



ATS TECHNICAL TRAINING SOLUTIONS

# Course Catalog



# The Ultimate Training Solution: Comprehensive, Customizable and Convenient.

SkillPoint™ Technical Training from **Advanced Technology Services (ATS)** provides a flexible solution to your maintenance training needs. With offerings ranging from introductory wiring to advanced PLC networks, SkillPoint has a full line of online and hands-on programs.



**Assessment** Our process helps you validate skill gaps and then identify where to start and how to best invest in employee development.



**Consultation** SkillPoint assessment findings are used to customize a flexible training strategy that addresses your organization's needs.



**Online Courses** Develop a solid foundation of knowledge so your staff gets the skills they need and you get the best long-term results.



**Hands-On Courses** Eliminate travel costs by bringing training station equipment and a SkillPoint instructor to your operation. Courses are completely customizable and suited to your schedule.



**Results** Training can increase productivity, reduce equipment failures, develop technician independence, improve retention and job satisfaction.



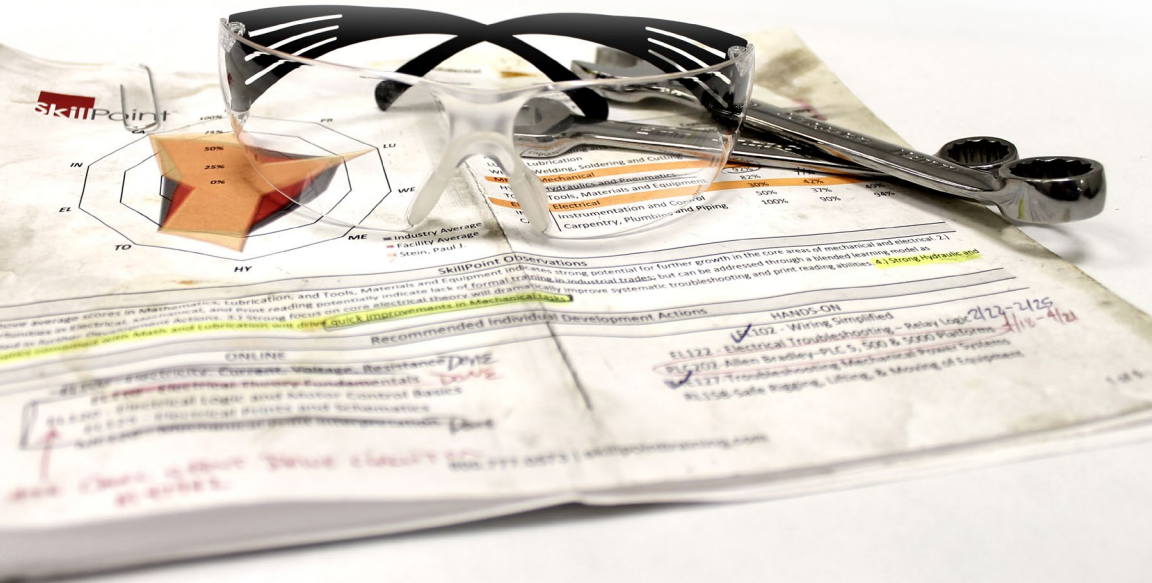
**Safety** Boost technician confidence and improve the overall safety of your facility. Training can save lives.

## Assessment

Find out where to start and how to best invest in employee development. Our validated gap analysis offers high level insight of organizational and individual needs.

- **SkillPoint Assessment:** 100 question proctored exam for each technician
- **Site Tour:** Plant, process and equipment details for customized prescriptive solution
- **Interview Process:** Discussion of pain points, key metrics and interpretations of workforce

Understanding how to ‘move the dial’ through employee development is more complex than knowing your critical equipment list, identifying your leading contributors to downtime and surveying the skills gap interpretations of your staff. To truly assess the training needs of your technical workers, SkillPoint assessment team members conduct low-pressure interviews with employees of all levels. These critical conversations provide the foundations for identifying root cause skills gaps, providing aid in the interpretation of overall assessment results.



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PULL ON  
PUSH OFF

GAUGE 1

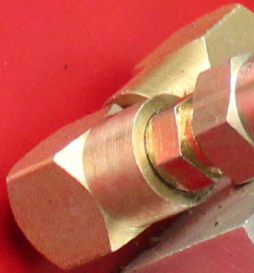
GAUGE 2



PSI

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# HANDS-ON COURSES

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SEQUENCE

SEQUENCE

NUMBER ONE

1000  
1000



# Electrical/Electronic and Industrial Motor Drives



## **EL102-Wiring Simplified**

The Wiring Simplified workshop is designed for general maintenance professionals, technicians, maintenance supervisors, and construction and maintenance electricians. Students learn how to practice electrically-safe work habits, calculate circuit loads and select conductors, use a multi-meter to troubleshoot circuits, learn conduit bending basics and much more.

- Practice electrically-safe work habits
- Apply National Electrical Code standards
- Describe electrical distribution component functions
- Calculate circuit loads and select conductors
- Select circuit protective devices
- Bend conduit
- Connect components to form electrical circuits
- Route conductors through raceways
- Use a multi-meter to troubleshoot circuits
- Repair minor circuit faults

**Estimated class duration: 24 hours**

## **EL121-Electrical Controls & Components**

A workshop designed for beginning electricians, equipment operators and people in skilled trades who are cross training from other disciplines. Students start by learning fundamental concepts of electricity and voltage then move on to the practical applications, units of measurement, circuits, components, ladder diagramming motors and more.

- Work safely with electricity
- Use a clamp-on meter to make AC current reading
- Read a resistor value from the color code
- Use simple math to calculate voltage drops, current and resistance
- Read single-line drawings
- Read control-circuit ladder diagrams
- Test relays, solenoids, contactors, switches, and motor starters
- Understand basic principles of AC and DC motors
- Use a multi-meter to make voltage and current readings
- Identify component parts in schematics and ladder diagrams

**Estimated class duration: 40 hours**



### **EL122-Electrical Troubleshooting, Relay Logic**

An intensive hands-on training course intended for personnel who are required to perform general electrical maintenance on production and support equipment including various electrical control circuits and programmable logic controllers. This course covers a detailed review of electrical theory, component identification and operation, and use of digital electrical meters (DVOM). Understanding, implementing, and creating relay controls and relay logic are the primary learning objectives of this course, and are aligned to the migration of relay controlled circuitry to Programmable Logic Controllers. This comprehensive electrical logic course is a must for any technician preparing to engage in PLC equipped equipment troubleshooting.

- Interpretation of ladder logic symbols and diagrams
- Understanding basic electrical troubleshooting theory
- Series and parallel circuit logic and diagnostics
- Ladder logic creation and diagramming
- Interpretation of electrical schematics and troubleshooting
- Development of motor starter circuits
- Creating ladder logic for relays, timers and starters
- Safely troubleshoot live circuits (NFPA70E Arc-Flash)
- Use a meter (DVOM) in electrical troubleshooting
- PLC components and operation

**Estimated class duration: 32 hours**

### **EL132-Electrical Print Reading**

A course designed for maintenance and skilled tradespersons who must be able to read prints for maintenance installation and troubleshooting applications. Although the course heavily emphasizes electrical/electronic print reading, other types of prints are covered sufficiently to account for other areas participants may encounter on the job. Participants are encouraged to encompass real prints from their facilities enabling the interpretation of prints relative to their current role, and allowing each student to exit the course with a better knowledge of the equipment operation.

- Read and interpret electrical/electronic drawings and prints
- Recognize electrical symbols used in industrial control, logic, electronic, and fluid-power drawings
- Use electrical prints to trace signal or power flow and to understand circuit operation
- Trace control operations through multiple-sheet drawings
- Recognize interfaces to fluid power, and other non-electrical systems

**Estimated class duration: 20 hours**

### **EL201-Industrial Electronics Maintenance**

Take a step deeper into board level diagnostics through this course that provides maintenance electricians with many of the electronic fundamentals they need to maintain and troubleshoot industrial electronic equipment. This course is designed to aid in the understanding and troubleshooting of electronic system components when board level diagnostics are required. The understanding gained within this course enables electrical technicians to troubleshoot electronic component failures at a more complex level, allowing for root cause failure analysis and prevention of repeat failure.

- Efficiently and effectively identify which circuit board needs replaced or repaired
- Troubleshoot solid-state circuits
- Use oscilloscopes and multi-meters
- Understand resistors, capacitors, inductors, diodes, SCR's, TRIAC's and other solid-state devices
- Safely work with electronic equipment, protecting people and equipment

**Estimated class duration: 40 hours**

## **EL235-Advanced Electrical Troubleshooting**

This hands-on training course is intended for maintenance personnel who are required to perform advanced electrical maintenance on production and support equipment including various electrical circuits and programmable logic controllers. This course covers a quick review of EL122 (Electrical Troubleshooting – Relay Logic), AC/DC power supplies, AC/DC motor theory, Oscilloscope usage, and Megger usage. Techs will be involved with higher level electrical circuit troubleshooting and development, Power conversion from single phase to three phase, and NFPA70E safety.

**EACH TECHNICIAN MUST HAVE THEIR OWN ARCH FLASH GEAR.**

### Advanced Electrical Troubleshooting

- Transforming Voltages
- 12V Power Supplies
- 24V Power Supplies
- AC/DC Motor Theory
- Differences in AC/DC Power Supplies
- Appropriate Oscilloscope usage
- Appropriate Megger usage
- Proximity switch usage and troubleshooting
- NFPA70E Safety

### LABS

- Single phase to 3 phase power conversion
- Wiring advanced electrical circuits
- Advanced Troubleshooting circuit issues
- SLC 500 PLC I/O board configuration
- Upload/Downloading plc programs

**Estimated class duration: 28 hours**

## **EL351-Troubleshooting & Repair of AC Motor Drives**

A robust hands-on course covering variable-voltage, variable-frequency and pulse width modulation types of AC motor drives and applications. Additionally, this covers technology utilized by Allen-Bradley, Fincor, GE, Emerson, Baldor, Vee Arc and others. While this course generalizes drive operations and troubleshooting, it is an essential building block of developing expert level diagnostic, set-up and troubleshooting skills for the electrical maintenance trades.

- Understand how a three-phase field rotates
- Volts/Hertz and boost effect on motor operation
- Slip and load effects on speed
- Power control device operation including diodes, transistors, SCR's and GTO's
- Three-phase bridge operation and faults
- The operation of converters, inverters, control parameters, fault codes, & tests in both PWM and VVVF drives
- Troubleshoot both PWM and VVVF drives to the board level

**Estimated class duration: 40 hours**

## **EL352-Troubleshooting & Repair of AB 1336 Drives**

Utilizing low horsepower Allen-Bradley 1336 Plus variable frequency motor drives, configured as open case training units interconnected to PLCs allows students to experience drive/controller interconnectivity as typical in industrial applications. The building blocks of the 1336 drives are explained along with methods for performing maintenance and troubleshooting; including parameters, meter measurements, and drive terminal interfaces. While this course focuses heavily on the AB 1336, the concepts in connectivity and troubleshooting transcend several drive operations principle of variable frequency drives with encoder feedback.

- Troubleshoot common 1336 drive malfunctions
- Program and read over 100 parameters
- Use 1336 fault codes to aid in troubleshooting
- Use encoder feedback functions necessary for programming and application

**Estimated class duration: 40 hour**

### **EL355-Troubleshooting & Repair of AB Flex 70/700 Drives**

Utilizing low horsepower Allen Bradley Flex 70 Enhanced variable frequency motor drives, configured as training units connected to operator stations and a live motor typical of industrial applications. The building blocks of the Flex 70/700 drives are explained along with methods for performing maintenance and troubleshooting; including parameters, meter and oscilloscope measurements, Communications modules, HIM utilization, and drive terminal interfaces. While course focuses heavily on the AB Flex 70, the concepts in connectivity and troubleshooting transcend several drive operations principals of variable frequency drives with encoder feedback.

- Troubleshoot common Flex 70 drive malfunctions
- Program and read over 500 parameters
- Use Flex 70 fault codes to aid in troubleshooting
- Use Allen Bradley "Workbench" software to aid in troubleshooting
- Use encoder feedback functions necessary for programming and application

**Estimated class duration: 40 hours**

### **EL361-Troubleshooting & Repair of GE DC-300 Drives**

Incorporating live GE DC300 drives, this hands-on course provides mid to upper level electrical technicians practical information regarding the set-up process, troubleshooting and maintenance aspects specific to the GE DC300. Furthermore, the course addresses general DC drive functionality and construction allowing technicians to advance their skills regarding drive testing and troubleshooting, parameter adjustments and an understanding of the adjustment of pots to obtain ideal drive performance.

- Read and interpret the GE DC-300 functional block diagram
- Identify circuit boards and the parts of the drive
- Properly adjust pots and install jumpers on a GE DC-300 drive
- Identify the location of the drive test points and the function of each
- Input parameters into the drive
- Set up and get a drive on line
- Interpret built-in diagnostics to aid in troubleshooting

**Estimated class duration: 40 hours**

### **EL371-NFPA70E Electrical Safe Work Practices**

Let SkillPoint bring our hands-on interactive NFPA70E Electrical Safe Work Practices training to your facility. We bring our instructor, code books and electrical training equipment to your site to train your team on your schedule. Our class focuses on how to utilize the standard and apply that knowledge. This class is available as a one-day refresher course, a two-day full content course or as an extension option for many of our hands-on classes.

- Electrical safe work practices
- Recognizing electrical hazards
- Emergency procedures
- OSHA requirements
- NFPA70E code updates
- Arc Flash / Arc Blast Shock / Electrocution
- Proper PPE use and inspection
- Lockout energy controls (LECP) procedures
- Multimeter safety

**Estimated class duration: 8 or 16 hour**

**\*MEETS SAFETY REGULATIONS**



## Fluid Power

### **FP131-Liquid Process Pumps Troubleshooting**

A workshop for millwrights, plumbers, pipefitters, mechanics, machinery maintenance mechanics, electromechanical technicians and more. Begins with an introduction to liquid process pumps and builds toward concepts like alignment and lubrication allowances.

- Troubleshoot, diagnose and repair failed seals
- Align pumps
- Read pump curves
- Install piping and flanges correctly
- Properly install pumps
- Reduce fugitive emissions
- Repack and adjust pump stuffing boxes
- Install standard shaft couplings

**Estimated class duration: 28 hours**

### **FP151-Fluid Power Print Reading**

A course designed for maintenance and skilled tradespersons who must be able to read prints for maintenance, installation and troubleshooting applications. Although the course heavily emphasizes hydraulic print reading, and pneumatic print reading is covered sufficiently to account for the variance between the two fluid power types. Within the course, standard symbology, conventional fluid diagrams, and logic diagrams are explained thoroughly. Participants are encouraged to encompass real prints from their facilities enabling the interpretation of prints relative to their current role, and allowing each student to exit the course with a better knowledge of the equipment operation.

- Demonstrate an understanding of symbology, including schematics and piping drawings.
- Understand typical fluid power diagrams
- Interpret schematics including fluid power logic and piping drawings
- Demonstrate understanding of various print attributes: plan view, detail, elevation, isometrics
- Utilize fluid power schematics to identify function of fluid power systems

**Estimated class duration: 20 hours**

### **FP153-Fluid Power–Troubleshooting Hydraulics**

An intensive lab based fluid power training course intended for all factory maintenance technicians involved in the troubleshooting or repair of hydraulic systems and equipment, or machinery equipped with hydraulic systems. Within this course students will learn how to read and interpret fluid power schematics to understand the component functions and common circuitry. This course also provides a hands-on experience in the application of fluid power troubleshooting, inspection and replacement of hydraulic components, and preventative maintenance processes.

- Understand hydraulic safety best practices
- Apply fluid power theory and Pascal's Law
- Understand the form and function of directional controls
- Understand the utilization of check valves and pilot operated checks
- Demonstrate the functions of pressure controls and reliefs
- Apply sequence valve operation for machine function
- Understand the use of counter-balance and unloading valves
- Demonstrate the use of various flow controls
- Demonstrate the use of actuators in parallel and regenerative circuits
- Utilize component functionality to demonstrate intensifier functions
- Apply troubleshooting methods at a component level
- Demonstrate function of accumulators
- Understand function and rating of hydraulic fluids, seals and filters

**Estimated class duration: 32 hours**

### **FP161-Troubleshooting Pneumatic Equipment/Controls**

A course designed for the intermediate to advanced experienced mechanical maintenance technician who must troubleshoot, repair, and maintain industrial air logic systems. Working safely with pneumatic systems is emphasized throughout this course focused on troubleshooting pneumatic logic systems.

- Read pneumatic schematics
- Identify and understand pneumatic components
- Troubleshoot pneumatic control circuits
- Troubleshoot pneumatic Programmable Logic Controllers
- Read and interpret ladder diagrams
- Understand common circuit applications
- Perform preventive maintenance
- Remove, clean and replace pneumatic components

**Estimated class duration: 40 hours**



## **Mechanical**



### **ME127-Troubleshooting Mechanical Power Systems**

Identify problems, troubleshoot and perform maintenance on mechanical systems through this hands-on course providing maintenance persons of all types with practical knowledge and techniques that can be immediately applied to troubleshooting mechanical systems. Within this robust offering drive systems including belts, chains, gear drives and recirculating ball screws, are covered at a pace that fits the specific needs of the student. Drive system serviceability, measurement and maintenance are of paramount focus in this course.

- Better understand mechanical systems design and operations
- Understand simple and complex machines through component breakdowns
- Troubleshooting mechanical systems through visual and physical inspection
- Understand gear drives, ratios and factors of input and output forces
- Understand belt drive types, applications and adjustments
- Service different types of belts, chain or gear driven systems
- Calculate and measure power
- Provide proper lubrication methods to mechanical drive components
- Use various precision measuring devices in mechanical diagnostics
- Understand applications and limitations of various industrial fasteners

**Estimated class duration: 32 hours**

### **ME170-Mechanical Print Reading**

Interpret the intention of the designer, and the proper function of the machine through this course designed for the machinist or maintenance technician. Within a classroom setting, understand the complexities of geometric dimensioning and tolerancing, various print views, projections and functions of mechanical prints, while developing skills that allow technicians to interpret both the prints of the equipment they are responsible for maintaining as well as understanding the parts that are being manufactured.

- Identify details, markings, and machine parts from an assembly drawing
- Identify an object from an orthographic drawing
- Identify elements located within the title block of a detail drawing
- Explain why more than one orthographic projection is needed to show an object on a blueprint
- Show two methods of joining machine parts
- Name and identify from an exhibit several types of threaded fasteners
- Identify screw threads from a number specification
- Understand the benefit and utilization of an exploded view
- Identify and interpret an assembly drawing
- Identify a specific part on an assembly drawing

**Estimated class duration: 20 hours**

### **ME202-Bearing Life Improvement**

Improve equipment longevity by diagnosing the root cause of bearing failures. In this course, students exercise the proper methods in the installation and removal of bearings and understand preventative measures required to alleviate premature failures. Additionally, bearing and bearing seal types are identified and discussed to ensure that students understand the proper application, adjustment and tolerances associated with different bearing types.

- Determine proper sizes of shafts and housings
- Measure straight and tapered shafts
- Demonstrate proper bearing mounting and dismounting techniques
- Properly lubricate rolling bearings
- Monitor rolling bearings to prevent catastrophic failure
- Identify all types of bearing failures and what is required to prevent future failures

**Estimated class duration: 20 hours**

### **ME221-Industrial Gearbox Repair (Speed Reducers)**

Thoroughly examine the aspects of troubleshooting, rebuilding, installing and aligning of industrial gearboxes through this hands-on course. This intermediate mechanical course allows students to develop the skills and methodology to properly address gearbox issues of the worm, helical, herringbone, spur and other types. Additionally, this course covers a selection of lubricants, their applications, and a breakdown on service rating.

- Correctly rebuild gear boxes to tolerance through measurement and adjustment
- Troubleshoot failed gear boxes
- Properly align a gear box allowing for thermal growth
- Select the proper worm gear box
- Apply service ratings for various applications/installations
- Properly install a speed reducer
- Select the proper lubricant
- Select the ideal coupling for the gearbox by rating, speed and misalignment factor
- Correctly replace seals and bearings
- Correctly set up a gear box using shims

**Estimated class duration: 32 hours**



# Rigging



## **RL158-Safe Rigging, Lifting, & Moving of Equipment**

Safe lifting and moving – this industrial rigging training course is intended for all factory maintenance technicians involved in the practice of lifting, rigging or moving equipment or equipment components requiring lifting devices. This specific training event covers the utilization of components and practices “Below the Hook”. Successful completion of this course and exam provide, internal qualification in accordance with standards set forth by OSHA 29CFR1910.184 and 29CFR1926.251.

- Inspect rigging hardware for capacity and safety
- Inspect rigging slings for capacity and safety
- Properly utilize rigging and lifting slings and hardware
- Understand the advantages and limitations of various sling types
- Know how to safely utilize machine jacks
- Understand the use of machine rollers and dollies
- Know when, how and with what material to utilize cribbing
- Demonstrate proper hand signals for rigging operation
- Execute a safe lifting and equipment move plan
- Understand the various roles of employees involved in rigging operations
- Demonstrate the ability to balance a load and identify load center
- Apply the techniques of a skilled rigger

**Estimated class duration: 32 hours**

**\*MEETS SAFETY REGULATIONS**

## **RL161-Overhead Crane Inspection**

This is a hands- on Overhead Crane training course intended for all factory maintenance technicians involved in the troubleshooting or repair of crane systems. Within this course students will learn how to perform the OSHA/ANSE frequent and periodic inspections. Further, this course provides a hands-on experience at the customer site and will be customized to fit the sites particular needs.

- Understand crane terms and applicable ANSI standards
- OSHA 1903.1- General Duty Clause
- OSHA 1910.6- Incorporation by Reference
- OSHA 1903.13- Imminent Danger
- OSHA 1910.179 –Overhead and Gantry Cranes
- OSHA 1910.184 with 1926.251 Insert and Applicable Tables
- Demonstrate proper Lockout/Tag Out
- Interpret the definition of crane operation, condition and limitations
- Identify risk and prevent overhead crane incidents
- Know wire rope technology
- Interpret and Perform inspection procedures
- Adhere to ASME/ANSI B30.xx and CMAA specification 70 & 74

**Estimated class duration: 32 hours**

**\*MEETS SAFETY REGULATIONS**







# Robotics

## **RB120-Fanuc Robotics System R-J# Series Controller**

Intended for maintenance personnel who are required to operate or perform maintenance on a FANUC System RJ, RJ-2, RJ-3 or RJ-3iB controller, this course covers the basic operations of FANUC robots, utilizing the teach pendant as the main interface point. Activities include familiarization in jogging the robot, recovering from common faults, basic programming, program execution, I/O manipulation and back-up file management. Additionally, this course introduces common maintenance practices including periodic maintenance, preventative maintenance and axis mastering.

- Identify all components of the cell that are part of the power up sequence
- Recognize the main components of the robot
- Identify all safety considerations related to operating the cell
- Describe the correct sequence for powering up the cell
- Recognize and clear alarms that would inhibit cell operation
- Identify the function of relevant keys on the teach pendant
- Describe the difference between joint and Cartesian/XYZ coordinate Systems
- Describe the difference in robot motion between linear and joint type motions
- Recognize the best jog system for specific applications
- Identify the origin of world and tool frames
- Understand the concepts of the robots representation (joint and world)
- Identify necessary keystrokes to have the robot perform programmed moves
- Understand how to select a previously written program
- Understand the steps for modifying an existing program
- Understand each element of a motion instruction
- Understand the hazards with manipulating I/O
- Recognize the different forms of I/O and their functions
- Be familiar with the process of saving and loading programs to and from storage devices
- Identify various places in the software where you can load and save programs
- Familiarization of preventative and periodic maintenance procedures for mechanical unit
- Understand procedure of grease replacement process of drive mechanism, axes gear boxes and wrist
- Understand process of backup battery replacement and preservation of position data
- Understand axis mastering procedure following replacement of motor, pulse coder, reducer, cabling or backup battery failure

**Estimated class duration: 32hours**



### **PLC202-PLC 5, 500 & 5000 Platforms**

This hands-on training course is intended for maintenance personnel who are required to operate or perform maintenance on Programmable Logic Controllers including: PLC5, SLC500, ControlLogix 5000, CompactLogix and MicroLogix families. This course covers the basic operations and troubleshooting of PLC's, utilizing Rockwell RSLinx/Logix PC software as the main interface point. Activities include familiarization Basic Electrical Fundamentals, Ladder Logic, PLC's, RS Software, Communications, and Troubleshooting.

#### Basic electrical fundamentals

- Basic Electricity
- Series Circuits
- Parallel Circuits
- Ladder Logic
- Ladder Logic Symbols
- Electrical Schematics
- Motor Starter Circuits
- Creating Ladder Logic for Relays
- Programmable Logic Controllers
- PLC's - Brief History
- Current PLC's
- PLC Components & Operation
- Relay Ladder vs. PLC Ladder
- PLC Scan Time and Method Variances
- PLC5, SLC500, ControlLogix, CompactLogix, & MicroLogix Specifics
- PC to PLC communications
- Rockwell RSLinx Software Driver Selection
- PC Com Port Selection
- PLC Fundamentals 1
- Going Online with RSLinx/Logix
- RSLinx/Logix Software Navigation
- Program Upload and Download
- Program Search Options
- PLC Tagging and Labeling
- Troubleshooting PLC Faults
- Troubleshooting with PLC Programs
- Troubleshooting I/O

**Estimated class duration: 28 hours**

### **PLC251-Introduction to PLC-5**

Get up to speed with an in-depth course specific to the legendary PLC-5. This is a workshop for individuals engaged in the program maintenance and troubleshooting of PLC-5 equipped systems. Students entering the course should have a working knowledge of electromechanical control devices and be familiar with relay ladder logic.

- Distinguish the features and capabilities of the different PLC-5 models
- Configure and install a PLC-5 system
- Effectively use a personal computer for entering, editing and troubleshooting programs
- Isolate processor and I/O faults to the module level
- Properly use peripheral devices to load, copy and print programs

**Estimated class duration: 36 hours**

### **PLC256-Introduction to SLC 500**

Gain proficiencies specific to the SLC500 controller through this workshop designed for individuals engaged in the program maintenance and troubleshooting of SLC500 equipped systems. Students attending this course should have a working knowledge of electromechanical control devices, ladder logic and basic computer skills. Additionally, familiarity with plant process helps with understanding the application of the SLC-500 to the production cycle.

- Identify typical hardware components and capabilities
- Configure, install and troubleshoot a SLC500 system
- Develop and interpret simple programs
- Isolate processor and I/O faults to the module level
- Setup communication protocol for the controller and computer
- Properly use peripheral devices to load, copy and print programs
- Learn to Backup and Restore through Utilities
- Perform Online Editing Functions
- Analyze Programs, Instructions, and I/O

**Estimated class duration: 36 hours**

### **PLC300-PLC Troubleshooting & Repair**

This course provides the active participant with the skills necessary to use and troubleshoot the S7 PLC control system. The student will configure, assemble, write, edit, and monitor ladder or STL logic to execute specific program functions using a student workstation.

At the conclusion of this four day course, the active student will be able to start developing a program, modify and troubleshoot an existing S7 PLC program by using the following skills:

- Configuring S7 software to communicate with S7 PLCs and use the offline simulation software.
- Configure the S7 PLC system hardware; CPUs, I/O modules, communication modules and Profibus network modules.
- Use S7 software to locate I/O module bits, internal memory locations, timers, counters, analog signals, mathematic calculations and recipes.
- Force on and off input and outputs.
- Monitor ladder and STL program logic.
- Download, Upload, save and restore programs.

**Who Should Attend:** Anyone who will troubleshoot, maintain or program a Siemens S7 PLC system.

**Estimated class duration: 36 hours**

### **PLC356-PLC-5 Advanced**

Advanced PLC-5 for the maintenance and engineering technician. Review the PLC-5 setup, communications and programming of the processor. Students will learn tracking file operations, tracking goods with shift registers, using sequencers, PID functions, variables in addressing and analyzing advanced program flow. Students will also learn handling STI and PII in PLC5 projects, how to set up DH+, handle fault routines and interpret I/O data flow.

- Become familiar with hardware and software setup
- Use block transfers
- Use PLC-5 in adapter mode
- Understand the setup, communications, programming of the processor
- Utilize tracking file operations, shift registers, sequencers, PID functions, variables, advanced program flow
- Handle STI in PLC projects and PII in PLC projects
- Setup data highway plus and use DH+ messaging with the PLC 5
- Setup up remote I/O, handle fault routines and utilize block transfers
- Be introduced to device net systems
- Understand many of the features and benefits associated with device net systems
- Understand device net topology and view a sample device net network
- Understand the setup, communications, programming of the processor
- Utilize tracking file operations, shift registers, sequencers, PID functions, variables, advanced program flow
- Handle STI in PLC projects and DII in PLC projects
- Setup data highway plus and using DH+ messaging with the PLC 5
- Setup up remote I/O, handle fault routines and utilize block transfers

**Estimated class duration: 36 hours**

### **PLC357-SLC500 Advanced**

Enhanced SLC500 development for the maintenance and engineering technician. Review the SLC500 setup, communications and programming of the processor. Students will learn tracking file operations, tracking goods with shift registers, using sequencers, PID functions, variables in addressing and analyzing advanced program flow. Students will also learn handling STI in SLC 500 projects and handling DII in SLC 500 projects. Students also learn how to set up data highway plus and using DH+ messaging with the SLC 500; and how to set up Remote I/O, handling fault routines and using block transfers with remote I/O.

- Familiarize with hardware and software setup
- Understand the setup, communications, programming of the processor
- Utilize tracking file operations, shift registers, sequencers, PID functions, variables, advanced program flow
- Handle STI and DII in SLC projects and DII in PLC projects
- Setup data highway plus and using DH+ messaging with the SLC500
- Setup up remote I/O, handle fault routines and utilize block transfers

**Estimated class duration: 36 hours**

### **PLC382-PLC Networking**

Gain knowledge on typical networks including ControlNet, DeviceNet, and EtherNet and their use in PLC communications. Designed for students who need to understand and manipulate communications of various protocol. This course focuses greatly on the configuration and set up of network communications as well as troubleshooting issues with peripheral devices.

- Be introduced to network systems including ControlNet, Ethernet, and DeviceNet
- Understand and interpret components and terms of functionality
- Understand features associated with network systems
- Understand DeviceNet Topology
- Implement DeviceNet through correct calculations
- Connect to, setup and add Blocks to DeviceNet network
- Utilization of RSLinx for configuration
- Setup an Ethernet network
- Understand the advantages of using Ethernet modules as Remote I/O
- Understand differences between I/O module ownership and Rack Optimization

**Estimated class duration: 20 hours**



### **PLC401-PanelView™ Modifications and Communications**

This course is aimed at the experienced PLC technician. Designed to present the basic requirements to setup, communicate and troubleshoot the PanelView. This course can be customized to the need of clients including PanelView choices: 550, 600, 1000, 1200 or 1400e. This course is ideal for technicians tasked with replacing, reprogramming, and installing PanelView displays and using the Rockwell PanelBuilder software.

- Modify PanelView™ screens and objects
- Setup and troubleshoot communications to a PLC control system
- Understand PLC/SLC memory allocation and communication to PV
- Use PV application files and PV utilities
- Understanding the PLC and PanelBuilder software & hardware
- Addressing PLC I/O
- Observing simple ladder logic operation
- Identifying data tables
- Adding objects to the PanelView screen
- Transferring a project to the PanelView screen
- Utilizing the PanelView I/O from the PLC ladder logic
- Navigating between the PanelView screens
- Setting up PLC controlled screens
- Configuring alarm and Information screens
- Block transfers to and from a PanelView

**Estimated class duration: 20 hours**

### **PLC481-ControlLogix & RSLogix 5000**

Engage deeply in the ControlLogix architecture through configuring, assembling, and then writing the necessary ladder logic to execute tasks with a ControlLogix 5000 controller. Where applicable, the student or participating company will provide a current system software printout, in advance, and we will use that to customize the lesson presentations to fit the application. Our courses can identify specific hardware or networks associated with the ControlLogix system, such as PLC-5, SLC500, remote I/O and Ethernet.

- Setting up, configuring communications, and designing a ControlLogix system
- Configuring the I/O structure and constructing a simple program for the ControlLogix system
- Integrating and configuring serial and Ethernet protocols using RSLinx software, for communicating data with other processors and remote I/O
- Distinguishing the differences between the 8-bit platform (1771-I/O) the 16-bit platform (PLC-5 and SLC500) and the 32-bit platform (ControlLogix)
- Troubleshoot a corrupt ControlLogix system

**Estimated class duration: 28 hours**





### **CNC201-CNC Maintenance and Troubleshooting**

Specifically developed for personnel who are required to operate or perform maintenance on CNC Controlled equipment. This course begins at a basic level; while in depth educational objectives exist, the main objective of this course is to promote comfort in navigation of the CNC control and system diagnostic features. Course is conducted using 0iC and/or 16/18i, but is applicable to other control models. This course covers basic operations, program interpretation, and troubleshooting of CNC components through feedback devices. Activities include familiarization in jogging the machine, recovering from common faults, MDI programming, program execution, I/O manipulation, troubleshooting with PMC logic, and servo system diagnostics.

- Start up a CNC system
- Identify the axis coordinate system of a given machine
- Use the function/soft keys to view different function screens
- Use the MDI controls to enter basic commands
- Identify the components of a CNC part program
- Interpret CNC part program blocks which contain basic Program Language
- Enter a CNC part program into the CNC controller's memory
- Step through the PMC control system menu and Ladder Logic
- Determine the type of signal based on the address given
- Read and interpret a PMC ladder program
- Use the STATUS screen to view the state of various input/output signals
- Use the TRACE screen to track changes in specified signals
- Troubleshoot a servo drive on a CNC machine
- Troubleshoot the feedback device in a CNC machine's servo system
- Troubleshoot the servomotor in a CNC machine's servo system
- Troubleshoot a CNC machine's servo system interface wiring

**Estimated class duration: 32 hours**

### **CNC236-CNC 16/18/21 A&B**

The perfect course for maintenance personnel including electricians, technicians, machine repairmen and any supervisors or plant engineers who want a practical, down-to-earth course on maintenance of CNCs 16/18/21. Students should have a good electrical background.

- Nomenclature, descriptions and functional relationships of the control unit modules
- Use the panel keyboard for manual data input and the soft-keys for main and submenu manipulation
- How to upload and download part programs and parameters using a PC and PCMCIA cards
- Construct a sequence program and understand the symbols used within the program
- Use the following for troubleshooting: image tables, I/O module tables, trace function, signal flow, cross reference, analyzer and scope screens, symbol tables, alarms

**Estimated class duration: 40 hours**







## Factory Maintenance

### **FM141-Plumbing Fixtures Repair & Maintenance**

A practical workshop created for those involved in the installation and troubleshooting of commercial plumbing fixtures, including millwrights, plumbers, pipe fitters, mechanics, machinery maintenance mechanics and electromechanical repair technicians. Throughout this course, students are exposed to the various components in plumbing fixture operation, troubleshooting at a system level, and the rebuild of assemblies.

- Install, adjust and repair flush valves
- Troubleshoot, repair and maintain faucets
- Understand and maintain interceptors
- Understand and maintain water hammer arrestors
- Repair, troubleshoot and maintain pressure regulators, backflow preventer's and electric water heaters
- Maintain water cooler flow controls

**Estimated class duration: 20 hours**

### **FM226-Air Conditioning & Refrigeration Certification**

Students earn an EPA Refrigerant Recovery Certification in this three-day course. Beginning with an overview of HVAC, students prepare to take the certification test by learning safety, electrical, troubleshooting and filtration concepts, to name a few.

- Understand the physics of heat and heat transfer
- Apply basic electrical theory and troubleshooting
- Apply Print reading and Schematics Skills to HVAC
- Safely work with refrigeration and air conditioning systems
- Understand the methods of heating, filtration and humidification

**Estimated class duration: 24 hours**

## Operator Performed Maintenance

Choose two curriculums to customize one 32 hour workshop. An OPM course is designed for machine operators who are learning more in-depth skills so they can help better maintain the functionality and reliability of their equipment.





# Operator Performed Maintenance

## **OPM110-Operator Performed Maintenance**

Equipment reliability is a job made easier through active participation in the maintenance of machines by operators. In this course, you'll learn the basic processes of maintenance from the perspective of an operator.

- Distinguish routine, preventive, and predictive maintenance
- Understand correlation of cleaning process to the inspection process
- Use visual guides and panel controls as maintenance indicators
- Explain basic lubrication theories, lubricants types, and procedures

**Estimated class duration: 16 hours**

## **OPM126-Fluid Power Hoses and Connection**

Fluid power conductors are critical in the reliability of any hydraulic or pneumatic system. Maintaining the condition of these conductors and their fittings is a factor in reducing downtime, costs, and safety risks associated with machine operations.

- Identify conductor types and proper uses
- Maintain conductors and connectors to optimize uptime
- Identify and specify replacement of typical conductors and connectors

**Estimated class duration: 16 hours**

## **OPM165-Belt Servicing and Tensioning**

Understand the importance of proper maintenance of belt drive applications. Through this task oriented course, operators participate in lab processes to implement industry standards in belt driven equipment.

- Identify types of belts
- Measure appropriate tensions
- Use the proper measuring tools

**Estimated class duration: 16 hours**

### **OPM168-Screw Conveyor Operation and Maintenance**

Understand the importance of proper maintenance and safe operations of screw conveyors. This course will cover the basic and safest methods of maintenance applications regarding augers, screw conveyors, and screw type material handlers.

- Identify wear components
- Understand safe working conditions
- Produce standard inspection materials
- Define and recognize screw types and functions
- Understand drive systems

**Estimated class duration: 16 hours**

### **OPM171-Pneumatic Controls**

This course is designed for operator performed maintenance and emphasizes entry level print reading, component identification and typical maintenance and conditioning procedures.

- Understand the function and maintenance of lubrication devices
- Develop knowledge of pneumatic print reading
- Understand the function of pneumatic systems
- Identify and correct typical pneumatic system faults
- Apply preventative maintenance best practices

**Estimated class duration: 16 hours**

### **OPM172-Hydraulic Fluid Conditioning Principles**

This course designed for operator performed maintenance emphasizes on entry level print reading, component identification and typical maintenance and conditioning procedures.

- Understand the function and maintenance of hydraulic systems, reservoirs, conductors and filtration
- Develop knowledge of hydraulic print reading
- Understand the function of hydraulic systems
- Identify and correct typical hydraulic system faults
- Apply preventative maintenance best practices
- Understand the principals and functions of hydraulic fluids

**Estimated class duration: 16 hours**

### **OPM174-Ladder Logic Methods**

This course covers a basic review of electrical theory, component identification and operation. Understanding relay controls and logic are the primary learning objectives of this course, and are aligned to the migration of relay controlled circuitry to Programmable Logic Controllers. This course is a critical piece to any operator engaged in electrical OPM practice.

- Interpretation of Ladder Logic Symbols and Diagrams
- Understanding Basic Electrical Troubleshooting Theory
- Series and Parallel Circuit Logic and Diagnostics
- Discern system discrepancies to schematics

**Estimated class duration: 16 hours**

### **OPM177-Bearing Life Improvement**

Mechanical maintenance of many industrial assets requires rotating, reciprocating, and linear motion components to be properly lubricated. Bearing life depends on proper lubrication techniques.

- Properly lubricate rolling bearings
- Monitor rolling bearings to prevent catastrophic failure
- Identify bearing failures and what is required to prevent future failures

**Estimated class duration: 16 hours**

### **OPM190-Troubleshooting from Schematics**

Implementation of operator performed maintenance begins with understanding what a machine is supposed to do. Prints and schematics are the road map to machine operations and the road map to troubleshooting machine errors.

- Interpret Mechanical, Electrical & Fluid Power print
- Follow standard documentation to implement OPM processes
- Identify components in prints and schematics
- Use prints and schematics in troubleshooting

**Estimated class duration: 16 hours**



# ONLINE COURSES





# Foundational

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