

Vibration control - Video course

COURSE OUTLINE

The main objective of course is to present fundamentals to a modern treatment of vibrations, the control strategies using active and passive control methods. In this course, the design consideration of material selection, smart materials and vibration measurement techniques are also discussed.

Contents: Review of free and forced vibrations with and without damping; Free and forced vibration of single, two and multi-degree of freedom systems with and without viscous damping; Basics of vibration control: reduction at source, Active feedback control, vibration isolation; Vibration generation mechanisms: Source classification, self excited vibration, flow induced vibration, field balancing of rigid rotors/flexible rotors and damping models and measures, Design consideration of material selection.

Principles of Passive Vibrations Control: Basics, design of absorber, absorber with ideal spring, shock absorber, isolators with stiffness and damping; Principle of Active Vibration Control: Basics, Piezoelectric materials, electro rheological fluids, magneto rheological fluids, [Magneto- and Electrostrictive Materials in Vibration Control](#), shape memory alloys and electro-magnetic materials; Vibration measurement techniques: Basics, data acquisition, FFT analysis and filters

COURSE DETAIL

S. No.	Particulars	Contact Hours
1	Basic Concepts: Review of free and forced vibrations with and without damping; Free and forced vibration of single, two and multi-degree of freedom systems with and without viscous damping	4
2	Basic Vibration Control: reduction at source, Active feedback control, vibration isolation	8
3	Vibration Generation Mechanism: Vibration generation mechanisms: Source classification, self excited vibration, flow induced vibration, field balancing of rigid rotors/flexible rotors and damping models and measures, Design consideration of material selection.	9
4	Passive Vibration Control: Basics, design of absorber, absorber with ideal spring, shock absorber, isolators with stiffness and damping.	6
5	Active Vibration Control: Basics, Piezoelectric materials, electro rheological fluids, magneto rheological fluids, Magneto- and Electrostrictive Materials in Vibration Control , shape memory alloys and electro-magnetic materials.	9
6	Vibration Measurement: Basics, data acquisition, FFT analysis and filters	4
Total		40

References:

1. Mechanical Vibrations, S. S. Rao, Pearson Education Inc. (4th Ed.), 2007.
2. Fundamental of Vibrations Leonard Meirovitch, Mc-Graw Hill Inc., 2001
3. Vibration and Control, D. J. Inman, John Willey & Sons Inc, 2002



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Mechanical Engineering

Pre-requisites:

- Understanding of basic concept of welding UG course on Basic Manufacturing Processes.

Coordinators:

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4. Mechanical Vibrations, S. Tamadonni & Graham S. Kelly, Schaum's Out line Series, Mc-Graw Hill Inc, 1998.

5. Vibration Condition Monitoring of Machines, J. S. Rao, Tata Mc-Graw Hill, 2006