

intelitek▶▶[®]

JOB MASTER[®]

Automation & Mechatronics

The extensive use of automation in industry driven by Industry 4.0 has led to a greater demand for skilled technicians with real world, hands-on experience. Intelitek's comprehensive training solutions for automation and mechatronics are designed to engage students in a vast range of skills for automated processes while developing problem solving and collaboration skills. Intelitek's project-based approach enables students to achieve outstanding results and display their career-readiness with valid and measurable learning outcomes. The Intelitek programs are aligned to industry credentials.

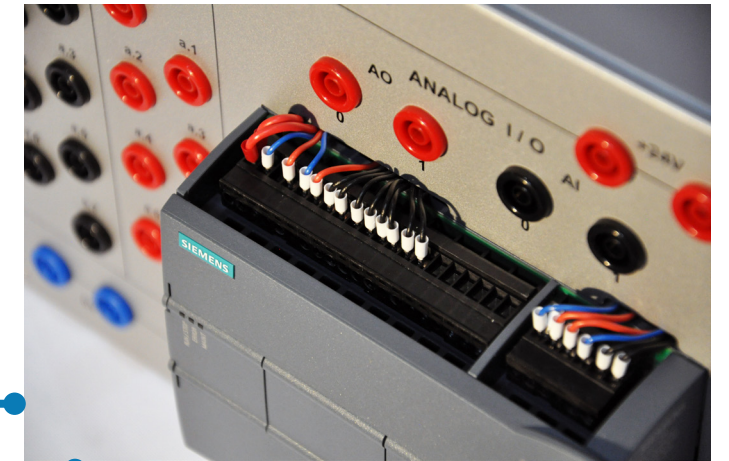
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Quality Hardware

JobMaster provides hands-on experiential learning based on industry-standard practices with hardware platforms consisting of industry-grade components.



Training for Automation & Mechatronics

The Problem

Employers in industry are challenged with the disparity between student knowledge and worker experience. Modern technical training programs need to bridge the gap and produce graduates that not only know the theory of the field in which they plan to work, but also have enough experience to be productive on day one.

The Solution

Project-based learning and platforms for interactive practical labs, like the JobMaster Training Station for Automation from Intelitek, are a step in the right direction. Intelitek curriculum integrates with industry hardware and provides students with activities performed on real equipment so they will have in-depth knowledge and hands-on experience when they find a job.

Intelitek's skills-based training provides independent and group work projects that send students individually or in teams to the test bench with a problem to solve, so they develop the essential soft skills needed to thrive in today's ever-evolving job market. These skills-based programs develop critical thinking skills, problem-solving, teamwork, and negotiation techniques.

Students who acquire these new skills and learn to think outside the box will become the graduates that are in demand with top industries across the world!



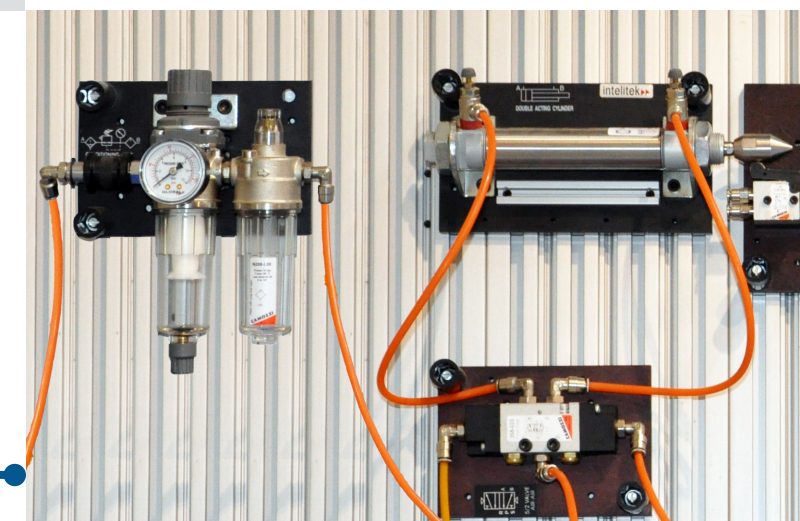
Skill-based E-learning

JobMaster's competency-based curriculum were developed by industry experts from companies across a wide range of sectors to ensure that the necessary technical skills are taught.

The online, skill-based training consists of individual exercises that reproduce essential tasks performed by maintenance technicians, equipment operators, and installers.

Industry Competencies

JobMaster's interactive and multi-disciplinary curriculum strengthen and reinforce values that help secure jobs and work skills that enable students to thrive in collaborative workplaces with the can-do and problem solving attitude employers seek.



JobMaster Pneumatic & Hydraulic Training Series

Intelitek's Pneumatics and Hydraulics Technology programs includes a three-part curriculum and labs for learning air and fluid power to prepare students for careers in industry. The hands-on, task-based skills training educates students on the fundamentals and advanced principles of Hydraulic and Pneumatic Systems. Students will learn to configure industrial components to create a variety of applications. Students connect different elements, change

physical parameters, and observe system responses. The unique combination of curriculum, software, simulation, and real industrial equipment familiarizes students with the design, programming and control of pneumatically and hydraulically operated systems.

Students learn to test and troubleshoot simulated circuits and then implement the real hydraulic or pneumatic circuits.



Certification framework aligned with:

NIMS
ITM & Industry 4.0
Smart Standards



Pneumatics Curriculum

Pneumatics Technology 1 Fundamentals of Pneumatics

Introduces the principles of pneumatics and pneumatically controlled systems commonly used in automated manufacturing environments.

Learning Topics

- Introduction to Pneumatics
- Atmospheric Pressure, Vacuum and Mechanical Work
- The Double-Acting Cylinder
- 3/2 Valves
- Controlling a Piston with PBs
- 5/2 Air-Operated, Air- Returned Valve
- 5/2 Air-Air Valves
- Laws of Gases
- 3/2 Air-Operated, Spring- Returned Valve
- Spot Welding System
- 3/2 Roller Valves
- Task - A Semi-Automatic System

Pneumatics Technology 2 Advanced Pneumatics

Covers advanced principles and components of pneumatics and pneumatically controlled systems, including timing diagrams and the logic functions AND and OR.

Learning Topics

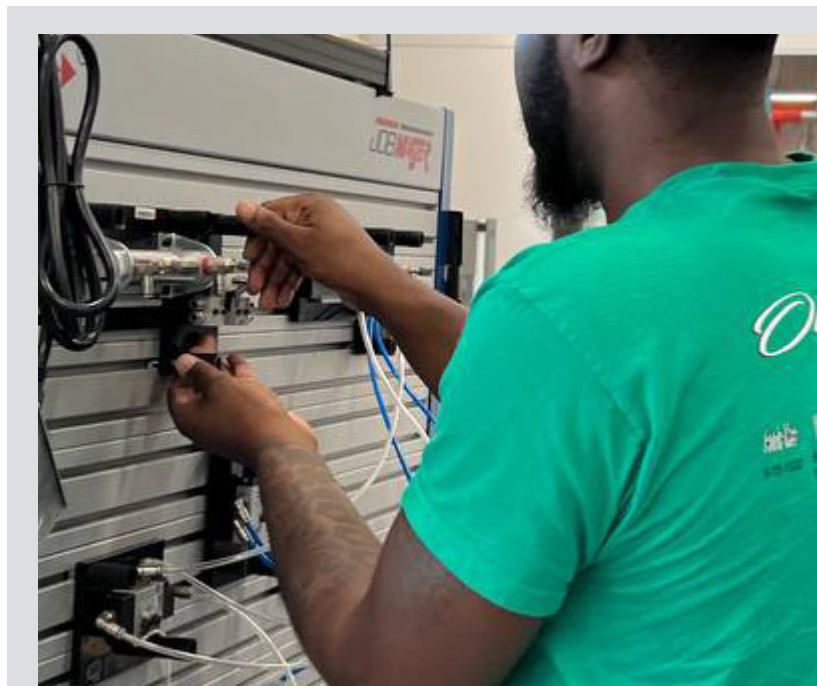
- The Logic Function AND
- Implementing AND in a Pneumatic Circuit
- The Toggle Valve
- Using AND to Build a Fully Automatic System
- The Logic Function OR
- Implementing OR in a Pneumatic Circuit
- Circuit with Two Double-Acting Cylinders
- Sequential Cycle
- A Delay
- Sequential Control with a Timed Delay
- Opposing Control Signals
- Timing Diagrams
- Using a Single Pilot Valve to Prevent Opposing Control Signals
- Using a Single Pilot Valve in a circuit

Pneumatics Technology 3 Fundamentals of Electro-Pneumatics

Enables students to grasp the fundamentals of electro-pneumatic controlled systems commonly used in modern automated manufacturing environments. In this module, students are exposed to the function and operation of electro-pneumatic components such as switches, relays, timers, electrical push buttons, solenoid operated valves and proximity sensors.

Learning Topics

- Review Pneumatics Concepts
- Building a Basic Electrical Circuit
- The 5/2 Solenoid-Spring Valve
- The 5/2 Solenoid-Solenoid Valve
- Magnetic Switches
- Implementing the Logic Function AND
- Implementing the Logic Function OR
- Implementing the Logic Function NOT
- Sequential Operation
- The Relay
- Unlatching a Relay
- Building a Fully Automatic Circuit
- Adding a Delay Using an Electric Timer
- Unlatching a Fully Automatic Circuit
- Measuring Cylinder Speed



Hydraulics Curriculum

Hydraulics Technology 1 Fundamentals of Hydraulics

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

Learning Topics



- Basic Principles of Hydraulics
- Pressure and Force
- Pressure Gauges
- Hydraulic Power Transmission
- 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

Students create, modify, operate and observe simulated hydraulic and electro-hydraulic devices and circuits. They will configure and connect simulated components to create a variety of applications, changing physical parameters and observing system responses.

Learning Topics



- 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

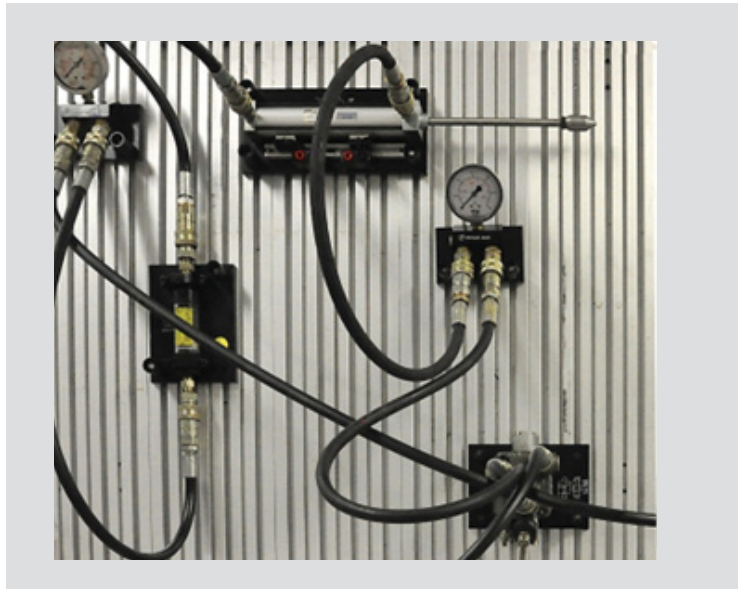
Hydraulics Technology 3 Advanced Hydraulics & Electro-Hydraulics

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.

Learning Topics



- Hydraulic Systems Usage & 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



JobMaster PLC Training Series

Intelitek's Programmable Logic Controller Technology program includes a four-part curriculum and labs that give students a solid grasp of the control logic used in the operation of industrial PLCs, ladder logic programming, inputs and output devices and electrical control.

The Programmable Logic Controller curriculum emphasizes PLC theory and basic programming and students learn to program a PLC and simulate industrial applications.

Two variants for the Allen-Bradley or Siemens PLCs use the respective company's powerful programming and design software to experience the real programming environment they will find in industry. The Allen-Bradley curriculum is based on the CompactLogix 5380 PLC with Studio 5000 Logix Designer software while the Siemens curriculum uses the S7-1200 PLC with STEP 7 TIA Portal software.



Aligned with
NIMS ITM Smart
Credentials



PLC Curriculum for Siemens

PLC Technology 1 Fundamentals of Ladder Logic

Introduces the fundamentals of PLC theory and basic programming for the Siemens S7-1200 PLC. The course teaches students the testing of input and output responses to ladder diagrams that they have programmed.

Learning Topics En Es 15 hrs

- Examining Input/Output Relationships
- PLC Monitoring Tools
- Writing and Simulating a Basic Ladder Diagram
- Boolean Logic Functions
- Latching and Unlatching Outputs
- Improving Elevator Control
- One Shot Rising
- Timer On Delay & Timer Off Delay
- Projects
 - Controlling a Sorting System
 - Arsenic Filling Station

PLC Technology 2 Advanced Ladder Logic

In this module students learn advanced PLC programming and how to program and use PLCs in industrial applications that require electrical control. This module emphasizes PLC memory, counters, and important bit instructions.

Learning Topics En Es 15 hrs

- Bits and Words
- Counter Instructions
- The Equal (EQU) Instruction
- The Not Equal (NEQ) Instruction
- The Less Than (LES) Instruction
- The Greater Than (GRT) Instruction
- The Move (MOV) Instruction
- The Add (ADD) Instruction
- The Subtract (SUB) Instruction
- Projects
 - Implementing CTU and CTD
 - Applying Equal and Not Equal
 - Implementing GRT and LES

PLC Technology 3 PLC- Controlled Pneumatic Systems

Students learn to apply PLCs to pneumatic systems. Students learn to control pneumatic systems, pneumatic terminology, and to simulate the operation of pneumatic components.

Learning Topics En Es 15 hrs

- The Pneumatic HMI
- Manual Control of a Pneumatic Piston
- Semi-Automatic Control Systems
- Semi-Automatic Action Using a 5/2
- Spring-Return Valve
- Fully Automatic Operation with & without Spring
- Timers
- Counters
- Sequential Operation with 2 Double- Acting Cylinders
- Sequential Operation with 3 Double- Acting Cylinders
- Solving Opposing Control Signals
- Solving Opposing Control Signals in a 3 Cylinder System
- Controlling a System with a Variable Timer
- Advanced Operation

PLC Technology 4 PLC- Controlled Hydraulic Systems

Teaches students how to control hydraulic systems using a PLC. Basic hydraulic terminology is introduced and explained, and the student simulates the operation of hydraulic components.

Learning Topics En Es 15 hrs

- Using a 4/2 Sol-Sol Valve to Control a Double-Acting Cylinder
- Using a 4/2 Sol-Spring Valve to Control a Double-Acting Cylinder
- Using a 4/3 Sol-Sol Valve to Control a Double-Acting Cylinder
- Using a Fully Automatic Hydraulic Circuit
- Using a Fully Automatic Hydraulic Circuit with a Timer
- Using a 4/3 Sol-Sol Valve with a Counter
- Using a Fully Automatic Hydraulic Circuit with an OSR Instruction
- Sequential Operation with 2 Double- Acting Cylinders
- Sequential Operation with 3 Double- Acting Cylinders
- Sequential Operation with 2 Double- Acting Cylinders and a Delay
- Sequential Operation with 3 Double- Acting Cylinders and a Delay
- Variable Timers
- Variable Counters
- Project: Port Soil Removal System

PLC Curriculum for Allen Bradley

PLC Technology 1

Introduces the basics of PLC theory and essential ladder logic programming concepts. The course includes a series of PLC projects for the Allen-Bradley CompactLogix 5380 PLC

Learning Topics En Es 15 hrs

- Defining PLCs
- PLC Monitoring Tools
- PLC History and Hardware
- Field Devices and Signal Types
- PLC Programming Languages
- Ladder Logic Basics
- The Studio 5000 Interface
- Boolean Logic Functions
- Projects
 - Connecting Your PLC
 - Creating a Program
 - Controlling a Sorting System
 - Improving Control and Safety
- Elevator Control
- Elevator Safety
- Arsenic Filling Station

PLC Technology 2

Builds on the lessons from the previous course, while introducing students to the inner working of PLC memory, timers, counters, and important bit instructions. The course also includes a number of hands-on PLC programming projects.

Learning Topics En Es 15 hrs

- PLC Memory
- Latch and Unlatch
- One Shot
- Timer Structures
- Counter Instructions
- Projects
- Tags and Data Types
- Gate Control
- Modern Elevator
- Automatic Stapler
- Timer On Delay & Timer Off Delay
- Counter Up and Reset & Counter Down
- The Lifting Platform

PLC Technology 3

Teaches students ladder diagram comparison and mathematical instructions with a number of PLC programming projects to give hands-on experience to enforce those concepts.

Learning Topics En Es 15 hrs

- Tips and Tricks
- Compare Instructions
- Projects
- The Equal (EQU) Instruction
- The Note Equal (NEQ) Instruction
- Conveyors
- The Less Than (LES) Instruction
- The Greater Than (GRT) Instruction
- Oven Conveyor System
- The Limit Instruction

PLC Technology 4

Students will learn how to control hydraulic systems using a PLC. Basic hydraulic terminology is introduced and explained, and the student simulates the operation of hydraulic components.

Learning Topics En Es 15 hrs

- Review
- PLC Communication
- HMIs
- Projects:
 - Introduction to View Designer
 - Navigation and Monitoring
 - The Stuck Conveyor
 - Jump to Subroutine
 - SBR and RET Functions
 - Arrays
 - UDTs
 - The Faults in Our Controllers
 - Alarms and Automatic Diagnostics
- PLC Communication – Part 2
- PLC Challenge Projects
 - Challenge 1: The Crosswalk
 - Challenge 2: The Memory Game
 - Challenge 3: Factory Application

JobMaster Smart Sensor Training Series

Intelitek's Smart Devices for Industry 4.0 curriculum prepares students to use cutting-edge IOT communication technology. Using smart sensors and actuators like those used in the manufacturing industry today, students will learn invaluable Industry 4.0-related concepts such as communication protocols,

Smart Sensor Curriculum

Introduction to IoT and Connectivity

Overview of smart sensors, IoT, Connectivity, Identification techniques in Industry 4.0.

Learning Topics



En Es 15 hrs

- Introduction to Sensors, Smart Sensors, and Actuators
- Introduction to PLCs
- IoT and IIoT
- IIoT Opportunities, Risks, and Challenges
- Networking and Connectivity for Sensors
- How a Sensor Connects to the Cloud
- Introduction to Edge Computing
- SCADA Systems
- Vision Systems
- Smart Manufacturing Architecture
- Introduction to Communication Protocols
- Tracking Methods

Introduction to IoT and Connectivity

Advanced course on sensors and connectivity within the smart factory. The course delves into machine-to-machine communications and protocols.

Prerequisite: Intro to IoT/ Connectivity

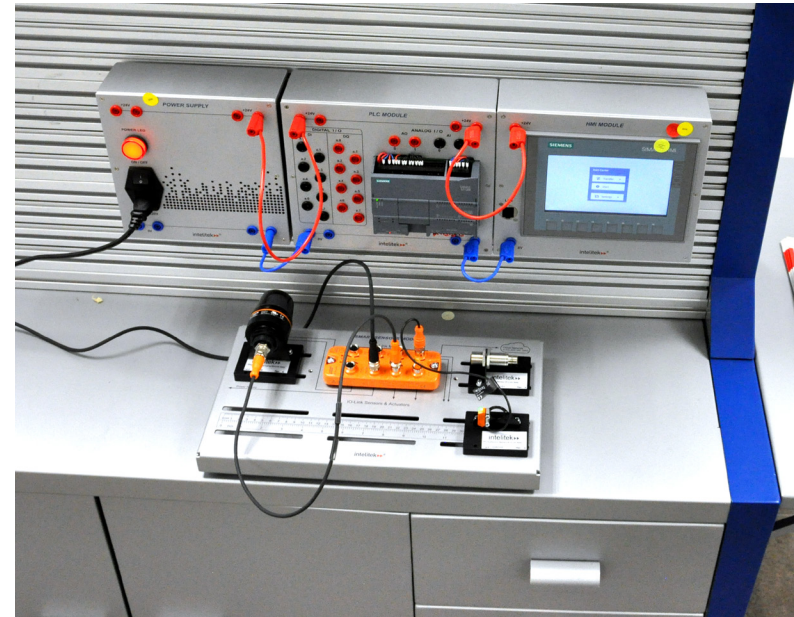
Learning Topics



En Es 15 hrs

- IoT Communications and Architecture
- PLC Functions and Applications
- Machine to Machine Communication
- Cloud Connectivity
- SCADA Systems
- Implementing IoT
- Design Modularity in Smart Factories
- IoT Communications and Architecture
- IIoT Protocols and Standards
- Materials Identification (RFID/ barcode/etc)
- Driving Manufacturing with IIOT

remote cloud monitoring, sensor network architecture, and smart asset tracking. Students will leave these courses with the confidence to select, install, maintain and operate the best sensor for any given automation application.



Smart Devices for Industry 4.0

In this practical, lab-based course, students will leave with the knowledge and confidence to select, install, maintain and operate the best sensor for any given automation application.

Learning Topics



En Es 15 hrs

- Introduction to Field Devices
- Conventional Sensors
- Introduction to Smart Sensors
- Device Communication and Industrial Networks
- Introduction to IO-Link
- Inductive Sensors
- Ultrasonic Proximity Sensors
- Photoelectric Proximity Sensors
- Key Considerations to Selecting a Sensor
- Cloud Monitoring
- Actuators and the Signal Lamp
- The RFID Read/Write Head
- Integrating a PLC and IO-Link System

JobMaster Training Station (JMTS)

This double-sided, portable, modular training bench is the base platform for Intelitek automation education programs that teach students hands-on skills to prepare them for the real world.

This training panel, designed for CTE classrooms hosts all the components for teaching advanced industrial automation including pneumatics, hydraulics, PLCs and smart sensors. The double-sided workbench can be populated with modular components to fit diverse training curriculum, classroom projects and certification tests.

The scalable teaching platform can be quickly and easily assembled and reconfigured between classes and expanded over time. The hardware solution is accompanied by Intelitek curriculum to prepare students to work with actual equipment they will find in the field.

JMTS Specifications

- Dimensions: (WxDxH) 53.4" x 31.5" x 68.9" (1330 mm x 800 mm x 1750 mm)
- Panel Working Area Dimensions: (WxH): 47.3" x 31.5" (1200 mm x 800 mm)
- Aluminum panel with T-slots
- Weight : ±450-650 lbs (250-300 kg)

Electronic Modules:

- Power Supply Unit - 24VDC
- Operational Module - function module with switches, buttons, indicators and buzzers
- Relay Module - function module with relays and switches indicators
- PLC Module - Allen Bradley CompactLogix or Siemens S7 PLC
- HMI Module - 7" touchscreen HMI for Siemens or Allen Bradley

Features:

- Modular design
- Double-sided
- Independent groups on single panel
- Supports identical or different setups on each side
- Mobile with everything onboard for easy transport between classes
- Fold-out side table
- Storage space and workspace built in
- Standard mounting hardware



Software Simulation Tools

PneuMotion CAD Software

PneuMotion is a computer-aided design tool that teaches students how to design and operate pneumatic and electro- pneumatic circuits. The software's HMI animation provides an accurate working simulation of pneumatic devices and circuits.

HydraMotion CAD Software

HydraMotion is a computer-aided design tool that teaches students how to design and operate hydraulic and electro-hydraulic circuits. The software's HMI animation provides an accurate working simulation of hydraulic devices and circuits.

PneuMotion and HydraMotion include a selection of components and a virtual workspace to build and simulate pneumatic and hydraulic circuits. The simulation can be played at a slow speed, enabling the students to follow the flow of air or liquid through the system. Internal views of components aid in understanding how each component functions.

PLC Software

PLC curriculum uses computer-aided design tools that teach students how to program and use PLCs. The courseware uses Allen-Bradley's Studio 5000, or Siemens' STEP 7 Portal software.



Lab Training Kits

The JMTS Hydraulic, Pneumatic, PLC, and Smart Sensor training hardware kits are for use in labs to build the systems as students learn. Each hardware kit contains a set of industrial components for students to build, learn, and troubleshoot fluid power and automation systems.

Pneumatics Training Kits

Each level has a hardware add on for the hands-on labs

- ▶ JMTS P1 KIT
- ▶ JMTS P2 KIT
- ▶ JMTS P3 KIT

Pneumatics 3 requires the Power, Relay and Operational modules

Hydraulics Training Kits

Each level has a hardware add on for the hands-on labs

- ▶ JMTS H1 KIT
- ▶ JMTS H2 KIT
- ▶ JMTS H3 KIT

Hydraulics 2 & 3 require the Power, Relay and Operational modules

PLC Training Kits

All levels require the PLC module and the hardware kit as well as the Power, Relay and Operational modules

- ▶ JMTS-P1 KIT

PLC 4 requires the HMI module

Smart Sensor Training Kits

Each level has a hardware add on for the hands-on labs

- ▶ OBJECT DETECTION & PROXIMITY KIT
- ▶ IDENTIFICATION KIT

All levels require the Power module

Advanced Smart Sensor kits include:

- ▶ IoT Condition Monitoring and Real Time Maintenance Software
- ▶ PLC & HMI Kit



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