13. Product Design and Development

Product Design and Development is the efficient and effective generation and development of ideas through a process that leads to new products. From an industrial engineering knowledge view, it is the processes and analysis employed supporting efficient decision-making during Product Design and Development.

13.1. Design Process
   13.1.1. State of the art
   13.1.2. Identify need
   13.1.3. Conceptualization
   13.1.4. Feasibility analysis
   13.1.5. Production
   13.1.6. Product life cycle

13.2. Design Process Steps
   13.2.1. Business strategy
   13.2.2. Identification of need
       13.2.2.1. Technology development
       13.2.2.2. Proposal
       13.2.2.3. Capture
   13.2.3. Definition of a problem
       13.2.3.1. Statement of requirements
   13.2.4. Gathering of information and data
   13.2.5. Benchmarking
       13.2.5.1. Competitive intelligence
       13.2.5.2. Intellectual property
   13.2.6. Conceptualization
   13.2.7. Evaluation
       13.2.7.1. Analysis of design
       13.2.7.2. Decision making
       13.2.7.3. Trade studies
           13.2.7.3.1. Weighing and judging
           13.2.7.3.2. Quality function deployment (QFD)
   13.2.8. Communication of the design

13.3. Design Project
   13.3.1. Gating process
   13.3.2. Feasibility study
   13.3.3. Preliminary design
       13.3.3.1. Internal interfaces
       13.3.3.2. External interfaces
   13.3.4. Detailed design
   13.3.5. Verification and Test
       13.3.5.1. Demonstration builds
13.3.5.2. Systems test
13.3.5.3. Operational test
13.3.5.4. Audits
13.3.6. Planning for manufacture/production
   13.3.6.1. Factory planning
   13.3.6.2. Supply chain
13.3.7. Planning for distribution
13.3.8. Planning for use
13.3.9. Operations and support
13.3.10. Planning for retirement

   13.4.1. Life cycle analysis

13.5. Planning and Scheduling
   13.5.1. Planning for manufacturing
   13.5.2. Project planning

13.6. Risk and Opportunity Management

13.7. Metrics for Design and Development

13.8. Program Leadership, Management, and Control
   13.8.1. Project start-up
   13.8.2. Plans/schedules

13.9. Design for Manufacturability
   13.9.1. How manufacturability can influence design
   13.9.2. Methods and procedures for production activity
   13.9.3. Work instruction/documentation for production
   13.9.4. Manufacturing process optimization

13.10. Design for Cost

13.11. Design for Six Sigma
   13.11.1. I2DOV process
      13.11.1.1. Invent
      13.11.1.2. Innovate
      13.11.1.3. Develop
      13.11.1.4. Optimize
      13.11.1.5. Verify
   13.11.2. CDOV process
      13.11.2.1. Concept design
      13.11.2.2. Design development
      13.11.2.3. Optimize
      13.11.2.4. Verify
REFERENCES:

