Introductory Basics to Industrial Hydraulic Fluid Power Concepts and Components

Course Number 11

Course Description

This course is designed to introduce the student to how fluid power is used in the industry and show students the major components that can be found in fluid power systems. Hydraulic components and systems will be discussed in general. Procedures to ensure safety of maintenance personnel will be covered. Fluid Power symbols will be compared to the physical components. Hands-on exercises will reinforce location, proper component connections, and effects of adjustments on system operation. Significance of fluid cleanliness to system longevity and techniques to extend filter life and reduce failures will be presented. 50% is hands-on.

Prerequisites: None

Course Length: 4 ½ days

Textbooks: Womack Industrial Fluid Power Volume 1 and lab book

Course Outline

Safety
- Lock-out/Tag out and Safe Practices

Hydraulic Fundamentals, Fluids & Reservoirs
- Pascal's law, Force (PSI) and Motion (GPM)
- Symbols and schematics
- Sizing, construction and heat dissipation of reservoirs
- Filter use , locations and sizing
- De-compression effects on filters

Actuators
- Construction, operation and applications of various types

Pressure Controls
- Construction, operation and applications of various types
- Proper use of relief, reducing, brake, sequence, and counterbalance valves

Pumps and Pumping Principles
- Construction, operation and applications of Gear, Vane and Piston Pumps
- Strainer and pressure filter consideration

Flow Controls and Flow Dividers
- Construction and operation
- Meter in verses meter-out
- Pressure compensated vs. non-compensated

Directional Controls
- Construction, operation and applications of various types

Accumulators & Accessories
- Construction, theory and operation
- Heat exchangers and heaters

Learning Objectives

- Define flow rate, GPM & LPM
- Explain force and the term PSI
- Describe the main function of reservoirs
- Explain the main function of pumps & list different types
- Describe main function of cylinders & motors, directional controls, pressure controls, flow controls, and accumulators
- Define the term and concept of filtration.
- Describe the main function of flow dividers, flow meters, gauges, and pressure taps
- List the terms and uses of fittings, tube, pipe, and hoses
- Explain the use and look of schematics.
- Outline hydraulic safety including lockout tag-out procedures
- Identify and correlate the standard schematic symbols to the hydraulic components and typical locations
- Use charts to determine actuator force and speed for given pressure and flow
- Identify/classify relief, sequence, unloading, reducing, and counterbalance valves
- Identify schematic symbol and operational differences of directional control valves
- Identify different types of filtration and understand contamination levels
- Identify causes of pressure spikes that damage filters
- Recognize fluid requirements for different machines

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