



BAKER COLLEGE
STUDENT LEARNING OUTCOMES

MATT2750: Pneumatics and Hydraulics
3 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Examine the safety aspects of Hydraulic and Pneumatic uses in manufacturing. (Chapter 5)
 - a. Workplace and Environmental Considerations
 - b. Industrial hazard control
 - c. Fluid power safety factors
 - d. Safety requirements and programs
2. Demonstrate an understanding of hydraulic systems and their basic principles (chapters 1-3)
 - a. Understand the history of fluid power
 - b. Be aware of the advantages and disadvantages of fluid power systems
 - c. Comprehend the functions and structure of hydraulic systems
 - d. Learn the components and operation of basic hydraulic systems
 - e. Understand basic principles of mechanics and mechanical measurement
 - f. Be able to explain fluid power transmission and heat transfer
3. Demonstrate the ability to identify and understand hydraulic circuits and symbols (chapter 4)
 - a. Be able to interpret hydraulic circuit diagrams
 - b. Have knowledge of the various hydraulic symbols
 - c. Create schematics according to industry standards by hand and/or in Auto CAD
4. Explain the functions and characteristics of hydraulic fluid applications (chapter 6, 8 and 12)
 - a. Performance characteristics
 - b. Commonly used fluids
 - c. Hydraulic fluid additives
 - d. Hydraulic fluid specifications and maintenance
 - e. Conductor installation (pipe, tubing, hose)
 - f. Sources and effects of contamination
 - g. System operating temperatures
 - h. Filters maintenance
5. Demonstrate a working knowledge of hydraulic power units and pumps (chapter 7)
 - a. Reservoirs and pressure control valves
 - b. Basic pump structure, operation and classifications
 - c. Various pump design
 - d. Pump features and operating considerations
6. Identify and understand hydraulic system actuators (chapter 9)
 - a. Basic cylinders and their classification
 - b. Cylinder cushioning and mounting
 - c. Rotating hydraulic actuators

- d. Hydraulic motors
 - e. Hydrostatic drives
7. Demonstrate competency when controlling pressure, direction and flow of a hydraulic system (chapter 10)
 - a. Basic structure and features of control valves
 - b. Valve operation and associated springs, pressure and flow
 - c. Pressure control devices
 - d. Directional control devices
 - e. Flow control devices
 8. Understand the function and hazards of hydraulic accumulators (chapter 11)
 - a. Basic function, design and operation of accumulators
 - b. Energy storage and supplementation
 - c. Sizing and selecting the proper accumulator
 - d. Accumulator maintenance
 9. Explain and demonstrate the various applications of hydraulic circuits (chapter 13)
 - a. Pressure relations within a hydraulic circuit
 - b. Basic flow methods of hydraulic circuits
 - c. Motion and sequencing of actuators
 - d. System safety and decompression
 10. Describe the functions of compressed air and pneumatic energy transmission (chapter 14)
 - a. Pneumatic system compression and expansion of air
 - b. Pressure and volume variations
 - c. Temperature variations
 11. Demonstrate knowledge of compressed air sources and contamination prevention (chapter 15 and 16)
 - a. Compressor design and operation
 - b. Compressor classifications
 - c. Compressor parts and functions
 - d. Controlling dirt, temperature and moisture
 - e. Maintaining air filtration, lubrication and regulation
 12. Explain the basic functions of pneumatic actuators and control devices (chapter 17 and 18)
 - a. Pneumatic cylinders
 - b. Rotary motors
 - c. Reciprocating motors
 - d. Pressure control methods and devices
 - e. Directional control methods and devices
 - f. Flow control methods and devices
 13. Demonstrate the ability to understand pneumatic circuits and systems (chapter 19)
 - a. Controlling maximum circuit pressure
 - b. Provide multiple pressure to the system
 - c. Control airflow to allow for various types of cylinders and valves
 - d. Allow for single cycle and continuous cycle operations
 - e. Booster and time delay circuits

Big Ideas and Essential Questions

Big Ideas

- Industrial Safety Foundations of Hydraulics and Pneumatics
- The Role of Hydraulics and Pneumatics
- Production Efficiencies of Hydraulics and Pneumatics
- Hydraulic and Pneumatic processes
- Components

Essential Questions

- Why is safety the first priority?
- How can industrial hydraulic and pneumatic processes be controlled to attain product conformance?
- How do I determine if a process is unsafe?
- Why is it important to consider process efficiencies?
- How do I determine what materials to utilize in hydraulic and pneumatic processes?
- What impact does an incorrect usage have on a product or process?
- How are the different components of hydraulics and pneumatics used?
- How does documentation impact industrial communication between shifts?
- What are the potential uses in the future?

These SLOs are not approved for experiential credit.

Effective: Fall 2020