

Machine Design (IE 207)

**Industrial Engineering Dept.,
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Aims

This course is provided to give the student the knowledge to **Produce** a useful **machine/device/product** that is **safe, efficient, economical, and practical** to manufacture.

Course Outlines

- Design procedures.
- Factors affecting design details.
- Selection of materials.
- Modes of loading.
- Safety factors and allowable stresses.
- Design of detachable joints: (threaded joints , keys and splines).
- Design of permanent joints: (welding, interference fitting, riveting, adhesion).
- Design of some machine elements: springs, power screws.
- Thin pipes and pressure vessels.
- Sealed design of hydraulic and pneumatic cylinders.
- Application of computer aided design.

Teaching and Learning Methods

- Power Point Lectures.
- Assignments.
- Quizzes.

Weighting of Assessment

Final Exam	100
Mid Term Exam	20
Project & Report	10
Home Work Assignment	20
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Total Marks	150

Machine Design

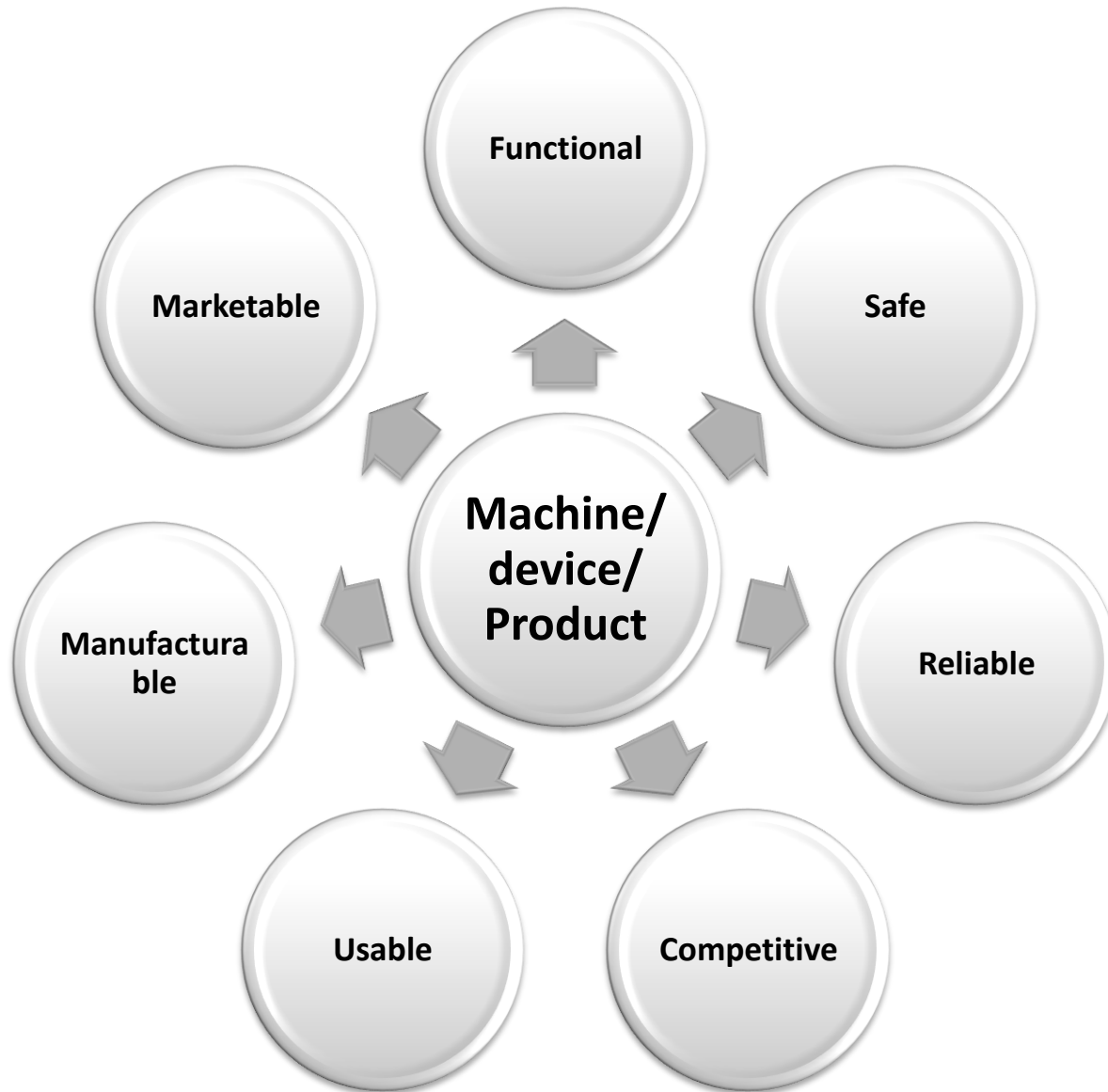
What is Machine Design?

Creation of new and better machines AND

Improving existing ones

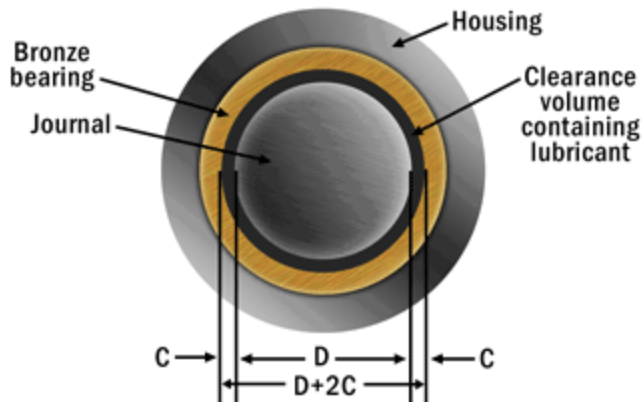
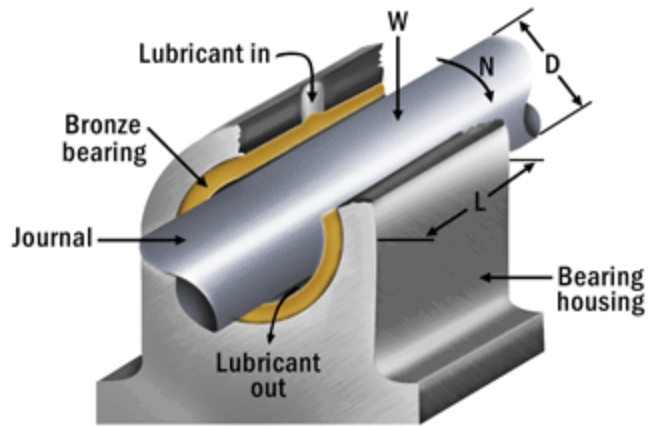
So that it is **economical** in the cost of production and operation.

Machine/device/Product



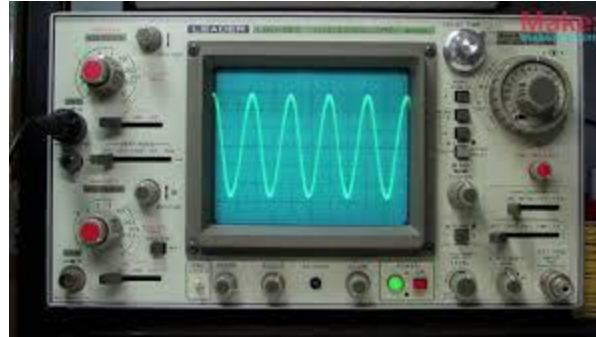
Design

Involve all the discipline of mechanical engineering.



- Fluid flow,
- Heat transfer,
- Friction,
- Energy transport,
- Material selection,
- Statistical descriptions,
-, etc.

Machine/device/Product



Design Process

- Identify Customer Requirements.
- Define functions of the device.
- State design requirements.
- Define evaluation criteria.
- Propose several alternative design concepts.
- Evaluate each proposed alternative.
- Rate each alternative against each evaluation criteria.
- Select the optimum design concept.
- Complete detailed design of the selected concept.



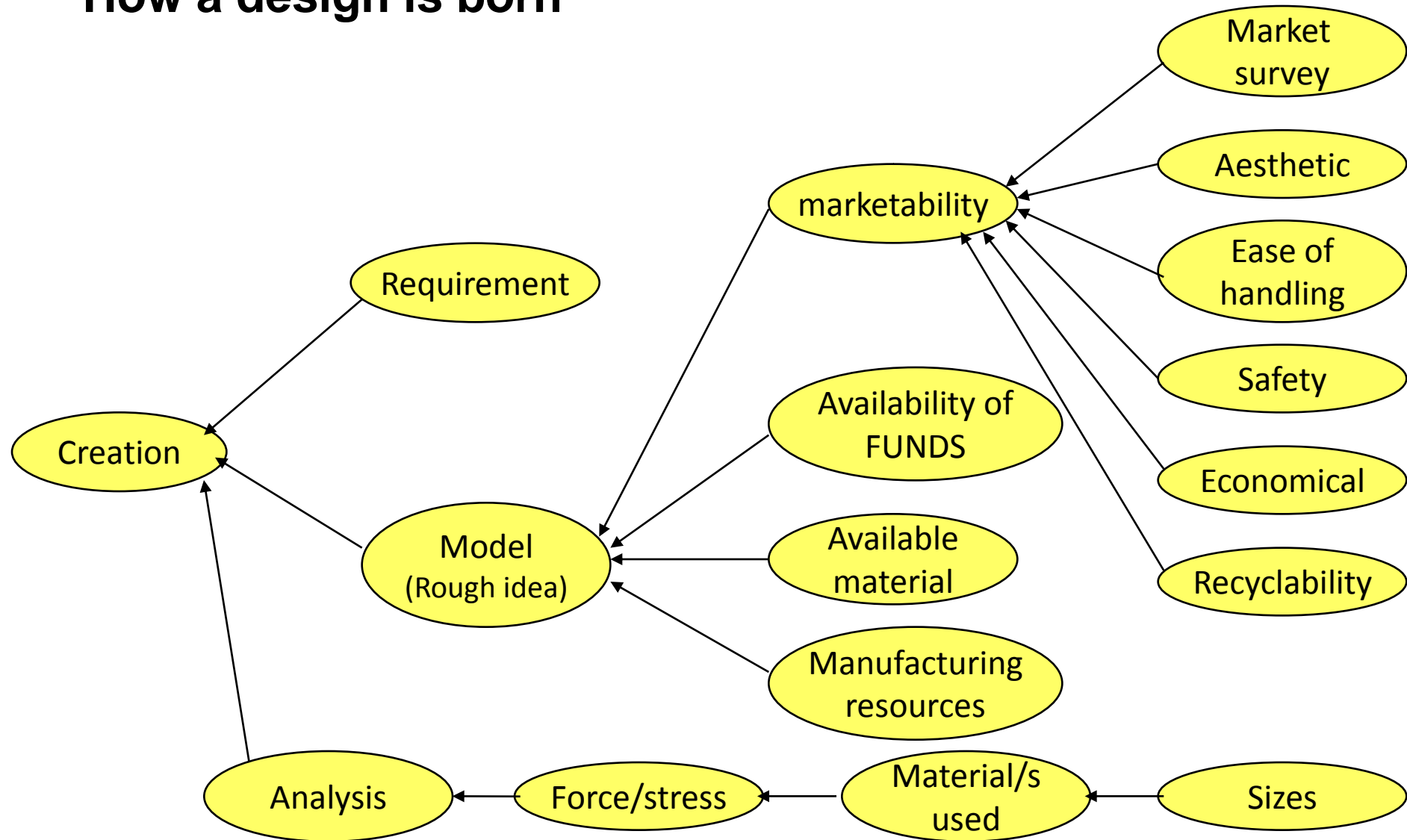
The Engineering Design Process:

(Core of Engineering)

- **Problem Identification:** Get with Customer.
- **Conceptual Design:** Ideas, Sketches and Solution Lists.
- **Refinement:** Computer Modeling, Data Base Development.
- **Testing:** Analysis and Simulation of All Design Aspects.
- **Prototyping:** Visualizing and Improving the Design.
- **Communication:** Engineering Drawings, Specifications.
- **Production:** Final Design, Manufacturing, Distribution.

Machine Design

How a design is born



What is the basic knowledge required for Machine Design?

- Mathematics
- Engineering Mechanics
 - Mechanics of Machines
 - Mechanics of Materials
 - Fluid Mechanics & Thermodynamics
- Strength of Materials

- Workshop Processes
- Engineering Drawing

- Computing
- Finite Element Analysis, Computational Fluid Dynamics etc