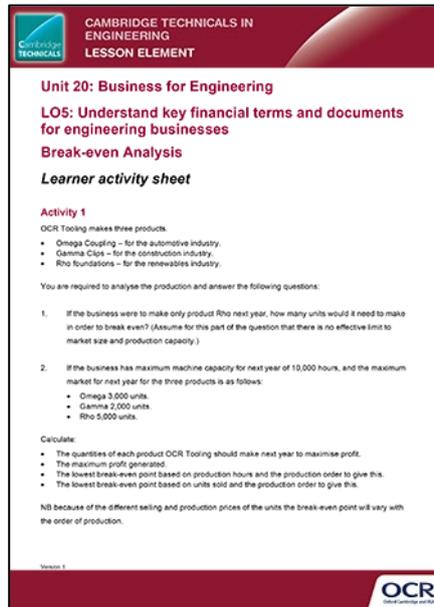# Unit 20: Business for Engineering

LO5: Understand key financial terms and documents for engineering businesses

Break-even Analysis

Instructions and answers for teachers

These instructions should accompany the OCR resource 'Using project monitoring tools – GANTT Charts' *activity which supports Cambridge Technicals in Engineering Level 3.*

The Activity:

Learners use the brief to produce a range of Break-even outcomes for the company, the task is complicated by the different sales prices and production costs.

This activity offers an opportunity for English skills development.

This activity offers an opportunity for maths skills development.

Suggested timings:

2 hours

Activity 1

The ability to understand and calculate break-even analysis is important for anyone involved in business. This task uses the example of OCR Tooling, an engineering company producing three different products at different costs and prices.

Learners use the brief to produce a range of Break-even outcomes for the company, the task is complicated by the different sales prices and production costs.

A spreadsheet containing the solution, a scenario calculator and illustrative break-even charts is provided.

The calculation of the Rho break-even price is a simple straight line graph.

Learners will be more challenged when they have to consider the production order and production limitations for the second part of the task.

Note that the best order for production changes if measured against production time instead of the more traditional units sold.

Learners are provided with diagrams showing how to calculate break-even point.

OCR Tooling makes three products.

- Omega Coupling – for the automotive industry.
- Gamma Clips – for the construction industry.
- Rho foundations – for the renewables industry.

Details of the three products are shown below.

Product	Omega £/unit	Gamma £/unit	Rho £/unit
Selling price	30	20	39
Variable material cost	15	10	18
Other variable production costs	6	5	10
Time per unit required on machines (hours)	2	1	3

Learners are required to analyse the production and answer the following questions:

1.	If the business were to make only product Rho next year, how many units would it need to make in order to break even? (Assume for this part of the question that there is no effective limit to market size and production capacity.)

2.	If the business has maximum machine capacity for next year of 10,000 hours, and the maximum market for next year for the three products is as follows:

- Omega 3,000 units.
- Gamma 2,000 units.
- Rho 5,000 units.

Calculate:

- The quantities of each product OCR Tooling should make next year to maximise profit.
- The maximum profit generated.
- The lowest break-even point based on production hours and the production order to give this.
- The lowest break-even point based on units sold and the production order to give this.

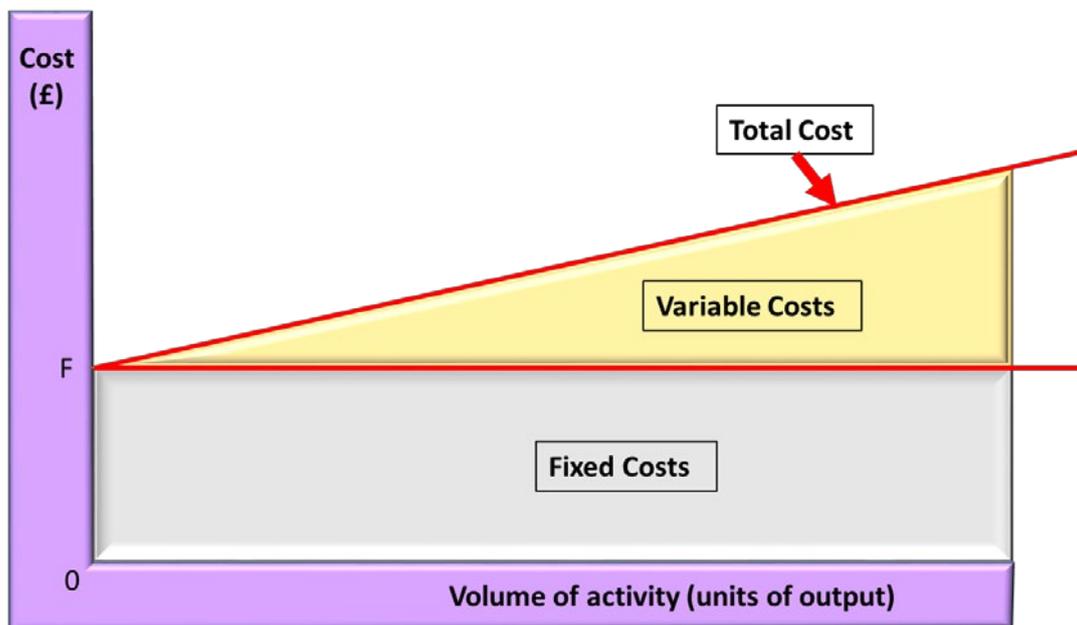## Overview of Break-even analysis

Figure 1: Total cost against volume of activity

The bottom part of the graph represents the fixed cost element. This is added to the wedge shaped top portion, which represents the variable costs. Together these represent the total cost.

At zero activity, the variable costs are zero, so total costs at this point equals the fixed cost. As the production increases, the variable cost and the total costs increase.
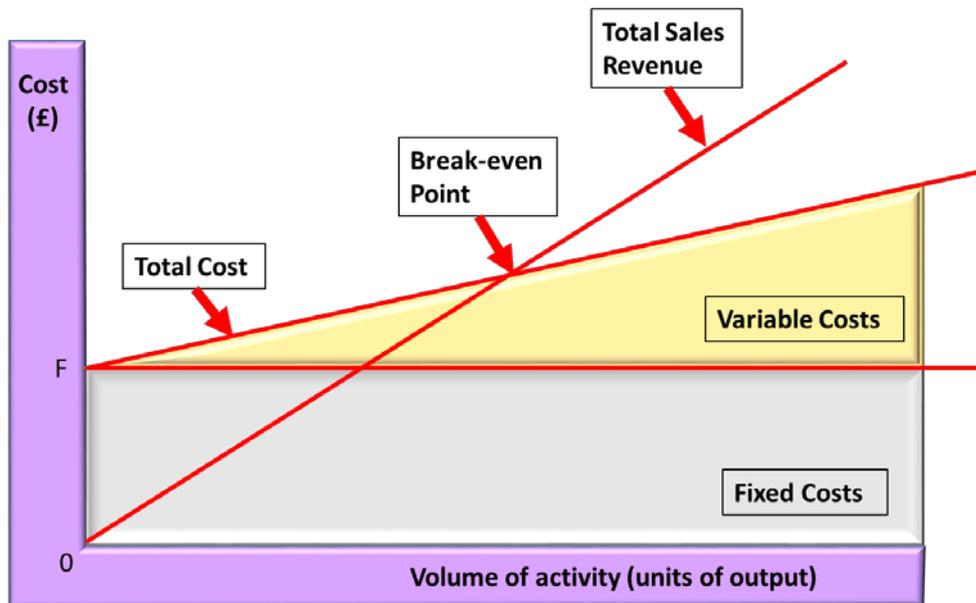

Figure 2: Break-even chart

The sloping line starting at zero represents the sales revenue at various volumes of activity.

The point at which this line crosses the sloping total cost line, is the break-even point. Below this point a loss is made, above it a profit.

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