CH0401 Process Engineering Economics

Lecture 3a

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Process Engineering Economics

1   **Economics of Selecting Alternatives**

2   Annual cost method

3   Present worth method

4   Replacement – Rate-of-return method

5   Payout time method

Process Engineering Economics

1 **Economics of Selecting Alternatives**

2 Annual cost method

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5 Payout time method

Process Engineering Economics – *Methods*

Four different methods used in the calculation of profitability or in the economic selection of alternatives they are

1. Annual cost method
2. Present worth method
3. Rate-of-return method and
4. Payout time

Process Engineering Economics – *Methods*

- If R is used as the basis, the procedure is called annual cost method, and **a comparison is made of all the pertinent (or relevant) annual direct costs plus the capital recovery**.

$$R = P\left(\frac{i(1+i)^n}{(1+i)^n - 1}\right)$$

$$R = (P-L) \times \left(\frac{i(1+i)^n}{(1+i)^n - 1}\right) + L \times i$$

- If P is used as the basis the procedure is called the present worth method and **the cost is equal to the sum of present worth's of all the pertinent (or relevant) annual direct costs and capital recovery cost (or the initial cost of installation).** If the installation is replaced during the time period considered then the present worth of this renewal must also be added to the total.

$$P = R\left(\frac{(1+i)^n - 1}{i(1+i)^n}\right)$$

Process Engineering Economics – *Methods*

- If the comparison is made on the basis of interest i earned on the alternative investments where R is a periodic return obtained by alternate equipment for n periods, the rate of return method is used.

$$R = (P - L) \times \left(\frac{i(1+i)^n}{(1+i)^n - 1} \right) + L \times i + \text{AOP}$$

- If a comparison is made for the number of periods that are required before a periodic saving or return R will equal to the original investment P at some interest rate i then payout time method is used.

$$n = \frac{-\log\left(1 - \frac{iP}{R}\right)}{\log(1+i)} \text{ , years}$$

Process Engineering Economics – *Methods*

In general the first two methods (annual and present worth method) are used where small amounts of capital is involved and isolated pieces of equipment are under consideration, whereas the later two methods (rate-of-return and payout time) are employed where the capital investments are large and the influence of profits tax must be considered and are more generally applicable to complete processes or plants.

Process Engineering Economics – *References*

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