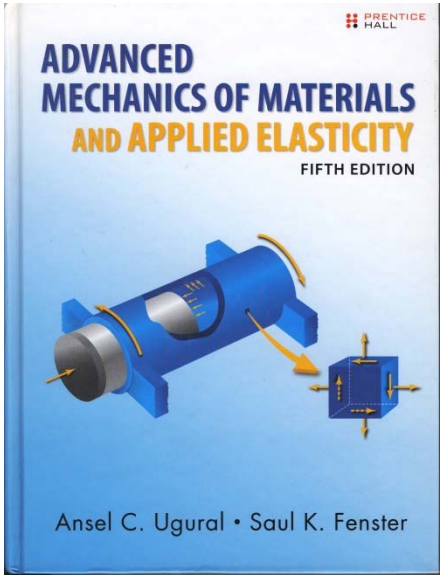
Mechanical & Industrial Engineering
Course and Option Talk – **Solid Mechanics**

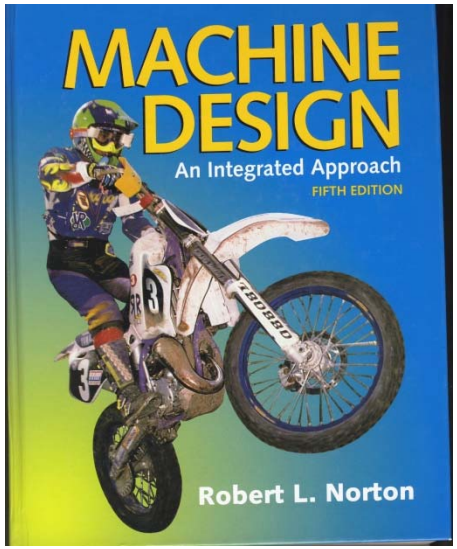
Prof J.K. Spelt

Solid Mechanics Stream:

MIE320S Mechanics of Solids II

MIE442F Machine Design





3rd Year Curriculum Overview

FALL

- MIE301: Kinematics and Dynamics of Machines
- MIE312: Fluid Mechanics I
- MIE342: Circuits with Applications to Mechanical Engineering Systems
- MIE358: Engineering Economics and Accounting
- Natural science requirement

WINTER

- MIE315: Design for the Environment
- MIE313: Heat and Mass Transfer
- MIE334: Numerical Methods I
- **Two stream option courses**

4th Year Curriculum Overview

FALL

- MIE491: Capstone Design
- **Two stream option courses**
- **One Technical Elective**
- Other: HSS or CS Elective

WINTER

- MIE491: Capstone Design
- **Three Technical Elective courses**
- Other: HSS or CS Elective

Solid Mechanics Stream

3S Term – **MIE320 – Mechanics of Solids II**

- Advanced strength of materials
- Continuation of Mechanics of Solids I
- Stress and deformation analysis
- Fracture mechanics
- Finite element analysis (6 labs)

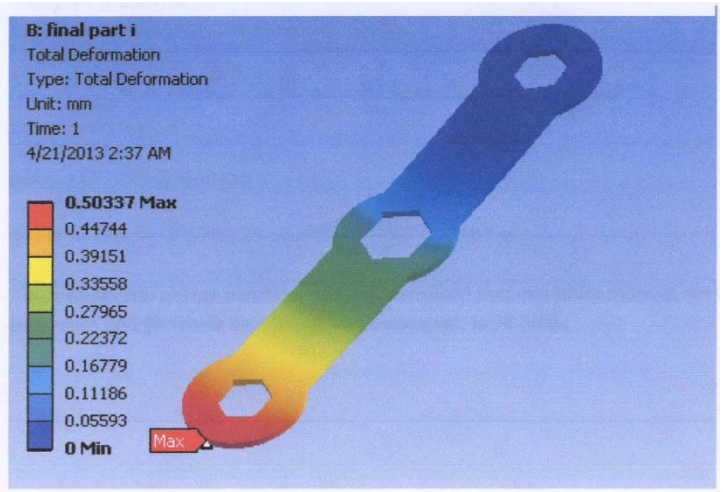
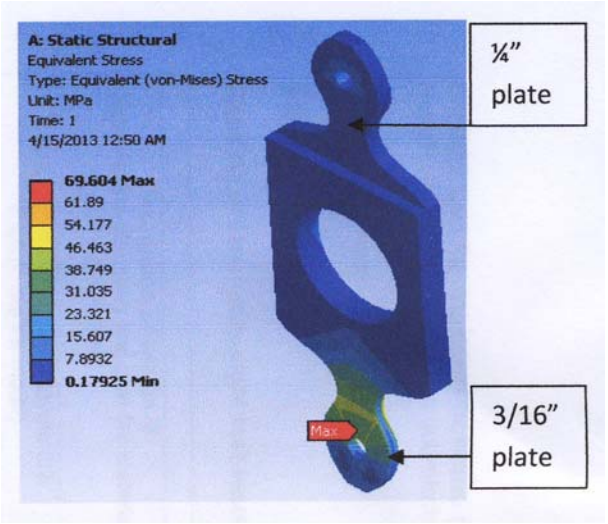


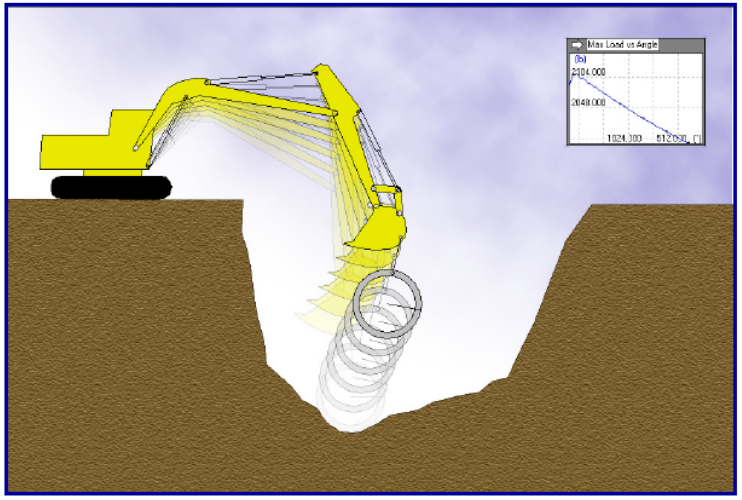
Figure 4 Total Deformation of Bicycle Wrench



Solid Mechanics Stream

4F Term – **MIE442 – Machine Design**

- Prediction of yield, buckling, fracture in machine components
- Fatigue
- Bearings and lubrication
- Surface failure (contact stress, wear, surface fatigue)
- *Working Model 2D* design project **or** 2 *George Brown* machining courses (*Basic Machining* (if not taken yet) / *Welding / Advanced Machining*)



Notable Technical Electives

There are many because it is such a central topic.

- Design of Innovative Products MIE440H1F
- Materials Selection in Design II MSE401H1 F

- Vibrations MIE402H1 S
- Thermal and Machine Design of Nuclear Power Reactors MIE408H1 S
- Biocomposites: Mechanics and Bioinspiration CHE475H1
- Biomechanics I MIE439H1 S
- Design Optimization MIE441H1 S
- Reliability and Maintainability Engineering MIE469H1 S
- MEMS Design and Microfabrication MIE506H1 S
- Product Design MIE540H1 S
- Surgical and Dental Implant Design MSE442H1 S

Solid Mechanics - Overview

Examples of application areas

- Product design (auto, rail, aircraft, energy, microelectronics …)
- Design of equipment for materials processing and product manufacturing
- Equipment maintenance
- Manufacturing process analysis (micro-machining, 3D printing, plastics forming …)
- Energy generation

… *Making things for the real world inevitably involves considerations of strength, durability and deflection*.