FACTFILE:
GCSE
Engineering and Manufacturing
3.3.1 Waste, Disposal and Recycling

Rewarding Learning

Waste, Disposal and Recycling

Learning outcomes

Students should be able to:

- consider waste produced as a cost when manufacturing a product; and
- discuss the issues around the disposal and recycling of waste materials.

Material waste

In the manufacturing process it is common practice to have individual parts of the product cut from sheet materials. This is the case with many items which are manufactured from sheets of metal, wood or plastic. In most cases it is very likely that there will be off cuts or other forms of waste material left after the individual parts have been cut out. Unwanted material left over from a production process is looked upon as waste. This waste comes at a price.

Losses in the production process

With the cost of goods and materials rising, using resources efficiently and reducing manufacturing waste makes good financial sense.

Worked example

A manufacturer of kitchen bins purchases sheets of aluminum (2000mm × 1000mm × 3mm) at a cost of £78.00. The manufacturing of the products creates waste material of 5%. This equates to losing £3.90 on every sheet used. Weekly production requires 500 sheets of material resulting in a loss of £1,950 per week. Over a year this loss costs the company £101,400. (Assuming manufacturing is 52 weeks)

It is important for the manufacturer to reduce the amount of waste material in the manufacturing process to as much as possible.

Planning

To know where waste is arising, it is important to have a detailed understanding of the manufacturing process. Discussions with relevant employees can produce feedback on where waste is occurring, and what could be done to reduce it. A production manager could produce a flowchart of the operation which may help identify where the waste is arising.

Reducing waste through design

There could be ways of designing the product so that it uses less raw materials. In this area the use of CAD can help maximise the usage of the sheet material because the manufacturer is able to visualise the product before manufacture.

Rejection at the inspection stage

An area of concern for some manufacturers is one which has products rejected at the inspection stage which has a direct impact on a company's profitability. In manufacturing, quality control is a process used to ensure products meet a company's quality requirements before they are sold to customers. Quality control systems can identify areas that create waste. By reducing the number of defective productsthe company reduces waste resulting in savings. The identification of defects early in the production process decreases the cost to the company.

The disposal and recycling of waste materials

Recycling

Recycling is important for the environment because it reduces the amount of waste sent to landfill and reduces the need to use new raw materials, however the priority should be to reduce waste in the first place.

With ever rising waste disposal costs, businesses need to think about alternative ways of disposing of their unwanted materials. One option is to recycle waste. Specialist recycling services can collect all sorts of everyday recyclable materials, including paper, plastic, metal and electronic equipment. The benefits of recycling are both environmental and financial.

Advantages of recycling waste

Environmental benefits;

- recycling waste means less disposal to landfill and less overall harm to the environment.

Reducing waste costs;

- managing and handling waste is costly, and reducing the amount of waste you send directly to landfill can bring large savings on landfill tax.

It can save energy, reduce air and water pollution and greenhouse gases;

- producing some recycled products, e.g. using recycled material might in some cases use less energy than using newly processed raw materials.

Meeting legal obligations;

- some industries have a legal responsibility for disposal of their products.

Disadvantages of recycling waste

Options;

- recycling waste may be better for the environment than disposal, however, either reducing waste or reusing waste is preferable to recycling.

Recycling costs;

- using a waste contractor to collect waste for recycling will cost money.

Space for recycling;

- collection and sorting of waste materials for recycling requires space which may be difficult to find on some business premises.

Recycling is the least preferred waste management option after reducing and reusing waste because energy and resources are needed to reprocess the waste before the materials can be used again. Businesses need to maximise the benefits which recycling waste can offer them and the environment.

Revision questions

Q1. In the manufacturing process why is the manufacturer left with some waste material after product parts have been cut from sheet materials?

Q2. A manufacturer has a materials bill of £3,420 per week. Material wastage is 3.5%. Calculate the annual material loss.

Q3. Describe **three** procedures that a manufacturer could employ to reduce material waste.

Q4. List **three** raw materials which are able to be recycled.

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Q5. Give **three** examples of how a manufacturer can benefit from recycling materials.

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Q6. Give **one** disadvantage of a recycling programme.

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Q7. How does the environment benefit from recycling waste materials?

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Additional information sources:

https://www.youtube.com/watch?v=CySG3I7DC3A

http://www.businessdictionary.com/definition/waste.html

https://www.gov.uk/government/publications/future-of-manufacturing/

https://www.nibusinessinfo.co.uk/content/create-strategy-reduce-business-waste

http://www.dailycadcam.com/computer-aided-engineering

https://www.eef.org.uk/campaigning/

http://www.bbc.co.uk/bitesize/science

http://www.plantengineering.com