



Training made possible through the South Bend Pathways On Demand Workforce Development Program

# FUNDAMENTALS OF ELECTRICITY AND TROUBLESHOOTING

A series of six, 8-hour sessions

Throughout this six-session course, participants will have hands-on, practical experience with foundational concepts of electricity, electric motors, industrial transformers, relay logic, and industrial controls. Participants who complete this course can expect to gain knowledge and learn skills useful in an industrial environment.

## Course Outline:

### Electrical Concepts, Circuits, and Direct and Alternating Currents

- Define electricity and electrical concepts like voltage, current, resistance, and power and introduce polarity in conjunction with AC and DC circuits
- Explain Scientific Notation, Engineering Notation and Engineering Units
- Review basic electrical safety including hazards, PPE, and good practices
- Learn how to analyze circuits using Ohms Law and apply these principles to series, parallel, and combination circuits with hands on exercises
- Use NEC Charts for wire, fuse, and breaker size
- Review commonly used electrical components such as relays, solenoids, contactors, switches, pushbuttons, indicators, and semiconductors

### Electric Motors and Industrial Transformers

- Review operation and usage of motor control circuits including circuit protection, full voltage starters, soft starts, and reversing starters
- Explain motor nameplates, motor torque curves, servos, transformer construction, wiring instructions, and basic operation of VFDs
- List basic principles of troubleshooting AC motors
- Interpret a transformer nameplate and describe the different ways a transformer can be wired

### Print Reading, Relay Logic, Industrial Controls, and Numbering Systems

- Review print reading including symbols, practices, and cross references
- Define logic gates and functions and interpret logic gate combinations
- Explain Relay Logic with practical exercises
- Apply the logic to functions of industrial machines standard start/stop latching circuits and safety circuits
- Explain Number Systems and convert decimal numbers to binary numbers
- Introduce PLC/controls and input/output cards
- Practical, hands-on use of meters, relays, switches, and lights will be used throughout the course

## PROGRAM DETAILS

- Sessions are Sept. 24 - 26 and October 1 - 3
- 8:30 am - 4:30 pm ET
- South Bend's Ignition Park  
*Additional details will be sent to participants after registration is confirmed.*
- Drinks, snacks, and meals are not included in the workshop and will be on your own. Please plan accordingly.

## REGISTRATION DETAILS

- Registration closes on Sept. 10

## APPROPRIATE FOR:

- All levels of industrial maintenance personnel (or those new to a maintenance role) with little or no electrical experience. Recommend that participants possess good math skills. Should have working knowledge of industrial applications.



Manufacturing Extension Partnership

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