Al-Mustaqbal University College Chem. Eng. Petroleum Industries Dept.

Engineering Economics
4th Stage

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Lecture 2

Gross Profit, Net Profit, And Cash Flow

The product sales revenue minus the total product cost gives the gross profit, also called gross earnings. Gross profit is expressed both with and without depreciation included as follows:

Gross Profit= Revenue – Production Cost or (COGS)

$g_j = s_j - Co_j$

where gj is gross profit, depreciation ***not*** included, in year j, and

Annual sales revenue, $/yr $= \sum$ (sales of product, kg/yr)(product sales price, $/kg)

$G_j = s_j - Co_j - d_j$

where G_j is gross profit, depreciation included, in year j;

Net profit, also called net earnings, is the amount retained of the profit after income taxes have been paid;

$N_{pj} = G_j (1-\Phi)$ ⟷ **Net Profit = Gross Profit – Taxes**

**Income taxes= $G_j \Phi = (s_j - Co_j - d_j) \Phi$**

Cash Flow

The flow of funds for an overall industrial operation based on a corporate treasury (the funds or revenue) serving as a reservoir and source of capital.

Inputs to the capital reservoir normally are in the form of loans, stock issues, bond sales, and other capital sources, and the cash flow from project operations. *Outputs* from the capital reservoir are in the form of capital

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investments in projects, dividends to stockholders, repayment of debts, and other investments.

Operating profit is gross profit minus all other fixed and variable expenses associated with operating the business, such as rent, utilities, and payroll.

Break-Even Point
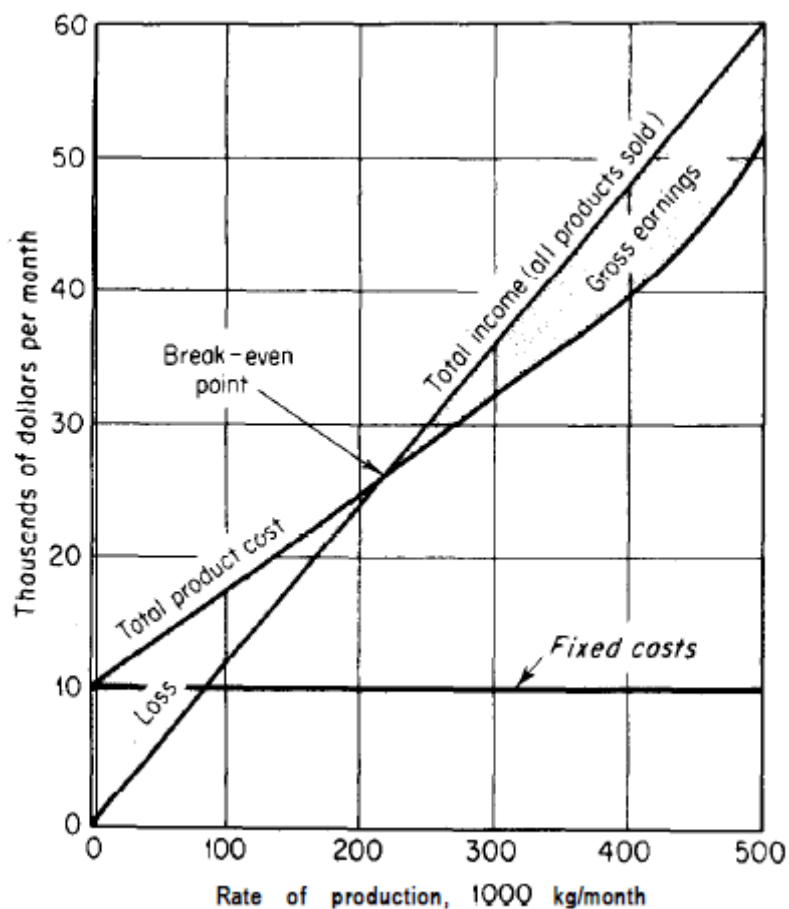
Figure 1 Breakeven chart for chemical processing plant

The corresponding volume of production on the *X*-axis is known as the break-even sales quantity. At the intersection point, the total cost is equal to the total

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revenue. This point is also called the no-loss or no-gain situation. For any production quantity which is less than the break-even quantity, the total cost is more than the total revenue. Hence, the firm will be making loss. For any production quantity which is more than the break-even quantity, the total revenue will be more than the total cost. Hence, the firm will be making profit.

Example:1

The annual variable production costs for a plant operating at 70 percent capacity are $280,000. The sum of the annual fixed charges, overhead costs, and general expenses is $200,000, and may be considered not to change with production rate. The total annual sales are $560,000, and the product sells for $4/kg. What is the breakeven point in kilograms of product per year? What are the gross annual profit Gj (depreciation included) and net annual profit for this plant at 100 percent capacity if the income tax rate is 35 percent of gross profit?

■ **Solution**

The breakeven point occurs when the total annual product cost equals the total annual sales. The total annual product cost is the sum of the fixed charges (depreciation included), overhead and general expenses, and the variable production costs.

Total annual sales = (No. kg of product) (selling price per kg)

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560,000= (No. kg of product) ($4/kg)

Direct production cost/kg = $280,000/ ($560,000/($4/kg))

= $280,000/ 140000= $2/kg

and the kg/yr needed for a breakeven point are given by

$200,000+ ($2) (kg/yr) = ($4)(kg/yr)

kg/yr required = 100,000

Since the annual capacity = 140,000 / (0.70) = 200,000 kg

So, the breakeven point is 100,000/ 200,000 = **50% of capacity**

The gross annual profit = total annual sales — total annual costs.

==**Gross Profit= Revenue – Production Cost or (COGS)**==

So at 100 percent capacity

Gj = ($4/kg) (200,000) - [$200,000 + (200,000 kg) ($2/kg)]

= $200,000

==**Net Profit = Gross Profit – Taxes, $N_{pj}= G_j (1-\Phi)= G_j - G_j\Phi$**==

and the annual net profit = $200,000 - (0.35) ($200,000), so

NPj = $130,000

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