

Product Design

Course: Production Management and Logistic Systems [10592713]

Economia e management (Latina Campus)

AA 2024-2025 | Prof. Alessandro Pietrogiacomì



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Lesson Plan for Tuesday, March 11

Overview of the lesson, and educational objectives,

Topic: Product Design

Time: 10:00–13:00

Duration: 3 hours

Learning Objectives

By the end of this lesson, students will be able to:

- Understand the principles of product design and their importance in production management.
- Apply design for manufacturability (DFM) principles to optimize production processes.
- Analyze real-world case studies to identify best practices in product design.

Lesson Outline

1. Introduction (15 minutes)
2. Principles of Product Design (45 minutes)
3. Design for Manufacturability (DFM) (45 minutes)
4. Real-World Case Studies (45 minutes)
5. Recap, Q&A and Homework Assignment (15 minutes)

Introduction

- Welcome back, let's recap the previous session
- The importance of understanding system approach to production, types of production systems and production flow diagrams

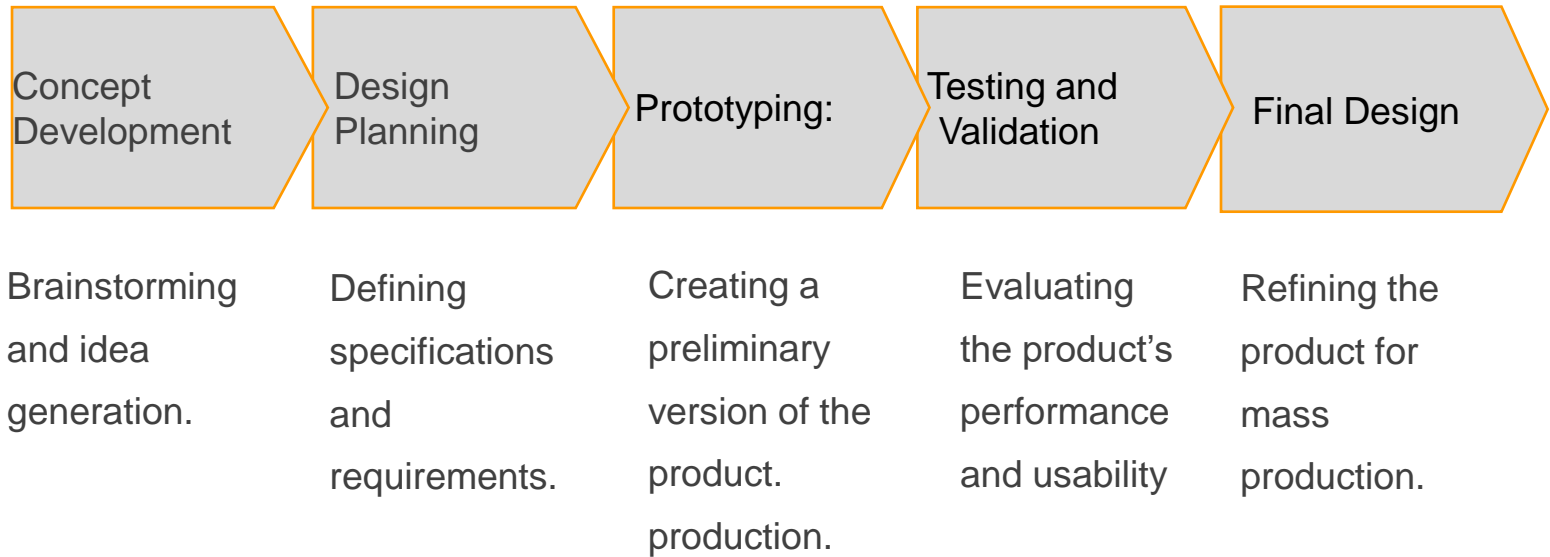
Principles of Product Design

- Definition and Scope
- Stages of Product Design
- Importance of Product Design

Definition and Scope

- **Product Design:** The process of creating a new product to be sold by a business to its customers.
- **Key Objectives:**
 - **Functionality:** Ensuring the product meets user needs.
 - **Aesthetics:** Creating an appealing design.
 - **Manufacturability:** Designing for efficient production.

Stages of Product Design



Importance of Product Design

- Enhances customer satisfaction and brand loyalty.
- Reduces production costs through efficient design.
- Supports innovation and competitive advantage

Industry Trends in Product Design

- **Sustainability:** Designing eco-friendly products with recyclable materials.
- **Customization:** Offering personalized products to meet individual customer needs.
- **Digital Tools:** Using CAD (Computer-Aided Design) and simulation software for faster prototyping.

Activity:

- **Class Discussion:** share examples of well-designed products and explain why you consider them successful (e.g., usability, aesthetics, innovation)

Design for Manufacturability (DFM)

- Definition and Principles.
- Benefits of DFM.
- Case Study: DFM in the Automotive Industry

Definition and Principles

- **DFM:** Designing products in a way that makes them easy and cost-effective to manufacture.
- **Key Principles:**
 - **Simplify the design:** Reduce the number of parts and assembly steps.
 - **Standardize components:** Use common parts and materials.
 - **Optimize tolerances:** Ensure parts fit together without excessive precision.
 - **Minimize waste:** Design for efficient use of materials.

Case Study: DFM in the Automotive Industry

- **Example:** How Toyota car manufacturer design components for easy assembly and repair.
<https://www.youtube.com/watch?v=zQeQWGqfFN0>
- <https://hbr.org/1998/07/another-look-at-how-toyota-integrates-product-development>
- **Discussion:** What are the trade-offs between design complexity and manufacturability?

Real-World Case Studies

Case Study 1: Apple's Product Design (Focus on simplicity, aesthetics, and functionality.) Discussion: How does Apple's design philosophy contribute to its success?

Further discussion questions

1. How does IKEA's modular design benefit both the company and its customers?
2. In what ways does flat-pack furniture improve the customer experience?
3. How does IKEA's design approach contribute to its sustainability goals?
4. What challenges might IKEA face with its flat-pack model, and how could it address them?

Real-World Case Studies

Case Study 2: IKEA's Flat-Pack Furniture (Emphasis on modular design and ease of assembly.) Discussion: How does IKEA's design approach reduce costs and improve customer experience

Further discussion questions

1. How does Apple's focus on simplicity enhance the user experience?
2. In what ways do aesthetics contribute to Apple's brand image and customer loyalty?
3. How does Apple balance functionality with minimalism in its product design?
4. What lessons can other companies learn from Apple's design philosophy?

Recap and Homework Assignment

1. Recap of Key Points

- Principles and stages of product design.
- Importance of design for manufacturability (DFM).
- Real-world applications and industry trends.

2. Homework Assignment

1. **Task:** Research a product that failed due to poor design (e.g., Google Glass, Segway, Microsoft Zune, New Coke, Juicero).
2. **Deliverable:** Write a 1-page analysis explaining the design flaws and how they could have been avoided.