry to close manufacturing overhead**

(date)	Work in Process Inventory	500.00	
	Finished Goods Inventory	500.00	
	Cost of Goods Sold	1,000.00	
	Manufacturing Overhead		2,000.00
	To apportion underapplied overhead		

Learning objective 5: Explain the role of a predetermined overhead rate in applying overhead to jobs, and explain the treatment of the difference between actual overhead and overhead allocated to jobs using a predetermined rate.

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Job-Order Costing for Service Companies

- Service companies use the same process
  - Allocate costs incurred to jobs
  - Use predetermined rate to apply overhead to jobs
- Examples
  - Hospitals
  - Repair Shops
  - Consulting Firms

Learning objective 6: Explain how service companies can use job-order costing to calculate the cost of services provided to customers.

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Service Company Example

- **ICMS has a contract with RCP Communications**
  - **Contract is for $4.2 million per year or $350,000 per month**
  - **ICMS needs to determine the cost of providing services to RCP**
    - **The details follow on the next slide**

Learning objective 6: Explain how service companies can use job-order costing to calculate the cost of services provided to customers.

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Job-Order Cost for Call Center

India Call Management Services

ICMS—Simply the Best

Customer: RCP Communications

Call center operators	
60 operators × 160 hours × $15.75 per hour	$151,200.00
Depreciation associated with	
20 workstations costing $500,000 in total	
($500,000 ÷ 4-year life) ÷ 12 months	10,416.67
Annual depreciation of $1,000,000 for 60,000-square-foot building	
2,000-square feet occupied by 20 workstations	
(($1,000,000 ÷ 60,000 square feet) ÷ 12 months) × 2,000 square feet	2,777.78
3 shift supervisors × $4,500 monthly salary	13,500.00
Other overhead allocated at $1.053 × operator salary	
$1.053 × $151,200	159,213.60
Total	$337,108.05

Learning objective 6: Explain how service companies can use job-order costing to calculate the cost of services provided to customers.

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Customer Profitability

- Is RCP a profitable customer?
  - Cost of the job is $337,108.05
  - Monthly revenue is $350,000
    - Profit from the job is $12,891.95
    - Markup is only 3.8%, which is lower than the company's goal of 30%
  - This information is useful the next time the contract is up for negotiation, especially if RCP presses for price concessions!

Learning objective 6: Explain how service companies can use job-order costing to calculate the cost of services provided to customers.

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Modern Manufacturing Practices

- **Just-in-Time Production (JIT)**
  - **Minimize raw materials and work in process inventories**
  - **Develop flexible, balanced production that is flexible and allows for smooth, rapid flow of materials**
  - **Concentrate on improving quality**
  - **Implications for over- and underapplied overhead**
    - **Work in Process and Finished Goods Inventories are very small**
    - **Close difference into Cost of Goods Sold**

Learning objective 7: Discuss modern manufacturing practices and how they affect product costing.

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Modern Manufacturing Practices

- **Computer-Controlled Manufacturing**
  - **Use computers (including robots) to control equipment and achieve flexible and accurate production process**
- **Lean Manufacturing**
  - **Similar to JIT**
  - **JIT focus is inventory management**
  - **Lean focus is elimination of waste**
- **Total Quality Management (TQM)**
  - **Ensure products are of highest quality**
  - **Production processes are efficient**

Learning objective 7: Discuss modern manufacturing practices and how they affect product costing.

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Full and Incremental Cost

Decision Making INSIGHT

When using job cost information to make a decision, care must be taken because some costs going into a job are fixed (e.g., depreciation on equipment that is included in manufacturing overhead) and some costs are variable (e.g., direct material costs). Thus, the *full cost* of a job is not the same as the *incremental* cost of a job.

Learning objective 7: Discuss modern manufacturing practices and how they affect product costing.

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Exercise 2-7 Recording Material Cost in Job-Order Costing

Five material requisitions (MR) forms were received by the materials storeroom of the Saint Louis Foundry during the first week of 2017, as follows:

MR101 for direct materials for job number 1501	$	250
MR102 for direct materials for job number 1502		350
MR103 for indirect materials issued to the factory floor		100
MR104 for direct materials for job number 1501		400
MR105 for direct materials for job number 1503		500

Required

Prepare summary journal entries to record the issuance of these materials.

	DR	CR

Solution: Exercise 2-7 Recording Material Cost in Job-Order Costing

Problem data follow:

MR101 for direct materials for job number 1501	$	250
MR102 for direct materials for job number 1502		350
MR103 for indirect materials issued to the factory floor		100
MR104 for direct materials for job number 1501		400
MR105 for direct materials for job number 1503		500

Required

Prepare summary journal entries to record the issuance of these materials.

	DR	CR
Work in Process Inventory	1,500	
Raw Materials Inventory		1,500
Manufacturing Overhead	100	
Raw Materials Inventory		100

Exercise 2-9 Recording Labor Cost in Job-Order Costing

Johnson Products had the following labor time tickets for the month of February:

Ticket #	Employee #	Pay Rate	Hours Worked	Job #
2101	011	$10.00	110	201
2102	008	$21.00	90	201
2103	011	$12.00	40	201
2104	008	$20.00	50	202
2105	008	$18.00	70	203

Required

a. Calculate the amount of direct labor cost assigned to each job.

Job No.	Hours Worked		Pay Rate		Labor Cost
201		×		=	
201		×		=	
201		×		=	

Job No.	Worked		Pay Rate		Cost
202		×		=	

Job No.	Worked		Pay Rate		Cost
203		×		=	

b. Summarize the labor time tickets.

Job	Time Ticket	Hours	Rate	Cost
Total labor charges				

Prepare a journal entry to record direct labor for the month.

		DR	CR

Solution: Exercise 2-9 Recording Labor Cost in Job-Order Costing

Johnson Products had the following labor time tickets for the month of February:

Ticket #	Employee #	Pay Rate	Hours Worked	Job #
2101	011	$10.00	110	201
2102	008	$21.00	90	201
2103	011	$12.00	40	201
2104	008	$20.00	50	202
2105	008	$18.00	70	203

Required

a. Calculate the amount of direct labor cost assigned to each job.

Job No.	Hours Worked		Pay Rate		Labor Cost
201	110	×	$10.00	=	$ 1,100
201	90	×	21.00	=	1,890
201	40	×	12.00	=	480
					$ 3,470

Job No.	Worked		Pay Rate		Cost
202	50	×	$20.00	=	$ 1,000

Job No.	Worked		Pay Rate		Cost
203	70	×	$18.00	=	$ 1,260

b. Summarize the labor time tickets.

Job	Time Ticket	Hours	Rate	Cost
201	2101	110	$10.00	$ 1,100
201	2102	90	21.00	1,890
201	2103	40	12.00	480
		240		$ 3,470
202	2104	50	20.00	1,000
203	2105	70	18.00	1,260
Total labor charges				$ 5,730

Prepare a journal entry to record direct labor for the month.

	DR	CR
Work in Process Inventory	5,730	
Wages Payable		5,730

Exercise 2-12 Allocating Manufacturing Overhead to Jobs

Webber Fabricating estimated the following annual hours and costs:

Expected annual direct labor hours	40,000
Expected annual direct labor cost	$625,000
Expected machine hours	20,000
Expected material cost for the year	$800,000
Expected manufacturing overhead	$1,000,000

Required

a. Calculate predetermined overhead allocation rates using each of the four possible allocation bases provided.

Direct labor hours

_____ ÷ _____ = _____ per _____

Direct labor cost

_____ ÷ _____ = _____ per _____

Machine hours

_____ ÷ _____ = _____ per _____

Direct material cost

_____ ÷ _____ = _____ per _____

b. Determine the cost of the following job (number 253) using each of the four overhead allocation rates.

Job 253	Direct materials	$ 3,000
	Direct labor (150 hours @$12/hr)	$ 1,800
	Machine hours used	150

	Direct Labor Hours	Direct Labor Cost	Machine Hours	Direct Materials
Direct materials				
Direct labor				
Manufacturing overhead				
Total				

Solution: Exercise 2-12 Allocating Manufacturing Overhead to Jobs

Webber Fabricating estimated the following annual hours and costs:

Expected annual direct labor hours	40,000
Expected annual direct labor cost	$625,000
Expected machine hours	20,000
Expected material cost for the year	$800,000
Expected manufacturing overhead	$1,000,000

Required

a. Calculate predetermined overhead allocation rates using each of the four possible allocation bases provided.

Direct labor hours

$1,000,000	÷	40,000	=	$25.00 per	direct labor hour

Direct labor cost

$1,000,000	÷	$625,000	=	$1.60 per	direct labor dollar

Machine hours

$1,000,000	÷	20,000	=	$50.00 per	machine hour

Direct material cost

$1,000,000	÷	$800,000	=	$1.25 per	dollar of direct material

b. Determine the cost of the following job (number 253) using each of the four overhead allocation rates.

Job 253	Direct materials	$ 3,000
	Direct labor (150 hours @$12/hr)	$ 1,800
	Machine hours used	150

	Direct Labor Hours	Direct Labor Cost	Machine Hours	Direct Materials
Direct materials	$ 3,000	$ 3,000	$ 3,000	$ 3,000
Direct labor	1,800	1,800	1,800	1,800
Manufacturing overhead	3,750	2,880	7,500	3,750
Total	$ 8,550	$ 7,680	$ 12,300	$ 8,550

Problem 2-1 Cost of Goods Manufactured, Cost of Goods Sold, and Income

The following information is available for Satterfield's Custom Glass for the fiscal year ending December 31, 2017:

Beginning balance in Work In Process Inventory	$ 210,000
Ending balance in Work In Process Inventory	300,000
Beginning balance in Finished Goods Inventory	500,000
Ending balance in Finished Goods Inventory	400,000
Direct material cost	2,500,000
Direct labor cost	3,000,000
Manufacturing overhead	1,700,000
Selling and administrative expenses	1,350,000
Sales	8,500,000

Required

a. Prepare a schedule of costs of goods manufactured.

Satterfield's Custom Glass Schedule of Cost of Goods Manufactured For the Year Ended December 31, 2017		
Beginning balance in work in process inventory		
Add current manufacturing costs:		
Total		
Less ending balance in work in process inventory		
Cost of goods manufactured		

b. Prepare an income statement for fiscal 2014. Ignore income taxes.

Satterfield's Custom Glass Income Statement For the Year Ended December 31, 2017		
Sales		
Less cost of goods sold:		
Gross profit		
Less nonmanufacturing expenses:		
Net income (loss)		

Solution: Problem 2-1 Cost of Goods Manufactured, Cost of Goods Sold, and Income

The following information is available for Satterfield's Custom Glass for the fiscal year ending December 31, 2017:

Beginning balance in Work In Process Inventory	$ 210,000
Ending balance in Work In Process Inventory	300,000
Beginning balance in Finished Goods Inventory	500,000
Ending balance in Finished Goods Inventory	400,000
Direct material cost	2,500,000
Direct labor cost	3,000,000
Manufacturing overhead	1,700,000
Selling and administrative expenses	1,350,000
Sales	8,500,000

Required

a. Prepare a schedule of costs of goods manufactured.

Satterfield's Custom Glass Schedule of Cost of Goods Manufactured For the Year Ended December 31, 2017		
Beginning balance in work in process inventory		$ 210,000
Add current manufacturing costs:		
Direct material cost	$ 2,500,000	
Direct labor cost	3,000,000	
Manufacturing overhead	1,700,000	7,200,000
Total		7,410,000
Less ending balance in work in process inventory		300,000
Cost of goods manufactured		$ 7,110,000

b. Prepare an income statement for fiscal 2014. Ignore income taxes.

Satterfield's Custom Glass Income Statement For the Year Ended December 31, 2017		
Sales		$ 8,500,000
Less cost of goods sold:		
Beginning finished goods inventory	$ 500,000	
Cost of goods manufactured	7,110,000	
Cost of goods available for sale	7,610,000	
Ending finished goods inventory	400,000	7,210,000
Gross profit		1,290,000
Less nonmanufacturing expenses:		
Selling and administrative expenses		1,350,000
Net income (loss)		$ (60,000)

Problem 2-3 Job-Order Costing: Inventory Accounts and Cost of Goods Sold

Smith Die Company manufactures cutting dies for the shoe industry. Each set of dies is custom designed to a customer's templates. During the first week of May, six orders were received from customers. They were assigned job numbers 1005-1010. The following transactions occurred during the first week of May.

=> Smith Die purchased steel on account from Eastern City Steel $ 5,500

=> The company received and paid for supplies (indirect materials) from Mallard Supply $ 2,400

=> Material requisitions indicated that materials were issued to the factory floor and

Job Number	Direct Materials	Indirect Materials	Direct Labor	Indirect Labor
1005	$650		$1,600	
1006	850		2,000	
1007	1,550		3,300	
1008	650		1,400	
1009	450		900	
1010	350		700	
Totals	$4,500	$1,000	$9,900	$6,500

=> Overhead was applied to all jobs in process based on direct labor cost 180%

=> Jobs 1005, 1006, 1007, and 1008 were completed and transferred to finished goods.

=> Jobs 1005, 1006, 1007 and 1008 were shipped to customers and billed at 150% of total job costs.

Required

a. Calculate the total cost of each job.

	1005	1006	1007	1008	1009	1010
Direct material						
Direct labor						
Mfg. overhead						

b. Prepare journal entries to record the above information.

	DR	CR
To record the purchase of steel		
To record the purchase of supplies		
To record materials used in production		

To record labor

To record overhead applied to production

To record the cost of jobs completed

To record the sale of finished goods

Solution: Problem 2-3 Job-Order Costing: Inventory Accounts and Cost of G

Relevant problem data follow:

=> Smith Die purchased steel on account from Eastern City Steel

=> The company received and paid for supplies (indirect materials) from Mallard Supply

=> Material requisitions indicated that materials were issued to the factory floor and labor time ticket summaries were prepared for the week as follows:

Job Number	Direct Materials	Indirect Materials	Direct Labor	Indirect Labor
1005	$650		$1,600	
1006	850		2,000	
1007	1,550		3,300	
1008	650		1,400	
1009	450		900	
1010	350		700	
Totals	$4,500	$1,000	$9,900	$6,500

=> Overhead was applied to all jobs in process based on direct labor cost

=> Jobs 1005, 1006, 1007, and 1008 were completed and transferred to finished

=> Jobs 1005, 1006, 1007 and 1008 were shipped to customers and billed at of total job costs.

Required

a. Calculate the total cost of each job.

	1005	1006	1007	1008	1009
Direct material	$ 650	$ 850	$ 1,550	$ 650	$ 450
Direct labor	1,600	2,000	3,300	1,400	900
Mfg. overhead	2,880	3,600	5,940	2,520	1,620
	$ 5,130	$ 6,450	$ 10,790	$ 4,570	$ 2,970

b. Prepare journal entries to record the above information.

		DR
Raw Material Inventory		5,500
	Accounts Payable	

To record the purchase of steel

Raw Material Inventory		2,400
	Cash	

To record the purchase of supplies

Work in Process Inventory		4,500
Manufacturing Overhead		1,000
	Raw Materials Inventory	
To record materials used in production		
Work in Process Inventory		9,900
Manufacturing Overhead		6,500
	Wages Payable	
To record labor		
Work in Process Inventory		17,820
	Manufacturing Overhead	
To record overhead applied to production		
Finished Goods Inventory		26,940
	Work in Process Inventory	
To record the cost of jobs completed		
Accounts Receivable		40,410
Cost of Goods Sold		26,940
	Finished Goods Inventory	
	Sales	
To record the sale of finished goods		

oods Sold
$ 5,500
$ 2,400

180%

goods.

150%

1010	
$	350
	700
	1,260
$	2,310

CR

5,500

2,400

5,500
16,400
17,820
26,940
26,940
40,410