Chapter 11 – Joint Product and Process Cost systems

Joint production process: Simultaneously converts a common input into several outputs.

Joint products: Products that jointly result from processing a common input.

Split-off point: The point at which joint products appear in the production process.

Final Product: One that is ready for sale without significant further processing.

Intermediate product: A product that might require further processing before it is saleable to the ultimate consumer; either by the producer or by another processor. Thus, an intermediate product might be a final product for one company (the producer) and input for another company that will process it further.

Joint costs: The costs to operate joint-product processes including the disposal of waste, the cost of unrecovered resources applied to defective products that cannot be sold. Depending on the technology used, joint-product processes primarily use resources at the batch and facility levels.

In practice, assigning joint costs to the various products for financial reporting involves a somewhat arbitrary cost allocation based on the quantities of outputs or the relative profitability or sales values of the joint products. The sequence of decisions involved in the management and reporting of joint product processes requires, first, deciding which products to produce and, only then, determining how to allocate joint process costs.

LO 1: Maximise profits from a joint product process by analysing the sell-or-process-further decision.

1. Identify alternative sets and quantities of final products possible from the joint product process.
2. Forecast the sales price of each final product.
3. Estimate the costs (if any) required to further process joint products into saleable products.
4. Choose the set of final products with the overall maximum profit.

Further processing costs: The costs incurred to make joint products usable or saleable after split-off.

The management team must decide whether selling outputs at intermediate stages or processing them further is more profitable. In this 'sell-or-process-further' decision, the relevant economic data to consider are
1) the revenues that can be earned before or after further processing and
2) the additional costs to process further.

Net realisable value (NRV): Is a product's contribution to profit after the split-off point and is computed as sales revenue minus further processing costs. To reiterate, a product's NRV does not include any 'upstream' joint processing costs that occur up to the point of split-off.

LO 2: Use the physical measures and net realisable value joint-cost allocation methods for reporting the costs of main products and by-products.

Organisations allocated joint costs for many reasons, including financial reporting, pricing, measuring and verifying process performance, estimating casualty losses, calculating regulated rates, specifying contractual obligations and resolving contractual disputes. Manufacturing companies are required to use joint cost allocation for financial and tax reporting to value inventories and cost of sales.

In practice, companies distinguish between main products and by-products before allocating joint costs because, by convention, joint costs are allocated only to main products. A main product is a joint output that generates a significant portion of the net realisable value from the process.
A by-product is the output from a joint production process that is minor in quantity and/or NRV when compared to the main products. Because they are deemed to be immaterial to reported financial results, by-products do not receive allocations of joint costs. By-products also by convention are not inventories, but the NRV from by-products is typically recognised as 'other income' or as a reduction of joint product processing costs when the by-product is produced.

The two major methods of allocating joint costs are
1) the net realisable value method and
2) the physical measures method.
Other methods, such as the relative sales value at split off and relative gross margin are important for certain industries, but are used less frequently;

Net realisable value (NRV) method: Allocates joint costs based on the NRV of each main product after the split-off point. If the main products are to be sold at the split-off point without further processing, the market values or sales prices at split-off are used for this allocation base. If further processing is required, the NRV at the split-off point is computed by subtracting actual or estimated further processing costs from the sales value. Using the NRV method, joint costs are allocated to the main products in proportion to their NRVs after the split-off point.
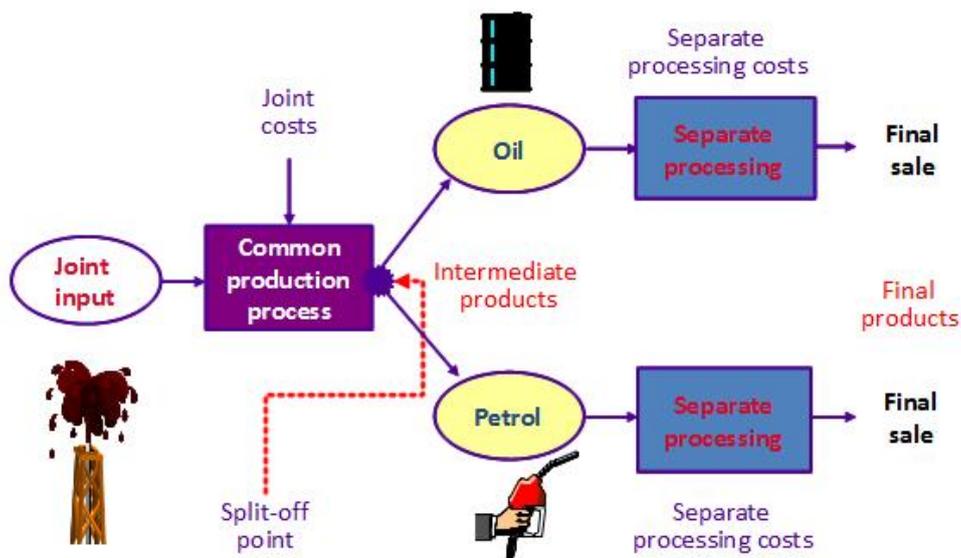
Physical measures (or quantities) method: A joint cost allocation based on the relative volume, weight, energy content or other physical measure of each joint product that appears at the split-off point. Companies might prefer the physical measures method when the outputs can be measured

comparably and the prices of their output products are highly volatile or unpredictable. This method is sometimes used when significant processing occurs between the split-off point and the first sales opportunity or when the market does not set product prices. The latter situation could arise when regulatory bodies set prices in regulated pricing situations or when cost-based contracts stipulated with method.

Many oil- and gas-producing companies allocated joint costs on the basis of the products' energy equivalents (BTU content), which are closely related to their sales values.

LO 3: Apply a five-step costing method to allocated process costs to finished and partially completed main products.

Process costing system: Treats all units processed during a time period as the output for costing and does not separately record costs for individual units produced. The rationales are that every unit is identical and recording the costs of each unit would be prohibitively expensive, without observable benefits.

Recall that job-order costing records the costs incurred to make specific units of production, which are typically jobs or orders. In process costing systems, however, costs are first recorded for each department (plant or process) and then allocated to the units (for example, litres of cola concentrate) that are completed by the department.

Process costing allocates costs to opening WIP inventory and to units completed (transferred out of WIP inventory) in five steps. These steps are:
1. Summarise the flow of physical units.
2. Compute the equivalent number of units produced.
3. Summarise the total costs to assign to products; these are the sums of the costs in opening inventory and the actual costs incurred in the department during the period. Note that use of standard costs eliminates the need to perform steps 3 and 4, because all inventories are valued at standard cost. Variances from standards would be expensed.
4. Compute costs per equivalent unit.
5. Allocated per-unit costs to goods transferred out to finished goods (completed) and to opening WIP inventory (not completed).

Step 1: Summarise the flow of physical units
Using the basic cost-flow model to account for units:

Opening inventory + Transfers in – Transfers out = Closing inventory

Step 2: Compute equivalent number of units produced
Step 2 applies the concept of an equivalent units, which represents the amount of work actually performed on units of product completed and not yet complete that is expressed as the work required to complete entire, fully completed units. This concept is one of the keys to applying process costing in a cost-effective manner. According to this concept, if five units were incomplete at the end of a month and each was 60% finished at the end of the month, the work performed would be considered equivalent to the work performed to complete three whole units. Thus, for process-costing purposes, the five incomplete units equal three equivalent units.

Step 3: Accumulate costs to allocate products
Step 4: Compute costs per equivalent unit
Step 5: Allocate costs to goods completed and to goods not completed
This summarises the process costs allocated to final outcomes and completes the production cost report for the first example.

LO 4: Apply the five-step method to allocate process costs to prepare a production report of finished goods, work-in-progress, and spoilage using weighted-average costing.

Waste: The loss of product because the technology of production does not convert all inputs to usable outputs.

Spoilage: Is effort (material and conversion) that results in defective outcomes: goods that are damaged, do not meet specifications, or are otherwise not suitable for further processing or sale as good output.

Normal spoilage: unsaleable products that are expected results, given the technology of regular operations of the production process. Organisations that strive to eliminate all defects might not consider any spoilage to be normal, because this implies acceptance of defects. These might treat all spoilage as abnormal.

Abnormal spoilage: Spoilage from unusual or unexpected operations of a process, such as an industrial accident or logistical failure that allowed defective inputs to be used. In general normal spoilage is waste that is counted as usual cost of production. Abnormal spoilage is accounted as a loss of the period.

To distinguish between normal and abnormal spoilage requires that we know
a) the normal spoilage rate and
b) when spoilage is detected in the process (the inspection point).
The normal spoilage rate is determined by the plant's technology.

Weighted-average process costing: The method by which the costs and equivalent units of the current efforts applied and the costs of opening WIP are pooled and averaged.

Complete the allocation of costs of direct materials and conversion to the month's outputs by multiplying each output's equivalent units from Step 2 by the appropriate cost per equivalent unit from Step 4. Typically, companies will measure the total cost of goods completed by adding the cost of normal spoilage.

LO 5: Use the relative sales value at split off and constant gross margin percentage methods of joint cost allocation.

The chapter discussed the typical net realisable value method for allocating joint costs. This appendix presents two other methods also based on the economic values of joint outputs:
1) The relative sales value at split-off method and
2) The constant gross margin percentage.

Relative sales value at split-off method: Allocates joint costs based on the relative sales values of the joint products at their split-off point. This method does not consider further processing costs after the split-off point. Note that the relative sales value method does not include any further processing costs and based on relative values at the split-off point before any additional processing. This is one of the rational, consistent methods permitted by financial reporting.

Constant gross margin percentage method: Allocates joint costs to products in such a way that the gross margin percentages as a percentage of revenue are the same for each joint product. Three steps are required to use this method:

1. Compute the total gross margin percentage for the outputs of the total joint process.
2. Use the total gross margin percentage calculated in step 1 to calculate the gross margin for each product. Gross margin = Total gross margin percentage x Sales value
3. Solve for the joint costs allocated to each product by subtracting gross margins and further processing costs from the sales revenue.

Allocated joint costs = Sales revenue – Gross margin – Further processing costs.

The constant gross margin percentage method is based on a similar principle to the NRV method, except for one difference. The NRV method results in gross margin percentages that are equal as a percentage of the net realisable values of each joint product, whereas the constant gross margin method requires that gross margin percentages be equal as a percentage of the revenues of each joint product.

LO 6: Allocate process costs to products using first-in first-out (FIFO) costing.

A limitation of weighted-average costing is that it mixes current period costs with the costs of products in opening inventory, making it impossible for managers to know by how much the costs to make a product during the current period differ from prior periods.
FIFO costing: Is an inventory method that identifies the first units completed as the first ones sold or transferred out. FIFO costing separates current period costs from those in opening inventory and transfers out the costs in opening inventory in a lump sum (assuming that the units in opening inventory were completed during the current period) rather than mingling them with current period costs.

If WIP inventories are large and if production costs vary across periods, FIFO process costing generates more accurate information about the work done in the current period. If the production process is a FIFO process, the inventory numbers are more likely to reflect reality under FIFO costing than under weighted-average costing because the units in opening inventory are likely to have been produced in the current period.

Read the Appendix 11B to fully understand the method.

LO 7: Explain operation costing.

Operation costing: A hybrid of job-order and process costing, and companies use it when they produce batches of similar products with significantly different types of material. Hybrid costing is appropriate for costing the manufacture of goods that have both common characteristics and some individual characteristics. An operation is a standardised method of making a product that is repeatedly performed.
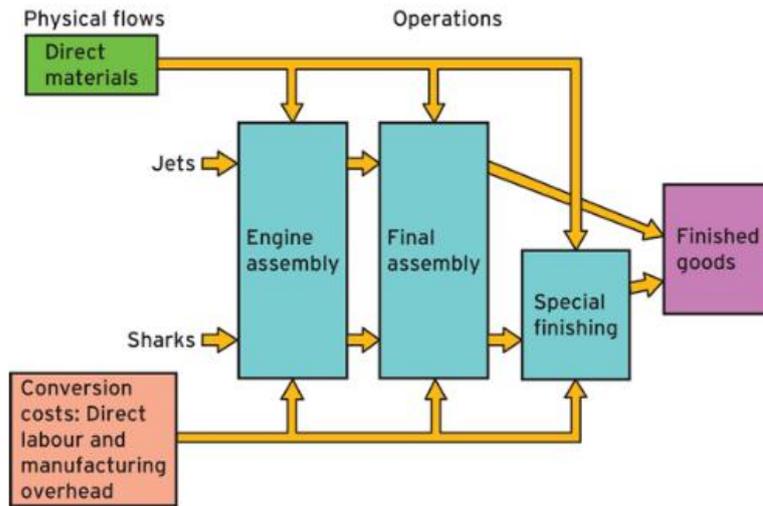
The key difference between operation costing, job costing and process costing is that direct materials for each work order or batch passing through a particular operation are different although conversion costs are the same.