

Capacity formulas

Capacity

Machine requirements for single products

$$M = \frac{Dp}{N[1-(C/100)]}$$

Machine requirements for multiple products

$$M = \frac{[Dp + (D/Q)s]_{product\ 1} + [Dp + (D/Q)s]_{product\ 2} + \dots + [Dp + (D/Q)s]_{product\ n}}{N[1 - (C/100)]}$$

M = Number of machines

D = Yearly demand

p = processing time per product

Q = Batch size

s = setup time per batch

N = Total operating time per year

C = Desired capacity cushion (expressed in %)

Break-even analysis

Total cost $C = F + c \times Q$

Total revenue $R = p \times Q$

Break even quantity $Q = \frac{F}{(p-c)}$

C = Total cost

F = Fixed cost

c = variable cost

Q = Quantity of sold products/services

R = Total revenue

p = revenue per sold unit