



Principles, Operation and Maintenance
of Hydraulic Systems



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Introduction:

This training seminar provides participants with greater working expertise and understanding of hydraulic power systems. The seminar delivers an interactive training experience designed to help participants understand the various components found in a typical hydraulic system and how these components function and interact with each other.

Participants will also learn about the major groups of hydraulic components, including the function and principles of operation of direct-and pilot-operated relief valves, pressure-reducing valves, directional-control valves, fixed- and variable-displacement pumps, and accumulators.

Understanding of the basic hydraulic circuits most often used in industrial hydraulic systems is covered. Hydraulic principles of mechanical maintenance, types of hydraulic fluids and their characteristics will be also covered.

This training is designed for participants to learn and recognize faults and damage to major components in hydraulic systems during inspection and to adjust control valves and test hydraulic circuits for correct and safe operation.

Targeted Competencies:

- Principles of Hydraulic Power Systems
- Problems Related to Hydraulic Fluids
- Variable and Fixed Displacement Hydraulic Pumps
- Principles of Operation of Control Valves
- Operation of Basic Hydraulic Circuits used industrial hydraulic systems
- Maintenance, Inspection and testing of Hydraulic System

Course Objectives:

At the end of this training, you will learn to:

- Identify the hydraulic system components
- Recognize the impact hydraulic fluids have on the components
- Understand and interpret hydraulic symbols
- Understand the correct operation procedures of hydraulic systems
- Explain maintenance and troubleshooting practices that apply to the entire hydraulic system

Targeted Groups:

This training course is intended for all employees involved in the operations and maintenance of hydraulic systems

This training is suitable to a wide range of professionals but will greatly benefit:

- Maintenance Engineers
- Process and Mechanical Technicians
- Design Engineers
- Supervisors and Operators
- Mechanical Engineers

Course Content:

Unit 1: Principles of Hydraulics and Hydraulic Fluids

- Pascal's Law
- Main Components of a hydraulic System
- Filters, Reservoirs and Accumulators
- Closed and Open Loop
- Properties of Hydraulic Fluid
- Types of Hydraulic Fluids
- Fluid Selection
- Problems Related to Hydraulic Fluids

Unit 2: Hydraulic Pumps & Actuators

- Classification and performance of Hydraulic Pumps
- Variable and Fixed Displacements Hydraulic Pumps
- Gear Pumps
- Vane Pumps
- Piston Pumps
- Pressure Compensator, and Load Sense Control
- Hydraulic Cylinders
- Hydraulic Motors

Unit 3: Control Valves

- Classification of Control Valves
- Direct-Acting and Pilot-Operated Valves
- Pressure Control Valves
- Directional Control Valves
- Flow Control Valves
- Meter In and Meter out

Unit 4: Operation and Hydraulic Circuits

- Operator Responsibilities
- Symbol of Hydraulic Components
- Operation of Regenerative Circuits
- Counterbalance Circuits
- Decompression Circuits
- Hydraulic Circuits of Various Machines
- Case Studies



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Unit 5: Maintenance and Troubleshooting of Hydraulic Systems

- Flow Chart of Hydraulic Circuits
- Troubleshooting of Different Components of Hydraulic Systems
- Assembling and Disassembling Hydraulic Units
- Inspection and Testing of Hydraulic Systems
- Maintenance of Hydraulic Systems
- Case Studies
- Course summary and Recap