Chapter 3
Systems Design: Job-Order Costing

Solutions to Questions

3-1 By definition, manufacturing overhead consists of costs that cannot be practically traced to products or jobs. Therefore, if these costs are to be assigned to products or jobs, they must be allocated rather than traced.

3-2 Job-order costing is used in situations where many different products or services that require separate costing are produced each period. Process costing is used in situations where a single, homogeneous product, such as cement, bricks, or gasoline, is produced for long periods.

3-3 The job cost sheet is used to record all costs that are assigned to a particular job. These costs include direct materials costs traced to the job, direct labor costs traced to the job, and manufacturing overhead costs applied to the job. When a job is completed, the job cost sheet is used to compute the unit product cost.

3-4 A predetermined overhead rate is used to apply overhead to jobs. It is computed before a period begins by dividing the period's estimated total manufacturing overhead by the period's estimated total amount of the allocation base. Thereafter, overhead is applied to jobs by multiplying the predetermined overhead rate by the actual amount of the allocation base that is incurred for each job. The most common allocation base is direct labor-hours.

3-5 A sales order is issued after an agreement has been reached with a customer on quantities, prices, and shipment dates for goods. The sales order forms the basis for the production order. The production order specifies what is to be produced and forms the basis for the job cost sheet. The job cost sheet, in turn, is used to summarize the various production costs incurred to complete the job. These costs are entered on the job cost sheet from materials requisition forms, direct labor time tickets, and by applying overhead.

3-6 Some production costs such as a factory manager's salary cannot be traced to a particular product or job, but rather are incurred as a result of overall production activities. In addition, some production costs such as indirect materials cannot be easily traced to jobs. If these costs are to be assigned to products, they must be allocated to the products.

3-7 If actual manufacturing overhead cost is applied to jobs, then the company must wait until the end of the accounting period to apply overhead and to cost jobs. If the company computes actual overhead rates more frequently to get around this problem, the rates may fluctuate widely. Overhead cost tends to be incurred somewhat evenly from month to month (due to the presence of fixed costs), whereas production activity often fluctuates. The result would be high overhead rates in periods with low activity and low overhead rates in periods with high activity. For these reasons, most companies use predetermined overhead rates to apply manufacturing overhead costs to jobs.

3-8 The measure of activity used as the allocation base should drive the overhead cost; that is, the base should cause the overhead cost. If the allocation base does not really cause the overhead, then costs will be incorrectly attributed to products and jobs and product costs will be distorted.

3-9 Assigning manufacturing overhead costs to jobs does not ensure a profit. The units produced may not be sold and if they are sold, they may not be sold at prices sufficient to cover all costs. It is a myth that assigning costs to products or jobs ensures that those costs will be re-

covered. Costs are recovered only by selling to customers—not by allocating costs.

3-10 The Manufacturing Overhead account is credited when overhead cost is applied to Work in Process. Generally, the amount of overhead applied will not be the same as the amount of actual cost incurred, since the predetermined overhead rate is based on estimates.

3-11 Underapplied overhead occurs when the actual overhead cost exceeds the amount of overhead cost applied to Work in Process inventory during the period. Overapplied overhead occurs when the actual overhead cost is less than the amount of overhead cost applied to Work in Process inventory during the period. Underapplied or overapplied overhead is disposed of by either closing out the amount to Cost of Goods Sold or by allocating the amount among Cost of Goods Sold and ending inventories in proportion to the applied overhead in each account. The adjustment for underapplied overhead increases Cost of Goods Sold (and inventories) whereas the adjustment for overapplied overhead decreases Cost of Goods Sold (and inventories).

3-12 Manufacturing overhead may be underapplied for several reasons. Control over overhead spending may be poor. Or, some of the overhead may be fixed and the actual amount of the allocation base was less than estimated at the beginning of the period. In this situation, the amount of overhead applied to inventory will be less than the actual overhead cost incurred.

3-13 Underapplied overhead implies that not enough overhead was assigned to jobs during the period and therefore cost of goods sold was understated. Therefore, underapplied overhead is added to cost of goods sold. Likewise, overapplied overhead is deducted from cost of goods sold.

3-14 Yes, overhead should be applied to value the Work in Process inventory at year-end. Since $6,000 of overhead was applied to Job A on the basis of $8,000 of direct labor cost, the company's predetermined overhead rate must be 75% of direct labor cost. Thus, $3,000 of overhead should be applied to Job B at year-end: $4,000 direct labor cost $\times$ 75% = $3,000 applied overhead cost.

3-15

Direct material	$10,000
Direct labor	12,000
Manufacturing overhead:	
$12,000 $\times$ 125%	15,000
Total manufacturing cost	$37,000
Unit product cost:	
$37,000 $\div$ 1,000 units	$37

3-16 A plantwide overhead rate is a single overhead rate used throughout all production departments in a plant. Some companies use multiple overhead rates rather than plantwide rates to more appropriately allocate overhead costs among products. Multiple overhead rates should be used, for example, in situations where one department is machine intensive and another department is labor intensive.

3-17 When automated equipment replaces direct labor, overhead increases and direct labor decreases. This results in an increase in the predetermined overhead rate—particularly if it is based on direct labor.

3-18 When the predetermined overhead rate is based on the amount of the allocation base at capacity and the plant is operated at less than capacity, overhead will ordinarily be underapplied. This occurs because actual activity is less than the activity the predetermined overhead rate is based on.

3-19 Critics of current practice advocate disclosing underapplied overhead on the income statement as Cost of Unused Capacity—a period expense. This would highlight the amount rather than burying it in other accounts.

Exercise 3-1 (10 minutes)

a. Job-order costing
b. Job-order costing
c. Process costing
d. Job-order costing
e. Process costing*
f. Process costing*
g. Job-order costing
h. Job-order costing
i. Job-order costing
j. Job-order costing
k. Process costing
l. Process costing

* Some of the listed companies might use either a process costing or a job-order costing system, depending on the nature of their operations and how homogeneous the final product is. For example, a plywood manufacturer might use job-order costing if it has a number of different plywood products that are constructed of different woods or come in markedly different sizes.

Exercise 3-3 (10 minutes)

The predetermined overhead rate is computed as follows:

Estimated total manufacturing overhead	$586,000	
÷ Estimated total direct labor hours (DLHs)...	40,000	DLHs
= Predetermined overhead rate.....	$14.65	per DLH

Exercise 3-5 (10 minutes)

Actual direct labor-hours.....	12,600
× Predetermined overhead rate.....	$23.10
= Manufacturing overhead applied	$291,060

Exercise 3-8 (10 minutes)

1. Actual direct labor-hours	8,250
× Predetermined overhead rate	$21.40
= Manufacturing overhead applied	$176,550
Less: Manufacturing overhead incurred	172,500
	$ 4,050
Manufacturing overhead overapplied	$4,050

2. Because manufacturing overhead is overapplied, the cost of goods sold would decrease by $4,050 and the gross margin would increase by $4,050.

Exercise 3-15 (15 minutes)

1. Milling Department:

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

$$= \frac{\$510{,}000}{60{,}000 \text{ machine-hours}} = \$8.50 \text{ per machine-hour}$$

Assembly Department:

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

$$= \frac{\$800{,}000}{\$640{,}000 \text{ direct labor cost}} = 125\% \text{ of direct labor cost}$$

2.

	Overhead Applied
Milling Department: 90 MHs × $8.50 per MH	$765
Assembly Department: $160 × 125%	200
Total overhead cost applied	$965

3. Yes; if some jobs require a large amount of machine time and little labor cost, they would be charged substantially less overhead cost if a plant-wide rate based on direct labor cost were used. It appears, for example, that this would be true of Job 407 which required considerable machine time to complete, but required only a small amount of labor cost.

Problem 3-23 (30 minutes)

1. Research & Documents predetermined overhead rate:

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

$$= \frac{\$700{,}000}{20{,}000 \text{ hours}} = \$35 \text{ per hour}$$

Litigation predetermined overhead rate:

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

$$= \frac{\$320{,}000}{\$800{,}000 \text{ direct attorney cost}} = 40\% \text{ of direct attorney cost}$$

2.

Research & Documents overhead applied:	
18 hours × $35 per hour	$ 630
Litigation overhead applied: $2,100 × 40%	840
Total overhead cost	$1,470

3. Total cost of Case 618–3:

	Departments		
	Research & Documents	*Litigation*	*Total*
Materials and supplies	$ 50	$ 30	$ 80
Direct attorney cost	410	2,100	2,510
Overhead cost applied	630	840	1,470
Total cost	$1,090	$2,970	$4,060

Problem 3-23 (continued)

4.

	Department	
	Research & Documents	*Litigation*
Departmental overhead cost incurred	$770,000	$300,000
Departmental overhead cost applied:		
23,000 hours × $35 per hour	805,000	
$725,000 × 40%		290,000
Underapplied (or overapplied) overhead	$ (35,000)	$ 10,000

Problem 3-25 (30 minutes)

1. Preparation Department predetermined overhead rate:

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

$$= \frac{\$416{,}000}{80{,}000 \text{ machine-hours}} = \$5.20 \text{ per machine-hour}$$

Fabrication Department predetermined overhead rate:

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

$$= \frac{\$720{,}000}{\$400{,}000 \text{ materials cost}} = 180\% \text{ of materials cost}$$

2. Preparation Department overhead applied:
   350 machine-hours × $5.20 per machine-hour $1,820
   Fabrication Department overhead applied:
   $1,200 direct materials cost × 180% 2,160
   Total overhead cost $3,980

3. Total cost of Job 127:

	Preparation	*Fabrication*	*Total*
Direct materials	$ 940	$1,200	$2,140

Direct labor	710	980	1,690
Manufacturing overhead...	1,820	2,160	3,980
Total cost.....	$3,470	$4,340	$7,810

Unit product cost for Job 127:

$$\text{Average cost per unit} = \frac{\$7,810}{25 \text{ units}} = \$312.40 \text{ per unit}$$

4.

	Preparation	*Fabrication*
Manufacturing overhead cost incurred.....	$390,000	$740,000
Manufacturing overhead cost applied:		
73,000 machine-hours × $5.20 per machine-hour.....	379,600	
$420,000 direct materials cost × 180%		756,000
Underapplied (or overapplied) overhead ..	$ 10,400	$(16,000)