Chapter 6

Process Cost Accounting
Additional Procedures: Accounting for Joint Products and By-Products
Learning Objectives

LO1 Compute unit costs when materials are not added uniformly throughout the process.

LO2 Account for units lost in the production process.

LO3 Account for units gained in the production process.
Learning Objectives

LO4 Assign costs to inventories, using the first-in, first-out method.

LO5 Identify the methods used to apportion joint costs to joint products and to account for by-products.
Equivalent Production and Equivalent Units

- When industries apply materials into production in different quantities and at varying points in the production cycle, equivalent units must be computed for each element of production cost.
- The valuation of the ending work in process requires the allocation of cost for each element.
The only difference between equivalent unit calculations for the material components and the labor and overhead components would concern the ending work in process inventory.

Example: Ending inventory of 400 units that were $\frac{3}{4}$ complete.

- Materials – 400 equivalent units (received all materials when started)
- Labor and overhead – 300 equivalent units ($400 \times \frac{3}{4}$ completed as to processing costs)
Once the equivalent production figures are calculated, the unit cost for the period can be calculated.

Add the cost of each element in beginning WIP to the cost of production for that element incurred in the current month.

Total cost is then divided by the appropriate equivalent production figure.

Cost is then applied to inventory to arrive at cost of goods finished and the cost of the ending WIP.
Equivalent Production and Equivalent Units - Materials Added at Close of Processing

- Only units finished will have materials cost applied.
- Units in process at the end of the accounting period will have no equivalent production for the period.
- Equivalent units for labor and factory overhead would be computed as the previous example.
The state of completion must be carefully considered.

Finished units will include all materials costs.

Units that were 50% completed will only have the percent of materials that are added in the first half of the cycle.
Equivalent Production and Equivalent Units - Materials Added at Different Stages (cont.)

- **Example:**
  - 40% at the beginning
  - 25% at one-quarter completed
  - 35% at the end
  - 1000 units are one-half completed
  - Equivalent production for materials
    - 1000 units \( \times (40\% + 25\%) = 650 \) units
Units Lost in Production

- Due to the nature of the processing cycle, many industries will have units that are lost due to evaporation, shrinkage, spillage, or other factors.
Normal Losses

- Are treated as products costs and are spread over the units finished and still in process.
- On the cost of production summary, the lost units are ignored in the calculation of equivalent production and in the determination of inventory costs.
- If lost at the end of the production cycle, the cost of lost units may be absorbed by the completed units only.
Normal Losses (cont.)

- The lost units are included in the number of units used to determine equivalent production.
- Unit cost is applied to units finished, units in process, and units that were lost.
- Cost of lost units is added to the cost of goods completed, and the total is transferred to the next department or to Finished Goods.
Abnormal Losses

- These are losses that are not inherent in the manufacturing process and are not expected.
- The lost units are included in the calculation of equivalent production and unit costs.
- Abnormal losses are not included in the cost of transferred or finished goods and are charged to a separate expense account.
Units Gained in Production

- In some processes, the addition of materials in a subsequent department increases the number of units being processed.
- Has the opposite effect of lost units and requires an adjustment to the unit cost for the previous department’s transferred-in units.
- The cost from the department is now spread over more units.
Equivalent Production - First-In, First-Out (FIFO) Method

- This method assumes that the costs of the current period are first applied to complete the beginning units in process, then to start and finish a number of units, and finally to start other units that are still in process.
Features of FIFO

- No need to break down the beginning WIP into its cost elements.
- If there is no beginning inventory, total equivalent production figures will differ from those for the average method because the output required to complete the beginning inventory must be calculated.
- When there is no beginning inventory, both methods yield the same results.
- If units are lost, a decision must be made as to whether the units lost came from the beginning inventory or from the units started during the process.
Comparison of Methods

- **First-In, First-Out**
  - Cost is determined by dividing the current period’s cost of each element by the unit output for the period.
  - Total costs to charge to the beginning WIP is the balance from the prior month plus the costs incurred to complete these units in the current period.

- **Average Cost**
  - Cost is determined by dividing the merged costs of the current period and those carried over as WIP by the unit output.
Comparison of Methods – Computations

Beginning Work in Process 3,000 units ⅓ complete.
5,000 units started and completed.
Ending Work in Process 4,000 units ½ complete.

**Average Costing**
- Units in Beginning Work in Process: 3,000
- Units Started and Completed: 5,000
- Units Completed & Transferred Out: (3,000 + 5,000) = 8,000
- Ending Work in Process: (4,000 x ½) = 2,000
- Equivalent Units in Production: 10,000

**FIFO Costing**
- Work Done to Complete Beginning Work in Process: (3,000 x ⅓) = 1,000
- Units Started and Completed: 5,000
- Work Done this Period on Ending Work in Process: (4,000 x ½) = 2,000
- Equivalent Units in Production: 8,000
Joint Products

- The manufacturing process originates with one or more raw materials started in process and two or more primary products are derived.
Common Bases for Allocation of Joint Costs

1. Relative sales value
2. Physical unit of measure
3. Chemical, engineering, or other types of analyses

The method most commonly used in the relative sales value method.
Joint Costs and Joint Products

Joint Processing

Split-off Point

Product A

Product B
By-Products

- These are secondary products with relatively little value that are derived from the manufacturing process.
- The most common practice is to make no allocation of the processing costs up to the split-off point.
By-Products (cont.)

- Entry to record the estimated sales value of the by-product

  By-Products (Inventory) XX
  Work in Process XX

- When the by-products are sold, the difference between the actual sales price and the estimated sales value is credited or debited to Gain or Loss on Sales of By-Products.

- If the sales value is uncertain or insignificant, the cost of the main products will not be reduced, and the only entry will be made at the time of sale.