

Course Number: 28536

Course Name: Machining and Cutting Tools

Course Type: Theoretical, Practical
Prerequisite: None
Level: Graduate
Group: Manufacturing Processes

Type & Max Unit: Constant 3
Corequisite: None
First Presentation: 1995-2
Last Edition: 2017-1

Objectives: To learn about physics governing machining processes in order to affect machined part quality, decreasing cycle time and costs

Topics:

- **Introduction to machining processes**
- **Mechanics of metal cutting:** Mechanism of chip forming, Forces Acting on the Cutting Tool, Specific Cutting Energy, Apparent Mean Shear Strength of the Work Material, Friction in Metal Cutting
- **Temperatures in Metal Cutting:** Heat Generation in Metal Cutting, Heat Transfer in a Moving Material, Temperature Distribution in Metal Cutting
- **Tool Life and Tool Wear:** Forms of Wear in Metal Cutting, Mechanisms of tool wear
- **Tool Material:** Cutting Tool Grades, Tool Selection Method, Advances in Tool Technology, Chip Control, Tool Wear During Chip Breaking,
- **Machine Tool Vibrations:** Forced Vibrations, Self-Excited Vibrations (Chatter), Improving Machine Tool Stability
- **Grinding:** The Grinding Wheel, Effect of Grinding Conditions on Wheel Behavior, Thermal Effects in Grinding, Grinding-Wheel Wear, Nonconventional Grinding Operations

References:

1. Knight, W.A., and Boothroyd, G., "Fundamentals of Metal Machining & Machine Tools", Third Edition, CRC Press, 2005.
2. Altintas, Y., "Manufacturing Automation: Metal Cutting Mechanics, Machine Tool Vibrations, and CNC Design", Cambridge University Press, 2000.
3. Weck, M., "Handbook of Machine Tools", Vol. 1-4, John Wiley & Sons, 1984.