

# School of Mechanical Engineering

Course Code : BTME3025

Course Name:Machine Design



## UNIT-1

Topic: DESIGN METHODS

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# Learning Objectives

- Able to Explain traditional methods as well as new concept of Design synthesis

The logo of Galgotias University is a circular emblem with a stylized 'G' shape in the center. The 'G' is composed of three curved segments in shades of yellow, blue, and pink. The background of the emblem is a light pinkish-purple.

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# TRADITIONAL DESIGN METHODS

- There are two traditional methods in design:
  1. Design by crafts evaluation
  2. Design by drawing

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# Design by crafts evaluation



Ref:[https://www.123rf.com/stock-photo/bullock\\_cart.html](https://www.123rf.com/stock-photo/bullock_cart.html)



Ref:<http://directboats.com/rowboats.html>

## MUSICAL INSTRUMENTS

accordion	acoustic guitar	bagpipes	banjo
bass guitar	bongo drums	bugle	cello
clarinet	cymbals	drums	electric guitar
flute	French horn	harmonica	harp
keyboard	maracas	organ	pan flute
piano	recorder	saxophone	sitar
tambourine	triangle	trombone	trumpet
tuba	ukelele	violin	xylophone

www.grammar.cl   www.woodwardenglish.com   www.vocabulary.cl

# contd

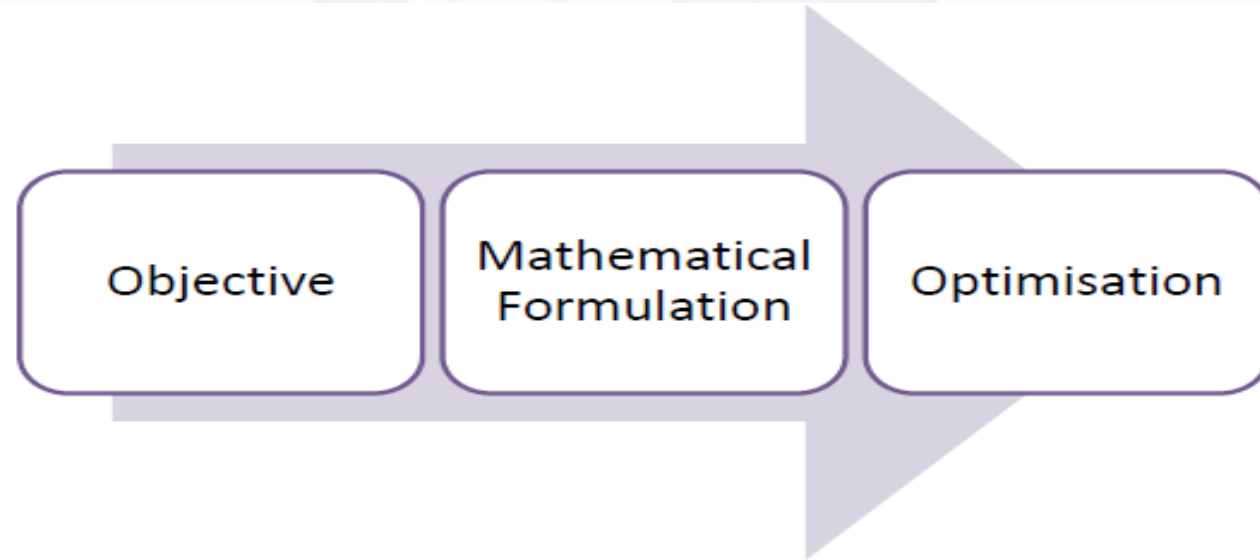
- Craftsman do not prepare dimension drawing of their products. They can not offer adequate justification for design they make.
- These products are developed by TRIAL & ERROR method over many centuries. Any modification in the product is costly because the Craftsman has to experiment with the product itself.
- 3. Moreover only one change at a time can be attempted and complete reorganization of the product is difficult.
- 4. The essential information of the product such as materials, component dimensions, manufacturing methods and assembly techniques is transmitted from place to place and from time to time by two ways. There is no symbolic medium to record the design information of the product.

# Design by drawing

- The essential features of design by drawing methods are as follows:
  - 1. The dimensions of the products are specified in advance of their manufacture.
  - 2. The complete manufacturing of the product can be sub-divided into separate pieces which can be made by different people. This division of work is not possible with Craft evaluation.
  - 3. When the product is to be developed by TRIAL & ERROR method, the process is carried out on a drawing board instead of the shop floor. The drawing of the product are developed prior to manufacture.

# DESIGN SYNTHESIS

Design Synthesis is defined as the process of *creating or selecting configurations, materials, shapes and dimensions for a product.*



Design synthesis begins with the statement of requirements, which are then converted into mathematical expressions and finally, equations are solved for optimization.



# Questions

- List down two reasons for not using the Design by crafts evaluation.
- Define design synthesis.
- Distinguish between design analysis and design synthesis.
- In order to illustrate the process of design synthesis consider a problem of designing cylindrical cans. The requirements are as follows:
  - (i) The cylindrical can is completely enclosed and the cost of its material should be minimum.
  - (ii) The cans are to be stored on a shelf and the dimensions of the shelf are such that the radius of the can should not exceed  $R_{max}$ .





# 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

The logo of Galgotias University is a circular emblem with a stylized, multi-colored swirl in shades of yellow, orange, and blue. The text "Thank you" is centered over the logo in a large, bold, black sans-serif font.

**Thank you**

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