

Western Technical College

10620144 Mechanical Drives

Course Outcome Summary

Course Information

Description N	lechanical drive components and systems are studied with emphasis on selection,
a	pplication and proper installation techniques. Topics include machine safety,
tc	orque, power, efficiency, bearings, couplings, alignment, v-belt drives, chain drives,
gu	ear drives and multi-shafting drives. Industrial equipment is used to present these
tc	opics.

Career Cluster	Manufacturing
Instructional Level	Associate Degree Courses
Total Credits	2
Total Hours	54

Textbooks

No textbook required.

Learner Supplies

Safety glasses with side eye protection that meet Z87 OSHA guidelines. Vendor: Campus Shop. Required.

Scientific calculator - T1-30XIIS or T1-36x Solar. Vendor: Campus Shop. Required.

Amatrol 206-LSUB4 Elearning License. Vendor: Campus Shop. Required.

Program Outcomes

1. Perform work safely

Course Competencies

1. Practice mechanical power transmission safety.

Assessment Strategies

- 1.1. written objective test
- 1.2. skill demonstration

Criteria

You will know you are successful when

- 1.1. you describe the five rules of safe dress for working with power transmission equipment.
- 1.2. you list eight mechanical transmission safety rules.
- 1.3. you perform a lockout/tagout procedure.
- 1.4. you describe the proper operation of the lockout/tagout system.

Learning Objectives

- 1.a. Identify five rules of safe dress for working with power transmission equipment.
- 1.b. Examine eight mechanical transmission safety rules.
- 1.c. Practice a lockout/tagout procedure.
- 1.d. Examine the proper operation of the lockout/tagout system.

2. Analyze key fasteners as a means of connecting a load to an electric motor.

Assessment Strategies

- 2.1. written objective test
- 2.2. skill demonstration

Criteria

You will know you are successful when

- 2.1. you describe the function and operation of a key fastener.
- 2.2. you explain applications of six types of key fasteners.
- 2.3. you analyze specifications for keys and keyseats.
- 2.4. you select a key for a given application.
- 2.5. you measure the actual key and keyseat given a sample.
- 2.6. you assemble a hub to a shaft using a key fastener.

Learning Objectives

- 2.a. Identify the function and operation of a key fastener.
- 2.b. Investigate the construction of six types of key fasteners and give an application of each.
- 2.c. Analyze specifications for keys and keyseats.
- 2.d. Select a key for a given application.
- 2.e. Measure the actual key and keyseat given a sample.
- 2.f. Practice assembling a hub to a shaft using a key fastener.

3. Analyze operational characteristics of a mechanical drive system.

Assessment Strategies

- 3.1. written objective test
- 3.2. skill demonstration

Criteria

You will know you are successful when

- 3.1. you explain two methods of loading a mechanical drive system.
- 3.2. you measure shaft torque using a prony brake.
- 3.3. you calculate rotary mechanical power.
- 3.4. you calculate mechanical efficiency.
- 3.5. you measure electric motor current.

Learning Objectives

- 3.a. Identify two methods of loading a mechanical drive system.
- 3.b. Use a prony brake to measure shaft torque.
- 3.c. Calculate rotary mechanical power.
- 3.d. Calculate mechanical efficiency.
- 3.e. Measure electric motor current.

4. Identify shaft and bearing applications.

Assessment Strategies

- 4.1. written objective test
- 4.2. skill demonstration

Criteria

You will know you are successful when

- 4.1. you explain the function of a drive shaft.
- 4.2. you identify shaft size given a sample.
- 4.3. you explain the function of a bearing.
- 4.4. you install pillow block anti-friction bearing on a shaft.

Learning Objectives

- 4.a. Examine the function of a drive shaft.
- 4.b. Identify shaft size given a sample.
- 4.c. Examine the function of a bearing.
- 4.d. Practice installing a pillow block anti-friction bearing on a shaft.

5. Investigate coupling and shaft alignment.

Assessment Strategies

- 5.1. written objective test
- 5.2. skill demonstration

Criteria

You will know you are successful when

- 5.1. you explain the function and application of a coupling.
- 5.2. you describe four categories of mechanical couplings.
- 5.3. you align two shafts for flexible jaw coupling installation.
- 5.4. you list two types of shaft misalignment.
- 5.5. you install a flexible jaw coupling.

Learning Objectives

- 5.a. Examine the function and application of a coupling.
- 5.b. Identify four categories of mechanical couplings.
- 5.c. Align two shafts for flexible jaw coupling installation.
- 5.d. Identify two types of shaft misalignment.
- 5.e. Practice installing a flexible jaw coupling.

6. Analyze belt drive system operation.

Assessment Strategies

- 6.1. written objective test
- 6.2. skill demonstration

Criteria

You will know you are successful when

- 6.1. you explain the function of the three basic components of a belt drive system.
- 6.2. you define pitch and explain its relevance to belt drive systems.
- 6.3. you determine the pitch circle, pitch diameter and pitch length of a belt drive system.
- 6.4. you calculate the pulley ratio of a belt drive system.
- 6.5. you list five types of belt drives and provide an application of each.
- 6.6. you install and align a fractional horsepower V-belt drive system.

Learning Objectives

6.a. Examine the functions of the three basic components of a belt drive system.

- 6.b. Define pitch and relate its relevance to belt drive systems.
- 6.c. Investigate the pitch circle, pitch diameter and pitch length of a belt drive system.
- 6.d. Calculate the pulley ratio of a belt drive system.
- 6.e. List five types of belt drives and provide an application of each.
- 6.f. Practice installing and aligning a fractional horsepower V-belt drive system.

7. Analyze the operation of a chain drive system.

Assessment Strategies

- 7.1. written objective test
- 7.2. skill demonstration

Criteria

You will know you are successful when

- 7.1. you explain the function of the three basic components of a chain drive system.
- 7.2. you calculate sprocket ratio and explain its significance to a chain drive system.
- 7.3. you calculate shaft speed and torque of a chain drive system.
- 7.4. you explain an application of each (4) type of drive chain.
- 7.5. you describe how to install, align and remove a chain drive system with adjustable centers.

Learning Objectives

- 7.a. Examine the functions of the three basic components of a chain drive system.
- 7.b. Calculate sprocket ratio and explain its significance to a chain drive system.
- 7.c. Calculate shaft speed and torque of a chain drive system.
- 7.d. List four types of chain drives and give an application of each.
- 7.e. Examine how to install, align and remove a chain drive system with adjustable centers.

8. Install a roller chain drive power transmission system.

Assessment Strategies

- 8.1. written objective test
- 8.2. skill demonstration

Criteria

You will know you are successful when

- 8.1. you install and align a roller chain system with adjustable centers.
- 8.2. you determine allowable chain sag for a given application.
- 8.3. you measure chain sag using a ruler and straight edge.
- 8.4. you adjust chain sag to a specified amount using adjustable centers.
- 8.5. you install and remove a chain master link using a chain puller.

Learning Objectives

- 8.a. Practice installing and aligning a roller chain system with adjustable centers.
- 8.b. Determine allowable chain sag for a given application.
- 8.c. Measure chain sag using a ruler and straight edge.
- 8.d. Adjust chain sag to a specified amount using adjustable centers.
- 8.e. Practice installing and removing a chain master link using a chain puller.

9. Examine the operation of a spur gear drive system.

Assessment Strategies

- 9.1. written objective test
- 9.2. skill demonstration

Criteria

You will know you are successful when

- 9.1. you describe the function of three components of a gear drive system.
- 9.2. you calculate gear ratio.
- 9.3. you calculate shaft speed and torque of a gear drive system.
- 9.4. you define the gear pitch, pitch circle and pitch diameter of a gear drive system.

Learning Objectives

9.a. Identify the functions of three components of a gear drive system.

- 9.b. Calculate gear ratio.
- 9.c. Calculate shaft speed and torque of a gear drive system.
- 9.d. Examine the gear pitch, pitch circle and pitch diameter of a gear drive system.

10. Align a multiple shaft gear drive system.

Assessment Strategies

- 10.1. written objective test
- 10.2. skill demonstration

Criteria

You will know you are successful when

- 10.1. you explain how to install a spur gear drive system.
- 10.2. you install a spur gear drive system.
- 10.3. you align a spur gear drive system.
- 10.4. you determine the allowable backlash in a gear drive system.
- 10.5. you measure gear backlash.
- 10.6. you adjust gear backlash to a specified amount.

Learning Objectives

- 10.a. Explore how to install a spur gear drive system.
- 10.b. Practice installing a spur gear drive system.
- 10.c. Align a spur gear drive system.
- 10.d. Determine the allowable backlash in a gear drive system.
- 10.e. Measure gear backlash.
- 10.f. Adjust gear backlash to a specified amount.