



SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF AGRICULTURE ENGINEERING

R2019-MACHINE DESIGN

II YEAR IV SEM

UNIT 1 –FUNDAMENTALS OF MACHINE DESIGN

TOPIC 1 –INTRODUCTION & GENERAL CONSIDERATION IN MACHINE DESIGN



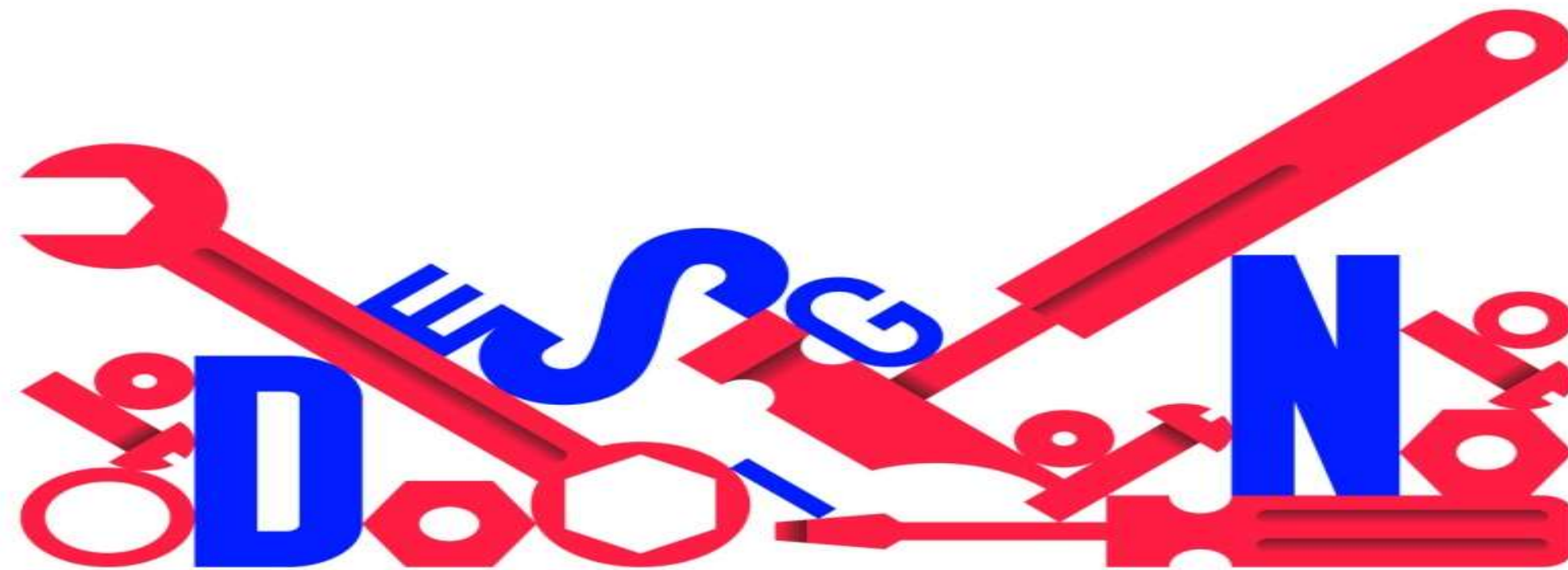
INTRODUCTION TO DESIGN



What is DESIGN??

The formulation of plan for the satisfaction of a human need.

Sometime the particular need to be satisfied is well defined, and sometime it is not; thus, a lot of thought and effort is necessary to understand the particular need, clearly.





Types of Design



Clothing design

Interior design

Highway design

Landscape design

Building design

Engineering design

Ship design

Bridge design

Computer-aided design

Heating system design

Process design



<https://tinyurl.com/y4veekhc>



General Considerations in Machine Design



Following are the general considerations in designing a machine component :

1. *Type of load and stresses caused by the load.* The load, on a machine component, may act in several ways due to which the internal stresses are set up. The various types of load and stresses are discussed in chapters 4 and 5.

2. *Motion of the parts or kinematics of the machine.* The successful operation of any machine depends largely upon the simplest arrangement of the parts which will give the motion required. The motion of the parts may be :

- (a) Rectilinear motion which includes unidirectional and reciprocating motions.
- (b) Curvilinear motion which includes rotary, oscillatory and simple harmonic.
- (c) Constant velocity.
- (d) Constant or variable acceleration.

3. *Selection of materials.* It is essential that a designer should have a thorough knowledge of the properties of the materials and their behaviour under working conditions. Some of the important characteristics of materials are : strength, durability, flexibility, weight, resistance to heat and corrosion, ability to cast, welded or hardened, machinability, electrical conductivity, etc. The various types of engineering materials and their properties are discussed in chapter 2.



4. *Form and size of the parts.* The form and size are based on judgement. The smallest practicable cross-section may be used, but it may be checked that the stresses induced in the designed cross-section are reasonably safe. In order to design any machine part for form and size, it is necessary to know the forces which the part must sustain. It is also important to anticipate any suddenly applied or impact load which may cause failure.

5. *Frictional resistance and lubrication.* There is always a loss of power due to frictional resistance and it should be noted that the friction of starting is higher than that of running friction. It is, therefore, essential that a careful attention must be given to the matter of lubrication of all surfaces which move in contact with others, whether in rotating, sliding, or rolling bearings.

6. *Convenient and economical features.* In designing, the operating features of the machine should be carefully studied. The starting, controlling and stopping levers should be located on the basis of convenient handling. The adjustment for wear must be provided employing the various take-up devices and arranging them so that the alignment of parts is preserved. If parts are to be changed for different products or replaced on account of wear or breakage, easy access should be provided and the necessity of removing other parts to accomplish this should be avoided if possible.



FACTOR OF SAFETY

The ratio of the component strength to the working or allowable stress.

The “strength” can be anything the designer chooses it to be. It should often be the yield strength, the ultimate strength, the fatigue strength.

It is a material property; while the working stress is the safe stress, which is allowed to be undertaken by the material in design.





Examples of Design





ASSESSMENT



Which of the following are true for aluminum

- a) Low specific gravity
- b) Corrosion resistance
- c) High thermal conductivity
- d) All of the mentioned



Is it possible to completely relieve the residual stresses in a cast steel product?

- a) True
- b) False



ASSESSMENT

Poor fluidity and contraction are compulsory to be taken into consideration while designing a cast steel product.

- a) True
- b) False

Which of the following parameters can be obtained by tension test of a standard specimen?

- a) Proportional Limit
- b) Yield Strength
- c) Percentage Reduction in area
- d) All of the mentioned



ASSESSMENT



Proportional Limit is defined as the stress at which the stress strain curves begins to deviate from the straight line.

- a) True
- b) False



Thank You