

Introduction to Hydraulics

CATALOG DESCRIPTION

This course instructs students in the basic fundamentals of hydraulics to include hands on operation, maintenance, problem diagnosis, repair and proper usage of tools, schematics and manuals of industrial equipment. This course will be taught in a hybrid format. Prerequisite of Trade Math or equivalent is required. 30 hours

LEARNING OUTCOMES

Upon completion of this course a student will be able to:

- Explain the main concept of using Hydraulic systems.
- Identify the parts of a Hydraulic system.
- Demonstrate the use of some Hydraulic applications.
- Explain the function of different Hydraulic components and its operation.
- Draw a Hydraulic circuit diagram for some applications.
- Determine the necessary components to be used in a certain Hydraulic application.
- Assemble Hydraulic circuits using different Hydraulic components.
- Design simple circuits for some given applications.
- Troubleshoot some Hydraulic circuit malfunctions.

COURSE OUTLINE

1. Introduction to Hydraulics Topics
 - a. Definition of Hydraulics
 - b. Describe the Functions of Basic Components of a Hydraulic System
 - c. Define Hydraulic Pressure and Give Its Units of Measurement
 - d. Describe the Function of a Hydraulic Schematic
 - e. Line Symbols Used with Fluid Power Circuits
 - f. Describe Eight Basic Rules for Drawing Hydraulic Schematics
2. Principles of Hydraulic Pressure and Flow
 - a. Calculate the Force of Extending and Retracting Cylinders
 - b. Pascal's Law and Its Significance in Hydraulics
 - c. How Force Is Multiplied Using Pascal's Law
 - d. How Pressure Is Distributed in a Hydraulic System
 - e. Two Types of Resistance in a Hydraulic System
 - f. How Delta P Describes Hydraulic Resistance and Explain Its Importance
 - g. Two Methods of Representing Pressure
 - h. How Oil Flows on the Suction Side of the Pump
3. Hydraulic Power
 - a. Discuss Hydraulic Safety Rules
 - b. Function of a Tee and a Cross and Application
 - c. Function of a Pressure Gauge and Application

4. Basic Cylinder Circuits
 - a. Function of a Hydraulic Cylinder and Application
 - b. Function of a Double-Acting Hydraulic Cylinder and Application
 - c. Function of a 4-Way, 3-Position Hydraulic DCV and Application
 - d. Design a Dual Cylinder Hydraulic Circuit

5. Pumps
 - a. Define Flow Rate and Explain How It Can Be Measured
 - b. Describe the Operation of Two Types of Flow Meters
 - c. Function of a Fixed-Displacement Pump and Application

6. Basic Motor Circuits
 - a. Function of a Hydraulic Motor and Application
 - b. Function of a Muffler and Application
 - c. Three Common Hydraulic Motor Designs and Applications
 - d. Design a Bi-Directional Hydraulic Motor Circuit

7. Hydraulic Speed Control Circuits
 - a. Function of a Hydraulic Needle Valve and Application
 - b. Function of a Hydraulic Check Valve and Application
 - c. Function of the Flow Control Valve and Application
 - d. Meter-In and Meter-Out Flow Control Circuit and Applications
 - e. Calculate Extend and Retract Speeds of Hydraulic Cylinders

METHOD OF INSTRUCTION

This hybrid course will be taught using lectures, discussion, hands-on lab sessions and self-study.

COURSE MATERIALS

Text: To be determined