



Western Technical College

10620112 Fluid Power Fundamentals

Course Outcome Summary

Course Information

Description	An introductory course dealing with theory, operation and application of industrial hydraulic and pneumatic systems. Emphasis is placed on component and system operation using practical lab applications. Maintenance, troubleshooting and electrical control of fluid power are included.
Career Cluster	Manufacturing
Instructional Level	Associate Degree Courses
Total Credits	2
Total Hours	54

Textbooks

Hydraulics Fundamentals 1 Lab Book. Publisher: Haldeman Homme Inc. **ISBN-13**:978-2-89289-349-6. Required.

Pneumatic Fundamentals Student Lab Manual. Publisher: Haldeman Homme Inc. **ISBN-13**:978-2-89289-383-6. 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.

Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Cultivate Passion: Increase Self-Awareness
3. Live Responsibly: Develop Resilience

4. Live Responsibly: Embrace Sustainability
5. Refine Professionalism: Participate Collaboratively

Program Outcomes

1. Perform work safely.
2. Troubleshoot electrical and mechanical systems and devices.
3. Repair electrical and mechanical systems.
4. Communicate technical information.
5. Integrate electrical and mechanical systems and devices.

Course Competencies

1. Identify hydraulic and pneumatic components.

Assessment Strategies

- 1.1. written objective test
- 1.2. skill demonstration

Criteria

You will know you are successful when:

- 1.1. you identify components of the fluid power trainer.
- 1.2. you identify equipment for conditioning and distributing air.

Learning Objectives

- 1.a. Identify components of the fluid power trainer.
- 1.b. Identify equipment for conditioning and distributing air.

2. Construct simple hydraulic and pneumatic circuits.

Assessment Strategies

- 2.1. written objective test
- 2.2. skill demonstration

Criteria

You will know you are successful when:

- 2.1. you demonstrate the lifting ability of a hydraulic circuit.
- 2.2. you demonstrate the force available using a pneumatic cylinder.

Learning Objectives

- 2.a. Demonstrate the lifting ability of a hydraulic circuit.
- 2.b. Demonstrate the force available using a pneumatic cylinder.

3. Apply rules relative to linear actuators for pressure, volume, flow and velocity.

Assessment Strategies

- 3.1. written objective test
- 3.2. skill demonstration

Criteria

You will know you are successful when:

- 3.1. you identify applications relevant to linear actuators (cylinders).
- 3.2. you calculate system values related to pressure, force and area.
- 3.3. you discuss basic methods of controlling hydraulic and pneumatic energy.
- 3.4. you calculate cylinder operating speeds.
- 3.5. you measure speed, force and pressure associated with cylinders.

Learning Objectives

- 3.a. Identify applications relevant to linear actuators (cylinders).
- 3.b. Calculate system values related to pressure, force and area.
- 3.c. Discuss basic methods of controlling hydraulic or pneumatic energy.
- 3.d. Calculate cylinder operating speeds.
- 3.e. Measure speed, force and pressure associated with cylinders.

4. Apply directional control valves in hydraulic and pneumatic circuits.

Assessment Strategies

- 4.1. written objective test
- 4.2. skill demonstration

Criteria

You will know you are successful when:

- 4.1. you identify directional control valves by number of ways, center type, positions and actuation.
- 4.2. you identify the operating parts of a directional control valve.
- 4.3. you explain directional control valve circuit operation.
- 4.4. you control cylinders in series and parallel using directional control valves.

Learning Objectives

- 4.a. Identify directional control valves by number of ways, center type, positions and actuation.
- 4.b. Identify the operating parts of a directional control valve.
- 4.c. Explain directional control valve circuit operation.
- 4.d. Control cylinders in series and parallel using directional control valves.

5. Calculate quantities related to the operation of hydraulic and pneumatic motors.

Assessment Strategies

- 5.1. written objective test
- 5.2. skill demonstration

Criteria

You will know you are successful when:

- 5.1. you describe the operation of hydraulic and pneumatic motors.
- 5.2. you calculate torque and speed quantities for a hydraulic motor.
- 5.3. you determine the interaction of flow rate and pressure on hydraulic motor operation.
- 5.4. you identify means of controlling speed and direction of pneumatic motors.
- 5.5. you use manufacturers data sheets to determine power, torque and flow rates for hydraulic and pneumatic motors.

Learning Objectives

- 5.a. Describe the operation of hydraulic and pneumatic motors.
- 5.b. Calculate calculate torque and speed quantities for a hydraulic motor.
- 5.c. Determine the interaction of flow rate and pressure on hydraulic motor operation.
- 5.d. Identify means of controlling speed and direction of pneumatic motors.
- 5.e. Use manufacturers data sheets to determine power, torque and flow rates for hydraulic and pneumatic motors.

6. Apply pressure control valves and accumulators in operating hydraulic and pneumatic circuits.

Assessment Strategies

- 6.1. written objective test
- 6.2. skill demonstration

Criteria

You will know you are successful when:

- 6.1. you describe the operation of a pressure reducing valve.
- 6.2. you develop and test the operation of a clamp and bend circuit that utilizes a pressure reducing valve.
- 6.3. you describe remote control of a pressure relief valve.
- 6.4. you identify accumulator applications for auxiliary power, emergency power, leakage compensation and shock suppression.
- 6.5. you construct circuits using accumulators.

Learning Objectives

- 6.a. Describe the operation of a pressure reducing valve.
- 6.b. Develop and test the operation of a clamp and bend circuit that utilizes a pressure reducing valve.
- 6.c. Describe remote control of a pressure relief valve.
- 6.d. Identify accumulator applications for auxiliary power, emergency power, leakage compensation and shock suppression.
- 6.e. Construct circuits using accumulators.

7. Construct and test electrically controlled hydraulic and pneumatic circuits.

Assessment Strategies

- 7.1. written objective test
- 7.2. skill demonstration

Criteria

You will know you are successful when:

- 7.1. you identify standard electrical control components.
- 7.2. you describe the operation of an electromechanical control relay.
- 7.3. you construct circuits utilizing solenoid operated control valves.
- 7.4. you assemble control circuits from ladder diagrams.
- 7.5. you test the operation of magnetic proximity switches.

Learning Objectives

- 7.a. Identify standard electrical control components.
- 7.b. Describe the operation of an electromechanical control relay.
- 7.c. Construct circuits utilizing solenoid operated control valves.
- 7.d. Assemble control circuits from their ladder diagrams.
- 7.e. Test the operation of magnetic proximity switches.