

MECH 592 Machine Tool Structures and Vibrations
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The room and lecture times will be adjusted based on the needs of registered students.

The major focus of this course is “Linear Vibrations and Experimental Modal Analysis”. Machine tools are used as a real world application to teach practical use of vibration engineering in machine design and troubleshooting rotating machinery.

CONTENTS

- 1- Overview of Metal Cutting Operations (2 weeks)
 - Orthogonal cutting Mechanics
 - Oblique Cutting Mechanics
 - Mechanics of MillingProject/Lab. Orthogonal Cutting, Milling Tests on CNC Machine Tools

- 2- Linear Vibrations and Modal Analysis
 - Static Machine Tool Deformations
 - Overview of Single and Multi-Degree of Vibrations
 - Frequency Response of Machine Structures
 - Experimental Modal Testing of Machines
 - Troubleshooting Machine Design via Modal Analysis
 - Oriented Frequency Response Function of MachinesProject/Lab. Experimental Modal Analysis of a Machine Structure

- 3- Chatter Vibrations of Machine Tools
 - Orthogonal Chatter Vibration Stability
 - Chatter Vibration Stability in Milling
 - Frequency Domain Stability Analysis
 - Semi Discrete Time Domain Stability AnalysisProject/Lab. Chatter Stability of an Actual Machine

- 4- Application of cutting, vibrations and stability in variety of real life problems in various industries.