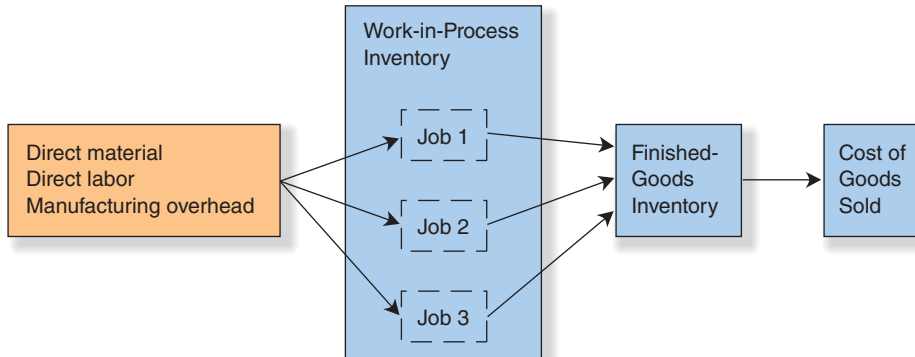
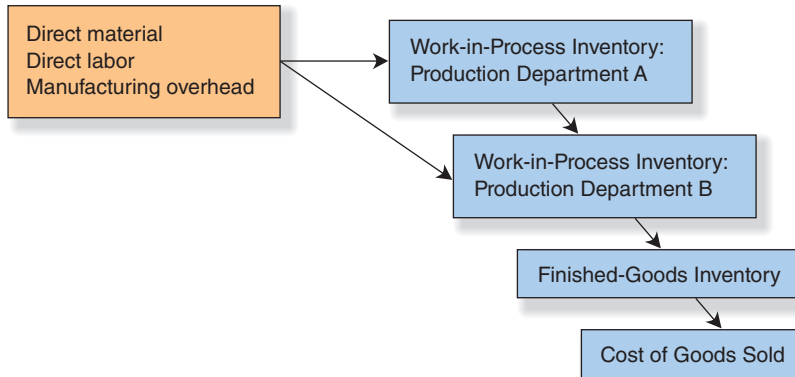


A. Job-Order Costing: Accumulates Costs by Job Order**Exhibit 4–2**

Comparison of Job-Order and Process Costing

B. Process Costing: Accumulates Costs by Production Department

CHAPTER 4

Process Costing and Hybrid Product Costing

With a **PROCESS-COSTING SYSTEM**, a company works in a **repetitive production environment**, *manufacturing a large number of like units in a continuous flow*.

IN PROCESS COSTING, COSTS ARE NORMALLY ACCUMULATED BY DEPARTMENT.

In Job Order Costing, costs are accumulated by job.

Conversion costs: Direct Labor + Manufacturing Overhead Costs

EQUIVALENT UNITS

In a manufacturing process with continuous production, some units are unfinished at period-end.

Processing costing uses the concept of *equivalent units*.

- The term refers to the amount of manufacturing activity that has been applied to a batch of physical units after adjusting for the stage of completion.

Equivalent-unit calculations are made for:

- Direct materials
- Conversion cost (direct labor and overhead)

When *computing the cost of a unit*, *we base the related calculations on equivalent units, not physical units.*

Equivalent units is a key concept in process costing.

- If a batch of goods has been completed, the *number of physical units and equivalent units will be the same.*
- Units in the ending Work-in-Process Inventory are only partially completed and may be in different stages of production.
 - For example, 100% of the materials may be present in the product, but only 50% of the conversion work (labor and overhead) may have been performed.
- **Conversion costs are usually assumed to be added continuously throughout the process in text problems.** Thus, if 100 units are 60% of the way through the process, the company is said to have performed 60 equivalent units of work during the period.
 - *Make the assumption if information to the contrary is not provided*
- **Direct materials, in contrast, are usually added at discrete points in text problems.** When considering materials, determine at what point the ending in-process units are and then evaluate whether the materials have been added.
 - If materials have been added, the units are 100% complete with respect to materials; if not, the units are 0% complete.

| Microsoft Excel - Basic Data for Illustration - Cutting Department | | | |
|--|---|------------|-------|
| Type a question for help | | | |
| B22 | =SUM(B20:B21) | | |
| | A | B | C |
| 1 | Information for Illustration | Amount | |
| 2 | | | |
| 3 | Work in process, March 1 - 20,000 units | | |
| 4 | Direct material: 100% complete, cost of* | \$ 50,000 | |
| 5 | Conversion: 10% complete, cost of* | 7,200 | |
| 6 | Balance in work in process, March 1* | \$ 57,200 | |
| 7 | | | |
| 8 | Units started during March | 30,000 | units |
| 9 | | | |
| 10 | Units completed during March and transferred out of the Cutting Department | 40,000 | units |
| 11 | | | |
| 12 | Work in process, March 31 | 10,000 | units |
| 13 | Direct material: 100% complete | | |
| 14 | Conversion: 50% complete | | |
| 15 | | | |
| 16 | Costs Incurred during March: | | |
| 17 | Direct material | \$ 90,000 | |
| 18 | | | |
| 19 | Conversion costs: | | |
| 20 | Direct labor | \$ 86,000 | |
| 21 | Applied manufacturing overhead** | 107,500 | |
| 22 | Total conversion costs | \$ 193,500 | |
| 23 | | | |
| 24 | *These costs were incurred during the prior month, February | | |
| 25 | | | |
| 26 | **(Predetermined overhead rate) x (Direct labor cost) = 125% x \$86,000 = \$107,500 | | |

Exhibit 4-4
Basic Data for Illustration—
Cutting Department



$$\begin{array}{c}
 \text{Weights} \\
 \swarrow \quad \searrow \\
 \left[\$2.50 \times \left(\frac{20,000}{20,000 + 30,000} \right) \right] + \left[\$3.00 \times \left(\frac{30,000}{20,000 + 30,000} \right) \right] = \$2.80
 \end{array}$$

↑ ↑ ↑ ↑ ↑
 Direct-material cost per equivalent unit in February Proportion of total equivalent units of direct material in the beginning work-in-process inventory Direct-material cost per equivalent unit in March Proportion of total equivalent units of direct material added during March Weighted-average cost per equivalent unit of direct material

Exhibit 4–9

March Production Report:
Cutting Department
(weighted-average method)



| MVP SPORTS EQUIPMENT COMPANY March Production Report: Cutting Department | | | | |
|---|----------------|---|------------------|------------|
| | Physical Units | Percentage of Completion with Respect to Conversion | Equivalent Units | |
| | | | Direct Material | Conversion |
| Work in process, March 1 | 20,000 | 10% | | |
| Units started during March | 30,000 | | | |
| Total units to account for | 50,000 | | | |
| Units completed and transferred out during March | 40,000 | 100% | 40,000 | 40,000 |
| Work in process, March 31 | 10,000 | 50% | 10,000 | 5,000 |
| Total units accounted for | 50,000 | | | |
| Total equivalent units | | | 50,000 | 45,000 |

| | Direct Material | Conversion | Total |
|--|------------------|------------------|------------------|
| Work in process, March 1 (from Exhibit 4–4) | \$ 50,000 | \$ 7,200 | \$ 57,200 |
| Costs incurred during March (from Exhibit 4–4) | 90,000 | 193,500 | 283,500 |
| Total costs to account for | <u>\$140,000</u> | <u>\$200,700</u> | <u>\$340,700</u> |
| Equivalent units (from step 2, Exhibit 4–6) | 50,000 | 45,000 | |
| Costs per equivalent unit | \$2.80 | \$4.46 | \$7.26 |

| | | | |
|--|---------------------|---------------------|-----------------|
| | ↑ | ↑ | ↑ |
| | \$140,000 50,000 | \$200,700 45,000 | \$2.80 + \$4.46 |

Cost of goods completed and transferred out of the Cutting Department during March:

| | | |
|--|-----------------------|------------------|
| (Number of units transferred out) × (Total cost per equivalent unit) | 40,000 × \$7.26 | <u>\$290,400</u> |
|--|-----------------------|------------------|

Cost remaining in March 31 work-in-process inventory in the Cutting Department:

Direct material:

| | | |
|---|-----------------------|-----------|
| (Number of equivalent units of direct material) × (Cost per equivalent unit of direct material) | 10,000 × \$2.80 | \$ 28,000 |
|---|-----------------------|-----------|

Conversion:

| | | |
|---|----------------------|---------------|
| (Number of equivalent units of conversion) × (Cost per equivalent unit of conversion) | 5,000 × \$4.46 | <u>22,300</u> |
|---|----------------------|---------------|

| | |
|--|------------------|
| Total cost of March 31 work in process | <u>\$ 50,300</u> |
| Check: Cost of goods completed and transferred out | \$290,400 |
| Cost of March 31 work-in-process inventory | <u>50,300</u> |
| Total costs accounted for | <u>\$340,700</u> |

TRACKING COSTS

Departmental production reports are completed to disclose equivalent units and unit costs, along with the cost of completed production and the cost of the ending work-in-process inventory.

- The text focuses on the **weighted-average method** of process costing because of the method's popularity in practice.
- *All units completed during a period are assumed to be started and completed during that period.*
- *Equivalent units are calculated without distinguishing as to whether the manufacturing activity occurred in current period or the preceding period.*

OVERHEAD ALLOCATION

Assigning Overhead

- ***Actual versus normal costing:*** Either actual overhead or applied overhead (i.e., actual costing or normal costing) may be used with process costing.
 - The use of applied overhead smooths per-unit cost fluctuations
 - Uses an appropriate cost driver to apply overhead
 - We assume that companies will use applied overhead.

Cost drivers

- As in job costing, cost drivers should be chosen to provide an equitable allocation of overhead to products.

HYBRID PRODUCT-COSTING SYSTEMS

Some processes have elements of both the job-cost (Chapter 3) environment and the process-cost (Chapter 4) environment.

A third (hybrid) system known as **operation costing** may be used.

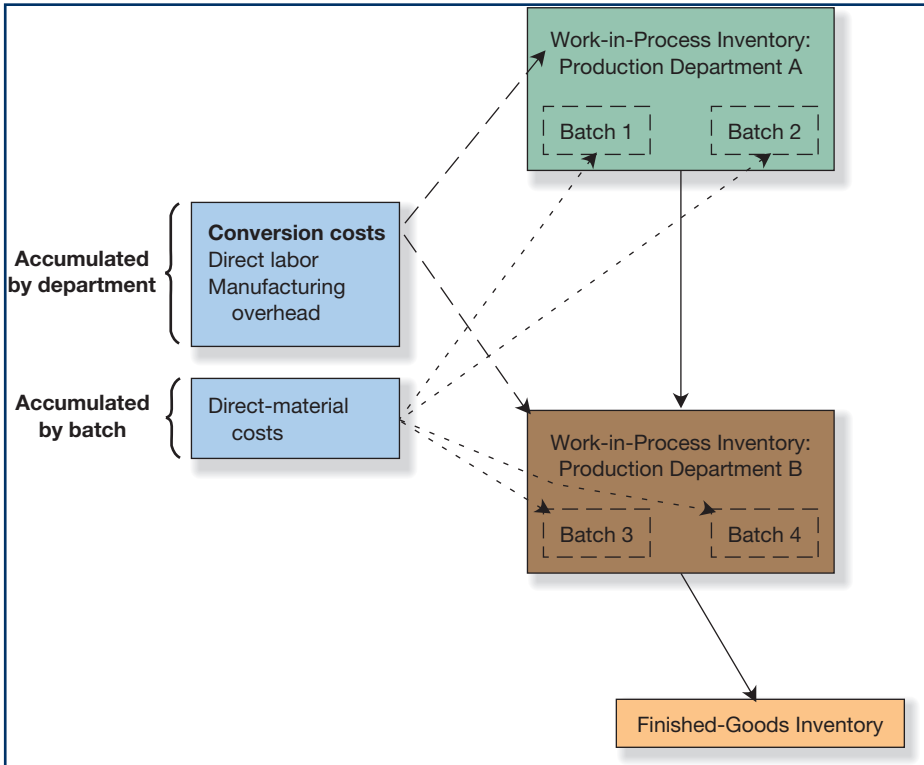
Characteristics

- Batch environment
- Conversion costs similar across product lines,
- Direct materials and direct labor significantly different across product lines

Conversion costs are usually applied to products by using a predetermined application rate.

Direct materials would be tracked by job, but the other cost elements would be more efficiently tracked by process.

Chapter 4 Process Costing and Hybrid Product-Costing Systems



Equivalent Units

Rainbow Glass Co. Manufactures decorative glass products. The firm employs a process-costing system for its manufacturing operations. All direct materials are added at the beginning of the process, and conversion costs are incurred uniformly throughout the process. The company's production schedule for October is as follows.

| Work in Process Inventory | Units |
|--|--------------|
| Work in process (WIP) October 1 (60% complete as to conversion) | 1,000 |
| Units started in October | 5,000 |
| Total Units to Account for | 6,000 |
| Units from beginning WIP, which were completed and transferred out in Oct. | 1,000 |
| Units started and completed during Oct | 3,000 |
| Units in process Oct 31 (20% complete as to conversion) | 2,000 |
| Total Units to Account for | 6,000 |

Compute equivalent units of direct material and conversion activity for October.

Worksheet

**CALCULATION OF EQUIVALENT UNITS: RAINBOW GLASS
COMPANY**

Weighted-Average Method

| | | Percentage of Completion | | | |
|---|-------------------|-----------------------------|------------|--------------------|------------|
| | | | | Equivalent Units | |
| | Physical Units | Materials | Conversion | Direct Material | Conversion |
| Work in process, October 1 | 1,000 | 100% | 60% | 1,000 | 600 |
| Units started during October | 5,000 | | | | |
| Total units to account for | 6,000 | | | | |
| Units completed and transferred out during October | 4,000 | 100% | 100% | 4,000 | 4,000 |
| Work in process, October 31 | 2,000 | 100% | 20% | 2,000 | 400 |
| Total units accounted for | 6,000 | | | | |
| Total equivalent units October | | | | 6,000 | 4,400 |