Fundamentals of Worm and Crossed Axis Helical Gearing

INSTRUCTOR:
William ‘Mark’ McVea
Email: markmcvea@kbeplus.com

COURSE INFORMATION

Course Description
Provides an introduction and emphasize the differences between parallel (the experience base) axis and worm and crossed axis helical gears. Describe the basics of worm and crossed axis helical gears, their fundamental design principals, application guidelines and recommendations, lubrication requirement, a discussion of accuracy and quality and summarize with a brief review of common failure modes.

It is recommended that you spend a minimum of 1 hour reading and reviewing the material each day.

Learning Objectives:

• Define the basic differences between parallel axis, common crossed intersecting axis and worm / wheel and crossed axis helical gears
• Interpret and discuss the design and applications specifics as they apply to worm / wheel and crossed axis helical gears
• Assess lubrication, cooling and support requirements for worm / wheel and crossed axis helical gears
• Explain the cause of a particular failure of a worm / wheel or crossed axis helical gear pair, as a function of application or use

Who Should Attend
This course will appeal to anyone who is interested in gears, gear systems, and the design, application and development of worm and wheel gearing. More specifically, anyone responsible for the following will benefit;

• Mechanical power transmission system design, development, durability assessment and application
• Application and development of geared systems technologies
• Management of transmission designers and manufacturers
• Supply of components and sub-systems to mechanical power transmission system manufacturers

Required Textbook (Provided by AGMA)
AGMA’s Fundamentals of Worm and Crossed Axis Helical Gearing, by William Mark McVea.
• **Worm and Wheel**
  o Gear Basics;
    ▪ What defines a worm and wheel
    ▪ Basic uses and typical applications
    ▪ Unique features and functions
  o Operation and Tooth Interaction;
    ▪ Why to use
    ▪ When not to use
    ▪ Relative motion of teeth
    ▪ Tooth contact description
  o Tooth Form Modification
  o Lubrication;
    ▪ Lubrication requirements
    ▪ Viscosity
    ▪ Acceptable lubricants
    ▪ Lubricant cooling requirements
    ▪ Tooth failures due to lubricant failures
  o Metallurgy
    ▪ Steel
    ▪ Bronze
    ▪ Brass
    ▪ Aluminum

• **Crossed Axis Helical**
  o Gear Basics;
    ▪ What defines a worm and wheel
    ▪ Basic uses and typical applications
    ▪ Unique features and functions
  o Operation and Tooth Interaction;
    ▪ Why to use
    ▪ When not to use
    ▪ Relative motion of teeth
    ▪ Tooth contact description
  o Tooth Form Modification
  o Lubrication;
    ▪ Lubrication requirements
    ▪ Viscosity
    ▪ Acceptable lubricants
    ▪ Lubricant cooling requirements
    ▪ Tooth failures due to lubricant failures
Assignments
Assignments and learning activities are given and directed at the discretion of the instructor.

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. Casandra Blassingame, Director, blassingame@agma.org or Rosemarie Bundoc, Education Manager at bundoc@agma.org.

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 Rosemarie Bundoc at bundoc@agma.org. She can be reached at 703-838-0069.

Grievance Procedures
Students who have concerns about the class are encouraged to contact Casandra Blassingame, Director of Education at blassingame@agma.org or 703-838-0055.

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

\(^1\) Plagiarism
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

Links for career resources:
- https://www.agma.org/newsroom/jobs/

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

---

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."