ENGINEERING ECONOMY

Chapter #1: Introduction to Engineering Economy

By:

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Engineering Economy

- Involves the systematic evaluation of the economic merits of proposed solutions to engineering problems.

- Engineering Economy is the application of economic factors and criteria to evaluate alternatives by computing a specific measure of worth of estimated cash flows over a specific period of time.

Engineering economic analysis can play a role in many types of situations

- Choosing the best design for a high-efficiency gas furnace.
- Selecting the most suitable robot for a welding operation on an automotive assembly line.
- Making a recommendation about whether jet airplanes for an overnight delivery service should be purchased or leased.
- Determining the optimal staffing plan for a computer help desk.

Principles of Engineering Economy

1. Develop the Alternatives
2. Focus on the Differences
3. Use a Consistent Viewpoint
4. Use a Common Unit of Measure
5. Consider All Relevant Criteria
6. Make Uncertainty Explicit
7. Revisit Your Decisions

Principles of Engineering Economy

1. Develop the Alternatives

The final choice (decision) is among alternatives. The alternatives need to be identified and then defined for subsequent analysis.

2. Focus on the Differences

Only the differences in expected future outcomes among the alternatives are relevant to their comparison and should be considered in the decision.

Principles of Engineering Economy

3. Use a Consistent Viewpoint

The prospective outcomes of the alternatives, economic and other, should be consistently developed from a defined viewpoint (perspective).

4. Use a Common Unit of Measure

Using a common unit of measurement to enumerate as many of the prospective outcomes as possible will make easier the analysis and comparison of alternatives.

Principles of Engineering Economy

5. Consider All Relevant Criteria

Selection of a preferred alternative (decision making) requires the use of a criterion (or several criteria).

6. Make Uncertainty Explicit

Uncertainty is inherent in projecting (or estimating) the future outcomes of the alternatives and should be recognized in their analysis and comparison.

7. Revisit Your Decisions

Improved decision making results from an adaptive process; to the extent practicable, the initial projected outcomes of the selected alternative should be subsequently compared with actual results achieved.

ENGINEERING ECONOMY AND THE DESIGN PROCESS

- An engineering economy study is accomplished using a structured procedure and mathematical modeling techniques. The economic results are then used in a decision situation that involves two or more alternatives and normally includes other engineering knowledge and input.

ENGINEERING ECONOMIC ANALYSIS PROCEDURE

1. Problem recognition, definition, and evaluation
2. Define the goal or objectives
3. Define the feasible alternatives
4. Collect all relevant data/information
5. Evaluate each alternative
6. Select the “best” alternative
7. Implement and monitor the decision

Problem 1.12

Solutions

(a) Problem: To find the least expensive method for setting up capacity to produce drill bits.

(b) Assumptions: The revenue per unit will be the same for either machine; startup costs are negligible; breakdowns are not frequent; previous employee's data are correct; drill bits are manufactured the same way regardless of the alternative chosen; in-house technicians can modify the old machine so its life span will match that of the new machine; neither machine has any resale value; there is no union to lobby for in-house work; etc.

(c) Alternatives: (1) Modify the old machine for producing the new drill bit (using in-house technicians); (2) Buy a new machine for $450,000; (3) Get McDonald Inc. to modify the machine; (4) Outsource the work to another company.

Problem 1.12 cont.

(d) Criterion: Least cost in dollars for the anticipated production runs, given that quality and delivery time are essentially unaffected

(e) Risks: The old machine could be less reliable than a new one; the old machine could cause environmental hazards; fixing the old machine in-house could prove to be unsatisfactory; the old machine could be less safe than a new one; etc.

(f) Non-monetary Considerations: Safety; environmental concerns; quality/reliability differences; "flexibility" of a new machine; job security for in-house work; image to outside companies by having a new technology (machine); etc.

HW

- 1.3/1.5/1.6/1.7/1.9/1.12/1.14
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