UNIT-1

Topic: Introduction to Machine Design

Learning Objectives

- Introduction to Machine design.
- Outcome of a machine design process.
- Steps involved in design of a machine element.
- Basic requirements of a machine element.

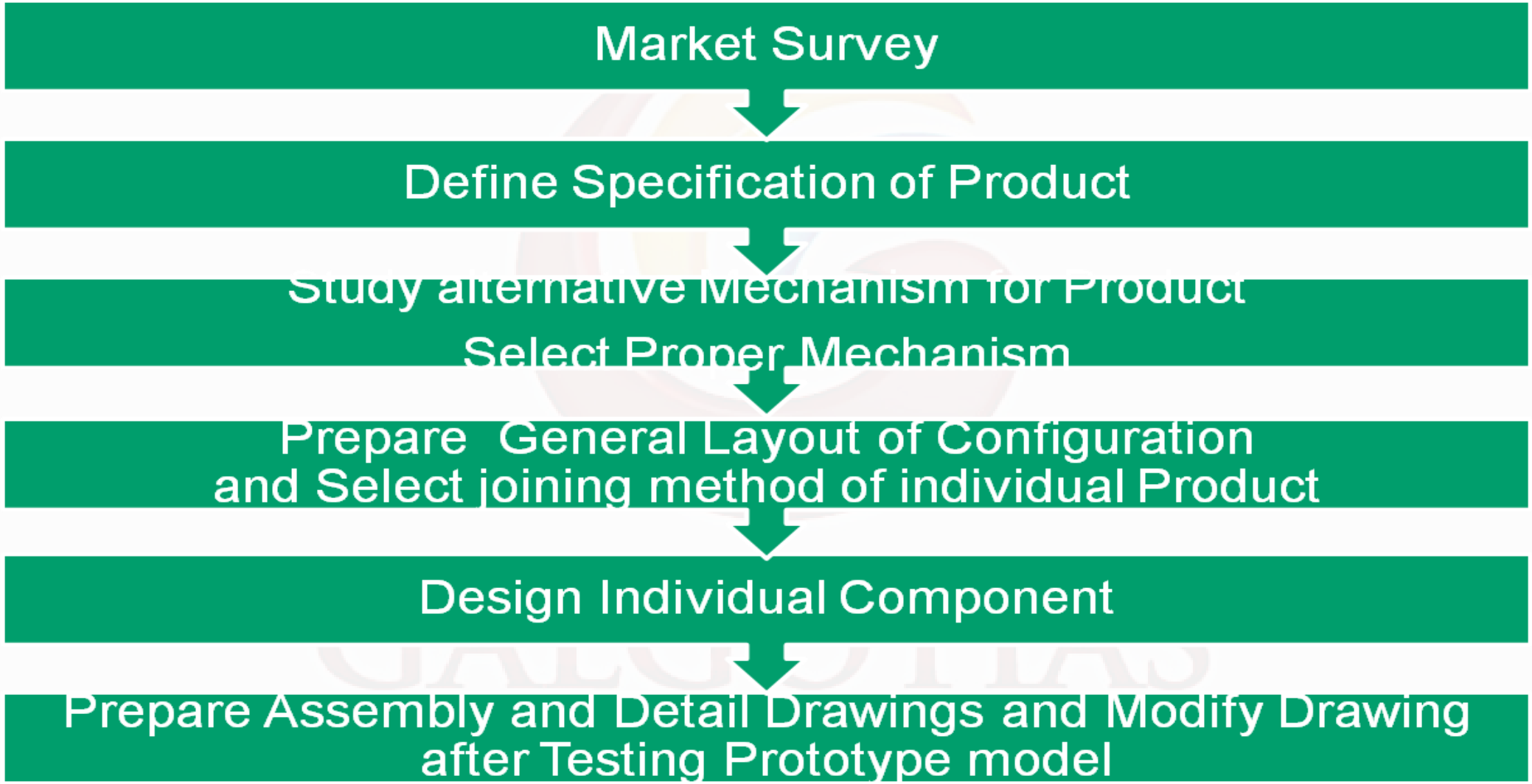
Machine design

Machine design is defined as the use of scientific principles, technical information & imagination in the description of a machine or a mechanical system to perform specific functions with maximum economy & efficiency.

-Machine Design is defined as the creation of new design or improving the exist one.

-Design is an innovative and highly iterative process.

Basic Procedure of Machine Design



Market survey

Ref: https://www.carwale.com/rollsroyce-cars/

Ref:http://www.lamborghinila.com/

Ref:https://www.cardekho.com/Tata/Tata_Nano

Product Specification

Selection of Mechanism

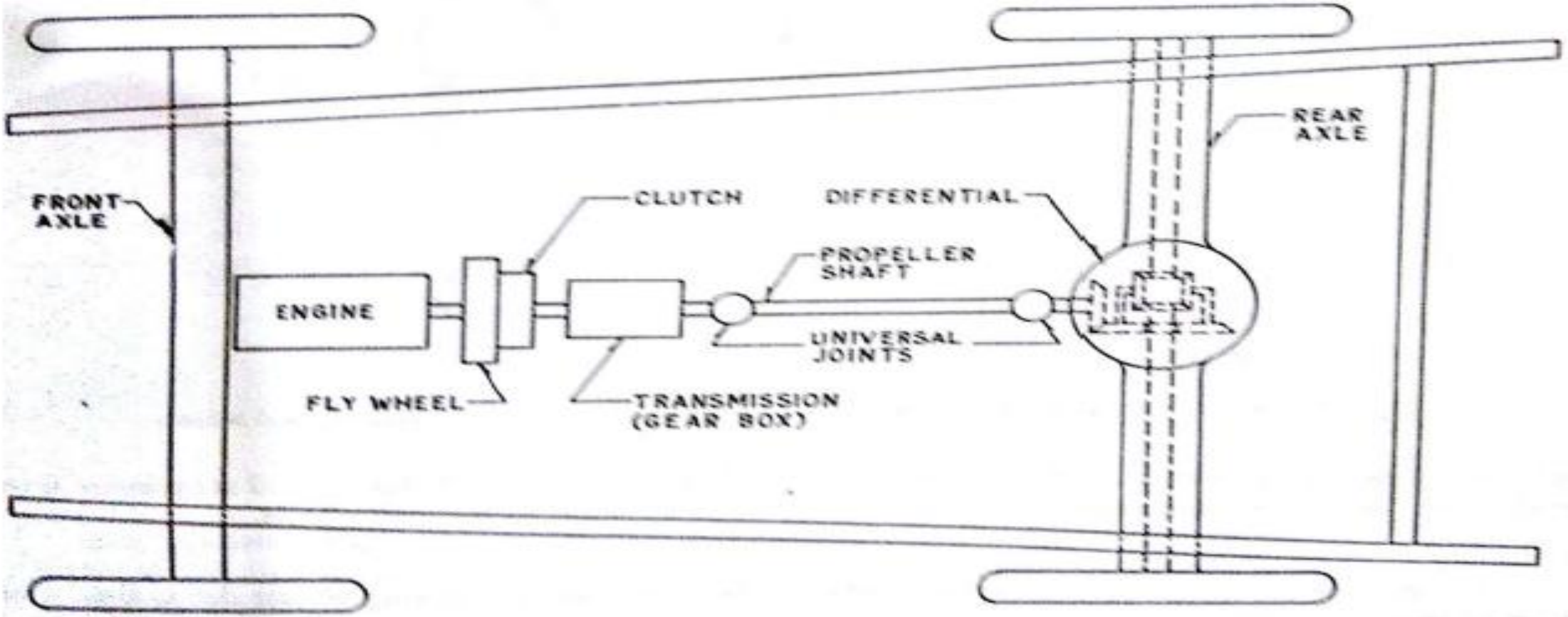
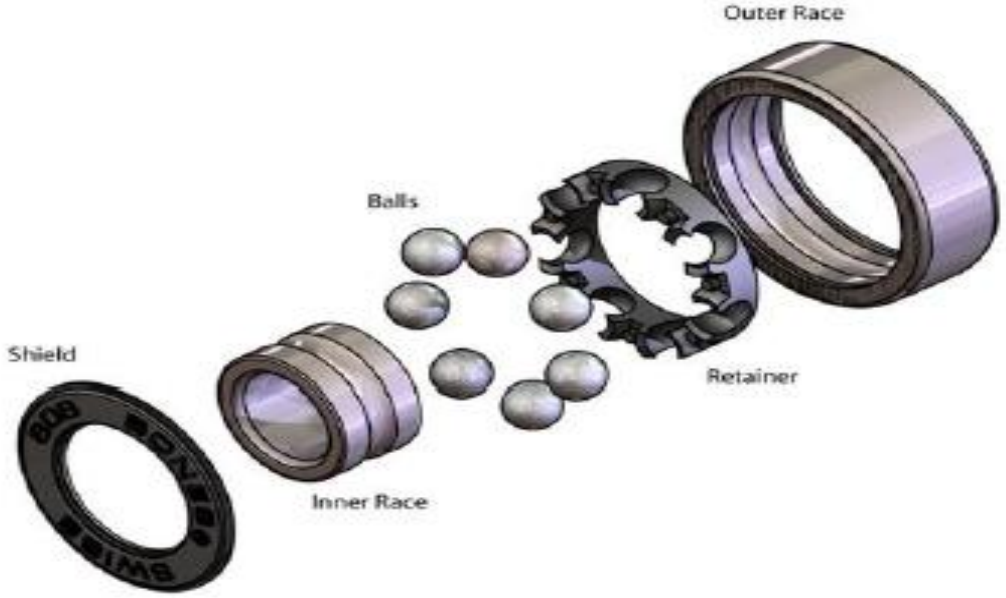
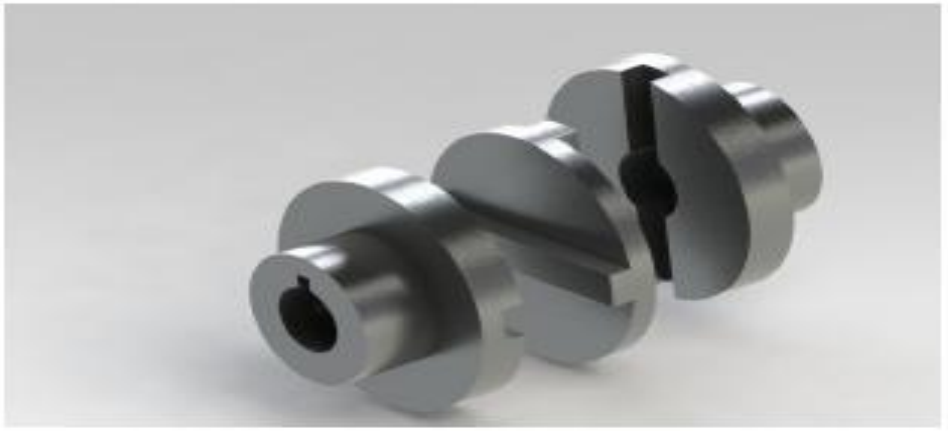


Fig. 1.4. Layout of complete transmission system of an automobile.

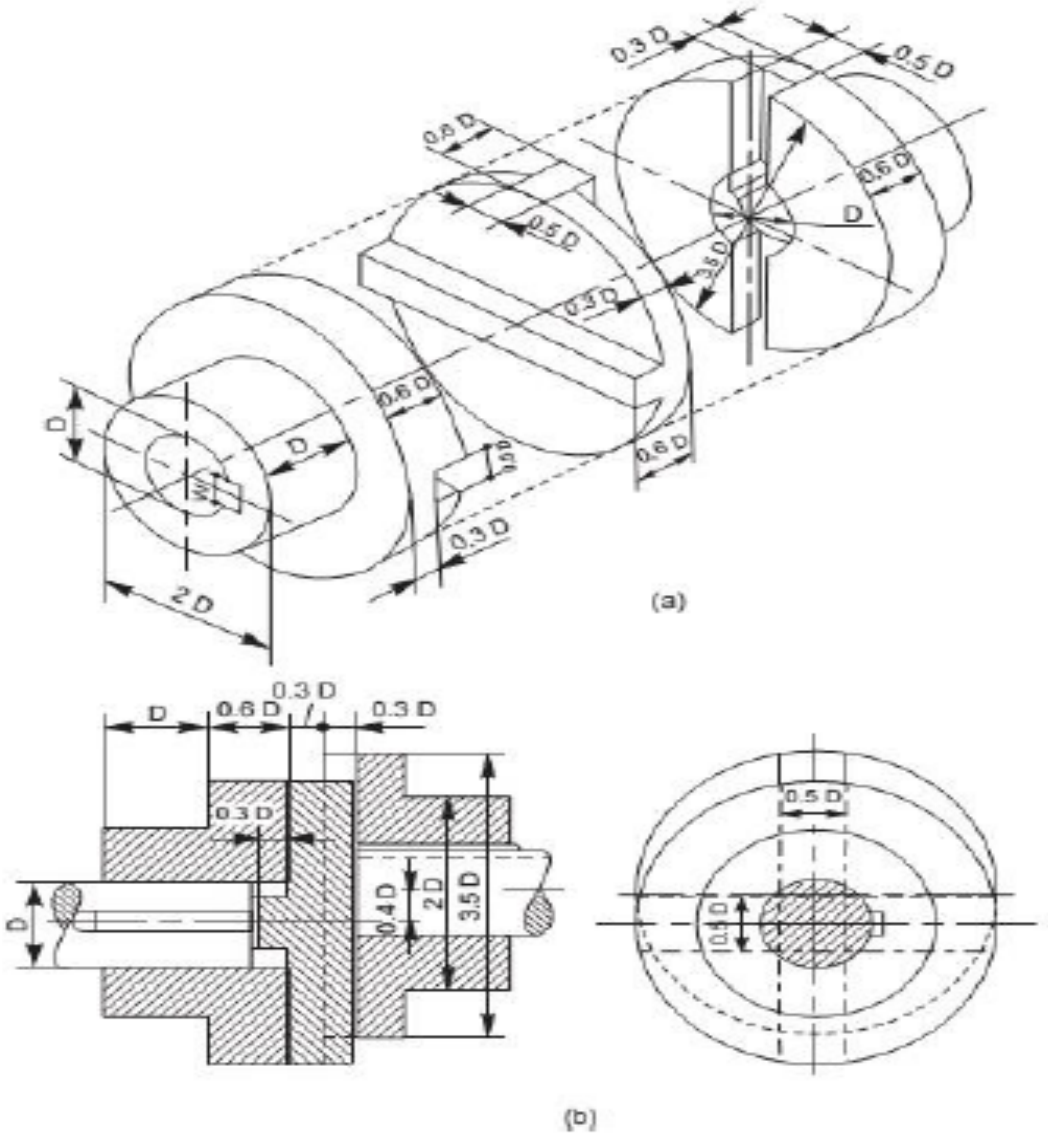
Layout of configuration and selection of joining methods

Ref. Automobile Engineering, Vol-1, Dr. Kirpal SIngh





Design of Individual Components



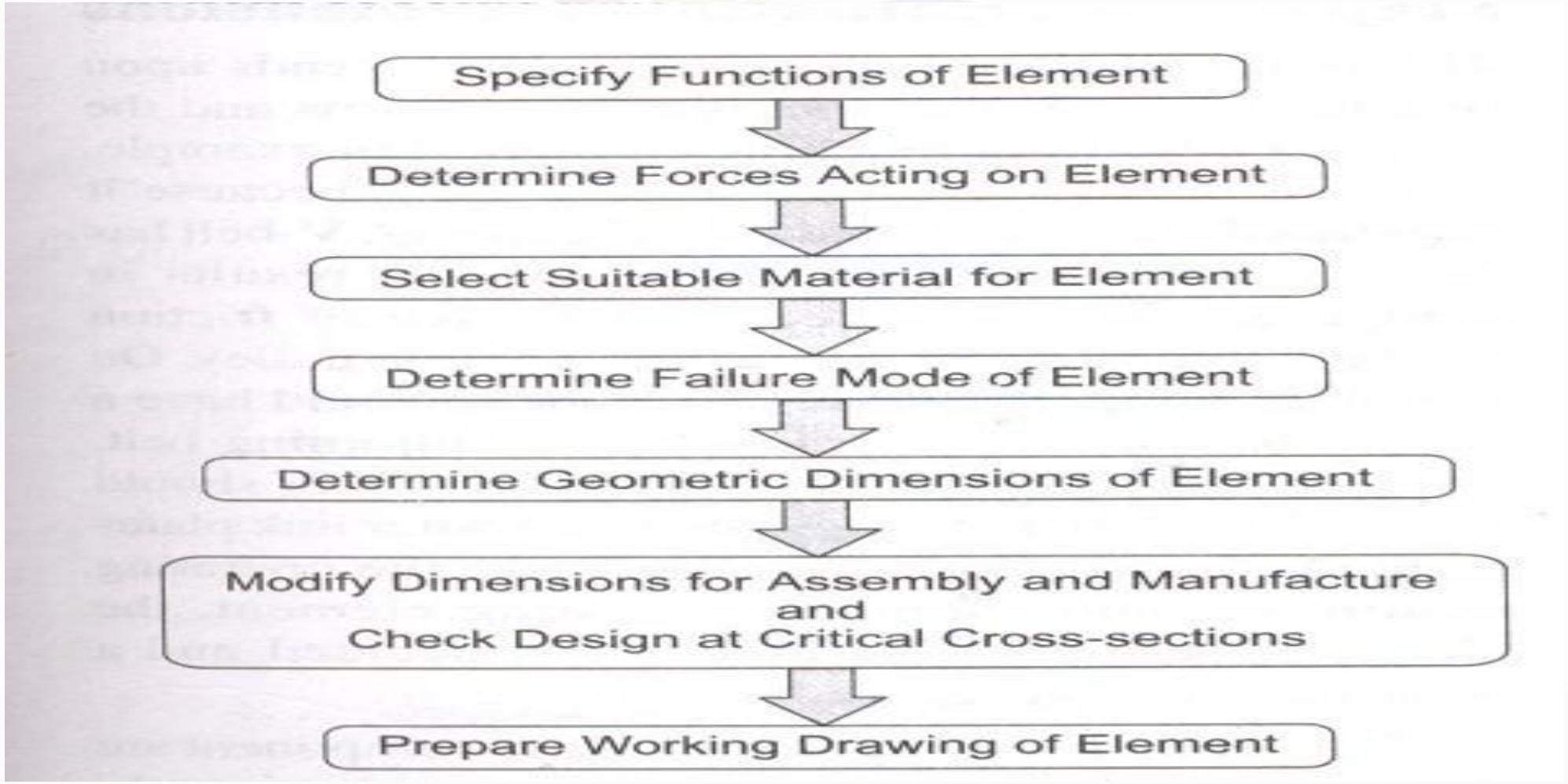
- Prepare Assembly and detail drawing
- Modify drawings after testing prototype

Ref: https://blogpuneet.wordpress.com/2013/10/08/oldhams-coupling/

Basic Requirement of Machine Element

- Strength
- Rigidity
- Wear resistance
- Minimum Dimensions and Weight
- Manufacturability
- Safety
- Conformance to Standards
- Reliability
- Maintainability
- Minimum Life Cycle Cost

Basic Procedure of Design of Machine Elements



Questions

- Define machine design.
- What is the final outcome of a machine design process.
- What are the steps involved in design of a machine element?
- What are the basic requirements of a machine element?
- Name the various requirements of a product giving suitable example.

MCQs

1-Following is the correct order for design of machine elements.

(A) Specify functions of element – Determine forces acting on element – select suitable material for element – determine failure mode of element.

(B) Specify functions of element – select suitable material for element – Determine forces acting on element – determine failure mode of element

(C) Specify functions of element – Determine forces acting on element– determine failure mode of element – select suitable material for element

(D) Specify functions of element – determine failure mode of element – Determine forces acting on element – select suitable material for element

In design process, which process is followed after selecting the material?

a. Selecting factor of safety
b. Synthesis
c. Analysis of forces
d. Determining mode of failure

In which part of engineering design process would you follow your plan to make something ?
Select one:
a. ask
b. create
c. imagine
d. plan

References

1. V.B. Bhandari (2010), Design of Machine elements, 3rd Edition, Tata McGraw Hill.ISBN: 978-0-070-68179-8.
2. Richard G. Budynas, J. Keith Nisbet(2011) Shigley's Mechanical Engineering Design ,Ninth Edition, McGRAW-HILL, ISBN: 978-0-07-352928-8

Thank you