



Advanced Concepts of Bearing Technology

INSTRUCTORS:

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COURSE INFORMATION

Course Description

This course builds on the foundations of the Essential Course and challenges the experienced engineer in areas such as internal loading and Hertzian stresses, failure initiation criteria, friction & wear, and fatigue life calculation methods. This is an exceptional course for engineers with 2-3 years work experience in rolling element bearings or past attendees of the Essential Concepts of Bearing Technology. A general knowledge of the basic bearing types and terminology is required.

Who Should Attend

This course is intended for those with several years of bearing knowledge involving the design, application, selection and use of rolling element bearings. A basic knowledge of the bearing types, tolerances, part numbers, bearing terminology and load calculations are required. A technical degree or training is suggested.

Learning Objectives

- Understand how bearing internal designs affect rolling element loading and life.
- Understand the different contact stresses and fatigue causing stress.
- Understand how lubricant film thicknesses are formed and characterized.
- Understand the role of surface finish and friction in the contact zones.
- Understand bearing deflections, stiffness and preloading.
- Understand the statistical nature of bearing failures.
- Understand advanced life calculations in standards.

Required Textbook

Advanced Concepts of Bearing Technology Manual by Dan Snyder, Tim Ovaert, Vern Wedeven, & Brian Werner

Advanced Concepts of Bearing Technology 5th Edition by Tedric A. Harris & Michael N. Kotzalas

COURSE OUTLINE

- Bearing Macro-geometry: Osculation, Internal Clearances, Contact Angles
- Load Contacts, Ball/Roller Loading: Static/Inertial
- Hertzian Contact Stresses, Bearing Deflection, Surface & Subsurface Shear Stresses
- Internal Load Distribution – Loaded Zones, Speed & Motion

- Concepts of Friction & Wear: Surface Topography and Measurement
- Fundamentals of Fatigue Life Theory, Dynamic Capacity
- Contact Friction, Traction Effects
- Bearing Friction & ISO Reference Speed Ratings
- Permanent Deformations & Static Capacity
- Fatigue Life Prediction: Standards & Advanced Calculation Methods
- Testing Methods & Statistical Test Data Analysis
- Lubricants & Rheology & EHL Calculations
- Shaft-Bearing Systems & Performance Analysis
- Bearing Preload

STUDENT FEEDBACK AND GRADING PROCEDURES

Assignments

There will be a opportunities for question and answer as well as group work or an assessment.

COURSE MANAGEMENT

Weather Delays and Cancelations

We will communicate any cancellations, delays or other concerns for safety prior to class via email, voicemail, and/or text message. Please be sure that we have all pertinent contact information as you travel to your class location.

Attendance for Domestic and International Students

Please be mindful that these are short, accelerated courses. Attendance is extremely important. If you are going to be absent from any class day, please contact the course coordinator.

Plagiarism, Cheating and other types of Misconduct

Plagiarism¹, cheating and other types of misconduct are unacceptable.

Students with Disabilities

Students requiring assistance and accommodation should complete the [Special Accommodation Request form](#) and submit it to Stephanie Smialek, Education Manager at smialek@motionpower.org. She can be reached at 773-302-8026.

Grievance Procedures

Students who have concerns about the class are encouraged to contact Stephanie Smialek, Education Manager, at smialek@motionpower.org or 773-302-8026.

Outline Changes

The instructor reserves the right to modify the outline during the course of the class.

LEARNING AND OTHER RESOURCES

Links for writing resources:

- grammar.ccc.commnet.edu/grammar

¹ Plagiarism is defined as "the use or close imitation of the language and thoughts of another author and the representation of them as one's own original work."

- www.merriam-webster.com

Links for Math resources:

- www.sosmath.com
- Khan Academy on www.youtube.com

Links for time management, study skills and note taking resources:

- www.mindtools.com
- www.testakingtips.com

Links for career resources:

- <https://www.agma.org/newsroom/jobs/>

Industry News:

- <https://www.agma.org/newsroom/industry-news/>