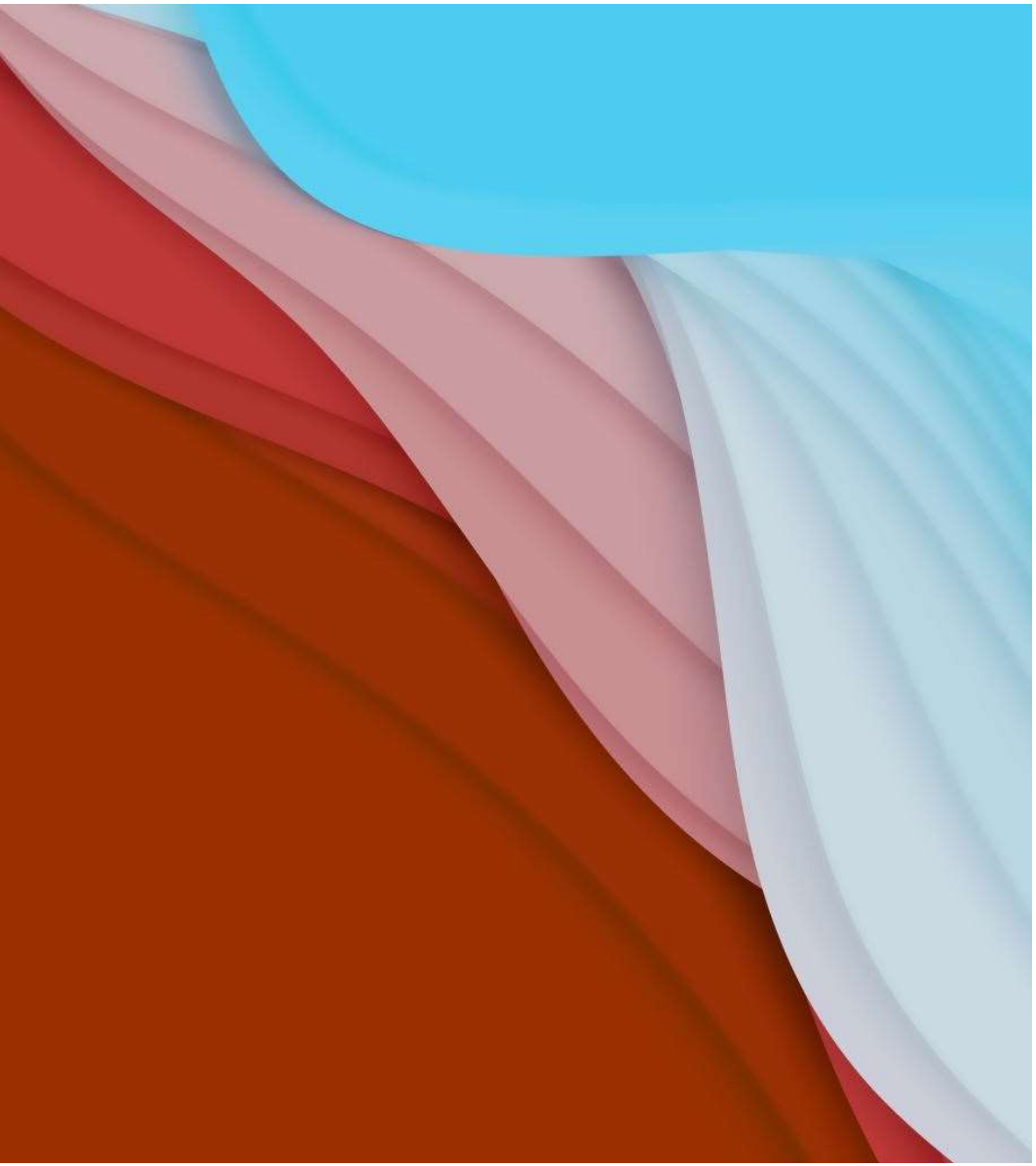

CEN4417
PROCESS DESIGN I

METHODS FOR ESTIMATING CAPITAL INVESTMENT

IT IS POSSIBLE TO COLLECT CALCULATION METHODS IN 6 GROUPS

1. DETAILED ITEM ESTIMATE METHOD
2. UNIT COST ESTIMATE METHOD
3. PERCENTAGE OF DELIVERED-EQUIPMENT COST METHOD
4. LANG FACTORS METHOD
5. POWER FACTORS METHOD - Plant Capacity Ratio
6. TURNOVER RATIOS METHOD

1. DETAILED ITEM ESTIMATE METHOD

1. Utilizing the process flow chart, all the machinery, equipment and material is determined.
2. Specifications are determined.
3. Prices are determined by obtaining proforma invoices from companies.
4. Installation costs are determined by considering actual labor fees.
5. Work efficiency and MAN / HOUR fees are taken into account.
6. Land costs, travel, engineering, drawing etc. all costs are taken into account

2. UNIT COST ESTIMATE METHOD

In calculating Fixed Capital Investment, previously made cost calculations and experiences are used.

Machinery Equipment price is calculated with proforma invoices or by using indexes for the equipment whose prices were known in previous years

Labor costs are calculated in percentage of the purchased equipment cost.

Costs for concrete, steel, pipe, electricity, insulation works are calculated as MATERIAL + LABOR using the prepared drawings of the project.

$$C_n = \left\{\sum (E + E_L) + \sum (f_x M_x + f_y M_L) + \sum f_e H_e + \sum f_d d_n\right\}(f_f)$$

where C_n = new capital investment
E = purchased-equipment cost
E_L = purchased-equipment labor cost
f_x = specific material unit cost, e.g., f_p = unit cost of pipe
M_x = specific material quantity in compatible units
f_y = specific material labor unit cost per employee-hour
M_L' = labor employee-hours for specific material
f_e = unit cost-for engineering
H_e = engmeermg employee-hours
f_d = unit cost per drawing or specification
d_n = number of drawings or specifications
f_F = construction or field expense factor always greater than 1

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