

JobMaster Hydraulics Technology Training

Intelitek's Hydraulics Technology training is a three part curriculum for learning fluid power to prepare students for careers in industry. The courseware is delivered in conjunction with the JobMaster Training Station (JMST) and the LearnMate LMS. The hands-on, task-based skills training educates students on the fundamentals and advanced principles of Fluid Power and Hydraulic Systems. Students will learn to configure industrial hydraulic components in order to create a variety of hydraulic applications. Students can connect different elements, change physical parameters and observe system responses. The unique combination of software, simulation and real industrial equipment allows students to test and troubleshoot simulated circuits and then implement the hardware connections on real hydraulic circuits.



Course List

Hydraulics Technology 1: Fundamentals of Hydraulics

Introduces students to the principles of hydraulics and the use of fluid power in automated manufacturing environments.

Skills Covered

- Basic Principles of Hydraulics
- Pressure and Force
- Pressure Gauges
- Hydraulic Power Transmission - Part 1
- Hydraulic Power Transmission - Part 2
- Hydraulic Power Source
- Determining Component Characteristics
- Controlling the Flow Rate
- Flow Control Valves
- 4/3 Closed-Center Valve - Construction
- 4/3 Closed-Center Valve - Characteristics
- Power Transformation Using a Double-Acting Cylinder
- Loading a Piston
- Controlling the Piston Location

Hydraulics Technology 2: Fundamentals of Electro-Hydraulics

In this course students create, modify, operate and observe simulated hydraulic and electro-hydraulic devices and circuits. They also have the opportunity to configure and connect simulated components to create a variety of applications, changing physical parameters and observing system responses.

Skills Covered

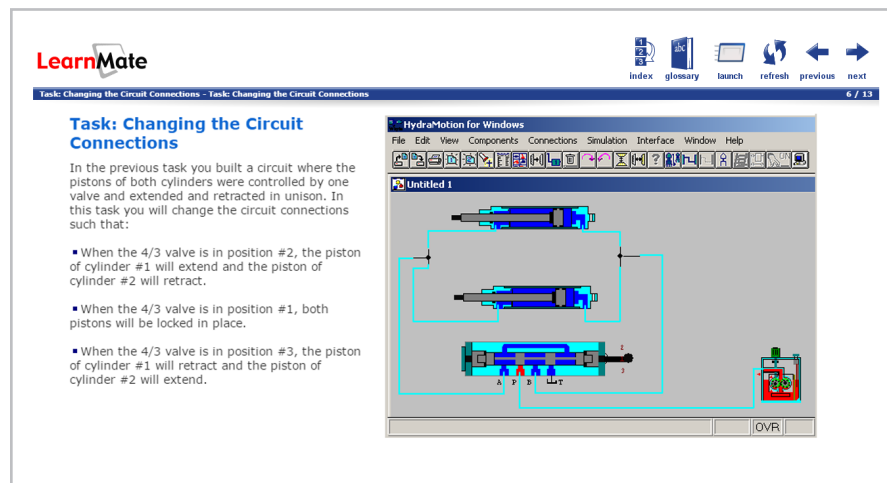
- The World of Electro-Hydraulics
- Mechatronics and Hydraulic Systems
- Building a Dowel Insertion System
- Controlling a Hydraulic Press
- Controlling a Barricade
- Sequential Operation
- Grain Gate Valves
- Controlling a Cargo Airplane Door
- Increasing System Efficiency
- The Relay
- Latching a Relay
- Semi-Automatic Press System
- The Timer
- Irrigation System
- Improving Control in a Circuit with Sequential Operation

Hydraulics Technology 3: Advanced Hydraulics & Electro-Hydraulics

The final course introduces students to advanced hydraulics and electro-hydraulics and the use of fluid power in automated manufacturing environments. Students use software to create, modify, operate and observe simulated hydraulic and electro-hydraulic devices and circuits.

Skills Covered

- Hydraulic Systems Usage and Control
- Electrical Control Signals
- Controlling Piston Speed
- Non-Return Pilot Valve
- Bi-Directional Motor
- Pressure Relief Valve
- 4/3 Closed-Center Valve vs. 4/3 Tandem-Center Valve
- Simultaneous Operation of Two Components
- Controlling Two Actuators Using Two Valves
- Roller Valves
- Limit Switch
- Sequence Valve
- Sequential Operation
- Pressure-Reducing Valve
- Latching a Relay
- Timers
- Automatic Cycle



LearnMate

Task: Changing the Circuit Connections - Task: Changing the Circuit Connections 6 / 13

Task: Changing the Circuit Connections

In the previous task you built a circuit where the pistons of both cylinders were controlled by one valve and extended and retracted in unison. In this task you will change the circuit connections such that:

- When the 4/3 valve is in position #2, the piston of cylinder #1 will extend and the piston of cylinder #2 will retract.
- When the 4/3 valve is in position #1, both pistons will be locked in place.
- When the 4/3 valve is in position #3, the piston of cylinder #1 will retract and the piston of cylinder #2 will extend.

The screenshot shows a hydraulic circuit diagram with two cylinders and a 4/3 valve. The circuit is connected to a power source. The diagram is titled 'HydraMotion for Windows' and includes a menu bar (File, Edit, View, Components, Connections, Simulation, Interface, Window, Help) and a toolbar with various icons for simulation and editing.

Example of a training task in the Hydraulics 1 curriculum

JobMaster Hydraulics Technology Training (continued)

JMTS Hydraulics Training System

The JMTS hydraulics training system gives students a complete hands-on experience in the design and construction of hydraulic circuits commonly used in industrial applications.

Standard Features

- JMTS is an educational panel for the assembly of hydraulic circuits and systems. Students can mount and configure industrial hydraulics components on the training panel to create a variety of applications. It can be used to teach the fundamentals of hydraulics at both basic and advanced levels.
- The components can easily be repositioned, coupled and uncoupled, to form a variety of hydraulic or electro-hydraulic circuits.

Hardware Kit H1 for Fundamentals of Hydraulics

- 1 Double-acting Cylinder 1-1/8"
- 1 4/3 selector valve, closed center
- 1 Two-way flow control valve
- 2 One-way flow control valves
- 1 Pressure relief valve
- 1 Flow meter
- 2 Pressure gauges
- 2 T-connectors
- 10 Hydraulic hoses, various sizes
- Hex wrench
- 1 Funnel
- 2 Gallons hydraulic oil

Hardware Kit H2 for Advanced Hydraulics

- Double-acting cylinder, diameter 3/4"
- 4/3 selector valve, open center (4/3 directional valve, open center)
- Pressure reducing valve
- Manifold (x2)
- Coiled hoses
- Temperature gauge
- Hoses: 80 cm (x2)

Hardware Kit H3 for Electro-Hydraulics

- 4/3 double solenoid valve (4/3 sol-sol valve, tandem center)
- 2/2 solenoid valve (2/2 sol-spring valve)
- Magnetic sensors (x3)
- Banana plug cables (14 total), assorted colors and lengths: red, black, gray; 610 mm (24"), 1220 mm (48")
- Electric distributor

JMTS Electrical Modules Required:

(not included)

- Power Supply 24 VDC, 4A
- PLC unit

HydraMotion Software

HydraMotion is a computer-aided design tool that teaches students how to design and operate hydraulic and electro-hydraulic circuits. HydraMotion can be used as an offline simulation tool or it can be used for online operation and control of hydraulic circuits.

The software's HMI animation provides an accurate working simulation of hydraulic devices and circuits.

Standard Features

Hydraulic component library

- A wide selection of components for creating hydraulic and electro-hydraulic systems
- Power pack
- Pumps
- Valves
- Cylinders
- Hoses and connectors
- Gauges
- Accumulators
- Filter
- Electrical components
- Text component

Functions and tools

- Component selection
- Component connections
- Cross-section (symbolic) display of components and circuits
- Schematic display of components and circuits, as they would appear in standard schematic drawings.
- Ladder diagrams
- Dynamic simulation of single component operation
- Timing diagram

- Software can control actual electro-hydraulic circuits.
- Software can perform on-line graphic tracking of hydraulic circuits in operation
- Parameter setting options for piston diameter, pump flow, valve setting, etc.
- Software monitors pressure and flow during circuit operation
- Editing options: standard Windows graphic tools, including: copy, paste and cut, resize, rotate and mirror

Languages

- English
- Spanish
- Chinese (Simplified, China)

Computer Requirements

- Pentium 4 Dual Core 3 GHz
- 1GB RAM (2 GB for Windows 7/10)
- 1 GB available disk space
- Windows XP SP3 / Win7 - 32 or 64 bit / Win10 - 32 or 64 bit
- CD ROM drive
- Separate RS232 ports on the PC-for each hardware device which uses an RS232 port (or USB ports with RS232 - USB adapter)

Ordering Information

Curriculum

Hydraulics Technology 1: Fundamentals of Hydraulics	77-8008-0000
Hydraulics Technology 2: Fundamentals of Electro-Hydraulics	77-3025-0000
Hydraulics Technology 3: Advanced Hydraulics and Electro-Hydraulics	77-3026-0000

Hardware

JMTS H1 - Hydraulics training kit for Hydraulics 1	00-2105-1000
JMTS H2 - Hydraulics training kit for Hydraulics 2	00-2106-1000
JMTS H3 - Hydraulics training kit for Hydraulics 3	00-2107-1000

Software

HydraMotion	63-9240-0000
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