

MANUFACTURING OVERHEAD

Key Terms and Concepts to Know

Manufacturing Overhead

- Overhead costs are indirect manufacturing costs. They are not directly traceable to units of production. In a sense, they are the “support” costs for the direct manufacturing process.
- Overhead costs occur throughout the year, sometimes uniformly each month such as a factory supervisor’s salary, and sometimes all in one or two months such as insurance or property taxes on the factory building and land.

Estimated Manufacturing Overhead vs. Actual Manufacturing Overhead vs. Applied Manufacturing Overhead

- There are three types of manufacturing overhead. They are not interchangeable. Each type has a specific definition and purpose.
- Estimated overhead is decided upon before the year begins as part of the budgeting or planning process. It is an educated guess of the amount of overhead that will be incurred during the year.
- Actual manufacturing overhead costs are the indirect manufacturing costs incurred periodically throughout the year in the production process.
- Manufacturing overhead applied are the overhead costs added or applied to each job during the production process. These costs are added to work-in-process to become part of total manufacturing costs along with direct materials and direct labor.

Manufacturing Overhead Account

- The manufacturing overhead account is used to bridge the gap between the irregular way overhead costs are incurred and the regular systematic application or allocation of overhead costs to units of production.
- The overhead account is debited for the actual overhead costs as incurred.
- The overhead account is credited for the overhead costs applied to production in the work-in-process account.
- Throughout the year, the balance in the manufacturing overhead account may fluctuate between debit and credit as the timing of when actual overhead is incurred typically does not match the timing of when units are produced.
- At the end of the year, there may be a balance in the account that is typically closed directly to cost of goods sold.

Key Topics to Know

Flow of Costs Through Manufacturing Overhead Account

- Manufacturing overhead is applied or added to each job while it is in process.
- The manufacturing overhead account is a holding account for the actual overhead costs incurred (debits) and applied to work-in-process (credits).
 - Actual overhead costs flow into the account as they are incurred
 - Applied overhead costs flow out of the account as the jobs proceed through the production process.

Manufacturing Overhead	
Beginning Balance	
+ Actual overhead costs incurred	- Overhead applied
= Under-applied	= Over-applied

- The balance in the manufacturing overhead account may be a debit or credit, depending on whether:
 - Debit if the overhead applied is less than the actual overhead costs incurred (underapplied). Underapplied overhead represents an expense that must be closed or transferred to cost of goods sold.
 - Credit if overhead applied is more than the actual overhead costs incurred (overapplied). Overapplied overhead represents a reduction of expense charged to jobs that must be closed or transferred to cost of goods sold.

Close balance in overhead account

Underapplied

Cost of goods sold	xxx	
Manufacturing overhead		xxx

Overapplied

Manufacturing overhead	xxx	
Cost of goods sold		xxx

- In cost variance terms, the balance in the overhead account is:
 - A favorable variance if it is overapplied
 - An unfavorable variance if it is underapplied

Applying Manufacturing Overhead

- Manufacturing overhead must be assigned or applied to each unit of production in a consistent manner.
- Before the year begins, a predetermined overhead rate based on estimated overhead costs is computed:

$$\text{Pre-determined overhead rate} = \frac{\text{Estimated annual overhead cost}}{\text{Estimated amount of the allocation base (denominator activity)}}$$

- During the year, manufacturing overhead is applied to jobs in work-in-process using the following formula:

$$\text{Overhead applied} = \text{Pre-determined overhead rate} \times \text{amount of allocation base incurred by the job}$$

- During the year, actual overhead costs are being accumulated in the overhead account.

Example #1

ABC Company applies overhead based on direct labor-hours. At the beginning of the year, estimated total manufacturing overhead was \$450,000 and the total direct labor-hours incurred would be 50,000. During the year, \$430,000 of actual overhead costs were incurred and 40,000 direct labor hours were used in production.

- Required:
- a) Determine the overhead cost applied to work-in-process and the balance in the overhead account at the end of the year.
 - b) How would the closing entry for manufacturing overhead affect cost of goods sold?

Solution #1

a)

Pre-determined overhead rate based on estimated overhead costs	\$9.00 =	\$450,000	50,000 direct labor hours
Applied overhead	\$9.00 X	40,000 dlh =	\$360,000
Actual overhead			<u>430,000</u>
Underapplied balance in overhead account			\$70,000

b) Since manufacturing overhead is underapplied, the closing entry would debit cost of goods sold thereby increasing cost of goods sold.

Summary of Manufacturing Overhead Accounting

- At the beginning of the period
Estimated amount of overhead / Estimated amount of allocation base = predetermined overhead rate
- During the period
 - Predetermined overhead rate x actual amount of allocation base incurred = total manufacturing overhead applied
 - Actual overhead costs are added to the manufacturing overhead account
- At the end of the period
Actual manufacturing overhead cost – Total manufacturing overhead applied = Underapplied overhead if a debit or Overapplied if a credit.
The underapplied or overapplied overhead is closed to Cost of Goods Sold.

Practice Problems

Practice Problem #1

Kei Products uses a predetermined overhead application rate of \$18 per labor hour. A review of the company's accounting records revealed budgeted manufacturing overhead for the period of \$621,000, applied manufacturing overhead of \$590,400, and overapplied overhead of \$11,900.

- Required:
- c) Determine Kei's actual labor hours, budgeted labor hours, and actual manufacturing overhead.
 - d) Prepare the year-end journal entry to adjust the overapplied overhead.

Practice Problem #2

X company uses job-order costing. It applies overhead cost to jobs on the basis of direct labor cost. For the current year, the company estimates that it will incur \$25,000 in direct labor cost and \$550,000 of manufacturing overhead. During the year, \$30,000 of direct labor costs were incurred. Actual overhead costs incurred were:

Indirect materials expense	\$100,000
Insurance expense	10,000
Depreciation expense	75,000
Indirect labor expense	150,000
Utilities expense	25,000
Rent expense	200,000

- Required:
- a) Compute the company's predetermined overhead rate.
 - b) Compute the amount of over or underapplied overhead.
 - c) Prepare the necessary journal entry to close the over or underapplied overhead.

Practice Problem #3

Oddly Corp. started in business on January 1 of this year. Company records provided the following information for costs applied to jobs during the year:

	<u>Work-in- Process</u>	<u>Direct Labor in Work-in-Process</u>
Jobs in process at year-end	\$167,000	\$65,000
Jobs completed and sold during the year	395,000	172,000
Jobs completed and not sold during the year	103,000	38,000

Oddly applied overhead on the basis of direct labor cost, using a predetermined rate of 60%. Overhead was underapplied by \$7,000 for the year. \$280,000 of direct labor was expected for the year.

- Required:
- a) Determine the estimated overhead for the year.
 - b) Determine the amount of actual overhead incurred.
 - c) Determine the overhead included in ending work-in-process

Practice Problem #4

Chen Services applied overhead on the basis of direct labor cost during the year. Company records provided the following information:

Estimated overhead cost	\$165,000
Actual overhead cost	182,000
Estimated direct labor cost	100,000
Actual direct labor cost	110,000

- Required: Prepare the journal entry to close the balance in the overhead account.

True / False Questions

1. Manufacturing overhead is applied by multiplying the predetermined overhead rate by actual amount of the allocation base.
True False
2. The predetermined overhead rate is computed using actual amount of overhead.
True False
3. Underapplied overhead means that the actual overhead was less than the applied overhead.
True False
4. In the journal entry to close overapplied overhead, Cost of Goods Sold is credited.
True False
5. The predetermined overhead rate is computed based on actual activity and applied overhead costs.
True False
6. Estimated overhead costs are credited to the overhead account.
True False
7. Manufacturing overhead account is debited for the amount of overhead applied to Work in Process.
True False
8. The predetermined overhead rate for the year is computed at the end of the year.
True False
9. Over applied overhead means that an error has been made in applying overhead to production.
True False
10. The activity base is not required to have any relationship to the amount of overhead cost incurred.
True False

Multiple Choice Questions

1. A cost driver is:
 - a) Factor that causes overhead costs
 - b) Part of direct materials
 - c) Cost of goods sold
 - d) Expected to be offset in future months

2. Which of the following statements is false?
 - a) The manufacturing overhead account is credited when manufacturing overhead is applied to Work in Process
 - b) Cost of Goods Sold is debited for the amount of overapplied overhead
 - c) Work in Process inventory account is credited when products are transferred to Finished Goods
 - d) Manufacturing overhead is applied to Work in Process using a predetermined overhead rate

3. XYZ Company applies overhead on the basis of direct labor-hours. The following data are available:

Estimated annual overhead cost	\$450,000
Actual annual overhead cost	580,000
Estimated direct labor-hours	25,000
Actual direct labor-hours	20,000

Compute the amount of overhead applied during the period and the amount of under or overapplied overhead (if any).

 - a) \$450,000 applied and \$130,000 underapplied
 - b) \$360,000 applied and \$220,000 underapplied
 - c) \$580,000 applied and no under or overapplied overhead
 - d) \$360,000 applied and \$220,000 overapplied

4. Overapplied overhead means that:
 - a) Actual overhead is more than overhead applied
 - b) Actual overhead is equal to overhead applied
 - c) Overhead applied is less than actual overhead
 - d) Actual overhead is less than overhead applied

5. ABC Company applies overhead on the basis of direct labor costs. The estimated amount of direct labor costs for the year was \$35,000. The predetermined overhead rate for the year is 150% and manufacturing overhead applied was \$45,000. What is the amount of actual direct labor costs incurred during the year?
 - a) \$67,500
 - b) \$52,500
 - c) \$30,000
 - d) \$53,000

6. During the year X Company estimated that it will incur the following costs for Job 090: \$400,000 direct materials; \$40,000 direct labor; \$120,000 manufacturing overhead. Overhead is applied based on direct labor costs. Job 090 was completed during the period and it incurred the following actual costs: \$350,000 direct materials; \$43,000 direct labor; manufacturing overhead \$135,000. The amount of under or overapplied overhead was:
 - a) \$6,000 overapplied
 - b) \$15,000 underapplied
 - c) \$15,000 overapplied
 - d) \$6,000 underapplied

7. If the manufacturing overhead account has a credit balance at the end of the year, it means that:
 - a) Overhead was overapplied
 - b) Overhead was underapplied
 - c) Overhead was not applied
 - d) The amount of actual and applied overhead was the same

8. A company applies overhead based on machine hours. The predetermined overhead rate for the year was \$25 per machine hour. Actual machine hours were 8,000. The amount of underapplied overhead was \$4,000. What was the amount of actual overhead costs incurred?
 - a) \$200,000
 - b) \$196,000
 - c) \$204,000
 - d) \$150,000

9. The predetermined overhead rate is computed:
- a) Using a weighted-average method.
 - b) Using actual activity as an allocation base.
 - c) At the beginning of the year, using estimates
 - d) After all actual costs have been incurred

The next 4 questions refer to the following information.

Z Company uses a job-order costing system and applies overhead based on direct materials used in production. For the recent year it estimated that \$150,000 of manufacturing overhead will be incurred and \$100,000 of direct materials will be used. The following data were taken from the company's books:

	<u>Beginning</u>	<u>Ending</u>
Raw Materials (all direct)	\$30,000	\$10,000
Work in Process	\$45,000	\$35,000
Finished Goods	\$20,000	\$25,000

Costs incurred during the year:

Purchases of raw materials (direct)	\$90,000
Direct Labor	\$40,000
Actual overhead	\$150,000

10. The amount of manufacturing overhead applied to Work in Process is:
- a) \$165,000
 - b) \$135,000
 - c) \$180,000
 - d) \$160,000
11. The under or overapplied overhead is:
- a) \$10,000 overapplied
 - b) \$15,000 overapplied
 - c) \$15,000 underapplied
 - d) \$10,000 underapplied

Solutions to Practice Problems

Practice Problem #1

a)

Actual labor hours:	$\frac{\$590,000}{\$18.00 \text{ per hour}}$	= 32,800 hours
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Budgeted labor hours	$\frac{\$621,000}{\$18.00 \text{ per hour}}$	= 34,500 hours
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Actual overhead:	\$590,000 - \$11,900	= \$578,500
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b)

Manufacturing overhead	11,900	
Cost of goods sold		11,900

Practice Problem #2

a)

Predetermined overhead rate:	$\frac{\$550,000}{\$25,000}$	= \$22.00 per DL\$
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b)

Overhead applied:	\$22.00 X \$30,000	= \$660,000
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Manufacturing Overhead	
actual	applied
100,000	
10,000	660,000
75,000	
150,000	
25,000	
200,000	
	100,000 overapplied

- c)
To close the balance in the manufacturing overhead account:

Manufacturing overhead	100,000	
Cost of goods sold		100,000

Practice Problem #3

- a)
- | | | |
|------------------------------|-----------------------|------------------|
| Predetermined overhead rate: | $\frac{?}{\$280,000}$ | = \$.60 per DL\$ |
| Estimated overhead: | $\$280,000 \times .6$ | = \$168,000 |

- b)
- | | | |
|-----------------------------|-------------------------------|--------------|
| Direct labor incurred | $\$65,000 + 172,000 + 38,000$ | = \$275,000 |
| Predetermined overhead rate | | <u>.6</u> |
| Overhead applied | | \$165,000 |
| Underapplied overhead | | <u>7,000</u> |
| Actual overhead incurred | | \$172,000 |

- c)
- | | |
|---|-----------|
| Direct labor in work-in-process at year-end | \$65,000 |
| Predetermined overhead rate | <u>.6</u> |
| Overhead in ending work-in-process | \$39,000 |

Practice Problem #4

Predetermined overhead rate: $\frac{\$165,000}{\$100,000} = \$1.65 \text{ per DL\$}$
 Overhead applied: $\$1.65 \times \$110,000 = \$181,500$

Manufacturing Overhead	
actual	applied
182,000	181,500
Underapplied 500	

Cost of goods sold 500
 Manufacturing overhead 500

Solutions to True / False Problems

1. True
2. False – predetermined overhead rate is computed using estimated overhead.
3. False – overhead is underapplied when actual overhead is greater than applied overhead.
4. True
5. True
6. False - the predetermined overhead rate is computed based on estimated activity and estimated overhead costs.
7. False – estimated overhead costs are not recorded in the general ledger.
8. False – the overhead account is credited for overhead applied.
9. False – overapplied overhead simply means that actual overhead did not equal applied overhead
10. False – the activity base should bear a close relationship to how overhead costs are incurred.

Solutions to Multiple Choice Questions

1. A
2. A
3. B
4. D
5. C
6. D
7. A
8. C
9. C
10. A
11. B