

The slide features a dark blue background with several large, semi-transparent gear shapes scattered across it. On the left side, there is a vertical strip with a colorful, abstract pattern of gears in shades of orange, yellow, and brown.

Engineering Design

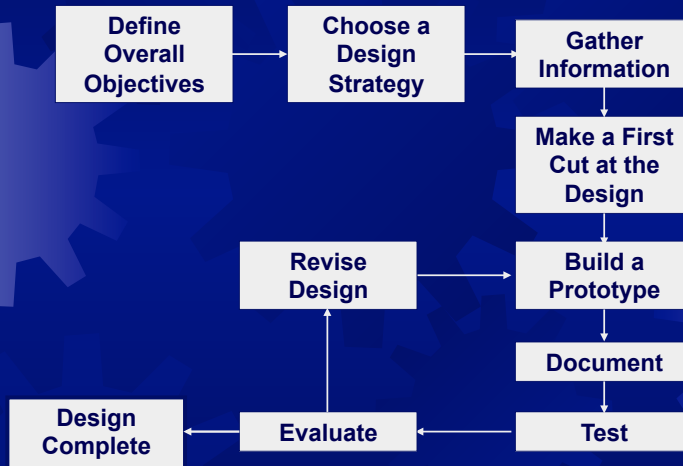
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What is Design?

- Design: the arrangement of parts, details, form, color, etc. so as to produce a skillful invention
- Engineers make designs of
 - Devices
 - Structures
 - Systems

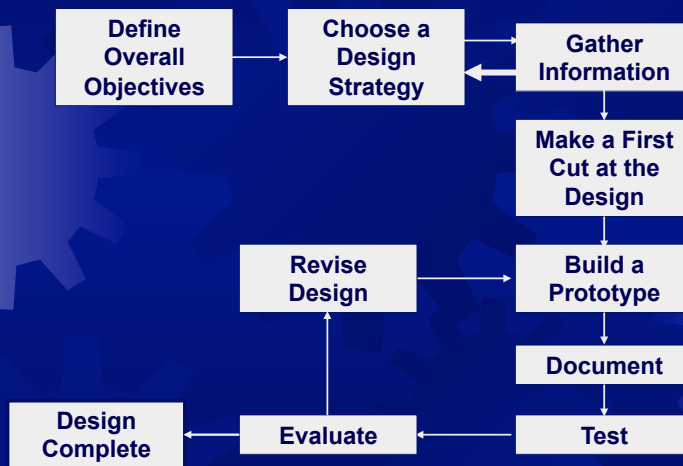
...Functional things

Design Cycle



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Design Cycle



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Define Overall Objectives

What are we trying to accomplish?

- ☀ Describe Problem
 - Consider customers' needs
 - Be specific

How will we know if we have achieved our goal?

- ☀ Performance Measures
 - Quantitative
 - Relevant

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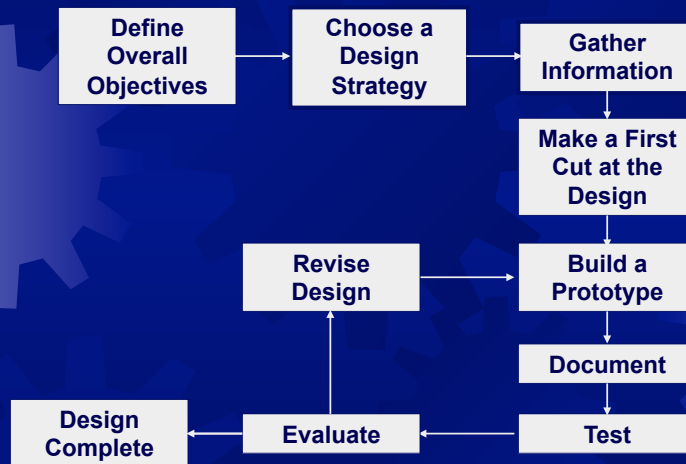
General Design Objectives

Completed design should:

- Work reliably
- Meet technical requirements
- Meet cost requirements
- Require minimal maintenance
- Be safe
- Be ethical

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Design Cycle



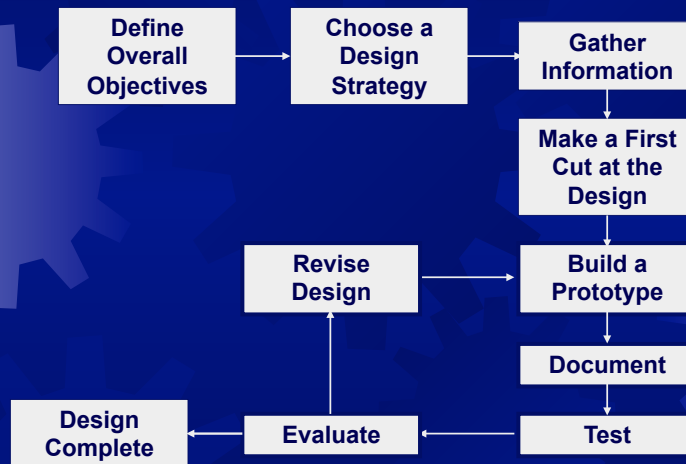
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Preliminary Design

- ☀ Choose a Strategy
 - List all possible solutions
 - Brainstorm
 - Quantity of ideas, not quality
 - Decide on best approach
 - Most likely to meet objectives
- ☀ Gather Information
 - Options
 - Performance
 - Costs

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Design Cycle



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Analysis and Testing

☀ Analysis

- Application of science, physics, & technology
- Use formulas to demonstrate design's feasibility

☀ Build a Prototype

- Physical Model
- Computer Model

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Design Documentation

- ☀ Documents
 - Block Diagrams
 - Specifications
 - Flowcharts
 - Commented Code
 - Testing Procedures
 - Change-Order Log
 - Schematics
 - Bill-of-Materials

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Testing and Evaluation

- ☀ Testing
 - Operate under actual conditions
 - Record data about performance
- ☀ Evaluate
 - Compare to objectives
 - Identify weaknesses

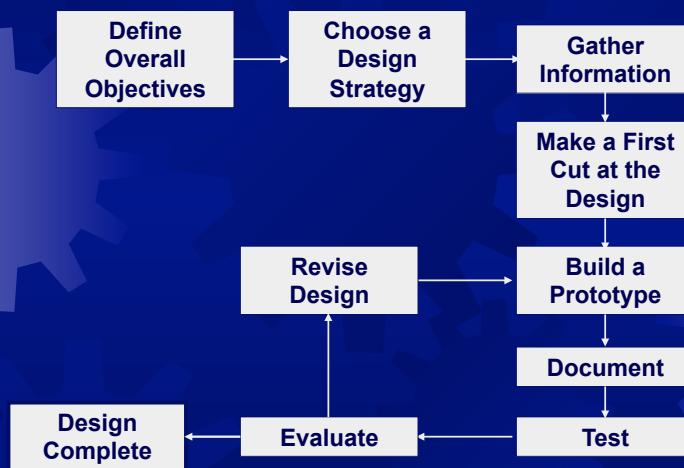
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Revising

- ☀ Need to eliminate weaknesses
 - Change design
 - New prototype
 - Retest
 - Re-evaluate
- ☀ Repeat until design is satisfactory

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Design Cycle



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