SPECIALTY

ELECTRICITY
LEVEL II

TRAINING DESCRIPTION:

A continuation of Level I, Level II takes the basic electrical concepts discussed in Level I and uses them to develop an understanding of more complicated concepts that are necessary to know to effectively maintain and troubleshoot motor control circuits, variable frequency drives, and other complex electrical systems.

This program begins with a brief review of the fundamentals of electricity.

Next, we move into a detailed discussion of how motors work. Beginning with DC motors. During this section, students will connect DC motors to voltages to see the principles in operation.

Then, our discussion will turn to single-phase AC induction motors, and three-phase AC induction motors, which are considered "the workhorse of industry. We will discuss, in detail, and practice, with hands-on exercises, proper motor troubleshooting techniques, including capacitor checks. Article 430 of the National Electrical Code explains specifically how to properly protect different types of motors from overcurrents. We will cover this information from the viewpoint of a troubleshooting maintenance person. During Level I, we covered the basics of electrical print reading. In this section, we will cover more advanced NEMA-style prints (prints generated in the United States), and IEC symbols and prints as well. We recommend including your prints in this section of the program to familiarize the students with the prints they will actually be working with. This program finishes with two to three days of very intense hands-on troubleshooting. We use actual motor control circuits and components. The students will hard wire motor control circuits, make them work, and then the instructor will insert real-world faults. The students will then have to apply the troubleshooting techniques taught by the instructor to repair the circuits. Many students tell us that this section of the program is the equivilent of a full week at work.

TRAINING BENEFITS:

- Investing in employee skills can reduce operation costs & downtime.
- Applicable skills available upon return to the workplace.
- Reflects a positive image of the company.
- Pre & post testing can help establish baseline skills.

TRAINING TOPICS:

REVIEW OF FUNDAMENTALS OF ELECTRICITY
- Voltage, Current, Resistance, and Power

DC MOTORS
- DC vs. AC Motor Comparison
- Basic Magnetic Field Theory
- Terminology
- Nameplate Information
- Operation & Troubleshooting

SINGLE-PHASE AC INDUCTION MOTORS
- Motor Nameplate Information
- Motor Operation, Rotation, and Connectors
- Capacitor Troubleshooting

THREE-PHASE AC INDUCTION MOTORS
- Operation & Enclosures
- Nameplate Information
- Overcurrent Protection
- Locked Rotor Amps
- Ground Fault/Short Circuit Protection Sizing
- Fuse Data and Circuit Breaker Operation
- Motor Starter Sizing
- Overload Protection Sizing

ADVANCED PRINT READING
- Symbol Laws and Facts
- Advanced Input and Output Devices
- Print Numbering Standards
- Reading Real-World Prints
- IEC Symbols
- Troubleshooting Using Prints

HANDS-ON ELECTRICAL TROUBLESHOOTING
- Continuity
- Testing Relays
- Photo Cells
- Motor Starter
- Troubleshooting Methods
- Troubleshooting Three-Phase Motor
- Troubleshooting Motor Control

CLASS DISCUSSION AND REVIEW

REMEMBER: Attendees should bring a multimeter, preferably the one they use on the job, with them for this hands-on training.

4-DAY TRAINING

CLASS SIZE: UP TO 14
CLASS LENGTH: 24 HOURS
CLASS NUMBER: N_E224

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