SNS COLLEGE OF TECHNOLOGY

New Product Development

Unit 3

Concept Embodiment And Modeling Of Product Metrices

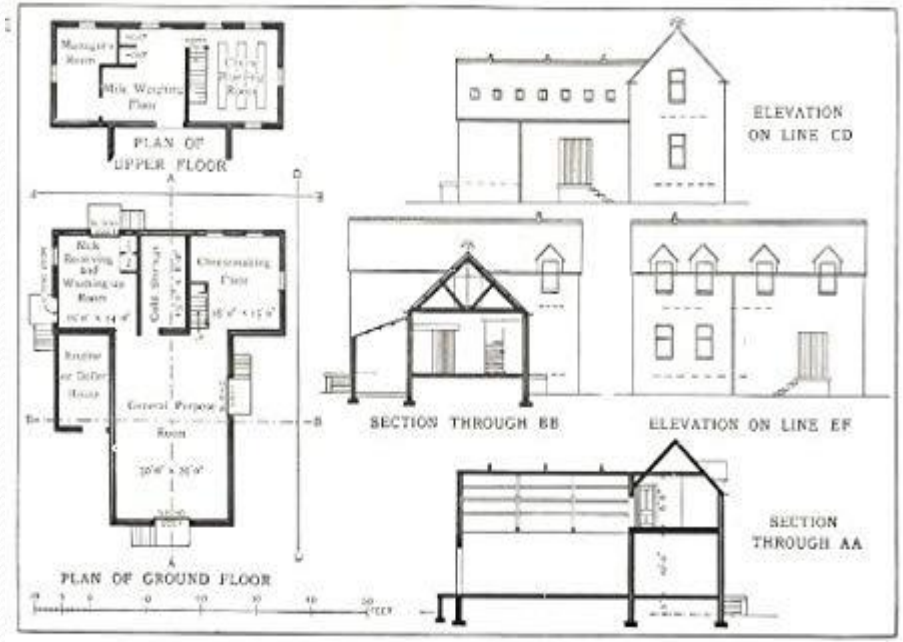
Text book

Kevin Otto and Kristin Wood ,” **Techniques in Reverse Engineering and New Product Development”**

Concept Embodiment

Concept Embodiment

- Concept embodiment is a process of conversion/change of a gathered or selected ideas into a structural form.



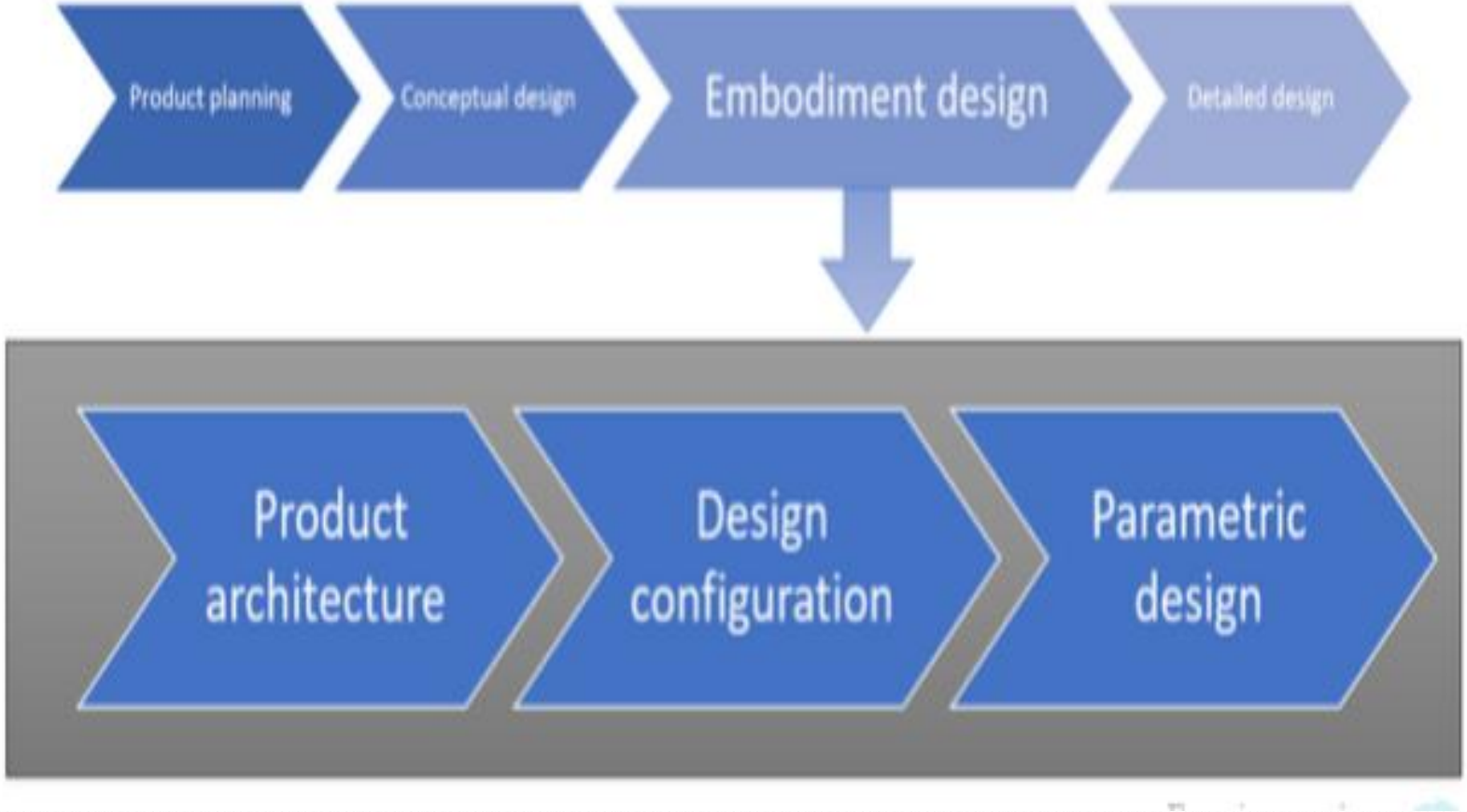
Concept embodiment

- Choices of component
- Standard and specialized
- Component interfaces
- Materials
- Geometry (Dimensions, shape, Tolerances)
- Surface finish
- Fasteners and connectors
- Manufacturing process
- Assembly process.

What is Embodiment design?

- Embodiment design is one of the main stages of the product design process in which, the main engineering product design concept is developed as per the product design specification (PDS) and economic criteria to a stage where subsequent detailed design can lead directly into production.

Embodiment design

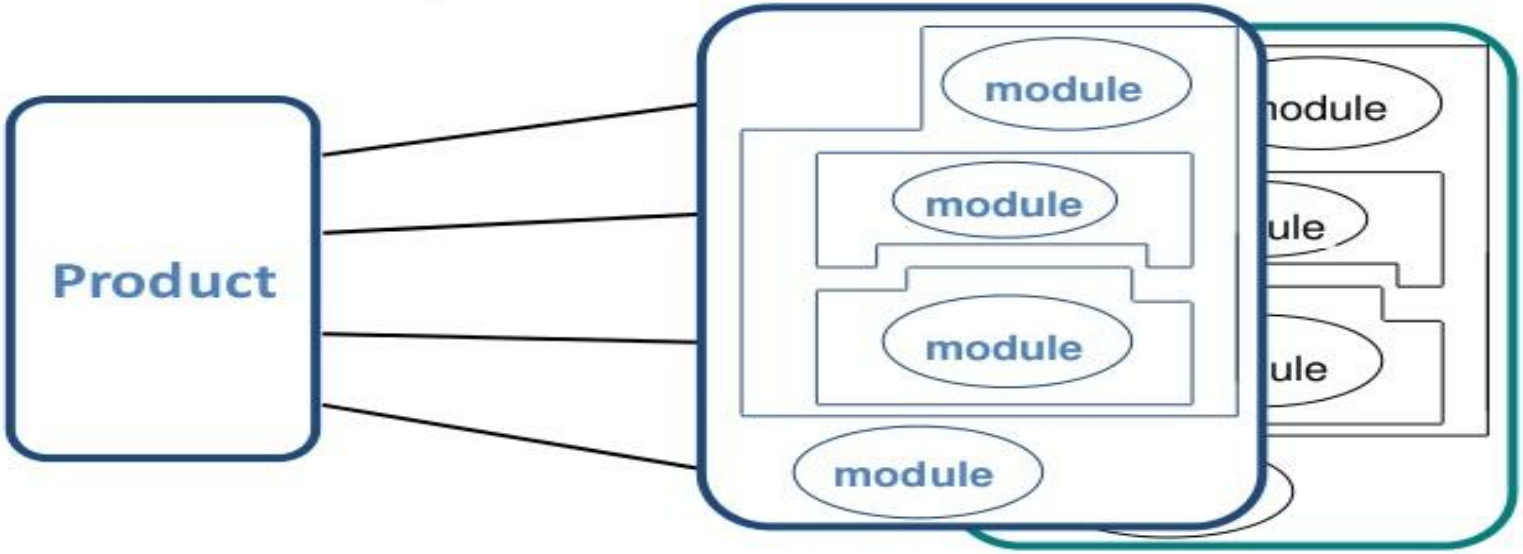


Embodiment design phases

- Embodiment design is a **complex process** as many design activities must be simultaneously performed, some of the design activities need to be repeated several times with changing data and any changes in one section will influence another section of the design
- Embodiment design phase activities can be divided into three sections or phases
  - Product architecture
  - Design configuration
  - Parametric design

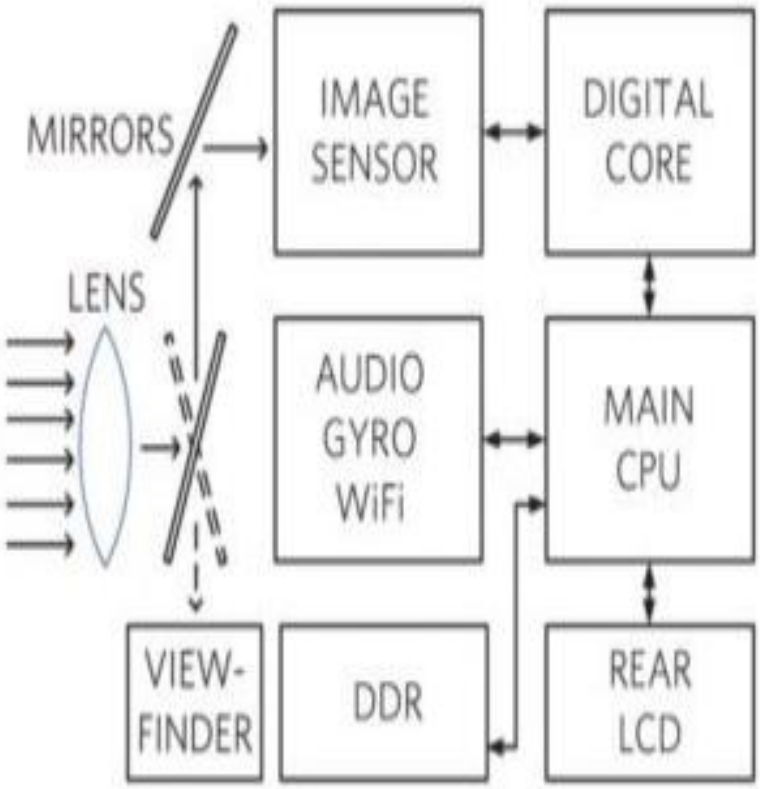
What is Product Architecture?

The arrangement of *functional* elements into *physical* chunks which become the building blocks for the product.



Product architecture

- Product architecture, also referred to as **System-level design** is, outlining and allocating physical components or entities to the function of a product
- Physical elements are defined and arranged to satisfy the overall product requirement specification and are usually called modules



- System-level design is defined by how each subcomponent or modules interact with each other in a product level and the function of each subcomponent
- Product architecture is vital to any product development as it would impact the product evaluation and the cost of the product

Product architecture

INTEGRAL

MODULAR

Embodiment design

- **Modular Design**
- In modular design, overall product purpose or system-level function is subdivided into smaller single functions or individual operations and allocated to single parts or sub-assemblies called modules.
- These modules are treated as individual components and have well defined electrical or mechanical interface. These are then interfaced together to form the complete product to perform its complete function. Engineering products with modular architecture are more common than integral designs.

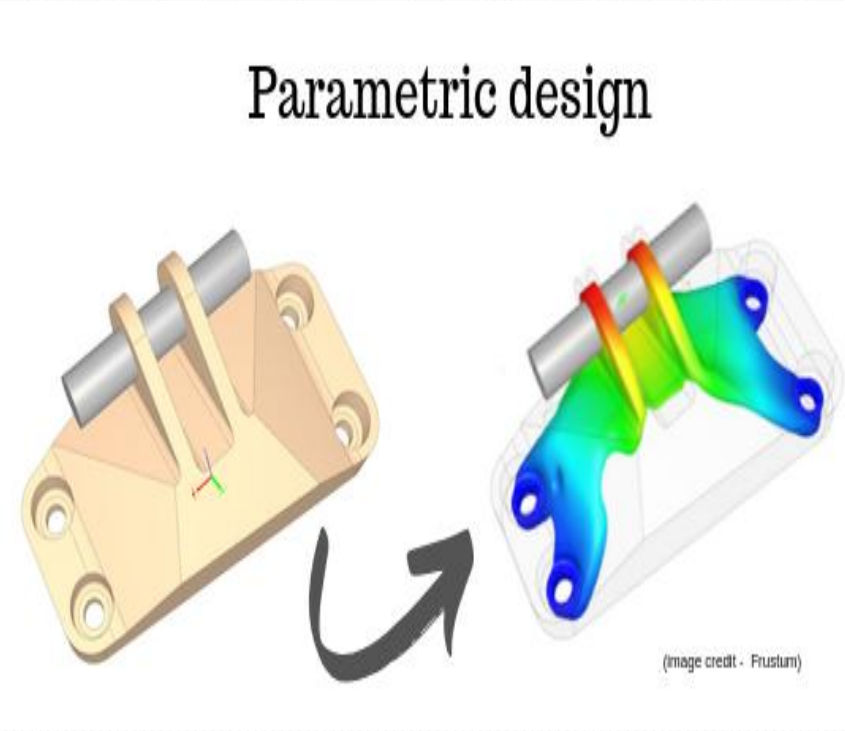
- **Integral Design**
- Integral product architecture is where the functions of the engineering product are **carried out by a combination of parts** which are not organized in a structured manner.
- Hence, the functional implementation is achieved by one or very few modules where components perform multiple functions.

Design configuration

- In design configuration, **shape and general dimensions or sizes** are established to the components that are defined in product architecture
- It is largely depended on the three-dimensional constraints that define the envelope in which the product operates and the product architecture. This would be a preliminary selection of material, manufacturing process, modelling, sizing of parts etc.

Parametric design

- The main objective of the Parametric design is to **allocate values to design variables** to produce the best possible product design or functional component by **considering both the technical and economical requirement**
- This aspect of the design is much more analytical than conceptual or design configuration



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