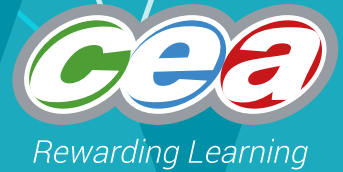


FACTFILE:

GCSE

Engineering and Manufacturing

3.3.3 Engineering and Manufacturing Costs



## Engineering and Manufacturing Costs

### Learning outcomes

Students should be able to:

- apply knowledge and understanding and be able to perform calculations relating to:
  - direct costs, within the production process: human, material and service resources identified within the production stage;
  - indirect costs: management, administration, marketing and expenses; and
  - total cost of manufacturing a product: direct costs plus indirect costs.

The manufacturing cost is the sum of costs of all resources needed in the process of making a product. The manufacturing cost is classified into three categories: direct costs, indirect costs, and manufacturing overheads.

- **direct costs;**
  - human, and
  - material and service resources.
- **indirect costs;**
  - management,
  - administration,
  - research and development, and
  - marketing and sales.
- **manufacturing overheads;**
  - manufacturing equipment,
  - manufacturing plant, and
  - general overhead costs.

## Direct labour costs

In simple terms this is the cost of paying employees directly involved in the production process. Companies carefully estimate how much direct labour goes into each product made — that is, how long each kind of worker takes to do the job or their part of the process. Then, to find the total direct labour cost of the product, they multiply this time period by the hourly cost of paying each worker. The direct labour cost of workers can vary in relation to their skill level and area of expertise. A quality control inspector would have a higher cost to the company than a shop floor cleaner.

Within the modern production plant there are many different categories of worker who are considered to be part of the direct labour cost. For example:

- goods handlers;
- assembly line operators;
- production process monitors;
- assembly technicians;
- quality control inspectors;
- packaging and distribution; and
- maintenance technicians.

All of these workers will have differing levels of cost which will impact on the overall cost of production.



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The number of workers involved in the production process can vary greatly from one type of production to another. There would be fewer workers involved in the production of a bespoke piece of furniture than there would be in the production of washing machines and this will have a direct impact on the production costs.



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However, as factories automate, they are replacing human workers with automated machines. Therefore, as they implement new manufacturing technologies, factories rely less on direct labour. In a modern factory, direct labour can account for 15% or less of total manufacturing cost. A completely automated factory does not need any direct labour at all.

### Direct materials cost

Direct materials are the raw materials that become a part of the finished product. In the production of washing machines sheet metal would be the primary material involved in production. There would be other components, such as motors, control units, hoses, rubber seals, electronic cabling and packaging that are needed to produce the finished product. These have a cost and would be added to direct material costs.



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### Indirect Costs

#### Management costs, administration, research and development and marketing



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In all manufacturing industries there will be a management team who are tasked with managing the business. Their role is to plan and implement strategies to maximize the profitability of the company. The size of the management team may be only 5% of the total workforce but those in the team would have a bigger salary than a shop floor worker.

Supporting the management team is the administration team which deals with the day to day non manufacturing business such as:

- HR (Human Relations),
- salaries and payroll,
- I.T support,
- sales and order management,
- customer services,
- purchasing materials, and
- stock control.

For some manufacturing companies it is vital to have a Research and Development Unit that plays a critical role in the innovation process. If a company is to introduce new technologies and develop their production methods, it is essential that it has a research and development department that is highly skilled and innovative. An investment in technology and future capabilities can be transformed into new products, processes, and services.

While the research and development department is usually separate from sales, production and other divisions, its functions are related and often require collaboration between the divisions. The people within this unit will be highly qualified and will demand a high salary.

Within this larger grouping of administration there will be a marketing and sales team tasked with promoting and selling the manufactured products to customers. This team set sales goals and quotas, build a sales plan, analyze data, identify prospective clients and assign sales teams to different regions, or countries internationally. This will involve sales personnel making contact with prospective customers, promoting and demonstrating the products and developing solid working relationships with the client.

## Manufacturing overheads

Manufacturing overheads can be:

- manufacturing equipment;
- manufacturing plant; and
- general overhead costs.

These overhead costs are just as important to the finished product as the costs of making the product. Think about overhead costs as other costs. That is, if a cost is not direct labour or direct materials, then it goes into overheads.



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The cost of setting up the manufacturing plant, both the physical building and the production equipment can be a huge financial investment on the part of the company. If a company introduces an improved manufacturing process it is likely that this will require improved production equipment which will come at an extra cost. Retooling can be a huge investment but it can result in improved manufacturing efficiency and company profitability.

The cost of property and other taxes, land rent, property insurance, electricity, freight and transportation and depreciation of factories and equipment all add to the overheads. The cost associated with consumables, such as lubricants, grease, and water, that are not used as raw materials would also fall into this category.

**Total cost of manufacturing a product: direct costs plus indirect costs.**

The total cost of production is the sum of all of these individual costs. All expenditure must be included in these calculations as it will allow the product price to be set to allow the company to create profit and plan for future development and production.

**Worked example**

Tony's Toy Corporation manufactures plastic figures at the rate of 25,000 per week. Direct materials were £60,000, direct labour was £30,000, and overheads were £65,000. Using this information, the total product cost and the per unit cost can be calculated.

- Direct Materials £60,000
- Direct Labour £30,000
- Overheads £65,000
- Total Product Cost £155,000
- Per Unit Cost =  $\text{£}155,000 / 25,000 = \text{£}6.20$  per plastic figure.

## Revision questions

1. Name the **two** main sources of direct costs in manufacturing.

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2. Name **two** areas within a manufacturing business that can be classified as an indirect cost.

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3. Give **two** examples of manufacturing overheads.

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4. Explain what is meant by direct labour costs.

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5. Identify **three** groups of direct cost materials that would be considered necessary in the manufacture of a washing machine.

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6. List **three** different manufacturing overheads.

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7. Calculate the product cost of a child's wooden puzzle from the following information:

- **Production = 4,500 units per week**
- Direct Materials £72,000
- Direct Labour £35,000
- Indirect Labour £39,550
- Overheads £60,000

Total Product Cost =

### Additional resources

<https://www.thebalance.com/product-pricing-direct-and-indirect-costs-393470>

<http://www.thedesigntrust.co.uk/calculate-how-much-your-product-will-cost/>

<http://www.jobisjob.co.uk/factory/job-description>

<http://www.accountingcoach.com/blog/direct-indirect-fixed-variable-costs>

<http://knowledgegrab.com/learners-zone/study-support/cost-and-management-accounting-explained/framework-introduction-to-cost-management-accounting/cost-and-management-accounting-example/>

<http://www.accounting-basics-for-students.com/manufacturing-cost-statement.html>

