FUNDAMENTALS OF PROGRAMMABLE LOGIC CONTROLLERS

Single Class Capacity: 12
Duration: 3 Days - 24 Hours

Program a PLC to provide real-time, interactive, diagnostics that pinpoints the issues. Use other troubleshooting methods such as the search function, cross references, histograms and forces.

Receive a copy of LogixPro PLC simulation software to practice programming, running and troubleshooting ladder logic on any computer. It includes programming examples and animated industrial simulations.

This course is beneficial for anyone who encounters control systems in their daily functions, such as engineers, maintenance, operations and management personnel.

WHAT THIS COURSE COVERS

- Learn how to tell your machine what is wrong with it
- Recognize the return on investment
- HMIs can be a troubleshooting tool
- Experience the ease of developing HMI projects
- Review ladder logic fundamentals
- Troubleshoot PLC/HMI communication problems
- Configure, scale and monitor analog signals
- Construct PLC/HMI tag data
- Create HMI screens, controls and indicators
- Create HMI real-time fault messaging
- Learn PLC networking capabilities

WHO SHOULD TAKE THIS?

- Engineers, maintenance, operations and management personnel
- IT Technicians
- Instrumentation Technicians
- Maintenance Technicians
- Automation Technicians
- Multi-craft personnel
- Anyone who needs cross-training on PLCs

COURSE OUTCOMES

- Understand the advantages and disadvantages of using PLCs
- Recognize the different hardware components of the PLC, including power supplies, input modules, output modules, central processing units and programming devices
- Understand how the ladder logic software and communication software interact to allow data to transfer between a PLC and a programming computer

EARN CEUs WITH EVERY COURSE

Every NTT course is eligible for CEUs (or Continuing Education Units) with your governing board approval or your states approval.

ONSITE - TRAINING TOUR - LIVE VIRTUAL - ONLINE - HANDS ON - AUDITS - CONSULTING - **SKILLED WORKERS. STRONGER COMPANIES.**

NTT TRAINING INC. • 1.800.922.2820 • WWW.NTTINC.COM • CONTACT@NTTINC.COM

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COURSE AGENDA

HISTORY
- Relay logic
- Programmable logic controller

PLC ARCHITECTURE
- Rack, power supply, processor, I/O
- Smart modules
- Communication networks
- Programming tools – software

INPUT AND OUTPUT (I/O) SYSTEMS
- I/O interfaces - voltages
- Data transfer from module to processor
- Number of I/O per module
- Analog data versus digital data
- Remote I/O systems

LADDER LOGIC VERSUS RELAY LOGIC
- Ladder diagrams versus ladder logic
- Sensor and load connections to the PLC
- Rungs and instructions

RELAY-TYPE INSTRUCTIONS
- Examine if on
- Examine if off
- Output energize, output latch/unlatch
- Differences between instructions and field devices (on/off versus open/closed)

ADDRESSING, DATA MEMORY, AND SCAN TIME
- I/O address relation to module location
- Internal data memory – binary files
- Internal data memory – integer files
- Register memory versus bit-wise memory
- I/O, memory and rung scan process

ADDITIONAL INSTRUCTIONS & ASSOCIATED BITS
- Timer on-delay, timer off-delay
- Timer done, enable and timing bits
- Up/down counter and control bits
- Moving data among registers
- Math instructions
- Comparison instructions – equal, greater than, less than

NUMBER SYSTEMS
- Decimal, octal, binary and hexadecimal systems
- Binary Coded Decimal (BCD)
- Data conversion

SIZING AND SELECTION OF PLCS
- Estimating system I/O requirements
- CPU and memory sizing
- Interpreting manufacturer specifications
- Choosing a vendor

TROUBLESHOOTING AND DIAGNOSTICS
- Configuring communications
- Wiring requirements
- Debugging and diagnostic tools

HANDS ON LAB EXERCISES
- Motor start/stop circuits
- Trapping random faults
- Signaling alarms
- Tank-level controls
- Sequence-controlled conveyors
- Inputting and outputting numerical data
- Batch control processes
- Automated control systems
- Troubleshooting communication problems

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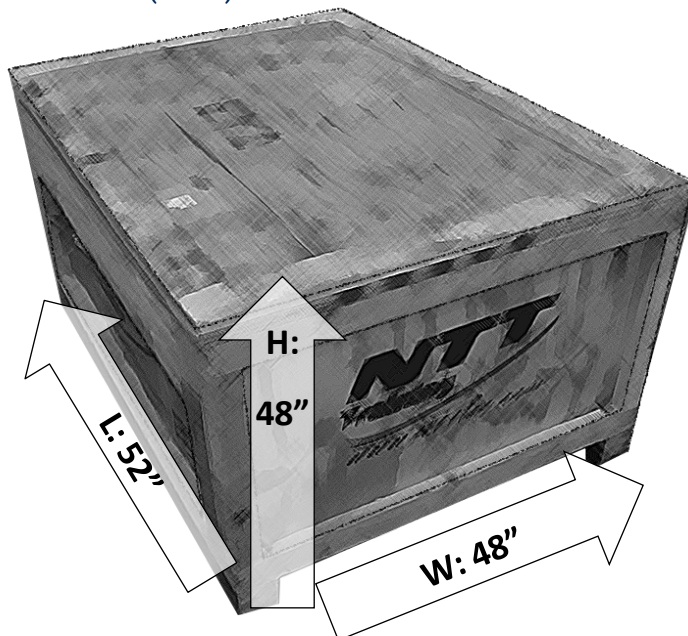## EQUIPMENT & MATERIALS

NTT TO PROVIDE

- 2 days (16 contact hours) of on-site instruction
- Textbooks and lab manuals
- "LogixPro" software with built-in PLC simulation for ladder logic programming, running testing and troubleshooting programs
- Classroom consumables
- Completion certificates,
- All shipping and instructor travel logistics

SHIPPING

- 1 crate @ 48" x 48" x 52" (710 lbs.)
  OR
- 2 cases @ 31" x 20" x 15" (55 lbs) & @ 32" x 24" x18" (85lbs)

CLIENT TO PROVIDE

- Classroom, with easy access, of 750 square feet or greater.
- Projection screen, white board and/or flip chart(s).
- A dock facility or a forklift to unload the training equipment.
- A pallet jack to move the crates around after they have been unloaded may also be needed.
- The equipment should be placed in the training room for the NTT instructor to test and set up prior to the start of training.

H: 48"
L: 52"
W: 48"

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