

Hydraulics and Electro-hydraulics Training

Duration: 40 Training Hours

Training Overview

This training provides participants with a comprehensive understanding of hydraulic and electrohydraulic systems used in industrial automation, manufacturing and heavy machinery. It combines theoretical foundations with practical exercises to ensure learners can design, operate, and troubleshoot hydraulic circuits and also integrate them with electrical control systems.

Training Objectives:

By the end of the training, participants will be able to:

- a) Understand the principles of fluid power and hydraulic energy generation and transmission.
- b) Identify and select hydraulic components (pumps, actuators, valves, accumulators).
- c) Install, repair or replace hydraulic components in a system
- d) Read and interpret hydraulic circuit diagrams for various applications.
- e) Integrate electrical and electronic control elements (relays, contactors and PLCs) with hydraulic systems.
- f) Apply troubleshooting techniques and preventive maintenance strategies.

Course Outline

Module 1: Fundamentals of Hydraulics

This module introduces participants to the fundamental physical principles of fluid power technology; fluid power principles, properties of hydraulic fluids, safety considerations, physical characteristics, SI units etc.

Module 2: Hydraulic Components

This module teaches the participants on the structure of a basic hydraulic system and the various components found in a basic system plus their applications in the system. Major components include: Pumps, motors, cylinders, directional control valves, pressure and flow control devices

Module 3: Hydraulic Circuit Design

This module introduces learners to the reading and interpretation of basic circuits using ISO symbols. Learners are then shown how to design simple to complex circuits using a software and implementation of the circuits on the provided electrohydraulic training rigs. Exercises include control of SAC directly to DAC control to complex multi actuator circuits.

Module 4: Introduction to Electro-hydraulics

This module covers the structure of a basic electrohydraulic circuit with the electrical control devices, solenoid-operated valves, sensors, relays and other accessories

Module 5: Electrohydraulic Circuit Design

At this stage, learners are taught how to integrate electrical signals with hydraulic circuits controlling the actuators, ladder diagrams, PLC interface basics.

Module 6: Troubleshooting & Maintenance

Participants are introduced to maintenance, fault diagnosis, repair and replacement of faulty components, contamination control among other tips for longer service life of the hydraulic systems/equipment

Training Methodology (blended learning)

- a) Online Lectures & Visual Aids: Presentations, diagrams, charts and animations for conceptual clarity.
- b) Hands-on Workshops: Building and testing circuits on Electro-hydraulic training rigs.
- c) Scenario-Based Exercises: Realistic industrial case studies.
- d) Evaluation: Reinforcing learning outcomes and engagement

Target Audience

- I. Machine operators
- II. Maintenance technicians
- III. Industrial operators
- IV. Engineering trainees
- V. Automation professionals