UNIT III

PRODUCT DESIGN LIFE CYCLE II

DETAILED DESIGN

IMPORTANT DEFINITIONS

DETAILED DESIGN

A group of tasks used to finalize a product design that meets the requirements and design approach defined earlier.

- Requires decisions, even though some technical information may not be available. The design team must use "best estimates," otherwise known as assumptions, to develop the design.
- Unless the design is thoroughly analyzed, this situation increases the probability that the design is inadequate or incorrect. Good analyses and models can remove much of this uncertainty.
- Design analysis, modeling, and simulation are design techniques used to assist the development team in substantiating those assumptions, which will increase the chance of a correct design and reduce the technical risk in product development.

DESIGN ANALYSIS

Use of scientific methods, usually mathematical, to examine design parameters and their interaction with the environment.

- The purpose of analysis is to gather enough information to improve our knowledge of a situation so to make better decisions.
- Its goal is to reduce technical risk. Since the team uses so many assumptions, design is often thought of as an iterative or continuous process of design, analysis, and test that utilizes the knowledge available at a given time.
- Examples of knowledge include rules of thumb, published standards, textbooks, databases, and results from analysis, modeling, simulation, and testing. The processes of design analysis, modeling, and testing are used to ensure that a design is appropriate.

MODELING AND SIMULATION

Tools for evaluating and optimizing designs, services and products.

- **Purpose is to assist the design team in the development of a product.**
- **They constitute a process in which models simulate one or more elements of either the product or the environment. The metrics for modeling depends on the analysis being performed**

BEST PRACTICES FOR DETAILED DESIGN

(i) Design analyses and trade-off studies are systematically conducted in a collaborative manner to ensure that a design and its support systems can meet or exceed all design requirements.

(ii) All disciplines including manufacturing, reliability, testability, human engineering, product safety, logistics, etc. are included

(iii) Design synthesis and high-level design tools are used to increase design quality and efficiency.

(iv) Modeling and simulation are extensively used for design analysis, trade-off studies, and performance verification

(v) Analyses contain sufficient detail to accurately model the "real world" including:

- Variability and uncertainty
- Worst-case, parameter variation, and statistical analyses
- Aging

(vi) Stress reduction including mechanical, thermal, and environmental improves reliability and quality.
(vii) Failure modes analysis such as failure modes and effects analysis (FMEA), production failure modes analysis (PFMEA) and fault tree analysis (FTA) are used to identify and then correct or minimize potential problems.

References

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Thank you