

ISET-1310: MECHANICAL POWER TRANSMISSION

Cuyahoga Community College

Viewing: ISET-1310 : Mechanical Power Transmission

Board of Trustees:

December 2023

Academic Term:

Fall 2024

Subject Code

ISET - Integrated Systems Engineering

Course Number:

1310

Title:

Mechanical Power Transmission

Catalog Description:

Introduction to basic concepts of industrial maintenance and installation of mechanical drive systems including bearing, shafts, gears, and couplings. With an emphasis on OSHA safety standards, installation, maintenance, troubleshooting, and lubrication of mechanical components.

Credit Hour(s):

2

Lecture Hour(s):

1

Lab Hour(s):

2

Requisites

Prerequisite and Corequisite

None.

Outcomes

Course Outcome(s):

Apply maintenance and troubleshooting procedures to basic belt, chain drive, and gear drive systems using OSHA safety standards.

Objective(s):

1. Discuss OSHA standard part 1926.
2. Discuss and apply lock-out / tag-out procedures as it relates to OSHA.
3. Identify components of mechanical power transmission systems (belt, chain and gear drives).
4. Recognize various belt, chain and gear drive configurations and determine appropriate applications for power transmission.
5. Discuss the types of material used for belt, chain and gear assemblies.
6. Select and apply appropriate instruments and techniques to troubleshoot slippage, binding and wear.
7. Discuss different maintenance plans for lubrication and alignment of power transmission components.

Course Outcome(s):

Install, maintain and troubleshoot bearings, shafts and linkages.

Objective(s):

1. Describe the role of bearings, shafts and linkages in power transmission, along with the proper materials for bearings and shafts.
2. Determine the proper bearing type, seal, shaft type and linkage for industrial applications for machines, blowers and pumps.
3. Select and apply appropriate instruments and techniques to troubleshoot overheating, alignment and wear.

4. Install bearings and shafts.
5. Identify and discuss various types of bearings, shafts and linkages.

Course Outcome(s):

Identify the characteristics and applications of lubricants for bearings, drives and linkages.

Objective(s):

1. Discuss the principles of lubrication.
2. Discuss the various types of lubrication and identify the characteristics of each type.

Course Outcome(s):

Recognize various alignment techniques and identify when each technique is applicable.

Objective(s):

1. Discuss the principles of laser and measurement alignments.
2. Identify and apply laser measurement alignment procedures for drives and linkages.
3. Discuss the principles of vibration analysis and techniques used to compensate for vibrations.

Methods of Evaluation:

1. Homework assignment
2. Written and verbal quizzes covering homework and in-class demonstrations
3. Lab Assignments
4. Final exam

Course Content Outline:

1. Concepts
 - a. OSHA Safety standards
 - b. Lockout / Tag-out
 - c. Mechanical system components (bearings, shafts, linkage types)
 - d. Principles of mechanical motion
 - e. Fundamentals of electricity
 - f. Friction
 - g. Characteristics of lubricants
 - h. Rotational torque
 - i. Horsepower to torque conversions
 - j. Frequency, Harmonics and the principles of laser alignment
 - k. Mechanical line diagrams
 - l. Materials for proper applications
 - m. Hand tools
 - n. Meters and instrumentation
 - o. Installation of mechanical drives
 - p. Principles of measurement and alignment
 - q. Troubleshooting
 - r. Reliability Centered Maintenance
 - s. Vibration analysis
2. Skills
 - a. Safety rule applications
 - b. Installation and repair techniques for mechanical systems
 - c. Hand tool applications
 - d. Using Industrial Terminology
 - e. Mechanical Print reading
 - f. Troubleshooting (fundamentals)

- g. Applying Lubrication
 - h. Component identification and application
 - i. Meter reading
3. Issues
- a. Relating theory to design applications
 - b. Identifying quality manufactures
 - c. Understanding the work environment

Resources

Albert W. Kemp. *Industrial Mechanics*. 4th. Orland Park IL: American Technical Publishers, 2016.

Larry Chastain. *Industrial Mechanics and Maintenance*. 4th. Boston, MA: Prentice Hall, 2020.

Brumbach, Michael. *Industrial Maintenance*. 2nd. Thomson Publishing, Clifton Park, New York, 2003.

Knoteck, Richard, and Stenerson, Jon. *Mechanical Principles and Systems*. 1st. Prentice Hall, Upper Saddle, New Jersey, 2005.

Thomas Davis & Carl A. Nelson. *Audel Millwrights and Mechanics Guide*. 5th. Wilmington DE: Wiley Publishing Inc, 2004.

Resources Other

1. Amatrol Software on Mechanical Systems
2. *Gears explained*. The Engineering Mindset. 2021. <https://www.youtube.com/watch?v=4ROtKKuSaBI> (<https://www.youtube.com/watch/?v=4ROtKKuSaBI>)
3. *Never be confused by Gear Ratios Again -Explained in the Most Visual Way*. 2021, <https://www.youtube.com/watch?v=txQs3x-UN34&t=49s> (<https://www.youtube.com/watch/?v=txQs3x-UN34&t=49s>)
4. *Pulley Belt Calculations - Belt length, distance between pulley wheels*. The Engineering Mindset. 2017. <https://www.youtube.com/watch?v=yxCBhD9nguw> (<https://www.youtube.com/watch/?v=yxCBhD9nguw>)

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