ME8793 PROCESS PLANNING AND COST ESTIMATION

UNIT 2 PROCESS PLANNING ACTIVITIES

5.ECONOMICS OF PROCESS PLANNING:

INTRODUCTION

The process planner should have the fundamental knowledge on cost estimating, cost accounting, various types of costs, and components of costs and calculation of manufacturing of a product.

The knowledge of costing will help the process planner and the management to take the following decisions:

- Type of material to be used for a product
- Type of manufacturing process to be used for a product
- Volume of product to be manufactured
- Make or buy a product
- Design of a product

The various classification of costs elements of costs and the calculation of total cost of a product with numerous numerical. In the following section, the Concept of break-even analysis with respect to process planning activities is presented.

BREAK-EVEN ANALYSIS

Break-even analysis, also known as cost-volume-profit analysis, is the study of Inter- relationships among a firm's sales, coats and operating profit at various levels of output. It reveals the effect of fixed costs, variable costs, prices, sales mix, etc., on the profitability of a firm.

It is a simple method of presenting to management the effect of changes in volume on profit. It is concerned with finding the point at which revenues and costs are exactly equal. This point is known as break-even point.

Aims of Break-Even Analysis

The important aims and objects of break-even analysis are:

- To help in deciding profitable level of output, below which losses will occur.
- To compute costs and revenues for all possible volumes of output to fix budgeted sales.
- To take decision regarding make or buy.
- To decide the product mix and promotion mix.
- To take plant expansion decisions.
- To take equipment replacement decisions.
- To indicate margin of safety.
- To fix the price of an article to give the desired profit.
- To compare a number of business enterprises.
- To compare a number of facility locations.

Break-Even Point

Break-even point may be defined as the level of sales at which total revenues and total costs are equal. It is a point at which the profit is zero. It is also known as "no-profit no-loss point". If a firm produces and sells above the break-even point, it makes profit. In case it produces and sells less than the break- even point, the firm would suffer losses, Management can change the break-even point by changing fixed cost, variable cost and selling price.

Determination of Break-Even Point

Two approaches used to determine break-even point are:

1. The algebraic method, and
2. The graphical method.

THE ALGEBRAIC METHOD:

(1) Break-even point in terms of Physical Units:

- FC = Fixed cost
- VC = Variable cost per unit
- TVC = Total variable cost
- TC = Total costs
- TR = Total revenue i.e., total income
- Q = Sales volume i.e., quantity sold
- SP = Selling price per unit

Total costs = Fixed cost + Variable cost TC = FC+(VC x Q)

Total revenue = Selling price / unit x Quantity sold

$$TR = SP \times Q$$

At Break-Even Point,

Total costs = Total revenue

$$TC = TR$$

$$FC + (VC \times Q) = SP \times Q$$

$$QBEP = FC / (SP - VC)$$

Break-even quantity = Fixed Costs / {(Selling price / unit) — (Variable cost / unit)}

(ii) Break-even point in terms of Sales Value:

This method is suitable for a multi-product firm.

Break-even sales (BEP in rupees) = Fixed costs / 1- {(Variable cost / unit) / (Selling price / Unit)}

$$BEP \text{ in rupees} = FC / 1 - (VC/SP)$$

Contribution

The difference between selling price and variable cost per unit is known as contribution or contribution margin.

Contribution = Selling price — Variable cost

C = SP—VC

Contribution is a companion measure of value that tells how much of the revenue from the sale of one unit of a product will contribute to cover fixed costs with the remainder going to profit.

Contribution margin divided by selling price is known as contribution ratio.

Contribution ratio = Contribution / Selling price

Contribution ratio = (Selling price — Variable cost) / Selling price

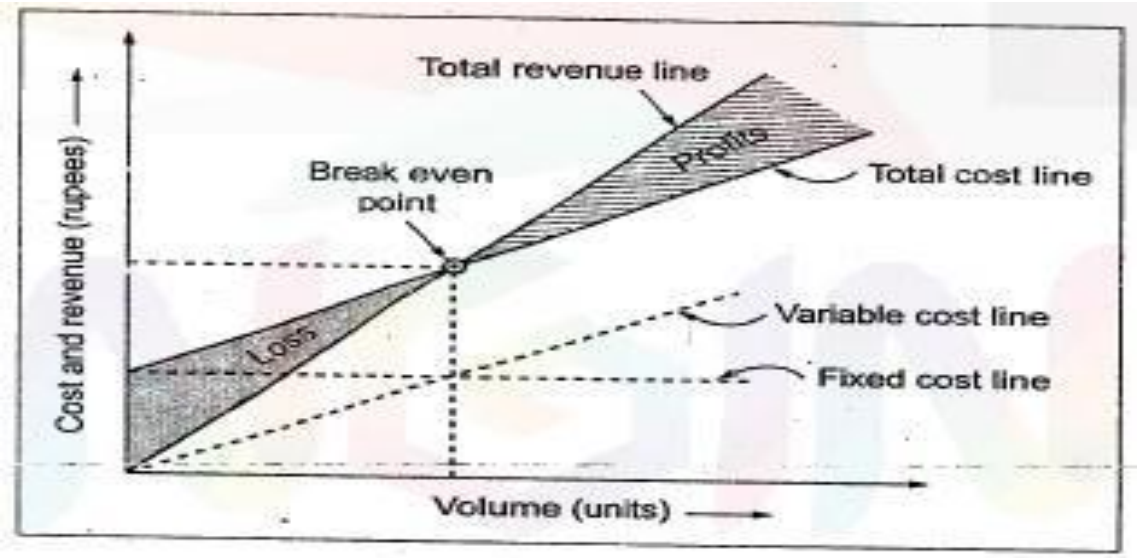
P/V RATIO (PROFIT / VOLUME RATIO)

P/V Ratio = Contribution / Sales

The Graphical Method (Break Even Chart)

- Break even chart is a graphical representation of the relationship between costs and revenue at a given time.
- It is a graphic device to determine the break-even point and amount of loss or profit under varying conditions of output and costs.
- In break-even chart, cost and revenue in rupees is represented on horizontal ax is
- The fixed cost line is horizontal and parallel to the X-axis. It indicates that fixed costs remain unchanged for any volume.
- The variable cost line is superimposed on the fixed cost line to show total costs.
- The total sales revenue line is drawn.
- This line indicates sales income at various levels of output.
- The point at which the total revenue line intersects the total cost line is the break-even point.

- The shaded area above the BEP marks profit to the firm whereas the shaded area below the BEP represents loss to the concern



MARGIN OF SAFETY

- Margin of safety is the difference between the existing level of output and the level of output at BEP.
- Greater value of margin of safety means higher profits to the firm
- If the safety margin is low, then the firm runs the risk of incurring losses.

Margin of safety (in%) = (Sales – Sales at BEP) / Sales * 100

Machine Break Points (Equipment Selection)

- Break even analysis is a useful guide in the selection of most economical equipment or production process
- The most economical alternatives is the one with the lowest costs at the expected volume
- A graph of the respective costs will reveal the machine break points.