
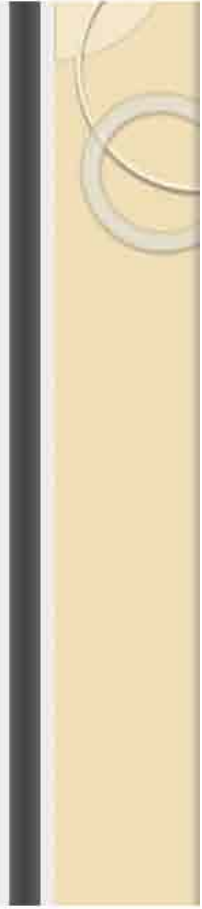


Reliability


- Generally defined as the ability of a product to perform as expected over time.
- Formally defined as the probability that a product, piece of equipment, or system will perform its intended function for a stated period of time under specified operating conditions



“Reliability is a general quality of an object – an ability to perform a desired function, sustaining the values of rated operational indicators in given limits and time according to given technical conditions.”



Four Elements of Reliability

1. Probability – numerical representation - number of times that an event occurs (success) divided by total number trials
 2. Satisfactory performance – criteria established which describe what is considered to be satisfactory system operation
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Four Elements of Reliability

3. Specified time – measure against which degree of system performance can be related - used to predict probability of an item surviving without failure for a designated period of time
4. Specified operating conditions expect a system to function - environmental factors, humidity, vibration, shock, temperature cycle, operational profile, etc.



Four Factors Associated with Reliability

1. Numerical Value.

The numerical value is the probability that the product will function satisfactorily during a particular time.



Four Factors Associated with Reliability

2. Intended Function.


Products are designed for particular applications and are expected to be able to perform those applications.



Four Factors Associated with Reliability

3. Life.


How long the product is expected to last. Product life is specified as a function of usage, time, or both.





Four Factors Associated with Reliability

4. Environmental Conditions


- Indoors.
 - Outdoors.
 - Storage.
 - Transportation.
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Reliability Management

- Define customer performance requirements.
- Determine important economic factors and relationship with reliability requirements.
- Define the environment and conditions of product use.



Reliability Management

- Select components, designs, and vendors that meet reliability and cost criteria.
 - Determine reliability requirements for machines and equipments.
 - Analyze field reliability for improvement.
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Design

- The most important aspect of reliability is the design.
- It should be as simple as possible.
- The fewer the number of components, the greater the reliability.
- Another way of achieving reliability is to have a backup or redundant component (parallel component)

Design

- Reliability can be achieved by overdesign.
- The use of large factors of safety can increase the reliability of a product.
- When an unreliable product can lead to a fatality or substantial financial loss, a fail-safe type of device should be used.
- The maintenance of the system is an

Transportation

- The third most important aspect of reliability is the transportation.
 - Packaging
 - Shipment
- Performance of the product by the customer is the final evaluation.
- Good packaging techniques and shipment evaluation are essential.

Production

- The second most important aspect of reliability is the production process.
- Emphasis should be placed on those components which are least reliable.
- Production personnel.