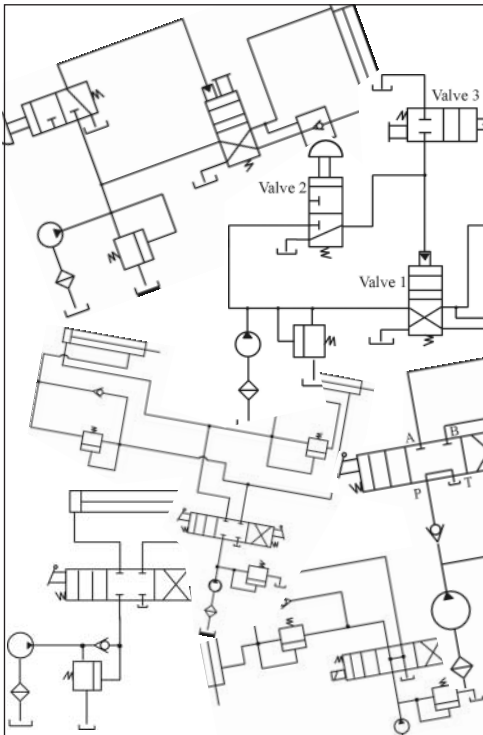


Practical

HYDRAULIC SYSTEMS: OPERATION & TROUBLESHOOTING

for Engineers & Technicians



YOU WILL LEARN HOW TO:

- Identify hydraulic systems components
- Describe essential hydraulic terms and understand their key applications
- Recognise the impact hydraulic fluids have on components
- Describe the correct operation, control sequences and procedures for the safe operation of various simple hydraulic systems
- Initiate an effective inspection and maintenance program
- Minimise forced outages and prevent serious damage to hydraulic equipment
- Explain the latest technologies available for electro hydraulic systems

WHO SHOULD ATTEND:

- Plant Engineers
- Operation, Maintenance, Inspection and Repair Managers, Supervisors and Engineers
- Mechanical Engineers
- Design Engineers
- Consulting Engineers
- Plant Operations and Maintenance Personnel
- Consulting Engineers
- Process Technicians
- Mechanical Technicians



Technology Training that Works

THE WORKSHOP

Whatever your hydraulic applications, you can increase your knowledge of the fundamentals, improve your maintenance programs and become an excellent troubleshooter of problems in this area by attending this information packed course. Cutaways of all major components are brought to the sessions to visually demonstrate the components' construction and operation. Developing an understanding of "How" it works leads to an understanding of how and why it fails. Multimedia views of the equipment are given to give you as realistic a view of hydraulic systems as possible.

The Hydraulics workshop is a highly practical, comprehensive and interactive two-day course. You will have an opportunity to discuss Hydraulic Systems construction, design-applications, operations, maintenance and management issues and be provided with the most up-to-date information and Best Practice in dealing with the subject. Towards the end of the workshop, you will have developed the skills and ability to recognise and solve hydraulic problems in a structured and confident manner.

PRE-REQUISITES

Fundamental knowledge of basic mechanical plant and operation thereof.

WORKSHOP OBJECTIVES

After attending this highly practical two-day workshop you will be able to:

- Work with basic hydraulic components
- Understand how basic hydraulic components function in a hydraulic circuit
- Read Hydraulic schematics
- Work safely with Hydraulic components and systems
- Troubleshoot simple hydraulics problems
- Apply a simple preventative maintenance program to lengthen hydraulic components life
- Make simple repairs to hydraulic systems

ON-SITE TRAINING

- ✓ **SAVE** over 50% by having an IDC workshop presented at your premises.
- ✓ Customise the training to **YOUR** workplace.
- ✓ Have the training delivered when and where you need it.

Contact us for a **FREE** proposal.

THE PROGRAM

DAY ONE

INTRODUCTION TO HYDRAULICS

- Origin of Hydraulics & classification

FUNDAMENTALS

- Force, Work, Power, Energy, Mass, Weight, Torque, Density, Specific gravity & Specific weight

PRESSURE & FLOW

- Definition & units of pressure measurement
- Pascal's law & applications
- Pressure-Force relationship
- Fluid flow/ Discharge
- Steady & Unsteady flows
- Bernoulli's principle
- Laminar & Turbulent flows
- Pressure Flow relationship

HYDRAULIC PUMPS

- Principles of Pump operation
- Classification (Positive & Non-Positive displacement)
- Gear Pump
- Vane Pump (Variable volume & Pressure compensated Variable volume pumps)
- Piston Pump (Axial/Inline, Bent axis, Radial, Variable volume, Pressure compensated & over center axial pumps)
- Gerotor Pump
- Rating of Pumps
- Pressure, Flow & Efficiencies of Pumps

HYDRAULIC MOTORS

- Principle of motor operation
- Classification (Rotating & Piston type)
- Gear Motors
- Vane Motors
- Piston motors
- Difference between hydraulic motors & hydraulic pumps
- Specification of hydraulic motors
- Efficiency of hydraulic motors
- Motor Slippage

HYDRAULIC CYLINDERS

- Classification (Single & Double acting)
- Construction of Cylinders
- Cylinder Mounting
- Seals
- Cylinder design checklist
- Common Cylinder problems

CONTROL VALVES

- Purpose
- Classification (Direction, Pressure & Flow control Valves)
- Valve symbols

DIRECTION CONTROL VALVES

- Poppet Valve
- Check Valve
- Spool Valve (Rotary & Sliding Valves)
- Direct & Indirect operated Valves
- Valve actuation methods (Manual, electrical, pilot, pneumatic, Electro-hydraulic & Electro-pneumatic)
- 2, 3 & 4 way Direction control Valves
- Positive & negative overlapping
- Center Conditions (Open center, Closed center, Tandem center & Float center Valves)

DAY TWO

PRESSURE CONTROL VALVES

- Relief valves (Pressure regulating & Emergency relief)
- Meaning of Surge Pressure
- Sequence Valves
- Counterbalance Valves
- Pressure reducing Valves
- Unloading Valves

FLOW CONTROL VALVES

- Classification (Non-Pressure Compensated & Pressure Compensated)
- Location of Flow Control Valve (Meter-in, Meter-out & Bleed-off circuits)

ELECTRO-HYDRAULIC SYSTEMS

- Proportional Solenoid
- Proportional Valves (Direction control, Flow control & Pressure control Valves)
- Servo Valves (Direction & Pressure Servo Valves, Single Stage & Multi Stage Servo Valves)
- Use of Transducers in Hydraulic Systems

HYDRAULIC ACCESSORIES

Reservoirs

- (Pressure & Non pressure types)
- Need for Breather & Baffle plates
- Role of Hydraulic oil tank in heat dissipation

Accumulators

- Function & Types (Dead weight, Spring load & Hydro-Pneumatic)
- Accumulator sizing
- Application of Accumulators in hydraulic circuits

Heat Exchangers

- Function & Types (Air Cooled & Water Cooled)

Hydraulic Pipes & Hoses

- Pipe specification & materials
- Pipe fittings
- Recommended oil speeds for selecting pipe sizes
- Construction of Hoses
- Reinforcement & cover variations
- Criteria for Hose selection
- Sizing of Hoses
- Maintenance of pipes & Hoses

HYDRAULIC FLUIDS

- Cavitation
- Aeration
- Locations of Filters & Strainers
- Filter Terminology
- Measurement of contamination levels

APPLICATION OF HYDRAULIC CIRCUITS

- Symbols of hydraulic components
- Need for check Valve in hydraulic circuits
- Regenerative circuit
- Flow equalizer
- Counterbalance circuit
- Pre fill & Compression relief circuit
- Decompression circuit
- Circuits of Open center, Closed center, Tandem center & Indirect control
- Hydraulic circuits of various machines

TROUBLESHOOTING HYDRAULIC SYSTEMS

- Flow chart analysis of hydraulic circuits
- Maintenance