



Hydraulics Fundamentals I

Single-Day Class

Factory or On-Site Availability

HELP YOUR TECHNICIANS TAKE THEIR HYDRAULIC SKILLS TO THE NEXT LEVEL!

Hydraulics is a branch of technology and applied science that leverages engineering, chemistry, and physics to study the mechanical properties and behavior of liquids. At its core, hydraulics serves as the liquid-based counterpart to pneumatics and is a key component of fluid power systems.

This single-day course introduces the foundational principles of hydraulics, beginning with basic theory and progressing through practical applications.

In this class, students will explore:

- Pascal's Law and its role in hydraulic pressure transmission
- Hydraulic system architecture, including pumps, valves, cylinders, and fluid reservoirs
- Hydraulic symbols and schematics, with guidance on how to interpret system diagrams
- Testing and troubleshooting techniques, enabling learners to diagnose and resolve common hydraulic issues

Through a combination of theoretical instruction and hands-on practice, participants will gain the skills needed to understand, operate, and maintain hydraulic systems with confidence and precision.



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Hydraulics Fundamentals I

Course Summary

Course Objectives

After completing this course, the student will be able to:

- Explain Pascal's Law/Principle
- Demonstrate the flow of hydraulic fluid in a basic hydraulic circuit
- Interpret and explain a hydraulic hose layline
- Describe the importance of clean hydraulic oil
- Understand the benefits of using a good hydraulic oil filter and how to know the filtration ability
- Name all hydraulic components in basic hydraulic system
- Describe each hydraulic component function in a basic system
- Identify hydraulic schematic symbols in a basic system
- Point out schematic symbol functions
- Troubleshoot basic hydraulic system failures
- Name each type of hydraulic pump used in a hydraulic system
- Identify each type of hydraulic valve used in a hydraulic system
- Explain the difference between each type of hydraulic actuator
- Summarize how to perform a hydraulic cylinder bypass test on a hydraulic system

Hydraulics I Outline

1. Hydraulic Theory & Principles

- What is hydraulics?
- Pascal's Law and its application
- Incompressibility, energy conservation, flow continuity

2. Basic Hydraulic System Operation

- How a hydraulic system works
- System components and their functions

3. Hydraulic Oil & Contamination

- Oil selection, viscosity, contamination sources, and control
- Cost reduction and maintenance best practices

4. Filter Quality & Beta Ratio

- Importance of filter quality
- Beta ratio explanation and ISO code for oil cleanliness

5. Oil Change & Tank Design

- When to change oil
- Oil tank features and maintenance

6. Hydraulic Pumps

- Types: Gear, Vane, Piston
- Operation, efficiency, failure modes, and schematic symbols

7. Hydraulic Control Valves

- Manual, pneumatic, electrical, and proportional valves
- Valve operation, troubleshooting, and schematic symbols

8. Pressure Relief Valves

- Function, adjustment, and troubleshooting

9. Cylinders & Testing

- Cylinder types, failures, bypass testing, and troubleshooting rules

10. Troubleshooting & Maintenance Rules

- Key rules for diagnosing and repairing hydraulic systems
- Common causes of component failure

11. Knowledge Check / Test Questions

- Multiple slides with review questions on key concepts, troubleshooting, and component identification

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Have questions? We're here to help! Contact us by email: Nextelintelligence@Terex.com