ME 564
Senior Design Group Project
(4 credit hours)

Objectives

1. Learn the entire engineering design process
2. Use design tools in conceptualization, computer aided design, and analysis
3. Complete a successful design through the preliminary design stage
4. Exercise oral and written communications as part of the design process
5. Use analysis techniques learned in other classes
6. Review issues in engineering professionalism and ethics
7. Learn techniques for reverse engineering

Prerequisites

ME 510, Heat Transfer
2nd writing course and prereq or concur:
ME 563, Design of Selected Machine Elements II

Before taking this class, the students should specifically know:

1. How to do engineering analysis and sizing in both the thermal and mechanical systems areas

Topics

1. Engineering Design Process
2. Engineering Analysis
3. Professionalism and Ethics
4. Reverse Engineering

Basis of Grading

Individual:
1. Oral reports
2. Attendance
3. Individual portion of group activities
4. Homework assignments

Group:
1. Concept development
2. Detailed design embodiment
3. Engineering analysis and sizing
4. Overall understanding of process
5. Final report and presentation

Engineering Design Process

1. Defining customer needs
2. Reverse engineering
3. External information search
   a. Patent search
   b. Commercial information search
   c. Journals and conference papers
4. Conceptual design
   a. Structured brainstorming
   b. Functional diagrams
   c. Analogies
   d. Sketching as an aid to creativity
   e. Affinity diagrams
   f. Morphological tables
   g. 631 group methods
5. Modularity versus integration
   a. Formation of product families
6. Design for manufacture
   a. Design for assembly
   b. Inventory cost
   c. Costing metrics for components

Engineering Analysis

1. Detailed layout of major systems
2. Detailed specification of all parts and subsystems
3. Detailed analysis of critical parts
4. Economic analysis
5. Codes and standards

Professionalism and Ethics

1. What is professionalism?
2. Professional societies
3. Life-long learning
4. Engineer's code of ethics
5. Ethics case studies
6. Responsibilities to society

Reverse Engineering

1. What is reverse engineering?
2. Exercise problem
3. Product analysis