

School of Mechanical Engineering

Course Code : MCDM5004

Course Name: Product Design and Life cycle Management

UNIT II

PRODUCT DESIGN AND LIFE CYCLE MANAGEMENT-EARLY DESIGN

GALGOTIAS
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Name of the Faculty: Dr MANIRAJ M

Program Name: M.Tech (CAD/CAM)

EARLY DESIGN

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BENCHMARKING AND COMPANY CAPABILITY ANALYSIS

➤ Processes for studying a company's capabilities and measuring the company's products, services, and practices against the competition or those companies recognized as leaders. The purpose is to determine product requirements and identifying innovative ideas. It is the systematic process of identifying the "best" practices in industry, setting product and manufacturing goals based on results of what the competition has achieved or will achieve in the future and identifying the best vendors.

➤ Importance of Bench marking for several reasons:

- Better awareness of customer needs, preferences and values
- Better knowledge of each company's strengths and weaknesses
- Better awareness of competitor's product, manufacturing processes, vendors used, etc.
- Identify successful product requirements (e.g., performance, quality, availability, price, service, reliability, support)

➤ Five key steps to benchmarking are:

1. **Analyze** all aspects of the **competition** and other **successful companies**.
2. Determine where your **company stands** relative to competitors and leaders on key features, parameters, and processes both on today's products and on predictions of future products.
3. **Establish "Best in Class" product features and parameters.**
4. Set product, manufacturing, and supportability **requirements.**
5. Implement a practice of **"innovative imitation"** (i.e., improve on the best ideas and methods that were identified).

PROTOTYPING AND VIRTUAL REALITY

➤ Use hardware and software conceptual prototypes to **study customer responses to new products and to identify areas for improvements** for both requirement definition and conceptual design. The basic philosophy behind the use of prototyping is to provide a **communications platform for studying consumer needs** and refining product use scenarios and task analysis.

➤ Prototyping helps the design team by encouraging the consideration of as many product development issues as possible during the early phases and identifying potential problems. The steps in prototyping are:

1. Produce prototypes that provide the reviewer a realistic view or feel of the proposed design.
2. Develop as many prototypes as economically possible.
3. Continuously produce prototypes throughout the product development process.
4. Show the prototypes to everyone.

HOUSE OF QUALITY

➤ House of Quality or Quality Function Deployment (QFD) is both a requirement definition and conceptual design tool that systematically documents customer needs, benchmarks competitors, and other aspects and then transforms this information into design requirements. QFD is a complex process that requires considerable effort.

➤ The steps in QFD are:

1. Determine and rank customer attributes, i.e. what does the customer want? Which attributes are most important?
2. Document customer perceptions of how well different products meet these attributes. Which products do the customers like for each of the attributes?
3. Determine “measurable” design characteristics/parameters and rate their relationship to the customer attributes.
4. Determine objective requirements and measures (goals) for the design characteristics.

PITFALLS IN REQUIREMENT DEFINITION

- Successfully translating customer needs into product level requirements is extremely difficult. There are several common pitfalls in this process.
- First - a **specific solution** (e.g., technology, resolution, bandwidth, or part types) is determined **too early** before conceptual design and trade-off studies have been performed.
- Second - **product requirement must be extremely Innovative** - many risks and ensure failure
- Third - **requirements can be stated in general terms.**
- Fourth - common temptation to **accept customer, marketing, or a consultant's suggestions as the only and final input.**

- Fifth - problem statement is continuously changing. This is called a "moving target."
- Sixth - product's requirements become too complex and detailed.
- Seventh - develop only one set of requirements for all customers.

References

1. Karl T. Ulrich and Steven D. Eppinger (2009), Product Design and Development, 4th Edition, Tata McGraw-Hill Publishing Company Limited, ISBN: 978-0-070-14679-2
2. Stephen C. Armstrong (2005), Engineering and Product development Management– The Holistic Approach, Cambridge University Press, ISBN: 978-0-521-01774-9.
3. Thomas A. Sabomone, (1995), What every engineer should know about concurrent engineering, Marcel Dekker Publications, ISBN- 978-0-824-79578-8.

The logo of Galgotias University, featuring a stylized 'G' composed of three overlapping curved segments in shades of yellow, blue, and red, set against a light pink circular background.

Thank you

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