

Failure Modes and Effects Analysis (FMEA)

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Outline

- What is FMEA?
- History
- Benefits
- Applications
- Procedure
- Exercise
- Summary

What is FMEA?

- FMEA is an acronym that stands for Failure Modes and Effects Analysis
- Methodology of FMEA:
 - Identify the potential failure of a system and its effects
 - Assess the failures to determine actions that would eliminate the chance of occurrence
 - Document the potential failures

Failure is ALWAYS a Design Requirement/Criteria

All Products fail!

Determining **how** they fail, **when** they will fail, and **why** they are failing will allow a designer to incorporate failure as an acceptable design constraint.

Failure as an acceptable design constraint = Customer Satisfaction = Design Quality

History of FMEA

- Created by the aerospace industry in the 1960s.
- Ford began using FMEA in 1972.
- Incorporated by the “Big Three” in 1988.
- Automotive Industry Action Group and American Society for Quality Control copyright standards in 1993.

From: "Inviting Disaster – Lessons From the Edge of Technology" By James R. Chiles

Regarding the continuing failure of rear cargo door on a DC-10:

" The design was originally going to use hydraulics, but under pressure from its client, American Airlines, to simplify and lighten the DC-10 equipment; McDonnell Douglas shifted to an electric door closer instead. This worried engineers working for the builder of the door assembly, Convair Division of General Dynamics. Convair engineers even sent McDonnell Douglas a formal document, called a "failure modes effects analysis," describing the problem and the disastrous consequences.

What are the Benefits?

- Improvements in:
 - Safety
 - Quality
 - Reliability