325: A Practical Approach for Managing Gear Noise

INSTRUCTOR:
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COURSE INFORMATION

Course Description
"A Practical Approach for Managing Gear Noise" combines theory with practical testing and simulation techniques used to manage gear noise. Topics focus on insights into the mechanisms for both whine and rattle, the two most common categories of gear "noise". The course presents clear explanations relating subjective evaluations of audible noise to objective actions, including troubleshooting and countermeasures. Concepts are supported with a number of sound and movie files. Technical papers supporting certain concepts are cited for the students' further study.

Course Rationale/Students Course Designed to Serve
Students, technicians, engineers, and managers interested in or responsible for the management of gear noise in a variety of industries.

Learning Objectives:

- Explanation of the underlying physics of gear noise generation mechanisms for whine and rattle
- Exposure to vibration and sound instrumentation and testing techniques used to characterize whine and rattle
- Introductions to advanced simulation tools for understanding the underlying physics of gear whine and rattle, with insight into troubleshooting and countermeasures.
- Development of a strategy for setting gearbox sound and vibration target levels

Reference Guide (Provided by MPMA)
Read Only copies of the PowerPoint modules providing full access to the slides' animations and sound files. The lecture narration is included in the notes section.

COURSE OUTLINE

I. Basics—guide to the underlying physics of gear whine and rattle; Subjective-to-objective relationships are described using Quality Function Deployment charts, Noise Path Analysis, Source-Path-Receiver Models, Tonal Noise Target Setting, etc.
II. Test—fundamental explanation of vibration and sound measurement techniques are presented, including post-processing methods specific to whine and rattle.
III. Simulation—exposure to various simulation tools and methods used to characterize whine and rattle, including approaches for high mileage gear whine predictions, thermal growth effects, boundary condition effects, and idler/planetary phasing
IV. Countermeasures—a practical approach to solving gear whine and rattle issues

STUDENT FEEDBACK AND GRADING PROCEDURES

Assignments
A self-graded assessment is administered during this course. Immediate feedback is given, and the material is reviewed by the instructor.

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
Plagiarism[1], 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 our Education inbox at education@motionpower.org. Or we can be reached by calling 703-684-0211.

Grievance Procedures
Students who have concerns about the class are encouraged to contact any Education Department staff at education@motionpower.org or by calling 703-684-0211.

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
- 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

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."

Links for career resources:

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

Industry News:

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