

Review Outline for ME 314 – Competitive Manufacturing

Spring 2005

- I. Introduction to Competitive Manufacturing**
 - a. Definition of manufacturing
 - b. Features of manufacturing engineering
 - c. Major changes in manufacturing – names and concepts

- II. Materials Selection**
 - a. ASTM standards – Why & how they are used
 - b. Quantitative method of material selection (Cambridge log-log charts and performance index)
 - c. Selection of materials based on competitive criteria (e.g., espresso machine example)

- III. Engineering Economic Analysis**
 - a. Cost estimating methods
 - b. Cash flow diagrams and interest relations (time value of money)
 - c. Analysis techniques
 - i. NPW
 - ii. Annual cash flow
 - iii. Rate of return
 - d. Taxation and depreciation

- IV. Quality**
 - a. Statistical Process Control
 - b. Taguchi Loss Function

- V. Product Liability**
 - a. Overview of product liability
 - i. Definition / When is a company considered liable for its products?
 - ii. Negligence vs. strict liability
 - b. Types of product defects, what constitutes these defects, and how to avoid them
 - i. Manufacturing defects
 - ii. Design defects – five criteria
 - iii. Labeling defects

- VI. Green Manufacturing**
 - a. Definition and characteristics
 - i. Types of environmental impact
 - ii. Issues in product and process design
 - b. Biopolymers

- VII. Advanced Manufacturing Processes**
 - a. Rapid Prototyping
 - i. Stereolithography (SL)
 - ii. Fused deposition modeling (FDM)
 - iii. 3-D printing (from online lecture notes and lab tour)
 - b. Microfabrication
 - i. Characteristics and applications of microfabrication
 - ii. Scaling laws and relative tolerances
 - c. Advanced Machining
 - i. Characteristics and applications of laser beam machining (LBM)
 - ii. Characteristics and applications of electrodischarge machining (EDM)
 - d. Micromachining
 - i. Characteristics of micro-scale endmilling
 - ii. Tool speed calculations