

## **PLC475: PLC Hardware, Programming and Design**

<b>Duration:</b>	<b>5 Day (Classroom) or 24 hours Online</b>
<b>Audience:</b>	<b>Process Control Engineers, PLC Engineers and Technicians, Instrument Engineers</b>
<b>Prerequisites:</b>	<b>Some control room exposure is desirable, but not required.</b>
<b>Course Material:</b>	<b>PowerPoint Slides, PLC slides, PLC Simulation Software and Industrial Examples</b>

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### **Course Description and Objectives:**

This course teaches you software, hardware and programming skills in using PLCs (programmable logic controllers). The course is designed to build skills in such a manner that upon completion, the student will have the skills needed to work with any PLC. This course like other PiControl courses is not vendor specific. The course starts with basics of PLC, covering both hardware, software and architecture. It teaches ladder logic, function blocks, input/output cards. It explains all basic, standard and custom functions and capabilities of a PLC. With this knowledge, a student will have the skills to design ladder logic, function blocks and safe habits to work in any manufacturing unit. Various real industrial examples are used to illustrate the concepts and with the incorporation and usage of all commonly used PLC functions.

### **Learning Outcomes:**

At the end of this course, students will have strong skills on PLCs. They will be exposed to hardware, software, ladder logic and function blocks. They will have learnt all common PLC blocks and schemes. The course is hands-on and allows students to design and build PLC schemes on their personal computers. With this knowledge, it is possible to design and build PLC logic and control schemes in an industrial environment. The course places significant emphasis on safety, reliability and maintenance for the safe and improved operation of any process. The course covers discrete control, continuous control, adaptive control, safety shutdowns and also the design and implementation of APC inside the PLC.

### **Day 1:**

Programmable Logic Controller (PLC) Overview  
PLC Hardware and Components  
PLC Communication  
Number Systems – Binary, Decimal and Hexadecimal  
PLC Input and Output Cards  
How to read P&IDs and design control schemes  
Relays

### **Day 2:**

Relay Logic Diagrams  
PLC Programming  
Logic Gate Functions  
Motor Starter Logic  
Timers  
Counters  
Setting up PLC software on personal computers  
PLC Lab Hands-On Project 1-3

**Day 3:**

PLC Math Blocks and Functions  
Compare and Jump Instructions  
PLC Lab Hands-On Project 4-6  
Subroutines for Repetitious Calculations and Logic  
Bit Shift Instructions

**Day 4:**

Data Handling Instructions  
Sequence Design and Implementation  
Sequence Instructions  
PLC Lab Hands-On Project 7-10  
Troubleshooting and Maintenance of PLC systems  
PLC Networks in Industry  
Safety Procedures

**Day 5:**

PID and cascade control design inside the PLC  
Developing APC inside the PLC  
Starting up APC schemes  
Safe operating practices and design to avoid making mistakes and process upsets  
Procedures and practices for improved user interface  
Designing PLC schemes for improved GUI and assisting the job of the operator