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 **Gearbox System Design**

**The Rest of the Story...Everything But the Gears & Bearings**

**INSTRUCTORS:**

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| **COURSE INFORMATION** |

**Course Description**

This course focuses the supporting elements of a gearbox that allow gears and bearings to do their jobs most efficiently. Learn about seals, lubrication, lubricants, housings, breathers, and other details that go into designing gearbox systems.

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

**Course Rationale/Students Course Designed to Serve**

Gear design engineers; management involved with the design and manufacture of gearing type components; metallurgists and materials engineers; laboratory technicians; quality assurance technicians; furnace design engineers; and equipment suppliers.

**Learning Objectives**

* Describe types of housing construction, housing elements (covers, inspection ports, sump, mounting, etc.)
* Apply drawing practices for housings and related components
* Bearing mounting, retention and sealing
* Describe election and role of gearbox accessories, such as breathers, filters, screens, sight gages, and other level indication devices
* Apply the appropriate lubricant selection
* Apply the lubricant to the rotating elements
* Describe the selection criteria concerning the basic lubricant chemistry
* Discuss drawing practices and tolerancing from the designers’ perspective
* Learn about translating the general design from the design manual to the individual component drawings.

**Required Textbooks (Provided by AGMA)**

AGMA’s *Gearbox System Design* by Raymond J. Drago and Steve Cymbala

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| COURSE OUTLINE |

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| 1. **History**

 A general overview on types of gearboxes1. **Gearbox Function and Layout**

 An exploration of the gearbox in the power transmission environment. Discover the best  location of the gearbox for various uses; preparation of detailed design layout of gearboxes;  and review detailed drawings to get to know all the various parts within a gearbox.1. **Gearbox Style**

 An overview of the various components within gearboxes: open gearbox, arrangement, type of  gearing, type of support, lubrication, enclosed gearbox arrangement, and types of gearing will  be explored.1. **Lubrication**

 An introduction to the wide variety of choice in lubrication for gearboxes. Learn thresholds of  each type, methods of applications; and maintenance of cleanliness of lubricant. Instructor will  provide details on gearbox breathers, oil level indicators, heat exchangers, operation  monitoring instrumentation, health monitoring and instrumentation, oil analysis, and vibration  sensors.1. **Gearbox Housing, Cover and Sump Design**

 A lesson in setting up your drawings for various parts of the gearbox. Separate drawings should  be prepared for machining, casting, weldment, and other techniques used to produce the final  product. Drawings should always utilize Geometric Dimensioning and Tolerancing (GD&T). Additional discussion on housing types, shaft seals, lip seals, packing, split seals, pressure  lubrication of gear meshes and bearings, cast oil passages integral with housing and inspection  ports.1. **Gearbox Marking/Identification**

 A list of the various nameplates and markings used when completing gearboxes.1. **Gearbox Accessories**

 There are small parts that have small roles that are still important in the ultimate functionality  of a gearbox. A discussion of breathers, caps, vibration monitoring, lube sample ports and  drain ports, is included here.1. **Provisions for Preservation**

 Once all the hard work is complete - you need to learn how to package your gearbox to  transport and complete. |

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| **STUDENT FEEDBACK AND GRADING PROCEDURES** |

**Assignments**

Assignments and learning activities are given and directed at the discretion of the instructor.

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| 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]](#footnote-1), cheating and other types of misconduct are unacceptable.

**Students with Disabilities**Students requiring assistance and accommodation should complete the [Special Accommodation Request form](http://www.graduateschool.edu/images/stories/AcademicPrograms/AdmissionsApplicationGuideD3.pdf) and submit it to Stephanie Smialek, Education Manager at smialek@agma.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@agma.org or 773-302-8026.

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

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| LEARNING AND OTHER RESOURCES |

**Links for writing resources:**

* grammar.ccc.commnet.edu/grammar
* [www.merriam-webster.com](http://www.merriam-webster.com)

**Links for Math resources:**

* [www.sosmath.com](http://www.sosmath.com)
* Khan Academy on www.youtube.com

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

* [www.mindtools.com](http://www.mindtools.com)
* [www.testakingtips.com](http://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.” [↑](#footnote-ref-1)