

MASTER OF MANAGEMENT IN MANUFACTURING

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(CMA) APCO Company manufactures various lines of bicycles. Because of the high volume of each type of product, the company employs a process-cost system using the weighted-average method to determine unit costs. Bicycle parts are manufactured in the molding department. The parts are consolidated into a single bike unit in the molding department and transferred to the assembly department where they are partially assembled. After assembly the bicycle is sent to the packing department.

Cost per unit data for the 20-inch dirt bike has been completed through the molding department. Annual cost and production figures for the assembly department are presented in the accompanying schedules.

Defective bicycles are identified at an inspection point when the assembly labor process is 70% complete; all assembly material has been added prior to this point of the process. The normal rejection percentage for defective bicycles is 5% of the bicycles reaching the inspection point. Any defective bicycles over and above the 5% quota are considered as abnormal. All defective bikes are removed from the production process and disposed of with zero net disposal value.

**ASSEMBLY DEPARTMENT COST DATA**

	<b>TRANSFERRED IN FROM MOLDING DEPARTMENT</b>	<b>ASSEMBLY MATERIAL</b>	<b>ASSEMBLY CONVERSION COST</b>	<b>TOTAL COST OF DIRT BIKE THROUGH ASSEMBLY</b>
Prior period costs	\$ 82,200	\$ 6,660	\$ 11,930	\$ 100,790
Current period costs	<u>1,237,800</u>	<u>96,840</u>	<u>236,590</u>	<u>1,571,230</u>
Total Costs	<u>\$1,320,000</u>	<u>\$103,500</u>	<u>\$248,520</u>	<u>\$1,672,020</u>

**ASSEMBLY DEPARTMENT PRODUCTION DATA**

	<b>BICYCLES</b>	<b>PERCENT COMPLETE</b>		
		<b>Transferred in</b>	<b>Assembly Material</b>	<b>Assembly Conversion</b>
Beginning inventory	3,000	100	100	80
Transferred in from molding department during year	45,000	100	---	---
Transferred out to packing Department during year	40,000	100	100	100
Ending inventory	4,000	100	50	20

**Required**

1. Compute the number of defective bikes that are considered to be
  - a. A normal amount of defective bikes
  - b. An abnormal amount of defective bikes
2. Compute the equivalent units of production for the year for
  - a. Bicycles transferred in from the molding department
  - b. Bicycles produced with regard to assembly material
  - c. Bicycles produced with regard to assembly conversion
3. Compute the cost per equivalent unit for the fully assembled dirt bike.
4. Compute the amount of the total production cost of \$1,672,020 that will be associated with the following items.
  - a. Normal defective units
  - b. Abnormal defective units
  - c. Good units completed in the assembly department
  - d. Ending work-in-process inventory in the assembly department
5. Describe how the applicable dollar amounts for the following items would be presented in the financial statements:
  - a. Normal defective units
  - b. Abnormal defective units
  - c. Completed units transferred into the packing department
  - d. Ending work-in-process inventory in the assembly department

## BICYCLE ASSEMBLY DEPARTMENT

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WEIGHTED AVERAGE Example

**Current Period Work Done**

FLOWS	PHYSICAL UNITS	TRANSFER IN (TI)	MATERIAL UNITS (DM)	CONVERSION UNITS (CU)
Beg. WIP	3,000			
				1.0 TI 1.0 DM 0.8 CU
<u>Units Started</u>	<u>45,000</u>			
<b>Units To Account For</b>	<b>48,000</b>			
T.O.	40,000	(40,000 x 1) 40,000	(40,000 x 1) 40,000	(40,000 x 1) 40,000
Normal Spoilage	(41,000 x 5%) 2,050	(2,050 x 1) 2,050	(2,050 x 1) 2,050	(2,050 x 0.7) 1,435
Abnormal Spoilage	(4,000 – 2,050) 1,950	(1,950 x 1) 1,950	(1,950 x 1) 1,950	(1,950 x 0.7) 1,365
<u>End WIP</u>	<u>4,000</u>	(4,000 x 1.0) <u>4,000</u>	(4,000 x 0.5) <u>2,000</u>	(4,000 x 0.2) <u>800</u>
<b>Units Accounted For</b>	<b>48,000</b>	48,000	46,000	43,600

**Current Period Costs (Weighted Average)**

Production Cost	Total Cost	TI Cost	DM Cost	CU Cost
Beg. WIP	\$100,790	82,200	6,660	11,930
<u>Current Costs</u>	<u>1,571,230</u>	<u>1,237,800</u>	<u>96,840</u>	<u>236,590</u>
<b>Total Costs To Account For</b>	<b>\$1,672,020</b>	1,320,000	103,500	248,520
Per Unit Cost	(27.50 + 2.25 + 5.70) \$35.45	(1,320,000/48,000) 27.50	(103,500/46,000) 2.25	(248,520/43,600) 5.70
Abnormal Spoilage (Period Cost)	\$65,793	(1,950 x 27.50) 53,625	(1,950 x 2.25) 4387.50	(1,365 x 5.70) 7780.50
COM for 40,000 Units	(40,000 x \$35.45) \$1,418,000			
Normal Spoilage	\$69,167	(2,050 x 27.50) 56,375	(2,050 x 2.25) 4612.50	(1,435 x 5.70) 8179.50
Total Costs for T.O.	\$1,487,167	(1,487,167/40,000) <b>\$37.18</b>	<i>This new cost represents the new per unit costs when taking normal spoilage into account</i>	
<u>End WIP</u>	<u>\$119,060</u>	(4,000 x 27.50) 110,000	(2,000 x 2.25) 4,500	(800 x 5.70) 4,560
<b>Total Costs Accounted For</b>	<b>\$1,672,020</b>			

**Note**

1. Costs of abnormal defect (spoilage), controllable is viewed as a period loss \$65,793 and is not a product costs, thus not inventoriable.
2. Cost of normal defect (spoilage) is uncontrollable and viewed as a necessary (scrap) to produce good units and so lumped with good inventory.
3. Per Unit cost is \$35.45 for internal costs but it is \$37.18 for inventory costs and for accounting purposes.

FIFO Example

**Current Period Work Done**

Same as wgt'd. avg.

FLOWS	PHYSICAL UNITS		TRANSFER IN (TI)	MATERIAL UNITS (DM)	CONVERSION UNITS (CU)
Beg. WIP	3,000	1.0 TI 1.0 DM 0.8 CU			
<u>Units Started</u>	<u>45,000</u>				
<b>Units To Account For</b>	<b>48,000</b>				
T.O.	40,000	1.0 TI 1.0 DM 1.0 CU	(40,000 x 1) 40,000	(40,000 x 1) 40,000	(40,000 x 1) 40,000
Normal Spoilage	(41,000 x 5%) 2,050	1.0 TI 1.0 DM 0.7 CU	(2,050 x 1) 2,050	(2,050 x 1) 2,050	(2,050 x 0.7) 1,435
Abnormal Spoilage	(4,000 - 2,050) 1,950	1.0 TI 1.0 DM 0.7 CU	(1,950 x 1) 1,950	(1,950 x 1) 1,950	(1,950 x 0.7) 1,365
<u>End WIP</u>	<u>4,000</u>	1.0 TI 0.5 DM 0.2 CU	(4,000 x 1.0) <u>4,000</u>	(4,000 x 0.5) <u>2,000</u>	(4,000 x 0.2) <u>800</u>
<b>Units Accounted For</b>	<b>48,000</b>		48,000	46,000	43,600
Less Work Started Last Period	<u>-3,000</u>	1.0 TI 1.0 DM 0.8 CU	-(3,000 x 1) <u>-3,000</u>	-(3,000 x 1) <u>-3,000</u>	-(3,000 x 0.8) <u>-2,400</u>
Work Done This Period	<u>45,000</u>		45,000	43,000	41,200

**Current Period Costs (FIFO)**

Production Cost	Total Cost	TI Cost	DM Cost	CU Cost
Beg. WIP (yr. 2001)	\$100,790			
<u>Current Costs (yr. 2002)</u>	<u>1,571,230</u>	<u>1,237,800</u>	<u>96,840</u>	<u>236,590</u>
<b>Total Costs To Account For</b>	<b>\$1,672,020</b>	1,237,800	96,840	236,590
Equivalent Unit Cost	(27.51 + 2.25 + 5.74) \$35.50124	(1,237,800/45,000) 27.50667	(96,840/43,000) 2.25209	(236,590/41,200) 5.74248
Beg. WIP (yr. 2001)	\$100,790			
Beg. WIP (yr. 2002)	\$3,445			(20% x 3000 x 5.74) 3,445
Abnormal Spoilage (Period Cost) (yr. 2002)	\$65,868	(1,950 x 27.51) 53,644.5	(1,950 x 2.25) 4387.50	(1,365 x 5.74) 7,836
COM for 37,000 Units (yr. 2002)	[(40,000 - 3,000) x 35.50] \$1,313,546			
Normal Spoilage (yr. 2002)	\$69,246	(2,050 x 27.51) 56,396	(2,050 x 2.25) 4,613	(1,435 x 5.74) 8,237
<u>End WIP (yr. 2002)</u>	<u>\$119,125</u>	(4,000 x 27.51) 110,027	(2,000 x 2.25) 4,504	(800 x 5.74) 4,594
<b>Total Costs Accounted For</b>	<b>\$1,672,020</b>			
Total Costs for T.O.	(Beg. WIP + COM + Normal Spoilage) \$1,487,027	(1,487,027/40,000) <u>\$37.17</u>	<i>This new cost represents the new per unit costs when taking normal spoilage into account</i>	

**Note:**

- (1) Abnormal loss is period expense on I/S.
- (2) WIP, ending appears on B/S.
- (3) Although the per unit cost comes as \$35.50, the real per unit cost is \$37.17 after including the normal spoilage costs.