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| Chapter 16 Outline1. **Process Operations**⎯is mass production of similar products in a continuous flow of sequential processes. Use a standardized process to make large volumes of similar products.
2. Organization of Process Operations
3. Each process is identified as a separate production department, workstation
4. Series of repetitive processes or steps.
5. Each applies direct labor, overhead and often direct materials to move the product toward completion.
6. Final process or department in the series finishes the goods and makes them ready for sale.
7. Comparing Process and Job Order Costing Systems
8. Both use materials, labor and overhead and aim to compute cost per unit of product.
9. Cost object:
10. Job order system: job or job lot.
11. Process system: process or department
12. Cost per unit:
13. Job order system: measures cost per unit after completion of a job
14. Process system: measures costs at the end of the period
15. Reporting:

a. Job order system: job cost sheetsb. Process system: production cost report1. Work in process inventory:

a. Job order system: one Work in Process Inventory accountb. Process system: one Work in Process Inventory account per processHigh standardizationC.Transferring Costs across Departments⎯overall objective is to determine the total cost per unit of a product or service. 1. In process costing, manufacturing costs are transferred across work in process inventor accounts.2. After production is complete, costs are accumulated and transferred from work in process inventory account from the final department in the series to the finished goods inventory account.1. Process Costing Demonstration – this section uses the weighted-average method to demonstrate the four-step process costing system. The weighted-average method combines units and costs across two periods in computing equivalent units and cost per equivalent unit.
2. Step 1: Determine Physical Flow of Units
3. A physical unit flow reconciliation proves that: 1) beginning units in process plus those started in the period equals the 2) ending units in process plus those completed and transferred out in the period.
4. The following totals should agree:
5. Units in beginning work in process + units started during the period = the number of units to account for.
6. Units completed and transferred out during the period + units in ending work in process inventory = the units accounted for.
7. The “units to account for” and the “units accounted for” must be equal.
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| 1. Step 2: Compute Equivalent Units of Production (EUP) – number of whole units that could have been started and completed given the costs incurred in the period.
2. Must convert the physical units worked on to equivalent units based on the amount of each input (direct materials, direct labor, and overhead) that has been used.
3. Equivalent Units⎯Direct Materials⎯add together the results of a two-step calculation:
4. Units completed and transferred out during the period times 100% (since the units have all required materials).
5. Units in ending inventory times % of materials added during the period.
6. Equivalent Units⎯Conversion Costs⎯add together the results of a two-step calculation:
7. Units completed and transferred out during the period times 100% (since the units have all required labor and overhead).
8. Units in ending inventory times the percent of labor and overhead added during the period.
9. Step 3: Compute Cost per Equivalent Unit of Production – uses equivalent units of production from step 2 along with cost data, to compute cost per equivalent unit.
10. Cost per Equivalent Unit for Direct Materials⎯The materials costs in beginning work in process inventory plus the direct materials costs added during the period are divided by the equivalent units of production (EUP) for direct materials (from step 2) to get the cost per equivalent unit for direct materials for the period.
11. Cost per Equivalent Unit for Conversion Costs⎯The conversion costs in the beginning work in process inventory plus the conversion costs added during the period are divided by the equivalent units of production (EUP) for conversion costs (from step 2) to get the cost per equivalent unit for conversion costs for the period.
12. Step 4: Assign and Reconcile Costs – uses EUP from step 2 and cost per EUP from step 2 to assign costs to the units completed and transferred out and to the units in ending work in process.
13. The following totals should agree:
14. Cost of beginning work in process inventory plus cost incurrent during the period equal total costs to account for*.*
15. Cost of units completed and transferred out plus cost of ending work in process inventory equal total costs accounted for.
16. Reconciliation – management verifies that total costs assigned to units completed and transferred out plus the cost of units in ending work in process equal the costs incurred by production.
17. Using Process Cost Information –
18. Control costs – department’s equivalent cost per unit can be compared to prior months and if changed a lot, corrective action can be taken.
19. Evaluate performance – top management can evaluate department managers based on their control of costs. Costs per equivalent unit are often compared to budgeted amounts.
20. Evaluate process improvements – organizations strive to improve processes. The success of process improvements can be evaluated by examining how costs per equivalent unit change after process improvements.
21. Prepare financial statements – cost of goods sold and ending inventory amounts computed from process cost data are reported on the income statement and balance sheet, respectively.
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| 1. Production Cost Report
2. Primary managerial accounting report. Also called a production report.
3. A separate report is prepared for each process or production department.
4. Four sections:
5. Physical flow of units: Reconciles beginning units in process and those started in a period with ending units in process and those completed and transferred out.
6. Equivalent units of production for direct materials and for conversion.
7. Cost per equivalent unit of production for direct materials and for conversion.
8. Cost Assignment of total costs among units worked on in the period.
9. **Accounting for Process Costing**
10. Accounting for Production Costs
11. Materials, labor and overhead costs flow through the manufacturing processes as shown in exhibit 16.12. There are separate Work in Process Inventory accounts for each department. When the goods are ready for sale, their costs are transferred to Finished Goods Inventory. When goods are sold, their costs are transferred to Cost of Goods Sold.
12. Materials Costs
13. Raw materials purchased on credit are recorded by debiting Raw Materials Inventory and crediting Accounts Payable.
14. Direct materials used in production are recorded by debiting each department’s Work in Process Inventory account and crediting Raw Materials Inventory.
15. Indirect materials used are recorded with a debit to Factory Overhead and a credit to Raw Materials Inventory.
16. Labor Costs
17. Direct labor costs used in production are recorded by debiting each department’s Work in Process Inventory account and crediting Factory Payroll Payable.
18. Indirect labor costs are recorded by debiting Factory Overhead and crediting Factory Payroll Payable
19. Factory Overhead
20. Overhead costs other than indirect materials and indirect labor are recorded by debiting Factory Overhead and crediting the related accounts.
21. Applying Overhead to Work in Process – use predetermined overhead rates to apply overhead. Rates are estimated at the beginning of a period and used to apply overhead during the period.
22. Applied using activity bases such as direct labor or machine hours.
23. Predetermined rate times actual cost driver quantity.
24. Journal entry to apply factory overhead costs to each department includes a debit to the department’s Work in Process Inventory and a credit to Factory Overhead.
25. **Accounting for Transfers**
26. Transfers across Departments – the transfer of partially completed units from one department to the next includes a debit to Work in Process Inventory – Department 2, and a credit to Work in Process Inventory – Department 1.
27. Transfer to Finished Goods - record cost of completed units transferred out by debiting Finished Goods Inventory and crediting the Work in Process Inventory account of the final production department.
28. Computing Cost of Goods Sold – computed as beginning finished goods inventory plus cost of goods manufactured minus ending finished goods inventory.
29. Sales and the Transfer to Cost of Goods Sold – record cost of goods sold by debiting Cost of Goods Sold and crediting Finished Goods Inventory. To record the sale on credit, debit Accounts Receivable and credit Sales.
30. Summary of Cost Flows⎯as shown in Exhibit 16.12, the flow of costs through accounts reflects the flow of manufacturing activities and products in the factory.
31. Financial Statement Reporting – cost of goods manufactured for a process manufacturer equals the costs transferred from the last production process to finished goods inventory. Sales and cost of goods sold are reported on the income statement. Inventories, raw materials, work in process, and finished goods, are reported on the balance sheet.
32. **Trends in Process Operations include the following:**

Process Design; Just in Time Production; Robotics and Automation; Continuous Processing; Services, and Customer Orientation.1. **Decision Analysis—Hybrid Costing System**
2. Contains features of both job order and process operations.

B. A hybrid system of processes requires a hybrid costing system.* + 1. Assembly line costs may be compiled using process costing.
		2. Customizing the product may use a job order system.

The total product cost will include the assembly line cost per unit plus the cost of customizing the product.1. **Appendix 16A – FIFO method of process costing**
2. The objectives, concepts, and journal entries (but not amounts) are the same as for the weighted average method.
3. FIFO method computes equivalent units and cost per equivalent unit based only on production activity in the current period.
4. The computation of equivalent units differs.
5. Step 1: Determine physical flow of units.
	1. The following totals should agree:
6. Units in beginning inventory plus units started during the period equals number of units to account for.
7. Units completed and transferred out: beginning work in process inventory plus units started and completed this period plus units in ending work in process inventory equals units accounted for.
8. Step 2: Compute Equivalent Units of Production (EUP)
	1. EUP is the number of whole units that could have been started and completed given the costs incurred in the period.
	2. EUP for Direct Materials⎯add together the results of a three-step calculation:
9. Units in beginning work in process inventory times the percent of materials added during the period.
10. Units started and completed during the period times 100% (since all materials were added during the period).

Units in ending work in process inventory times the percent of materials added during the period. |
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| * 1. EUP for Conversion Costs⎯add together the results of a three-step calculation:
1. Units in beginning work in process inventory times the percent of conversion costs added during the period.
2. Units started and completed during the period times 100% (since all labor and overhead were added during the period).

Units in ending work in process inventory times the percent of labor and overhead added during the period.1. Step 3: Compute Cost per Equivalent Unit
	1. Costs assigned to the department during the period divided by the equivalent units of production (from step 2) in the current period equals the cost per equivalent unit for the period.
	2. Perform calculation separately for direct materials and conversion costs.
2. Step 4: Assign and Reconcile Costs
	1. Similar in concept to the reconciliation of the physical flow of units (except that dollars are used instead of units).
	2. The following totals should agree:
3. Costs of beginning work in process inventory plus costs incurred during the period (i.e., amounts debited to the Work in Process Inventory during the period) equals total costs to account for.
4. Costs assigned to the completed beginning work in process inventory units, plus costs assigned to the units started and completed during the period, plus the costs assigned to ending work in process inventory equals the costs accounted for *(see 3 below)*.
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| * 1. Sources of amounts used in cost reconciliation:
1. Cost of the completed beginning inventory units equals beginning balance of the Work in Process Inventory plus the following costs to complete the beginning inventory:
2. Direct material cost assigned: (EUP to complete beginning work in process inventory for direct materials times the EUP cost per unit).
3. Conversion costs assigned: (EUP to complete beginning work in process inventory for conversion costs times EUP cost per unit.)
4. Cost assigned to units started and completed during the period
	* 1. Direct material cost assigned: (EUP for units started and finished for materials times EUP cost per unit).
		2. Conversion costs assigned: (EUP in ending work in process inventory for conversion costs times EUP cost per unit).
5. Cost assigned to ending work in process inventory equals:
	* 1. Direct material cost assigned: (EUP of ending work in process inventory for direct material times EUP cost per unit).
		2. Conversion costs assigned: (EUP in ending work in process inventory for conversion costs times EUP cost per unit).
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