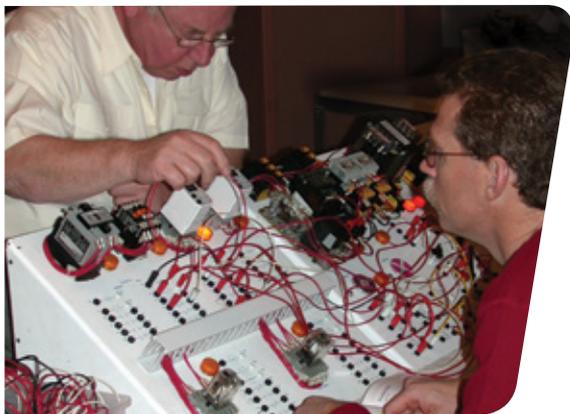




Skilled Workers. Stronger Companies.

# HANDS-ON INDUSTRIAL TRAINING CATALOG

THE RIGHT SKILLS  
HANDS-ON  
IN 2 TO 5 DAYS



# Welcome

Thank you for spending some time with NTT. I trust the time you've invested with us provides you a meaningful and practical hands on training experience you'll be able to use on the job tomorrow.

With over 1 million people trained so far, we've listened to you, and we've built our courses around you. Your feedback helps to guide our teaching methods and the training tools we've crafted for you.

If our courses could help further your career, then call us toll-free to register at **1-877-652-1026**, or visit our website, **www.nttinc.com**.

Thank you, and please send me your thoughts and ideas to help our ongoing effort to improve your learning experience. You can reach me directly at **dan@nttinc.com** anytime.

Warm regards,



Dan Rinn  
President  
National Technology Transfer, Inc.



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**= Hands-on**



**= Lecture**

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**We're Hands-On**

## Partner with NTT to manage your training and compliance programs

NTT helps America maintain a highly safe and proficient skilled workforce. For nearly three decades, NTT has successfully trained nearly 1,000,000 employees at thousands of companies and government agencies around the world. Each of our master instructors brings an average of 30 years of real-world experience into the classroom. Plus, only NTT has full-sized equipment for the widest variety of courses to ensure that students actually *learn by doing*.



NTT is the only provider that integrates instructor-led classroom training, e-learning, managed learning services, electrical qualification training and consulting to develop company-specific safety programs. Our comprehensive and holistic approach to training, safety and compliance reduces workplace accidents and increases productivity.

## On-site training

We conduct one to five-day instructor-led courses on over 60 subjects within our program disciplines: Electrical Safety, Electrical Systems, National Electrical Code, Compliance, HVAC, Fluid Power and Mechanical Systems.

We can bring any of our training courses on-site to any of your locations – on your schedule – for your production challenges. Training at your location reduces employee downtime and training costs. It eliminates travel expenses and allows employees to remain on-site to cover work shifts. Clients typically save up to 25% per participant.

The most valuable benefit is that we can customize courses and learning materials for your company's specific needs to ensure training meets business objectives, is relevant to your personnel and is designed for your operating environment.



## Why leave the building? Train at your location

- Anywhere. Anytime. Any way. We can bring any of our 60+ training courses on-site to any of your locations – on your schedule – customized to focus on your company's production challenges.
- Reduce employee downtime and training costs: On-site training eliminates travel expenses and allows employees to remain on-site to cover operations. Save up to 25% per participant by bringing our course to your site.
- Eliminate hassles and stay within budget: We handle all logistics of instructor travel as well as shipping equipment and textbooks. All expenses are included in your cost so you won't be surprised with unexpected bills.
- Customize your training: We can customize course content and learning materials for your company's needs to ensure the training is specific to your facilities, equipment, personnel and business objectives.
- Hands-on Labs: We can bring full-sized mobile hands-on lab equipment to your location to ensure that each student learns on real-world equipment. We can also train your employees on your equipment.



## Hands-on training saves lives

Would you let a surgeon operate on your heart if you discovered he'd only learned how to perform surgery by watching videos? We wouldn't! Additionally, OSHA requires "classroom or on-the-job type" training for qualified electrical workers. When it comes to performing hazardous procedures, hands-on training can mean the difference between life and death. Hands-on labs teach students *real* skills - on *real* equipment - for *real-world* situations.

## NTT Public Training

**Remember that our regional courses are available for individuals or one-off classes.**

For nearly three decades, NTT has successfully trained nearly 1,000,000 employees, many of which have attended our public courses scheduled in cities nationwide each year. We continually expand our curriculum of two to five-day instructor-led courses within our seven program disciplines: Electrical Safety, National Electrical Code®, Electrical and Electronics, Compliance, HVAC, Fluid Power and Mechanical Systems. We deliver the best lecture and hands-on training because we have the industry's largest team of master instructors. We're also the only provider that offers full-size hands-on lab equipment for each of your students to ensure they learn by doing, which is essential for skilled trades.

### **Skill Circuit™ Online**

Our web-based learning management system delivers a comprehensive blended learning solution that ensures workers will retain more knowledge from their lecture style training. This program also helps companies manage training activities.

## NTT Professional Services

**We do more than training. How can we help you?**

We consult with client management teams to develop company-specific training, workplace safety and workforce development programs. Our subject matter experts will collaborate closely with your team to develop a project scope and estimate based on requirements specific to your facilities personnel, equipment and training objectives. Not only do we consult, we help you implement highly sophisticated programs.

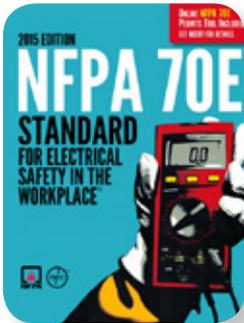


**More training like this**

**Before you do this**

## NFPA 70E /

### Arc Flash Electrical Safety



NFPA 70E/Arc Flash Electrical Safety course meets the safety training requirements for employees bound by OSHA rule 29 CFR 1910:331-335. Learn how current NFPA 70E standards apply to a facility, why safe electrical work practices are important, and what can be done to ensure your organization meets

all government standards for electrical safety. OSHA's mandated training requirements apply to employees who face a risk of electric shock that is not reduced to a safe level by the electrical installation requirements of OSHA 29 CFR 1910.303-308.

Electrical safety training empowers workers to perform their jobs safely. According to the US Department of Labor, electrocution is one of the main causes of on-the-job deaths of industrial workers. Within this group, skilled trades personnel—electricians in particular—are two times more likely to be seriously injured or killed than non-skilled trades personnel. Electrical safety training is a requirement even for technically competent electrical workers.

#### Agenda Topics:

- NFPA 70E Updates
- Safety Concepts
- Hazards of electricity
- Boundaries
- Selection and use of safe work practices
- Risk category tables
- Selection, use and care of personal protective equipment

### Introduction to Arc Flash Analysis

This training is for anyone who works on or near exposed energized components operating at 50 volts up to 600 volts nominal. Additional training may be required in regards to specific work methods and recognition of hazards associated with specific equipment and work methods. Additional training may also be required for voltages above 600 volts nominal.

#### Agenda Topics:

- Calculate fault current and incident energy levels using various methods, including scientific calculators using the IEEE formulas, Excel® spread sheets, and over the counter software
- Proper PPE relative to the task to be done
- Job hazard analysis.
- Create a “living” document for new tasks and used as a reference to accomplish a task that has already been analyzed
- Warning labels energized work permit equipment safety
- System grounding



**Course Schedule** For the NFPA 70E complete schedule view on pages 7, 8 and 9.

#### Related Training

##### Implementing NPFA 70E

In this course we will consider implementing the 70E/Z462 directives, why workers perform as they do and what an employer might consider when discovering then evolving their facility safety culture.

*Go to page 7 for more details.*

##### NFPA 79: Electrical Standards for Industrial Machinery

Get an overview of scope of the NPFA 79. Learn how to effectively use the Standard as a guideline for wiring, sizing conductors and overcurrent protection for industrial machines operating from a nominal voltage of 600 volts or less.

*Go to page 11 for more details.*

##### NEC®

The National Electrical Code® is used by all states for industry-wide electrical standards. Ensure your organization is in compliance. This course benefits individuals who are either at an introductory level or who are experienced in working with electrical systems. Significantly increase their knowledge, skill level and confidence.

*Go to page 8 for more details.*

## Electrical Safety Practical Skills

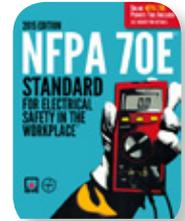
Review current OSHA standards that apply to your facility and the effects of the 2015 NFPA 70E standards on your high voltage areas. Keep yourself and your environment safe with proper personal protective clothing during grounding and switching of electrical equipment. Learn the electrical hazards in switch gear rooms, as well as safe switching procedures and documentation of electrical equipment.

### Agenda Topics:

- Training requirements for employees working on high voltage systems and equipment
- OSHA 1910.269 and 1910.331-335
- Electrical hazards in switch gear rooms
- Minimum approach for over 600 volts
- Safe electrical work practices for high voltage systems and equipment
- Safe switching procedures and documentation of electrical equipment
- Applying the two-person rule
- Proper personal protective equipment for switching and clearance duties
- Selecting and using test equipment to ensure absence of voltage
- How to inspect and test protective equipment
- Proper sizing, inspecting and installing of grounding clusters
- Care and proper body positioning when handling live line tools, including hot sticks

## Implementing NFPA 70E

When implementing NFPA 70E and CSA Z462 an employer must understand that these documents are addressing work behaviors. Until the deeper issue of the safety DNA of the worker and the safety culture of a facility are understood then an employer is only marking time until an incident may occur. Human nature is such that people learn to perform as expected when they are being observed. The greater question is, "What will they do when working alone, feeling pressured or in an emergency?" What in my company's culture leads them to determine which path to choose?



In this course we will consider implementing the 70E/Z462 directives, why workers perform as they do and what an employer might consider when discovering then evolving their facility safety culture.

### Agenda Topics:

- NFPA 70E — Road map to electrical safety
- Developing safe electrical workers (Qualified Workforce)
- Conducting an arc flash hazard analysis
- Developing electrical safe work practices (ESWP)
- Auditing and monitoring work practice compliance



### Electrical Safety & Hands-on Practical Skills

ES31

Seattle WA.....Aug 2-4, 2016	PhoenixAZ.....Feb28-Mar2,2017	Elk Grove IL.....Jul 11-13, 2017
Riverside CA.....Aug 16-18, 2016	Sacramento CA.....Mar 14-16, 2017	Riverside CA.....Aug 15-17, 2017
PhoenixAZ.....Aug30-Sept1, 2016	Baltimore MD.....Apr 4-6, 2017	Sacramento CA.....Aug 29-31, 2017
Sacramento CA.....Sept 13-15, 2016	Las Vegas NV.....Apr 11-13, 2017	Baltimore MD.....Oct 3-5, 2017
Las Vegas, NV.....Oct 11-13, 2016	Denver CO.....Apr 25-27, 2017	Denver CO.....Oct 24-26, 2017
Denver CO.....Nov 1-3, 2016	Charlotte NC.....May9-11, 2017	Phoenix AZ.....Nov 14-16, 2017
DallasTX.....Nov29-Dec1,2016	Dallas TX.....May 23-25, 2017	Dallas TX.....Dec 5-7, 2017
RiversideCA.....Feb14-16,2017	Houston TX.....Jun 13-15, 2017	

### NFPA 70E Arc Flash Electrical Safety

ES

Seattle WA.....Aug 2-3, 2016	Phoenix AZ.....Feb 28-Mar 1, 2017	Elk Grove IL.....Jul 11-12, 2017
RiversideCA.....Aug16-17, 2016	Sacramento CA.....Mar 14-15, 2017	RiversideCA.....Aug15-16, 2017
PhoenixAZ.....Aug30-31, 2016	Baltimore MD.....Apr 4-5, 2017	SacramentoCA.....Aug29-30,2017
SacramentoCA.....Sept13-14, 2016	Las Vegas NV.....Apr 11-12, 2017	BaltimoreMD.....Oct 3-4, 2017
Las Vegas, NV.....Oct 11-12, 2016	Denver CO.....Apr 25-26, 2017	Denver CO.....Oct 24-25, 2017
Denver CO.....Nov 1-2, 2016	Charlotte NC.....May 9-10, 2017	Phoenix AZ.....Nov 14-15, 2017
DallasTX.....Nov29-30, 2016	Dallas TX.....May 23-24, 2017	DallasTX.....Dec5-6,2017
RiversideCA.....Feb14-15, 2017	Houston TX.....Jun 13-14, 2017	

## National Electrical Code®

The National Electrical Code® is used by all states for industry-wide electrical standards. Ensure your organization is in compliance now so you can avoid reworking your electrical systems.



This course benefits individuals who are either at an introductory level or who are experienced in working with electrical systems. By the conclusion of the course, both levels will significantly increase their knowledge, skill level and confidence.

The full five-day combination course will also address how to remain safe when working on or around electrical systems. Additionally, you will learn how to maintain electrical systems with the correct grounding and bonding techniques.

### Agenda Topics:

- Applying the NEC – Article 90
- NEC Code Changes
- Electrical installation – Article 110
- Branch circuits and feeders – Article 110
- Services – Article 230
- Conductors and overcurrent protection – Article 240
- Wiring methods – Article 300
- Wiring material—raceway and boxes – Article 300
- Panelboards – Article 408
- Equipment for general use – Article 400
- Motors, generators, A/C and refrigeration and fire pumps – Articles 430, 440 and 695
- Transformers – Article 450
- Special locations – Articles 500 and 600
- Understanding the rules for overcurrent protection
- Industrial control panels (Article 409)

## Grounding and Bonding

Establish strong grounding and bonding fundamentals and performance requirements essential for electrical installation, design and inspection while maintaining the highest level of electrical safety for persons and property.

Learn about grounding requirements as they relate to Article 250 and other articles of the National Electrical Code®. Installation, testing and inspection procedures for industrial, commercial, institutional and residential power systems are covered along with rules to minimize the risk of electricity as a source of electric shock, and as an ignition source of fires and explosions.

### Agenda Topics:

- Fundamentals of grounding and bonding
- When to ground
- Grounding electrical systems and services
- Service equipment and man bonding jumpers
- Grounding electrodes and electrode systems
- Grounding electrode conductors
- Bonding enclosures and equipment
- Equipment grounding conductors
- Enclosure and equipment grounding
- Clearing ground faults and short circuits
- Grounding separately derived systems
- Ground-fault circuit-interrupter protection
- Ground-fault protection for equipment
- Grounding and bonding for special locations
- Grounding at (feeder supplied) separate structures
- Low-voltage and intersystem grounding and bonding
- Power quality systems



### Course Schedule



#### 2014 National Electrical Code® & NFPA 70E Arc Flash Electrical Safety

ESECS

Columbus OH.....Aug 22-26, 2016	Indianapolis IN.....Sept 12-16, 2016	Miami FL.....Sept 26-30, 2016
Reno NV.....Aug 29-Sept 2, 2016	Albuquerque NM.....Sept 19-23, 2016	



#### NFPA 70E Arc Flash Electrical Safety

ES

Reno NV.....Aug 29-30, 2016	Albuquerque NM.....Sept 19-20, 2016
Indianapolis IN.....Sept 12-13, 2016	Miami FL.....Sept 26-27, 2016



#### 2014 National Electrical Code® (3 Day)

EC14

Denver CO.....Aug 30-Sept-1, 2016	Indianapolis IN.....Sept 14-16, 2016	Miami FL.....Sept 28-30, 2016
Reno NV.....Aug 31-Sept 2, 2016	Albuquerque NM.....Sept 21-23, 2016	

Course Schedule



2017 National Electrical Code® & NFPA 70E Arc Flash Electrical Safety

ESEC17

Denver CO.....Oct 10-14, 2016	San Diego CA.....Dec 5-9, 2016	Phoenix AZ.....Jun 12-16, 2017
Sacramento CA.....Oct 10-14, 2016	Phoenix AZ.....Dec 12-16, 2016	Seattle WA.....Jun 19-23, 2017
Albany NY.....Oct 10-14, 2016	Seattle WA.....Dec 12-16, 2016	Minneapolis MN.....Jul 10-14, 2017
Salt Lake City UT.....Oct 17-21, 2016	Elk Grove IL.....Dec 12-16, 2016	Cleveland OH.....Jul 17-21, 2017
Houston TX.....Oct 17-21, 2016	Portland OR.....Jan 9-13, 2017	Milwaukee WI.....Jul 24-28, 2017
Williamsburg VA.....Oct 17-21, 2016	Washington DC.....Jan 23-27, 2017	Las Vegas NV.....Aug 7-11, 2017
Portland OR.....Oct 24-28, 2016	St Louis MO.....Jan 30-Feb 3, 2017	San Diego CA.....Aug 14-18, 2017
Memphis TN.....Oct 24-28, 2016	Dallas TX.....Feb 6-10, 2017	Cincinnati OH.....Aug 14-18, 2017
Philadelphia PA.....Oct 24-28, 2016	Houston TX.....Feb 13-17, 2017	San Jose CA.....Aug 21-25, 2017
Riverside CA.....Oct 31-Nov 4, 2016	Atlanta GA.....Feb 27-Mar 3, 2017	Columbus OH.....Aug 28-Sept 1, 2017
Kansas City MO.....Oct 31-Nov 4, 2016	Philadelphia PA.....Mar 13-17, 2017	Indianapolis IN.....Sept 11-15, 2017
Cincinnati OH.....Oct 31-Nov 4, 2016	Albuquerque NM.....Mar 20-24, 2017	Dallas TX.....Sept 18-22, 2017
San Jose CA.....Nov 14-18, 2016	Reno NV.....Mar 27-31, 2017	Sacramento CA.....Sept 25-29, 2017
Anchorage AK.....Nov 14-18, 2016	Sacramento CA.....Apr 3-7, 2017	Denver CO.....Oct 2-6, 2017
Baltimore MD.....Nov 14-18, 2016	Denver CO.....Apr 10-14, 2017	Riverside CA.....Oct 23-27, 2017
Tampa FL.....Nov 14-18, 2016	Virginia Beach VA.....Apr 10-14, 2017	Virginia Beach VA.....Oct 23-27, 2017
Milwaukee WI.....Nov 28-Dec 2, 2016	Salt Lake City UT.....Apr 24-28, 2017	Baltimore MD.....Nov 13-17, 2017
Nashville TN.....Nov 28-Dec 2, 2016	Riverside CA.....May 1-5, 2017	Orlando FL.....Nov 27-Dec 1, 2017
Las Vegas NV.....Nov 28-Dec 2, 2016	Baltimore MD.....May 15-19, 2017	Elk Grove IL.....Dec 4-8, 2017
Orlando FL.....Dec 5-9, 2016	Orlando FL.....May 22-26, 2017	Phoenix AZ.....Dec 4-8, 2017
Cleveland OH.....Dec 5-9, 2016	Elk Grove IL.....Jun 5-9, 2017	Seattle WA.....Dec 11-15, 2017



NFPA 70E Arc Flash Electrical Safety

ES

Denver CO.....Oct 10-11, 2016	San Diego CA.....Dec 5-6, 2016	Phoenix AZ.....Jun 12-13, 2017
Sacramento CA.....Oct 10-11, 2016	Phoenix AZ.....Dec 12-13, 2016	Seattle WA.....Jun 19-20, 2017
Albany NY.....Oct 10-11, 2016	Seattle WA.....Dec 12-13, 2016	Minneapolis MN.....Jul 10-11, 2017
Salt Lake City UT.....Oct 17-18, 2016	Elk Grove IL.....Dec 12-13, 2016	Cleveland OH.....Jul 17-18, 2017
Houston TX.....Oct 17-18, 2016	Portland OR.....Jan 9-10, 2017	Milwaukee WI.....Jul 24-25, 2017
Williamsburg VA.....Oct 17-18, 2016	Washington DC.....Jan 23-24, 2017	Las Vegas NV.....Aug 7-8, 2017
Portland OR.....Oct 24-25, 2016	St Louis MO.....Jan 30-31, 2017	San Diego CA.....Aug 14-15, 2017
Memphis TN.....Oct 24-25, 2016	Dallas TX.....Feb 6-7, 2017	Cincinnati OH.....Aug 14-15, 2017
Philadelphia PA.....Oct 24-25, 2016	Houston TX.....Feb 13-14, 2017	San Jose CA.....Aug 21-22, 2017
Riverside CA.....Oct 31-Nov 1, 2016	Atlanta GA.....Feb 27-28, 2017	Columbus OH.....Aug 28-29, 2017
Kansas City MO.....Oct 31-Nov 1, 2016	Philadelphia PA.....Mar 13-14, 2017	Indianapolis IN.....Sept 11-12, 2017
Cincinnati OH.....Oct 31-Nov 1, 2016	Albuquerque NM.....Mar 20-21, 2017	Dallas TX.....Sept 18-19, 2017
San Jose CA.....Nov 14-15, 2016	Reno NV.....Mar 27-28, 2017	Sacramento CA.....Sept 25-26, 2017
Anchorage AK.....Nov 14-15, 2016	Sacramento CA.....Apr 3-4, 2017	Denver CO.....Oct 2-3, 2017
Baltimore MD.....Nov 14-15, 2016	Denver CO.....Apr 10-11, 2017	Riverside CA.....Oct 23-24, 2017
Tampa FL.....Nov 14-15, 2016	Virginia Beach VA.....Apr 10-11, 2017	Virginia Beach VA.....Oct 23-24, 2017
Milwaukee WI.....Nov 28-29, 2016	Salt Lake City UT.....Apr 24-25, 2017	Baltimore MD.....Nov 13-14, 2017
Nashville TN.....Nov 28-29, 2016	Riverside CA.....May 1-2, 2017	Orlando FL.....Nov 27-28, 2017
Las Vegas NV.....Nov 28-29, 2016	Baltimore MD.....May 15-16, 2017	Elk Grove IL.....Dec 4-5, 2017
Orlando FL.....Dec 5-6, 2016	Orlando FL.....May 22-23, 2017	Phoenix AZ.....Dec 4-5, 2017
Cleveland OH.....Dec 5-6, 2016	Elk Grove IL.....Jun 5-6, 2017	Seattle WA.....Dec 11-12, 2017



2017 National Electrical Code® (3 Day)

EC17

Denver CO.....Oct 12-14, 2016	San Diego CA.....Dec 7-9, 2016	Phoenix AZ.....Jun 14-16, 2017
Sacramento CA.....Oct 12-14, 2016	Phoenix AZ.....Dec 14-16, 2016	Seattle WA.....Jun 21-23, 2017
Albany NY.....Oct 12-14, 2016	Seattle WA.....Dec 14-16, 2016	Minneapolis MN.....Jul 12-14, 2017
Salt Lake City UT.....Oct 19-21, 2016	Elk Grove IL.....Dec 14-16, 2016	Cleveland OH.....Jul 19-21, 2017
Houston TX.....Oct 19-21, 2016	Portland OR.....Jan 11-13, 2017	Milwaukee WI.....Jul 26-28, 2017
Williamsburg VA.....Oct 19-21, 2016	Washington DC.....Jan 25-27, 2017	Las Vegas NV.....Aug 9-11, 2017
Portland OR.....Oct 26-28, 2016	St Louis MO.....Feb 1-3, 2017	San Diego CA.....Aug 16-18, 2017
Memphis TN.....Oct 26-28, 2016	Dallas TX.....Feb 8-10, 2017	Cincinnati OH.....Aug 16-18, 2017
Philadelphia PA.....Oct 26-28, 2016	Houston TX.....Feb 15-17, 2017	San Jose CA.....Aug 23-25, 2017
Riverside CA.....Oct Nov 2-4, 2016	Atlanta GA.....Mar 1-3, 2017	Columbus OH.....Aug 30-Sept 1, 2017
Kansas City MO.....Oct Nov 2-4, 2016	Philadelphia PA.....Mar 15-17, 2017	Indianapolis IN.....Sept 13-15, 2017
Cincinnati OH.....Oct Nov 2-4, 2016	Albuquerque NM.....Mar 22-24, 2017	Dallas TX.....Sept 20-22, 2017
San Jose CA.....Nov 16-18, 2016	Reno NV.....Mar 29-31, 2017	Sacramento CA.....Sept 27-29, 2017
Anchorage AK.....Nov 16-18, 2016	Sacramento CA.....Apr 5-7, 2017	Denver CO.....Oct 4-6, 2017
Baltimore MD.....Nov 16-18, 2016	Denver CO.....Apr 12-14, 2017	Riverside CA.....Oct 25-27, 2017
Tampa FL.....Nov 16-18, 2016	Virginia Beach VA.....Apr 12-14, 2017	Virginia Beach VA.....Oct 25-27, 2017
Milwaukee WI.....Nov 30-Dec 2, 2016	Salt Lake City UT.....Apr 26-28, 2017	Baltimore MD.....Nov 15-17, 2017
Nashville TN.....Nov 30-Dec 2, 2016	Riverside CA.....May 3-5, 2017	Orlando FL.....Nov 29-Dec 1, 2017
Las Vegas NV.....Nov 30-Dec 2, 2016	Baltimore MD.....May 17-19, 2017	Elk Grove IL.....Dec 6-8, 2017
Orlando FL.....Dec 7-9, 2016	Orlando FL.....May 24-26, 2017	Phoenix AZ.....Dec 6-8, 2017
Cleveland OH.....Dec 7-9, 2016	Elk Grove IL.....Jun 7-9, 2017	Seattle WA.....Dec 13-15, 2017

## Industrial Electricity: Basics and Troubleshooting

Gain a basic understanding of electricity generation and delivery. Learn how electricity is applied to transformers, motors and common electrical devices; how and where these components work and their applications. You will also learn and practice safe methods and how to choose the proper instruments and tools to measure and comprehend the characteristics and properties of electrical signals in terms of voltage, current and impedance (resistance).

Gain invaluable experience in using and understanding electricity and its function in an electrical circuit. The course covers all aspects of electricity, including Ohm's law, terminology, common circuits, test equipment, safety, generators, motors and relays. Theory and explanations support numerous practical hands-on exercises, and can apply to real world situations.

### Agenda Topics:

- Basic electricity
- Basics of multimeters
- Electrical safety guidelines
- Common and industrial wiring devices
- Lighting and heating
- Conductors and raceways
- Wires
- Electricians' tools and test equipment
- Generators and transformers
- Solid-state devices
- Protective devices
- Electrical drawings and symbols
- Motors



## Troubleshooting Electrical Control Circuits

This is a basic course, without any prerequisites, that helps you develop a solid foundation on which to build your troubleshooting knowledge and skills. You will learn techniques that will help locate faults quickly. It starts with the fundamentals and builds from that point. About 70% of the time is spent working hands-on at a troubleshooting station with motor control circuits (operating at a safe, low level of 24 volts).

Learn basic troubleshooting techniques in a logical sequence to cover all the standard control circuits. Gain practical, useful techniques that can be put into immediate use.

### Agenda Topics:

- Electrical Schematics
- Mapping Control Circuits: Ladder Diagrams
- Logical Circuits
- Basic Electrical Principles
- Transformers
- Disconnecting Devices and Symbology
- Automatic Switches
- Control Elements, Switches and Symbology
- Manual Switches: Functionality and Symbology
- Troubleshooting Suggestions and Safety Awareness
- Supplementary contact symbols and terms
- Ground-fault overload protection
- Motor overload protection
- Application specific circuits
- Safety awareness

### Course Schedule



#### Basics of Industrial Electricity and Troubleshooting Electrical Control Circuits

EYMC

Elk Grove IL.....Aug 2-5, 2016  
 Kansas City MO.....Aug 16-19, 2016  
 Boston MA.....Aug 30-Sept 2, 2016  
 Houston TX.....Sept 13-16, 2016  
 Philadelphia PA.....Sept 13-16, 2016  
 Denver CO.....Sept 27-30, 2016  
 Seattle WA.....Oct 11-14, 2016  
 Baltimore MD.....Oct 18-21, 2016  
 Sacramento CA.....Oct 25-28, 2016  
 Nashville TN.....Nov 1-4, 2016  
 Riverside CA.....Nov 8-11, 2016  
 Atlanta GA.....Nov 15-18, 2016  
 Orlando FL.....Nov 29-Dec 2, 2016  
 Reno NV.....Nov 29-Dec 2, 2016

Baltimore MD.....Dec 13-16, 2016  
 Dallas TX.....Dec 13-16, 2016  
 Washington DC.....Jan 10-13, 2017  
 San Diego CA.....Jan 24-27, 2017  
 Philadelphia PA.....Feb 28-Mar 3, 2017  
 Houston TX.....Mar 14-17, 2017  
 Denver CO.....Mar 28-31, 2017  
 Seattle WA.....Apr 18-21, 2017  
 Sacramento CA.....Apr 25-28, 2017  
 Virginia Beach VA.....May 9-12, 2017  
 Cincinnati OH.....May 23-26, 2017  
 Reno NV.....Jun 6-9, 2017  
 Baltimore MD.....Jun 13-16, 2017  
 Dallas TX.....Jun 20-23, 2017

Phoenix AZ.....Jul 11-14, 2017  
 Elk Grove IL.....Aug 1-4, 2017  
 Philadelphia PA.....Aug 29-Sept 1, 2017  
 Houston TX.....Sept 12-15, 2017  
 Denver CO.....Sept 26-29, 2017  
 Seattle WA.....Oct 17-20, 2017  
 Sacramento CA.....Oct 24-27, 2017  
 Riverside CA.....Oct 31-Nov 3, 2017  
 Orlando FL.....Nov 14-17, 2017  
 Reno NV.....Nov 28 Dec 1, 2017  
 Baltimore MD.....Dec 5-8, 2017  
 Dallas TX.....Dec 12-15, 2017

## **NFPA 70B / Recommended Practices for Electrical Equipment Maintenance**

Receive an overview of the necessary tools to construct a cost-effective preventive maintenance program for electrical systems and equipment that are in industrial, institutional and commercial buildings. Learn the techniques to help guard against premature damage from power surges, spikes, transients and every day usage. A well maintained system will lessen the chance of electrical failures.

### **Agenda Topics:**

- Properly administered electrical preventive maintenance (EPM)
- Benefits of EPM
- Mechanics of EPM
- Dependability and support
- Planning and developing an EPM program
- EPM from commissioning through acceptance testing
- Fundamentals of electrical equipment maintenance
- Molded-case circuit-breaker power panels
- Equipment maintenance between shutdowns
- Uninterruptible power-supply (UPS)
- Protective device maintenance and arc flash hazard



## **NFPA 79: Electrical Standard for Industrial Machinery**

Get an overview of scope of the NPFA 79 and understand its relationship with other codes. Learn how to effectively use the Standard as a guideline for wiring, sizing conductors and overcurrent protection for industrial machines operating from a nominal voltage of 600 volts or less.

Learn preventative maintenance for equipment and systems, and electrical, electronic and communication equipment.

Gain essential safety techniques and knowledge from protecting yourself and the equipment from electrical hazards to grounding and more.

### **Agenda Topics:**

- Introduction to NFPA 79
- History of electric machine tools
- Modern machine tool electrical equipment
- Administration
- Referenced publications
- Definitions
- General operating conditions
- Incoming supply circuit conductor
- Terminations and devices for disconnecting and removing power
- Protection from electrical hazards
- Protection of equipment
- Grounding
- Control circuits and control functions
- Operator interface and control devices
- Control equipment location, mounting and enclosures
- Conductors, cable and flexible cords
- Wiring practices

### **Course Schedule**



**NFPA 79: Electrical Standard for Industrial Machinery**

**NFPA79**

Denver CO.....Aug 23-24, 2016

## Electrical Systems in Hazardous Locations

Identify hazardous zones, learn codes, standards and certification requirements. The National Electrical Code® (NEC) defines hazardous locations as those areas where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings. Articles 500 through 504, and 510 through 517 provide classification and installation standards for the use of electrical equipment in the three classified hazardous locations: type, condition and nature. Also learn about design issues, proper grounding and bonding, safe wiring methods and maintenance techniques.

### Agenda Topics:

- Classification of area locations—Class I, II, III
- Division and zone systems
- Groups within class, division, and zone
- National Electrical Code and other related articles
- Air, fuel and ignition sources
- Hazardous area
- Adjacent areas
- Classify any area
- Normal and abnormal conditions
- Classification of area locations—Class I, II, III
- Multiple classifications

## 1910.269 - Electrical Safety for Power Generation, Transmission & Distribution

This course is essential for anyone working near energized stations. You will gain an advanced understanding of the safety standards that ensure a safe work environment that is in compliance with government standards.

### Agenda Topics:

- OSHA 1910.269
- Job briefing requirements
- Develop and apply proper switching techniques
- Equipotential grounding and its application on the job
- OSHA clearance procedure requirements
- OSHA requirements for workers having access to or working on electrical utility systems
- Working on or near exposed lines
- Underground electrical installations
- De-energizing lines and equipment
- Substation safety
- Emergency procedures



### Course Schedule



#### Hazardous Location Electrical Systems with Grounding & Bonding Workshop

**HZL4GR**

Denver CO.....Sept 12-15, 2016	Houston TX.....Mar 20-23, 2017	Houston TX.....Oct 16-19, 2017
Houston TX.....Oct 10-13, 2016	Columbus OH.....May 8-11, 2017	Newark NJ.....Nov 27-30, 2017
Newark NJ.....Nov 28-Dec 1, 2016	Baton Rough LA.....Jun 26-29, 2017	



#### Grounding & Bonding 2-Day Classroom

**GR2**

Denver CO.....Sept 14-15, 2016	Houston TX.....Mar 22-23, 2017	Houston TX.....Oct 18-19, 2017
Houston TX.....Oct 12-13, 2016	Columbus OH.....May 10-11, 2017	Newark NJ.....Nov 29-30, 2017
Newark NJ.....Nov 30-Dec 1, 2016	Baton Rough LA.....Jun 28-29, 2017	



#### \$1910.269 Electrical Safety for Power Generation, Transmission, Transformation, and Distribution

**HS**

Elk Grove IL.....Aug 9-10, 2016	Sacramento CA.....Mar 7-8, 2017	Denver CO.....Aug 22-23, 2017
Dallas TX.....Aug 23-24, 2016	Seattle WA.....Mar 14-15, 2017	Virginia Beach VA.....Aug 8-9, 2017
Atlanta GA.....Sept 20-21, 2016	Philadelphia PA.....Apr 11-12, 2017	Dallas TX.....Aug 22-23, 2017
Cincinnati OH.....Oct 18-19, 2016	Phoenix AZ.....May 2-3, 2017	Seattle WA.....Sept 12-13, 2017
Virginia Beach VA.....Nov 1-2, 2016	Riverside CA.....May 9-10, 2017	Sacramento CA.....Sept 19-20, 2017
Pittsburgh PA.....Dec 6-7, 2016	Baltimore MD.....Jun 27-28, 2017	Riverside CA.....Nov 28-29, 2017
Denver CO.....Feb 7-8, 2017	Orlando FL.....Jul 25-26, 2017	

## Substations: Safety, Operation and Maintenance

Learn the best practices for electrical equipment safety testing. This intensive training program covers air-magnetic and vacuum circuit breakers found in most facilities from 2.3kV through 15kV.

Maintenance and testing (including interpreting test results) for circuit breakers, switchgear, battery and ground systems are covered in detail.

Develop the skills you need to manage the maintenance of substations. Power transformers and various types of protective relays are covered. Power factor testing, winding resistance, core excitation and FRA tests are just a few of the tests covered. Overcurrent, over/undervoltage and differential protective relays are covered, including how to inspect, maintain and calibrate.

### Agenda Topics:

- Applicable regulations and standards
- Common equipment
- Safety
- Operation
- Maintenance
- Transformer and maintenance/testing



### Related Training

#### Load Banking

Learn the electrical safety requirements, purposes and procedures for load banking generators and power systems. Technicians often work alone at remote locations and must select and use personal protective equipment (PPE) and safe work practices on their own.

*Go to page 20 for more details.*

#### 2015 NFPA 70E/Arc Flash Electrical Safety

Learn how current 2015 NFPA 70E standards apply to a facility, why safe electrical work practices are important, and what can be done to ensure your organization meets all government standards for electrical safety.

*Go to page 6 for more details.*

#### 1910.269 - Electric Safety for Power Generation, Transmission & Distribution

This is essential for anyone working near energized stations. You will gain an advanced understanding of the safety standards that ensure a safe work environment that is in compliance with government standards. *Go to page 12 for more details.*

## Substation Maintenance for Supervisors and Managers

Learn what every supervisor and manager needs to know about managing the electrical safety of employees. Review why maintenance is critical to power systems and how to determine proper maintenance intervals. Gain the knowledge about managing the electrical safety of employees.



The maintenance and testing required for common substation devices, including transformers, protective relays, circuit breakers, (air, vacuum, oil and SF6), grounding systems, batteries and chargers are all covered in detail. This intensive training program provides the latest information on maintaining and testing electrical power system equipment, including what to do, when to do it and interpreting test results.

### Agenda Topics:

- Lubricant target cleanliness levels
- Step-by-step procedures for risk-free flushing
- Three types of filters that you need to get rid of now
- Tips for filtering problematic, high-viscosity lubricants
- Seven simple techniques for getting longer filter life and reducing filtration costs

## Electrical Print Reading from Construction to Control

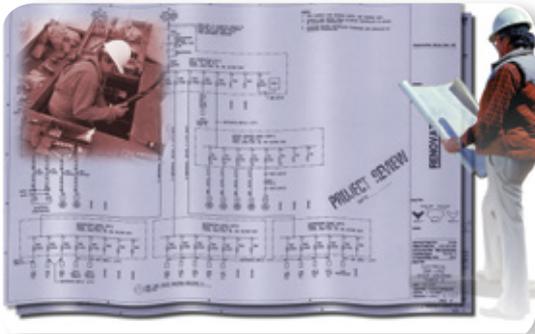
The course covers the various types and purposes of electrical prints, and teaches the skills needed to interpret them properly.

Review photos of electrical devices and equipment and their ANSI symbols and ratings. Examine diagrams and schedules in a typical construction project. Then review prints for errors and National Electrical Code® (NEC) compliance in voltage drop, conductor sizing, conductor fill, short-circuit analysis, kVA ratings, service calculations and more.

Learn to design and sketch simple electrical systems and circuits.

### Agenda Topics:

- Introduction to reading and interpreting prints
- Architectural electrical drawings construction blueprints
- Single-line type diagrams
- IEEE and IEC symbols for devices found on schematic diagrams



## Electrical Qualification Training

**Resolve a compliance quandary: How to produce qualified electrical workers.**

Employers must demonstrate that any worker performing an electrical task is “qualified” for that particular task. It’s up to the employer to figure out the best way to do this, and the task of “qualifying” electrical workers seems vague and nebulous: After proper hands-on training has been provided, what is the best way to demonstrate that workers can safely perform the electrical tasks that they are assigned? What process needs to be established in order for companies to deem them as “qualified” with defensible evidence of compliance?

Skill Circuit™ Electrical Qualification Training is a simple five-step program at your location that delivers a powerful blend of instructor-led classes and hands-on labs that enable workers to develop their skills using real equipment. The classroom training is reinforced with online assessments, courses and tutoring tools. But this program far exceeds training alone – it helps companies implement a documented and compliant process for producing qualified electrical workers that exceeds OSHA requirements and NFPA 70E standards.

### Program Benefits:

- A reduction in workplace accidents, violations and fines.
- Increased business productivity due to properly trained workers that operate safely and know how to protect expensive equipment from damage.
- Training that exceeds OSHA mandates and NFPA 70E standards by providing a documented and compliant process for electrical training and worker qualification.
- A better training system that is standardized across multiple locations and yet is also customized for the company’s facilities, equipment and operating environment.
- Improved worker morale and retention because workers appreciate the company’s investment in their skills – and in their safety.

### Course Schedule



#### Electrical Print Reading

SCL

Denver CO.....Aug 9-10, 2016

## Introduction to Instrumentation and Process Control

Understand instrumentation and process control to become more valuable as your skill set expands. You'll spend approximately 50% of the time working in hands-on labs exercises with various instruments and controllers. You will learn to program, connect input/output devices, as well as how to troubleshoot process controls including sensors, transmitters, controllers and final elements.

Use various instruments to measure temperature, pressure, flow rate, level and position, pH and analysis and weight and density. Understand the differences between open and closed-loop controls, feedback and feed forward controls, PLC, DCS, and stand-alone controllers. Find out how analog signals are produced, processed and protected from noise and differences in proportional, PI and PID control strategies. Understand what causes errors in instruments and how to minimize and troubleshoot them. Learn to calibrate transmitters and tune controllers.

### Agenda Topics:

- Basic concepts
- Piping and instrument diagrams (P and IDs)
- Control technologies
- Basic electrical and math concepts
- Pressure instrumentation and measurements
- Flow instrumentation and measurements
- Level instrumentation and measurements
- Density, specific gravity and analysis
- Manipulating the process
- Troubleshooting
- Controllers
- Control systems

### Course Schedule

## Fiber Optic Network Installation and Maintenance

Maintain your fiber optic network and learn the skills to minimize network downtime. Learn the ins and outs of design considerations and specification requirements. Work on budget/loss analysis techniques for fiber optic circuits. Learn safety requirements and proper techniques for terminating and splicing fiber. Upon completion of the training, students have the option to take a Fiber Optic Association exam to become a Certified Fiber Optic Technician (CFOT) or an Advanced Fiber Optic Technician (AFOT).

### Agenda Topics:

- Basics
- Cables
- Connectors, splices and terminations
- Networks and design considerations
- Installation requirements
- Test equipment



### Introduction to Instrumentation and Process Control

IA

Sacramento CA.....Aug 16-18, 2016	Baltimore MD.....Nov 29-Dec 1, 2016	Phoenix AZ.....Jun 20-22, 2017
Nashville TN.....Aug 30-Sept 1, 2016	Houston TX.....Dec 6-8, 2016	Riverside CA.....Jun 27-29, 2017
Reno NV.....Aug 30-Sept 1, 2016	Riverside CA.....Jan 10-12, 2017	Sacramento CA.....Jul 25-27, 2017
Orlando FL.....Sept 13-15, 2016	Sacramento CA.....Jan 31-Feb 2, 2017	Orlando FL.....Sept 12-14, 2017
Seattle WA.....Sept 27-29, 2016	Orlando FL.....Mar 14-16, 2017	Seattle WA.....Sept 26-28, 2017
Denver CO.....Oct 11-13, 2016	Seattle WA.....Mar 21-23, 2017	Elk Grove IL.....Oct 3-5, 2017
Indianapolis IN.....Oct 18-20, 2016	Elk Grove IL.....Apr 4-6, 2017	Denver CO.....Oct 31- Nov 2, 2017
Kansas City MO.....Oct 25-27, 2016	Denver CO.....Apr 11-13, 2017	Baltimore MD.....Nov 28-30, 2017
Milwaukee WI.....Nov 1-3, 2016	Dallas TX.....Apr 25-27, 2017	Houston TX.....Dec 5-7, 2017
Dallas TX.....Nov 8-10, 2016	Baltimore MD.....May 23-25, 2017	Phoenix AZ.....Dec 12-14, 2017
Boston MA.....Nov 15-17, 2016	Houston TX.....Jun 6-8, 2017	



### Fiber Optic Training

FB

Virginia Beach VA.....Sept 20-22, 2016	Virginia Beach VA.....Feb 7-9, 2017	Denver CO.....Nov 28-30, 2017
Dallas TX.....Oct 25-27, 2016	Denver CO.....Mar 14-16, 2017	
Denver CO.....Dec 6-8, 2016	Virginia Beach VA.....Sept 26-28, 2017	

## Fundamentals of Programmable Logic Controllers

Focus on the fundamentals of PLCs from setting up communications to uploading and downloading programs to troubleshooting and modifying the system.

Spend most of the class time on various PLCs working on hands-on exercises. Working in small groups, learn to program, connect input/output devices and solve elementary and complex problems.

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.

### Agenda Topics:

- History
- PLC Architecture
- Input and output (I/O) systems
- Ladder logic versus relay logic
- Relay-type instructions
- Addressing, data memory and scan time
- Additional instructions and associated bits
- Number systems
- Sizing and selection of PLCs
- Troubleshooting and diagnostics

## Programmable Logic Controllers Automation Systems

Learn how operator interfaces (OIs), or human machine interfaces (HMIs) integrate with a PLC to access information about the machine. You will discover that the HMI is a well designed real-time troubleshooting tool when properly programmed.

### Agenda Topics:

- Modern systems overview
- Hardware components
- Ladder logic review
- Human machine (operated) interfaces (HMIS) overview
- Motion control
- PID and analog control
- Remote I/O networks overview
- Diagnosing networks



### Course Schedule

#### Fundamentals of Programmable Logic Controllers and PLC Automation Systems PC5A

Houston TX.....Aug 15-19, 2016	Reno NV.....Jan 23-27, 2017	Elk Grove IL.....Jul 17-21, 2017
Kansas City MO.....Sept 12-16, 2016	Denver CO.....Feb 6-10, 2017	Houston TX.....Aug 14-18, 2017
Denver CO.....Sept 26-30, 2016	Orlando FL.....Mar 20-24, 2017	Riverside CA.....Aug 28-Sept 1, 2017
Las Vegas, NV.....Oct 24-28, 2016	Virginia Beach VA.....Apr 24--28, 2017	Denver CO.....Sept 25-29, 2017
Sacramento CA.....Nov 7-11, 2016	Baltimore MD.....May 8-12, 2017	Washington DC.....Oct 16-20, 2017
Seattle WA.....Nov 28-Dec 2, 2016	Philadelphia PA.....May 15-19, 2017	Sacramento CA.....Nov 13-17, 2017
Phoenix AZ.....Jan 9-13, 2017	San Diego CA.....Jun 5-9, 2017	Seattle WA.....Nov 27-Dec 1, 2017

#### Fundamentals of Programmable Logic Controllers PC5

Houston TX.....Aug 15-17, 2016	Reno NV.....Jan 23-25, 2017	Elk Grove IL.....Jul 17-19, 2017
Kansas City MO.....Sept 12-14, 2016	Denver CO.....Feb 6-8, 2017	Houston TX.....Aug 14-16, 2017
Denver CO.....Sept 26-28, 2016	Orlando FL.....Mar 20-22, 2017	Riverside CA.....Aug 28-30, 2017
Las Vegas, NV.....Oct 24-26, 2016	Virginia Beach VA.....Apr 24--26, 2017	Denver CO.....Sept 25-27, 2017
Sacramento CA.....Nov 7-9, 2016	Baltimore MD.....May 8-10, 2017	Washington DC.....Oct 16-18, 2017
Seattle WA.....Nov 28-30, 2016	Philadelphia PA.....May 15-17, 2017	Sacramento CA.....Nov 13-15, 2017
Phoenix AZ.....Jan 9-11, 2017	San Diego CA.....Jun 5-7, 2017	Seattle WA.....Nov 27-29, 2017

#### PLC Automation Systems 5A

Houston TX.....Aug 18-19, 2016	Reno NV.....Jan 26-27, 2017	Elk Grove IL.....Jul 20-21, 2017
Kansas City MO.....Sept 15-16, 2016	Denver CO.....Feb 9-10, 2017	Houston TX.....Aug 17-18, 2017
Denver CO.....Sept 29-30, 2016	Orlando FL.....Mar 23-24, 2017	Riverside CA.....Aug 31-Sept 1, 2017
Las Vegas, NV.....Oct 27-28, 2016	Virginia Beach VA.....Apr 27--28, 2017	Denver CO.....Sept 28-29, 2017
Sacramento CA.....Nov 10-11, 2016	Baltimore MD.....May 11-12, 2017	Washington DC.....Oct 19-20, 2017
Seattle WA.....Dec 1-2, 2016	Philadelphia PA.....May 18-19, 2017	Sacramento CA.....Nov 16-17, 2017
Phoenix AZ.....Jan 12-13, 2017	San Diego CA.....Jun 8-9, 2017	Seattle WA.....Nov 30-Dec 1, 2017

## Programmable Logic Controllers (PLC): Siemens Step 7

Learn how operator interfaces (OIs), or human machine interfaces (HMIs) integrate with a PLC to access information about the machine. You will discover that the HMI is a well designed real-time troubleshooting tool when properly programmed.

### Agenda Topics:

- Modern systems overview
- Hardware components
- Ladder logic review
- Human machine (operated) interfaces (HMIS) overview
- Motion control
- PID and analog control
- Remote I/O networks overview
- Diagnosing networks

## ControlLogix Maintenance and Troubleshooting

Gain a solid understanding of hardware, software and communication concepts inherent to Allen-Bradley's ControlLogix PLCs and Rockwell Software's RSLogix5000 ladder logic programming software. This course is designed for technicians, maintenance personnel or engineers who want to improve maintenance and troubleshooting skills in order to minimize machine downtime. Learn the basic concepts and terminology as well as working hands-on with hardware and platforms.

### Agenda Topics:

- Set up communications between the PLC and the computer
- Access, and monitor arrays, tags and user-defined data types
- Interpret project organization and execution
- Edit the ladder logic
- Create tags and monitor data in a routine
- Troubleshoot and repair hardware faults
- Create and learn proper file structure
- Perform backup and restore procedures
- Use search routines to locate items within a project
- Use software troubleshooting tools
- Force I/O and toggle bits
- Troubleshoot analog and digital inputs and outputs

### Course Schedule



#### PLC: Siemens Step 7

PCS7

Reno NV.....Sept 12-15, 2016	Houston TX.....Apr 10-13, 2017	Reno NV.....Sept 11-14, 2017
Virginia Beach VA.....Sept 26-29, 2016	Denver CO.....Jun 5-8, 2017	
Sacramento CA.....Feb 27-Mar 2, 2017	Virginia Beach VA.....Jul 31-Aug 3, 2017	

## Variable Frequency Drives

Learn proper design recommendations to ensure that your equipment is as energy efficient and safe as possible. Discover the best practices for frequency drives in HVAC, pumping and facility applications. Approximately 50% of these systems are running in bypass which usually results in higher energy costs. Whether in facility maintenance, chilled water systems, waste water systems or manufacturing, this course unlocks the secrets of VFDs to maintain your equipment.

In the hands-on lab portion you will use scopemeters to see how improper designs can lead to motor deterioration and other problems. You will also spend over 50% of the time programming and troubleshooting newly upgraded equipment that includes Allen-Bradley Powerflex4 and ABB ACS-350 variable frequency flux vector drives.

### Agenda Topics:

- Introduction
- Motor/drive/control system design and overview
- Power transmission, relationship and formulas
- Maintenance recommendations and special considerations
- AC induction motors
- Operating on variable frequency
- Variable speed drives
- Motor specifications: Mating motor for variable speed drive operations—MGI
- Operations, set up and maintenance of VSD
- Selection and application for drives
- Enclosure sizing for heat dissipation

## Tuning DDC / Process Control Loops

Optimize your process with proper setting and tuning of DDC or control loops to increase quality consistency. Learn the process characteristics that become the basis for tuning the DDC or process controller.

Practice different tuning methods to ensure accurate control. Gain an understanding of the functions of proportional band, integral and derivative process in a 3-mode or DDC controller.

### Agenda Topics:

- Process Characteristics
- PID Controller Parameters
- Tuning Methods
- Advanced Control



## Course Schedule



### Variable Frequency Drives Hands-On [3-day]

VS

Denver CO.....Aug 9-11, 2016  
 Phoenix AZ.....Aug 23-25, 2016  
 Riverside CA.....Sept 13-15, 2016  
 Las Vegas, NV.....Sept 27-29, 2016  
 Sacramento CA.....Oct 11-13, 2016  
 Seattle WA.....Oct 25-27, 2016  
 Reno NV.....Nov 15-17, 2016

Orlando FL.....Feb 7-9, 2017  
 Baltimore MD.....Mar 21-23, 2017  
 Virginia Beach VA.....Apr 18-20, 2017  
 Las Vegas NV.....May 16-18, 2017  
 Elk Grove IL.....Jun 13-15, 2017  
 Dallas TX.....Jul 25-27, 2017  
 Denver CO.....Aug 8-10, 2017

Phoenix AZ.....Aug 22-24, 2017  
 Washington DC.....Sept 19-21, 2017  
 Sacramento CA.....Oct 3-5, 2017  
 Seattle WA.....Oct 24-26, 2017  
 San Diego CA.....Nov 14-16, 2017

## Understanding and Troubleshooting Electric Motors

Learn the basics of electric motors including how to maintain and troubleshoot common problems found in the workplace.

This course covers the operation and maintenance of AC and DC motors, including 3-phase, dual voltage and multiple speed motors. For each motor application, factors such as driven load, environmental conditions, power availability and performance capabilities will help determine what type of motor is the best fit for a given purpose.

The National Electrical Code® (NEC) requirements for motor operation and installation is also covered. Course content progresses logically from basic operational theory to the actual operation of various types of AC and DC motors. The training includes numerous hands-on lab exercises designed to help participants operate, test and troubleshoot electric motors.

### Agenda Topics:

- Basic motor theory
- Nameplate data
- Three-Phase motors
- National Electric Code® and motors
- Single-phase motors
- DC motors



## Introduction to Industrial Electronics

Learn the fundamental concepts, symbols and components of electronic circuits. Sharpen your troubleshooting skills to help reduce downtime of equipment. You will work with real world industrial components and circuits and wire electronic circuits using schematic diagrams, testing the circuit for proper operation.

Participants will gain invaluable experience using and understanding common electronic test equipment, such as, oscilloscopes, signal generators, power supplies and multimeters to verify electronic operation. The course covers all aspects of industrial electronics, including Ohm's law, terminology, common circuits, test equipment and safety. Theory and explanations support numerous hands-on exercises.

### Agenda Topics:

- Electronics fundamentals
- Resistance and basic circuit laws
- Electromagnetics and inductance
- Capacitance
- AC resistive, capacitive and inductive circuits
- Semiconductor devices
- Linear integrated circuits
- Photoelectronics
- Soldering considerations
- Meter types

### Course Schedule



#### Understanding & Troubleshooting Electric Motors

EM

Virginia Beach VA.....Aug 23-24, 2016

Denver CO.....Oct 3-4, 2016

## Load Banking

Learn about the electrical safety requirements, purposes and procedures for load banking generators and power systems. It is understood that many of these technicians often work alone at remote locations and must select and use personal protective equipment (PPE) and safe work practices on their own. These technicians are responsible for their own safety, as well as the safety of other persons while conducting the load bank testing. Technicians must understand the types of load banks, purposes of this testing, what to measure, procedures to safely conduct these tests and how to measure and interpret results.

### Agenda Topics:

- Overview of load bank testing
- Review of recent electrical safety statistics, injuries and fatalities when working on power equipment
- Recognition of potential electrical hazards associated with standby power
- Field maintenance requirements for electrical safety
- Apply the safety requirements when working on standby power
- Walk-throughs and hands-on of load banking on customer equipment



### Related Training

#### NEC®

The National Electrical Code® is used by all states for industry-wide electrical standards. Ensure your organization is in compliance. This course benefits individuals who are either at an introductory level or who are experienced in working with electrical systems significantly increase their knowledge, skill level and confidence.  
*Go to page 8 for more details.*

#### Electrical Print Reading from Construction to Control

The course covers the various types and purposes of electrical prints, and teaches the skills needed to interpret them properly.  
*Go to page 21 for more details.*

#### Introduction to Arc Flash Analysis

This training is for anyone who works on or near exposed energized components operating at 50 volts up to 600 volts nominal. Additional training may be required in regards to specific work methods and recognition of hazards associated with specific equipment and work methods.  
*Go to page 6 for more details.*

## Standby and On-site Power Generation

Gain the background needed to operate, maintain and test the various types of generator sets used in on-site power production. Common examples of facilities that heavily rely upon these systems include: data centers, hospitals, banks, airports, water treatment facilities, manufacturing and industrial plants, schools, sports stadiums and, commercial office buildings. As the need for reliable electrical power continues to increase many firms are turning to the use of on-site generators.

The generators discussed in this class range in size from small portable generators used only in temporary situations to larger standby power systems and, on to cogeneration units that operate tied onto the utility grid. The training begins with the basics of generators and prime movers and moves through typical generator and engine control systems and operations. Recommended maintenance and testing activities are also covered. Practical applications of operations and maintenance are heavily reinforced throughout the class.

### Agenda Topics:

- Standby and on-site power generation overview
- Prime movers
- Generator set applications
- Electrical generation principles
- AC generator control, operation and protection
- Generator loading
- Troubleshooting and maintenance of on-site power generation systems

## Computer Numerical Control (CNC) Troubleshooting

Gain an understanding of the operation principals and know where to start looking for a problem. The goal of this basic course is to be able to intelligently discuss a machine problem with other engineers. A more advanced course is also offered and will be customized to your goals.

### Agenda Topics:

- Metal cutting and how it affects the machine
- Commands such as G, F, M, S and T codes
- Control types, software versions, machine models
- Machine control handles movement and I/O
- Diagnostic and ladder logic screens to trace errors
- Fanuc and machine alarms
- Control screens for diagnosing errors
- Safely test the major components
- Troubleshoot analog and digital inputs and outputs

## KUKA Robot Progamming 1

The seminar “Robot Programming 1” is made for the programming personnel of KUKA industrial robots. This seminar provides training with regard to:

- The proper and safety-conscious operation of a robot in a production environment.
- The modification and maintenance of robot application programs.
- The creation of linear application programs.



### Related Training

#### NEC®

The National Electrical Code® is used by all states for industry-wide electrical standards. Ensure your organization is in compliance. This course benefits individuals who are either at an introductory level or who are experienced in working with electrical systems significantly increase their knowledge, skill level and confidence.  
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*Go to page 6 for more details.*

## Building and Facility Electrical Systems

Learn to design, modify and maintain building and facility electrical systems. See how various building electrical components work and how systems are designed. Learn how to size conduit and wire for power and lighting loads in accordance with NEC® standards.

- Fundamentals of building and facility electrical systems
- Types of industrial control systems
- Ratings and specifications
- Interior building distribution
- Transformers: below 600 volts
- Switchboards and switchgear
- Distribution centers
- Motor control centers and controls
- Panelboards and load centers
- NEMA enclosures
- Automatic transfer switches for generator systems
- UPS systems: uninterruptible power
- Fire alarm systems
- Design considerations
- National Electrical Code® voltage classifications, ampacity rules and calculations, articles, tables and figures



### Related Training

#### NEC®

The National Electrical Code® is used by all states for industry-wide electrical standards. Ensure your organization is in compliance. This course benefits individuals who are either at an introductory level or who are experienced in working with electrical systems significantly increase their knowledge, skill level and confidence.  
*Go to page 8 for more details.*

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*Go to page 6 for more details.*

## NEC® Updates & Practical Application in Buildings & Facilities

This course will include information found in the National Electrical Code®, but is not a typical “code” class. This course starts by covering the major changes of the 2017 National Electrical Code® so you can then examine some of the basic rules in the NEC® and learn to apply them in examples of how the proper size devices or components are selected for an electrical installation through lab exercises.

Over time the updating of equipment changes the route, load (power requirement), and access-point of electricity. This class allows the employer’s employee team to make these changes safely, legally (code compliance) and cost effectively. You will be taught basic principles of how various electrical systems of a facility are designed. While some electrical projects should employ a qualified engineer, the size and scope of many electrical tasks require your personnel to understand basic rules of component sizing and system arrangement.

### Agenda Topics:

- EC17 Topic Analysis – Major Changes in Chapter 1 through 4
- Fundamentals of Building and Facility Electrical Systems
- Proper Planning for Design or Modification of Electrical Systems
- Practical Exercises

## Air Conditioning and Refrigeration

When your HVAC system runs safely and efficiently, energy and maintenance costs are reduced. Learn how to maintain the peak efficiencies of your systems which will minimize the downtime spent on maintenance and maximize your energy efficiency.

This course covers the basics of servicing and troubleshooting air conditioning equipment, while expanding your knowledge of ventilation systems.

Learn how to troubleshoot air conditioning system electrical and mechanical problems, and how to legally recover, recycle, and reclaim refrigerants.

### Agenda Topics:

- Thermodynamics
- Vapor-compression refrigerator cycle

### Course Schedule

## Principles of Heating Applications

Learn how to maintain peak efficiencies of HV systems while minimizing the risk of downtime due to unscheduled maintenance and repair.

Since HV system problems are electrical, this course teaches you the proper procedures and equipment for electrical safety testing.

Electrical test meters are also important. These skills are practiced in hands-on exercises with the actual type of test instruments, such as an ohmmeter, voltmeter and ammeter.

### Agenda Topics:

- Gas fired heating systems: design and operation
- Controls and control systems

### Air Conditioning and Refrigeration with Principles of Heating Applications

HV5A

Phoenix AZ.....Aug 1-5, 2016  
 Milwaukee WI.....Aug 8-12, 2016  
 Indianapolis IN.....Aug 22-26, 2016  
 KansasCityMO.....Aug29-Sept2,2016  
 Seattle WA.....Sept 12-16,2016  
 Washington DC.....Sept 19-23, 2016  
 San Diego CA.....Sept 26-30, 2016  
 Atlanta GA.....Oct 3-7, 2016  
 Reno NV.....Oct 10-14, 2016  
 Orlando FL.....Oct 17-21, 2016  
 Dallas TX.....Oct 31-Nov 4, 2016  
 Virginia Beach VA.....Nov 7-11, 2016  
 Denver CO.....Nov 14-18, 2016

SacramentoCA.....Nov28-Dec2,2016  
 Baltimore MD.....Dec5-9,2016  
 Orlando FL.....Jan9-13,2017  
 PhoenixAZ.....Jan30-Feb3,2017  
 AlbuquerqueNM.....Feb13-17,2017  
 Seattle WA.....Feb27-Mar3,2017  
 ElkGroveIL.....Mar20-24,2017  
 WashingtonDC.....Mar27-31,2017  
 SanDiegoCA.....Apr3-7,2017  
 DallasTX.....Apr17-21,2017  
 Virginia Beach VA.....May 1-5, 2017  
 Denver CO.....May 22-26, 2017  
 Sacramento CA.....Jun 5-9, 2017

Baltimore MD.....Jun 19-23, 2017  
 Orlando FL.....Jul 10-14, 2017  
 Phoenix AZ.....Jul 31-Aug 4, 2017  
 Las Vegas NV.....Aug 14-18, 2017  
 Seattle WA.....Aug 28-Sept 1, 2017  
 Elk Grove IL.....Sept 18-22, 2017  
 Washington DC.....Sept 25-29, 2017  
 San Diego CA.....Oct 2-6, 2017  
 DallasTX.....Oct30-Nov3,2017  
 VirginiaBeachVA.....Nov13-17,2017  
 DenverCO.....Nov27-Dec1,2017  
 Sacramento CA.....Dec 4-8, 2017  
 BaltimoreMD.....Dec11-15,2017

### Air Conditioning & Refrigeration

AC5

Phoenix AZ.....Aug 1-3, 2016  
 Milwaukee WI.....Aug 8-10, 2016  
 Indianapolis IN.....Aug22-24,2016  
 Kansas City MO.....Aug 29-31, 2016  
 Seattle WA.....Sept 12-14,2016  
 Washington DC.....Sept 19-21,2016  
 San Diego CA.....Sept 26-28,2016  
 Atlanta GA.....Oct 3-5, 2016  
 Reno NV.....Oct 10-12,2016  
 Orlando FL.....Oct 17-19,2016  
 Dallas TX.....Oct 31-Nov 2,2016  
 Virginia Beach VA.....Nov 7-9, 2016  
 Denver CO.....Nov 14-16,2016

Sacramento CA.....Nov 28-30, 2016  
 Baltimore MD.....Dec 5-7, 2016  
 Orlando FL.....Jan 9-11, 2017  
 Phoenix AZ.....Jan 30-Feb 1, 2017  
 Albuquerque NM.....Feb 13-15, 2017  
 Seattle WA.....Feb 27-Mar 1, 2017  
 Elk Grove IL.....Mar 20-22, 2017  
 Washington DC.....Mar 27-29, 2017  
 San Diego CA.....Apr 3-5, 2017  
 Dallas TX.....Apr 17-19, 2017  
 Virginia Beach VA.....May 1-3, 2017  
 Denver CO.....May 22-24, 2017  
 Sacramento CA.....Jun 5-7, 2017

BaltimoreMD.....Jun19-21,2017  
 OrlandoFL.....Jul10-12,2017  
 PhoenixAZ.....Jul31-Aug2,2017  
 LasVegasNV.....Aug14-16,2017  
 SeattleWA.....Aug28-30,2017  
 Elk Grove IL.....Sept 18-20, 2017  
 Washington DC.....Sept 25-27, 2017  
 San Diego CA.....Oct 2-4, 2017  
 DallasTX.....Oct30-Nov1,2017  
 VirginiaBeachVA.....Nov13-15,2017  
 Denver CO.....Nov 27-29, 2017  
 Sacramento CA.....Dec 4-6, 2017  
 Baltimore MD.....Dec 11-13, 2017

### Heating & Ventilation

5H

Phoenix AZ.....Aug 4-5, 2016  
 Milwaukee WI.....Aug 11-12, 2016  
 Indianapolis IN.....Aug25-26,2016  
 Kansas City MO.....Sept 1-2, 2016  
 Seattle WA.....Sept 15-16,2016  
 Washington DC.....Sept 22-23,2016  
 San Diego CA.....Sept 29-30,2016  
 Atlanta GA.....Oct 6-7, 2016  
 Reno NV.....Oct 13-14, 2016  
 Orlando FL.....Oct 20-21, 2016  
 Dallas TX.....Nov 3-4, 2016  
 Virginia Beach VA.....Nov 10-11, 2016  
 Denver CO.....Nov 17-18,2016

Sacramento CA.....Dec 1-2, 2016  
 Baltimore MD.....Dec 8-9, 2016  
 Orlando FL.....Jan 12-13, 2017  
 Phoenix AZ.....Feb 2-3, 2017  
 Albuquerque NM.....Feb 16-17, 2017  
 Seattle WA.....Mar 2-3, 2017  
 Elk Grove IL.....Mar 23-24, 2017  
 Washington DC.....Mar 30-31, 2017  
 San Diego CA.....Apr 6-7, 2017  
 Dallas TX.....Apr 20-21, 2017  
 Virginia Beach VA.....May 4-5, 2017  
 Denver CO.....May 25-26, 2017  
 Sacramento CA.....Jun 8-9, 2017

BaltimoreMD.....Jun22-23,2017  
 OrlandoFL.....Jul13-14,2017  
 PhoenixAZ.....Aug3-4,2017  
 LasVegasNV.....Aug17-18,2017  
 SeattleWA.....Aug31-Sept1,2017  
 Elk Grove IL.....Sept 21-22, 2017  
 Washington DC.....Sept 28-29, 2017  
 San Diego CA.....Oct 5-6, 2017  
 Dallas TX.....Nov 2-3, 2017  
 VirginiaBeachVA.....Nov16-17,2017  
 DenverCO.....Nov30-Dec1,2017  
 SacramentoCA.....Dec7-8,2017  
 BaltimoreMD.....Dec14-15,2017

## Chillers: Operations and Maintenance

It is imperative that your water cooling systems operate at maximum efficiency. In this hands-on course, you will receive the critical information needed to increase your system's reliability. Learn how chillers work and what causes their problems. Plus, you will get the most up-to-date information on the latest technology that will help you maintain your system at peak performance.

Gain hands-on practice and knowledge of instruments and test meters. Learn how to collect data and evaluate the operating equipment. Become familiar with approach temperature and to interpret it in terms of the system operation.

Learn preventive maintenance and troubleshooting methods to ensure the system is always operating with the most efficiency and cost savings.

Upon request, we offer free 608, 410A EPA and HVAC Excellent Technician Certificate testing at the end of this class.

### Agenda Topics:

- Chilled water systems
- Thermodynamics
- Refrigeration theory
- Refrigeration prime movers
- Evaporators and liquid coolers and condensers
- Metering (expansion) devices
- Controls and control systems pumps
- Piping systems

## Boilers: Technical and Operational Workshop

Does your boiler system run flawlessly? Has the everyday wear and tear on it made it unreliable? In this hands-on course taught by boiler system experts, you will learn about the common failures of boiler systems and how to prevent them. All of your questions will be answered to help make your system run more efficiently. You will leave with a better understanding of boiler construction, preventive maintenance and safe work practices.

### Agenda Topics:

- Operator responsibilities
- Thermodynamics
- Boiler basics
- Boiler types and details
- Codes and standards
- Classification of boiler fuels combustion systems and fuel-burning equipment
- Combustion theory and tuning controls
- Emissions
- Water treatment
- Plant operations maintenance and repairs
- Efficiency improvements

### Course Schedule

#### Chillers: Operation and Maintenance of Chilled Water Systems

CW

Reno NV.....Aug 2-4, 2016  
 Seattle WA.....Aug 16-18, 2016  
 Miami FL.....Aug 30-Sept 1, 2016  
 Riverside CA.....Aug 30-Sept 1, 2016  
 Houston TX.....Sept 13-15, 2016  
 Memphis TN.....Sept 20-22, 2016  
 Boston MA.....Oct 4-6, 2016  
 Kansas City MO.....Oct 11-13, 2016  
 Elk Grove IL.....Oct 18-20, 2016  
 Dallas TX.....Oct 25-27, 2016

Denver CO.....Nov 8-10, 2016  
 Virginia Beach VA.....Nov 15-17, 2016  
 Sacramento CA.....Dec 6-8, 2016  
 Las Vegas NV.....Jan 10-12, 2017  
 Houston TX.....Jan 31-Feb 2, 2017  
 Phoenix AZ.....Mar 7-9, 2017  
 Indianapolis IN.....Mar 21-23, 2017  
 Dallas TX.....Apr 4-6, 2017  
 Denver CO.....Apr 18-20, 2017  
 Sacramento CA.....May 23-25, 2017

Baltimore MD.....Jun 6-8, 2017  
 Virginia Beach VA.....Jun 20-22, 2017  
 Las Vegas, NV.....Jul 11-13, 2017  
 Houston TX.....Jul 25-27, 2017  
 Phoenix AZ.....Aug 29-31, 2017  
 San Diego CA.....Sept 19-21, 2017  
 Dallas TX.....Oct 3-5, 2017  
 Denver CO.....Oct 17-19, 2017  
 Sacramento CA.....Nov 28-30, 2017

#### Boilers Operator Workshop: Hands-on (3-day)

BO

Boston MA.....Aug 9-11, 2016  
 Philadelphia PA.....Sept 13-15, 2016  
 Phoenix AZ.....Sept 20-22, 2016  
 Baltimore MD.....Sept 27-29, 2016  
 Riverside CA.....Oct 4-6, 2016  
 Atlanta GA.....Oct 11-13, 2016  
 Reno NV.....Oct 18-20, 2016  
 Elk Grove IL.....Oct 25-27, 2016  
 Dallas TX.....Nov 8-10, 2016  
 Denver CO.....Nov 29-Dec 1, 2016

Virginia Beach VA.....Dec 6-8, 2016  
 Sacramento CA.....Dec 13-15, 2016  
 Houston TX.....Feb 7-9, 2017  
 Baltimore MD.....Mar 12-16, 2017  
 St Louis MO.....Mar 28-30, 2017  
 Atlanta GA.....Apr 11-13, 2017  
 Elk Grove IL.....Apr 18-20, 2017  
 Denver CO.....May 16-18, 2017  
 Dallas TX.....Jun 6-8, 2017  
 Virginia Beach VA.....June 13-15, 2017

Sacramento CA.....Jun 20-22, 2017  
 Portland OR.....Jul 11-13, 2017  
 Houston TX.....Aug 1-3, 2017  
 Baltimore MD.....Sept 12-14, 2017  
 St Louis MO.....Sept 26-28, 2017  
 Atlanta GA.....Oct 3-5, 2017  
 Elk Grove IL.....Oct 17-19, 2017  
 Denver CO.....Nov 14-16, 2017  
 Dallas TX.....Nov 28-30, 2017

## Advanced Air Conditioning

When your HVAC system runs safely and efficiently, energy and maintenance costs are reduced. Learn how to maintain the peak efficiencies of your systems which will minimize the downtime spent on maintenance and maximize your energy efficiency.

This course covers the basics of servicing and troubleshooting air conditioning equipment, while expanding your knowledge of ventilation systems.

Learn how to troubleshoot air conditioning system electrical and mechanical problems, and how to legally recover, recycle, and reclaim refrigerants.

NTT is a proctor for the HVAC Certification Exams—ESCO 608, 410A and Test of Excellence. If you are scheduled to take the test, you receive a free copy of the EPA Certification Exam Preparatory Manual.

### Agenda Topics:

- Thermodynamics
- Vapor-compression refrigerator cycle
- Refrigerants and refrigerant oils
- Refrigeration equipment components
- AC systems
- Compressors
- Evaporators
- Metering devices
- Condensers
- Electrical components and fundamentals

## Water and Air System Balancing

Learn every aspect of testing, adjusting and balancing, including the instruments required. Experience the different methods to adjust constant volume, single zone, dual duct, induction, and variable air volume systems. Complete details are provided for balancing devices and instrument usage. Learn to calculate the CFM from heat flow and use established equations and a conversion tables. Go through proper testing procedures and evaluation techniques.

### Agenda Topics:

- HVAC testing and balancing
- Airside balancing procedure
- Waterside balancing procedure
- Airflow management
- Calculation of CFM from heat flow
- Kitchen ventilation
- Principles and procedures for balancing hydronic systems
- Automatic valves
- Constant volume water-balancing procedure
- Variable volume water-balancing procedure
- Expansion or compression tanks
- Series loop
- Basic testing of water-cooled and air-cooled chillers
- Field performance testing of chillers
- Cooling tower testing



### Course Schedule



#### Balancing of Water & Air Systems

**BWA**

Denver CO.....Aug16-17,2016

#### Advanced Air Conditioning

**AAC**

Denver CO.....Oct 3-5, 2016

## Brazing for Air Conditioning and Refrigeration

Learn guidelines to select the most suitable process for joining copper and copper alloy components in air conditioning and refrigeration system. Discover cost effective installation methods that are also clean and debris free.

Learn brazing, proper procedures for flaring, swaging and leak testing techniques, while ensuring safety and standard compliance.



### Agenda Topics:

- Selection of a joining process
- Bolting and riveting
- Adhesive bonding
- Soldering
- Copper, solid or plates, tin-bronzes, gunmetals
- Gilding metals and commercial brasses
- Filler metals
- Basic brazing principles
- Brazing process with different metals
- Physical and metallurgical factors
- Alloy properties
- Joint design
- Pre-weld and inter-run cleaning
- Jigging and backing techniques
- Process applications
- Work-hardening and precipitation-hardening
- Joining and repairing castings
- Metallurgical factors in joining dissimilar metals

## Centrifugal Pumps

Increase your understanding and knowledge of centrifugal pumps including their design, selection, operation and maintenance. Moreover, the course will aid you in increasing productivity and reducing costly downtime.

The hands-on lab exercises demonstrate and reinforce the practical techniques of maintenance and troubleshooting. It is important to understand what a pump is and how it works in order to solve problems. There are many misconceptions about pumps. We will explain the basics so that you will be adequately prepared to understand certain design considerations, including sizing. In addition, this course provides the inside information on why and how centrifugal pumps are designed.

### Agenda Topics:

- Pump operation and design
- System curves
- Pumping systems
- Calculate pump energy costs
- Cause of wear
- Hydraulic theory and design
- Installation, maintenance and troubleshooting



### Course Schedule



#### Centrifugal Pumps [3-day course]

PTH

Houston TX.....Aug 9-11, 2016  
 Denver CO.....Aug 30-Sept 1, 2016  
 Las Vegas, NV.....Sept 13-15, 2016  
 Phoenix AZ.....Oct 4-6, 2016  
 San Diego CA.....Oct 18-20, 2016  
 Seattle WA.....Nov 1-3, 2016  
 Sacramento CA.....Nov 15-17, 2016

Baltimore MD.....Jan 10-12, 2017  
 Reno NV.....Feb 7-9, 2017  
 Denver CO.....Feb 28-Mar 2, 2017  
 Dallas TX.....March 21-23, 2017  
 Orlando FL.....Apr 18-20, 2017  
 Sacramento CA.....May 16-18, 2017  
 Houston TX.....Aug 8-10, 2017

Denver CO.....Aug 29-31, 2017  
 Elk Grove IL.....Sept 12-14, 2017  
 Phoenix AZ.....Sept 26-28, 2017  
 San Diego CA.....Oct 24-26, 2017  
 Sacramento CA.....Dec 12-14, 2017

## Mechanical Drives/ Power Transmission

Learn to install and maintain mechanical drives. Examine all the common mechanical drives including belts, chains and gears. Learn the roles of proper lubrication, bearings, proper alignment and fastening techniques, troubleshooting, spotting the symptoms of failure and selection of the appropriate remedy.

This is an excellent cross-training opportunity for plant and process engineers, maintenance mechanics, supervisors, machinery designers and field service personnel.

### Agenda Topics:

- Introduction: mechanical power transmission
- Prime movers
- Bushings, keys and keyways
- General lubrication considerations
- Belt drive systems
- Gear drive systems
- Chains
- Couplings
- Clutches and brakes
- Mechanical variable speed drives



### Course Schedule

## Bearings and Lubrication

Gain the knowledge and techniques to significantly reduce operating and energy costs and extend the life of your rotating equipment.



Learn the different bearing systems, including their function, load tolerance and lifespan. Discover how to anticipate maintenance requirements, reduce unnecessary system downtime and correct the situation quickly and effectively.

This course will help anyone who has to specify, purchase, install, maintain or repair bearing based systems.

### Agenda Topics:

- Power-transmission physics
- Types of bearings
- Installation and maintenance of bearings
- Troubleshoot bearing failures
- Select bearings
- Shaft and housing fits
- Bearing materials of construction
- Types and installation of precision ball bearings
- Tapered roller bearings
- Select the right lubricant, method and amount
- Properties
- Test procedures
- Flash and fire points
- Bearing operating environment
- Couplings and alignment

### Mechanical Drives

MD

Phoenix AZ.....Aug 16-18, 2016  
 Virginia Beach VA...Aug 30-Sept 1, 2016  
 Sacramento CA.....Sept 13-15, 2016  
 Atlanta GA.....Sept 27-29, 2016  
 Riverside CA.....Oct 18-20, 2016  
 Nashville TN.....Nov 8-10, 2016  
 Las Vegas, NV.....Dec 13-15, 2016

Baltimore MD.....Feb 28-Mar 2, 2017  
 Sacramento CA.....Mar 21-23, 2017  
 Denver CO.....Apr 4-6, 2017  
 Seattle WA.....May 9-11, 2017  
 Elk Grove IL.....Jun 20-22, 2017  
 Dallas TX.....Jul 11-13, 2017  
 Phoenix AZ.....Aug 15-17, 2017

Virginia Beach VA.....Aug 29-31, 2017  
 Sacramento, CA.....Sept 12-14, 2017  
 Denver CO.....Oct 3-5, 2017  
 Riverside CA.....Oct 17-19, 2017  
 Orlando FL .....Dec 12-14, 2017

### Principles of Bearings and Lubrication & Shaft Alignment

LRSA

Nashville TN.....Aug 2-5, 2016  
 Dallas TX.....Aug 16-19, 2016  
 Denver CO.....Sept 13-16, 2016  
 Sacramento CA.....Oct 4-7, 2016  
 Seattle WA.....Oct 18-21, 2016  
 Riverside CA.....Nov 15-18, 2016  
 Phoenix AZ.....Nov 29-Dec 2, 2016

Las Vegas, NV.....Dec 13-16, 2016  
 Denver CO.....Jan 24-27, 2017  
 Elk Grove IL.....Mar 7-10, 2017  
 Sacramento CA.....Mar 28-31, 2017  
 Baltimore MD.....Apr 11-14, 2017  
 Virginia Beach VA.....Jun 6-9, 2017  
 Orlando FL.....Jun 27-30, 2017

Nashville TN.....Aug 1-4, 2017  
 Dallas TX.....Aug 15-18, 2017  
 Denver CO.....Sept 12-15, 2017  
 Seattle WA.....Oct 3-6, 2017  
 Riverside CA.....Nov 14-17, 2017  
 Phoenix AZ .....Nov 28-Dec 1, 2017

## Shaft Alignment

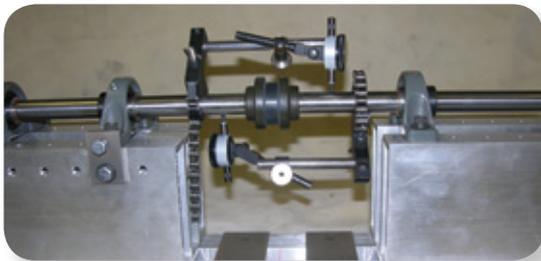
Proper alignment of rotating machinery can help cut your energy costs and increase the “in-production” time of your equipment, lower your maintenance costs and increase bearing life.

Learn to identify the symptoms of misaligned rotating machinery. Then use the proper tools to correct a multitude of issues ranging from piping induced stress to soft foot to run out.

Combine computer software technology with your hands-on skills to help with shaft alignment.

### Agenda Topics:

- Align two pieces of rotating machinery
- Soft foot
- Run out
- Symptoms of misaligned rotating machinery
- Piping induced stress problems
- Tools and techniques to control lateral movement of machinery
- Accurate alignment
- Measuring misalignment
- Measure alignment with different coupling types
- Checking alignment
- Supervising contractors
- Alignment systems
- Computer software programs



### Related Training

#### Bearings and Lubrication

The Bearings and Lubrication Principles course gives you the knowledge and techniques to significantly reduce operating and energy costs and extend the life of your rotating equipment.  
*Go to page 25 for more details.*

#### Maintenance Manager

A well run maintenance organization can have a positive impact on company profits. Take the opportunity to learn how to build a comprehensive maintenance program for your team.  
*Go to page 46 for more details.*

#### Mechanical Drives/ Power Transmission

Learn to install and maintain mechanical drives. Examine all the common mechanical drives including belts, chains and gears.  
*Go to page 27 for more details.*

## Conveyor Systems

This course is designed to teach maintenance personnel Conveyor System components so they first understand the system. This enables them perform proper maintenance and troubleshooting to enable a preventative/planned maintenance approach to system maintenance.



### Agenda Topics:

- Troubleshoot a lack of pressure in the system
- Diagnose why there is not any fluid in the system
- Use measurement instruments detects true cavitations
- Find the cause of a frequently blown shaft seal on a hydraulic pump
- Discover the sources of excessively high fluid temperature
- Find the cause of excessive high fluid pressures
- Understand conveyor system components
- Perform proper maintenance and troubleshooting of conveyors
- Have a planned/preventative maintenance approach to system maintenance for both Hydraulics and Conveyor systems

## Ball Screw Applications and Techniques

The various types of ball screws will be examined with a discussion of their appropriate applications. In particular the differences between rolled ball screws and ground ball screws will be analyzed in depth. Learn the importance of inspection of new ball screws prior to installation. Proper handling and alignment techniques will be covered.



### Agenda Topics:

- Terminology
- Types of ball screws
- Nut housing
- Preload configurations
- Ball screw alignment process
- Deflection method
- Initial machine familiarization process guide

## 3-Axis Machine Tool Alignment

Designed for equipment services personnel, this course will give you the basic concepts of 3-axis machine tools and how to properly perform alignments.

### Agenda Topics:

- Machine tool nomenclature
- Check and adjust level, straightness and parallel
- Adjust machine tool level
- Measure geometries in 3 axis (XY, YZ, ZX)
- Adjust geometries to manufacturers' specification
- Check (x axis) table for level and flatness, rise and fall
- Check spindle taper
- Check spindle run out
- Check spindle tram (sweep) for square
- Check for lost motion (mechanical looseness)
- Check for positioning error (not part of alignment)
- Troubleshooting techniques



### Related Training

#### NFPA 79: Electrical Standards for Industrial Machinery

Get an overview of scope of the NFPA 79. Learn how to effectively use the Standard as a guideline for wiring, sizing conductors and overcurrent protection for industrial machines operating from a nominal voltage of 600 volts or less. *Go to page 7 for more details.*

#### 5-Axis Machine Tool Alignment

Designed for equipment services personnel, this course will give you the basic concepts of 5-axis machine tools and how to properly perform alignments. *Go to page 30 for more details.*

#### Introduction to Instrumentation and Process Control

Understand instrumentation and process control to become more valuable as your skill set expands. Learn to program, connect input/output devices and to troubleshoot process controls. *Go to page 15 for more details.*

## 5-Axis Machine Tool Alignment

Designed for equipment services personnel, this course will give you the basic concepts of 5-axis machine tools and how to properly perform alignments.

### Agenda Topics:

- Define 5 (plus) axis machine tool nomenclature
- Machine configurations
- Machine axis
- Review and confirm XYZ geometries
- Check and adjust B axis alignments
- Check and adjust A axis alignments
- Check and adjust alignment of rotary table (center line of rotation and rise and fall)
- Spindle gauge line
- Spindle taper
- Spindle run out
- Spindle trams
- Positioning accuracy for each axis
- Check and adjust counter balance operation
- Effective troubleshooting techniques



### Course Schedule

## Hydraulics Training and System Troubleshooting

Learn the basic hydraulic components, how they work and their function in a hydraulic circuit. You will be able to understand and interpret hydraulic schematics, and implement safe work practices.

The extreme flexibility of hydraulic elements can create a number of problems. Learn how fluids must be positively confined through the entire system and prevented from going anywhere except where we want them to go.

Using the hands-on hydraulic trainers you will construct, operate and troubleshoot systems using common hydraulic components.

### Agenda Topics:

- Hydraulic principles
- Hydraulic pumps
- Flow, pressure and directional control valves
- Hydraulic cylinders
- Hydraulic motors
- Accumulators
- Hydraulic fluids
- Fluid conductors
- Reservoirs, heating exchangers and filters
- Troubleshooting – basic requirements
- Principles of motion and force
- Noisy pumps or cavitation and aeration
- Low, erratic or no pressure
- Contamination in valves no movement of actuator
- Noise control
- Cylinder and circuit problems
- Solenoid failure
- Leakage control



### Hydraulics and System Troubleshooting

HY4T

Indianapolis IN.....Aug 2-5, 2016  
 Las Vegas, NV.....Aug 9-12, 2016  
 Milwaukee WI.....Aug 9-12, 2016  
 San Diego CA.....Aug 23-26, 2016  
 Boston MA.....Sept 13-16, 2016  
 Phoenix AZ.....Sept 13-16, 2016  
 Philadelphia PA.....Sept 27-30, 2016  
 Reno NV.....Oct 4-7, 2016  
 Denver CO.....Oct 18-21, 2016  
 Baltimore MD.....Oct 25-28, 2016  
 Atlanta GA.....Nov 8-11, 2016  
 Houston TX.....Nov 26-Dec 2, 2016  
 Miami FL.....Dec 6-9, 2016  
 Seattle WA.....Jan 10-13, 2017  
 Elk Grove IL.....Jan 24-27, 2017

Sacramento CA.....Feb 14-17, 2017  
 Boston MA.....Feb 28-Mar 3, 2017  
 Nashville TN.....Mar 7-10, 2017  
 Phoenix AZ.....Mar 14-17, 2017  
 Reno NV.....Apr 4-7, 2017  
 Denver CO.....Apr 18-21, 2017  
 Baltimore MD.....May 2-5, 2017  
 Reno NV.....Apr 5-8, 2017  
 Baltimore MD.....Apr 12-15, 2017  
 Denver CO.....Apr 19-22, 2017  
 Dallas TX.....May 16-19, 2017  
 Orlando FL.....Jun 6-9, 2017  
 Virginia Beach VA.....Jun 27-30, 2017  
 Seattle WA.....Jul 11-14, 2017  
 Elk Grove IL.....Jul 25-28, 2017

Sacramento CA.....Aug 15-18, 2017  
 Boston MA.....Aug 29-Sept 1, 2017  
 Indianapolis IN.....Sept 12-15, 2017  
 Phoenix AZ.....Sept 19-22, 2017  
 Sacramento CA.....Jul 26-29, 2017  
 Indianapolis IN.....Aug 2-5, 2017  
 Las Vegas, NV.....Aug 9-12, 2017  
 Reno NV.....Oct 3-6, 2017  
 Denver CO.....Oct 17-20, 2017  
 Baltimore MD.....Oct 31-Nov 3, 2017  
 Dallas TX.....Nov 14-17, 2017  
 Orlando FL.....Dec 5-8, 2017  
 Virginia Beach VA.....Dec 12-15, 2017

## Pneumatic Systems and Principles

This is an introduction to the real-world of pneumatic control and power transmission. Learn the full scope of compressed air production, preparation and distribution. Learn to apply simple gas laws and to read appropriate symbols to understand component technologies.

Improve your ability to install, maintain and troubleshoot pneumatic automation systems.

### Agenda Topics:

- Pneumatic principles
- Air compression
- After coolers and air dryers
- Pneumatic piping systems
- Pneumatic actuators
- Acting cylinder—4-way valve
- Pilot operated indirect control
- Memory control
- Automatic cylinder return
- Valve—logic or gate
- Two pressure valve—logic and gate
- Flow control
- Quick exhaust
- Compressed-air-drive vacuum pumps
- Time delay
- Pressure regulators
- Sequence valve



## Electro-Pneumatics Training

This interactive training program is for engineering, maintenance, operations and management personnel who encounter pneumatic power control and systems during the course of their daily functions. They may directly or indirectly encounter installing, maintaining, troubleshooting, buying or specifying pneumatic power equipment.



The program introduces the real world of the hybrid technology of electro-pneumatics. After a brief introduction to compressed air technology, you will learn and understand the electrical ladder diagram, along with components and their symbols.

Through hands-on exercises, learn everything about the control of pneumatic actuators, latching of electrical signals, logic controls, timers, and counters. All the hands-on exercises are real world applications and can be used on most of the industry's automated equipment. Upon completion of this training, you will be able to successfully install, maintain, and troubleshoot electro-pneumatic systems and components.

### Agenda Topics:

- Introduction to pneumatics
- Introduction the electric ladder diagram
- Ladder diagrams
- Components
- Solenoid valves
- Control of actuators
- Latching electrical signals
- Logic control
- Timers and counters
- Emergency stops

## Course Schedule

### Pneumatic/ Electro-Pneumatics Systems and Principles

PNE

Denver CO.....Aug 2-4, 2016  
Virginia Beach VA.....Oct 11-13, 2016

Denver CO.....Jan 31-Feb 2, 2017  
Virginia Beach VA.....Mar 14-16, 2017

Denver CO.....Aug 8-10, 2017  
Virginia Beach VA.....Nov 28-30, 2017



## Hoisting and Rigging

NTT will customize this course to fit your needs. Depending on materials your team transports, the focus can be on aspects of rigging safety, calculating the weight of the load, common hitch types, common sling types, ropes, locating the load's center of gravity, gaining a mechanical advantage and more.

Gain proper inspection disciplines, techniques and schedules. There should be periodic detailed inspection and maintenance that go beyond daily inspection to help avoid many accidents and prevent faulty equipment from going back into service.

This course covers many industries: mining, electrical facilities, transportation, construction, military, forestry, fire fighting, lumber production, and rope rescue. The practical knowledge gained will deliver a tangible improvement in both safety and on-the-job performance.

### Agenda Topics:

- Introduction to rigging safety
- Calculate the weight of the load
- Rigging hardware
- Common types of slings
- Common types of hitches
- Ropes
- Load's center of gravity
- Knots, hitches, bends, anchors, forming taglines for large loads
- Temperature, chemicals, sunlight, abrasion
- Strength loss from knots, tight bends, etc.



## Welding Principles and Procedures

Update your knowledge about various welding processes used for fabrication or manufacturing. Both engineers and welding operators will learn about the factors that impact weld quality. Increase your understanding of applied metallurgy and your knowledge of weld references on welding prints.



Discover the importance of following safety guidelines and approved welding procedures. You'll also learn the basics of troubleshooting weld defects. This course material is in accordance with American Welding Society standards.

### Agenda Topics:

- Understanding metals
- Introduction to arc welding
- Shielded metal arc welding (stick)
- Gas metal arc welding (MIG)
- Flux cored arc welding (FCAW)
- Metal cored arc welding (MCAW)
- Gas tungsten arc welding (TIG)
- Welding and cutting safety electric arc welding equipment
- Oxy-acetylene flame cutting/gouging
- Oxy-acetylene welding, braze welding, brazing and soldering
- Air carbon gouging
- Plasma arc cutting and gouging
- Welding certification requirements
- Principles of Welding Inspection
- Understanding Weld Prints
- Repair welding principles and procedures

## Course Schedule



### Welding—Level 2 (4-Day Classroom)

WT4

Denver CO.....Oct 25-28, 2016

VirginiaBeachVA..Nov29-Dec2,2016

## Injection Molding

High scrap rates reduces efficiency and profits! This workshop teaches participants to recognize and differentiate causes of poor quality directly related to manufacturing errors and molding deficiencies. Discussed is an overview of injection molding problems, their causes and, steps to resolve them. Polymer flow characteristics and the complex relationship of materials design and process will be explained in understandable terms. Each student will learn to recognize the origin of a molded defect such as: Surface Quality, Burning, Contamination, Mechanical- Physical deficiencies, Part Size, Geometry, and Structural Defects. 47-common molding problems will be visually reviewed and open to discussion. To enhance this workshop, *Lean Manufacturing for Injection Molding* and *Scientific Injection Molding* will be reviewed and shown how they will help the molding company become efficient and productive.

### Agenda Topics:

- Air Streaks
- Brittleness
- Bubbles
- Contamination
- Groove and Gouge Marks
- Knit-Line Formation
- Moisture Streaking
- Push Marks
- Rainbow Effects
- Splay Marks (moisture/burning)
- Warp/Warping
- Along with 30 other Defects

## Machine Tool Alignment Concepts

Designed for equipment services personnel, this course will give you the basic concepts of machine tool alignment, and the use of common tool and instruments used for maintenance of machine tools.

### Agenda Topics:

- Configuration and classifications
- Standards for ACES designations
- Machine tool construction material
- Foundations and designs
- Components and construction for machining centers
- Machine geometry, positioning and alignment
- ANSI standards
- ASME B5.54



## Related Training

### Hydraulics Training and System Troubleshooting

Learn the basic hydraulic components, how they work and their function in a hydraulic circuit. You will be able to understand and interpret hydraulic schematics, and implement safe work practices. *Go to page 30 for more details.*

### Introduction to Instrumentation and Process Control

Understand instrumentation and process control to become more valuable as your skill set expands. Learn to program, connect input/output devices and to troubleshoot process controls including sensors, transmitters, controllers and final elements. *Go to page 15 for more details.*

### NFPA 70E/Arc Flash Electrical Safety

Learn how current NFPA 70E standards apply to a facility, why safe electrical work practices are important, and what can be done to ensure your organization meets all government standards for electrical safety. *Go to page 6 for more details.*

## Fluid Power Connector & Conductor Certification

The success or failure of any fluid power system depends on four factors: design, installation, start-up (commissioning), and maintenance. Hose and tube assemblies are a vital consideration in each of these factors as well as system and operating personnel safety.

All Connector & Conductor certifications require a three (3)-hour written and a three (3)-hour job performance (hands-on) test.

NOTE: Students must register with the IFPS (International Fluid Power Society) at least 30-days prior to class dates.

### Agenda Topics:

This class is a review in preparation for taking the Connector & Conductor certification exam for which you will need to demonstrate:

- Understand basic components of hose construction
- Identify hose types and pressure ratings
- Identify port and fitting threads using measuring tools and charts
- Identify the various two- and four-bolt flanges
- Use appropriate charts to determine ratings for stainless and carbon steel tubing for application
- Use the “Stamped” acronym to determine the correct hose and/or tube for correct assembly procedure
- Understand metric and English values to ensure correct assembly of components
- Square-cut hose to measured length
- Know when and how to skive hose
- A study manual will be provided ahead of time for candidates to prepare for the Connector & Conductor certification exam.

## Fluid Power Hydraulic Specialist Certification

The International Fluid Power Society is the only organization that provides comprehensive technical certifications for all professionals in the fluid power and motion control industry.

- IFPS certification tests provide an objective, third-party assessment of an individual’s skill level and are recognized industry-wide. Individuals who successfully master a level of competency are issued a credential signifying an elevated status in the workforce.
- A Hydraulic Specialist designs systems and writes specifications, sizes and selects hydraulic components for mobile and industrial machinery.

### Agenda Topics:

This class is a review in preparation for taking the Industrial Hydraulic Specialist certification exam for which you will need to demonstrate:

- Basic Principles, Concepts, and Terminology
- Load and Motion Analysis
- System Analysis and Troubleshooting
- System Design
- Fluids, Fluid Conductors, Fluid Filtration
- Control Components and Systems
- All Hydraulic Specialist certifications require a three(3)-hour written test.
- A study manual will be provided ahead of time for candidates to prepare for the Hydraulic Specialist certification exam.

### Course Schedule



#### Fluid Power Connector & Conductor Certification (3 day)

FPCC

Denver CO.....Aug 23-25, 2016  
Virginia Beach VA.....Dec 13-15, 2016

Virginia Beach VA.....Mar 7-9, 2017  
Denver CO.....Aug 22-24, 2017



#### Fluid Power Hydraulic Specialist Certification (4 day)

FPHS

Virginia Beach VA.....Sept 20-23, 2016  
Virginia Beach VA.....Jun 27-30, 2017

Virginia Beach VA.....Sept 19-22, 2017

## Fluid Power Industrial Hydraulic Technician Certification

The International Fluid Power Society is the only organization that provides comprehensive technical certifications for all professionals in the fluid power and motion control industry.

- IFPS certification tests provide an objective, third-party assessment of an individual's skill level and are recognized industry-wide. Individuals who successfully master a level of competency are issued a credential signifying an elevated status in the workforce.
- An Industrial Hydraulic Technician applies fluid power theory and related knowledge to test and troubleshoot operational industrial hydraulic systems and applications, reads industrial application schematics, does basic cylinder & hydraulic motor calculations.

### Agenda Topics:

This class is a review in preparation for taking the Industrial Hydraulic Technician certification exam for which you will need to demonstrate:

- You'll learn to read and understand hydraulic symbols and comprehend basic hydraulic principles.
- You'll learn to understand the function and design of hydraulic components, basic hydraulic circuits and system controls.
- This seminar consists of three days of intensive review and hands –on practice for the Industrial Hydraulic Technician certification test which will be held on the fourth day.
- All Industrial Hydraulic Technician certifications require a three (3)-hour job performance (hands-on) test and a three (3)-hour written test.
- A study manual will be provided ahead of time for candidates to prepare for the Industrial Hydraulic Technician certification exam.

## Fluid Power Industrial Hydraulic Mechanic Certification

The International Fluid Power Society is the only organization that provides comprehensive technical certifications for all professionals in the fluid power and motion control industry.

- IFPS certification tests provide an objective, third-party assessment of an individual's skill level and are recognized industry-wide. Individuals who successfully master a level of competency are issued a credential signifying an elevated status in the workforce.
- An Industrial Hydraulic Mechanic fabricates, assembles, services, maintains, and tests industrial hydraulic equipment. The mechanic understands hydraulic symbols, reads system schematics, understands electrical principles, and is skilled in using hand tools, power tools, micrometers, and testing equipment.

### Agenda Topics:

This class is a review in preparation for taking the Industrial Hydraulic Mechanic certification exam for which you will need to demonstrate:

- You'll learn preventative maintenance techniques, fluid filtration, component assembly, field repairs and shop repairs.
- You'll learn to understand hydraulic symbols, read system schematics, understand electrical principles, use hand tools, micrometers, and testing equipment.
- This seminar consists of three days of intensive review and hands –on practice for the Industrial Hydraulic Mechanic certification test which will be held on the fourth day.
- All Industrial Hydraulic Mechanic certifications require a three (3)-hour job performance (hands-on) test and a three(3)-hour written test.
- A study manual will be provided ahead of time for candidates to prepare for the Industrial Hydraulic Mechanic certification exam.

### Course Schedule



#### Fluid Power Industrial Hydraulic Technician Certification (4 day)

FPHT

Virginia Beach VA.....Oct 18-21, 2016  
Riverside CA.....Sept 27-30, 2016  
Dallas TX.....Dec 6-9, 2016

Denver CO.....Jul 11-14, 2017  
Virginia Beach VA.....Oct 17-20, 2017



#### Fluid Power Industrial Hydraulic Mechanic Certification (4 day)

FPHM

Virginia Beach VA.....Oct 4-7, 2016  
Riverside CA.....Oct 11-14, 2016  
Dallas TX.....Nov 15-18, 2016

Denver CO.....Jul 18-21, 2017  
Virginia Beach VA.....Oct 3-6, 2017

## Fluid Power Mobile Hydraulic Mechanic Certification

Fabricates, assembles services, maintains, and tests mobile hydraulic equipment. The mechanic understands hydraulic symbols, reads system schematics, and is skilled in using hand tools, power tools, micrometers and testing equipment. All Mechanic certifications require a three (3) hour written and a three (3) hour Job Performance (hands on) test.

### Agenda Topics:

This class is a review in preparation for taking the Mobile Hydraulic Mechanic certification exam for which you will need to demonstrate:

- Reads hydraulic symbols and circuit diagrams
- Skilled in the use of dial calipers and micrometers
- Knowledge of various tube fittings and selecting the proper replacement
- Make up tube assemblies
- Knows how to prevent and repair system leaks
- Invaluable skills in contamination control
  - Adds fluid to system with filter cart
  - Knows how, when and where to take fluid samples
  - Aids in system flushing and commissioning
  - Has "Target Cleanliness Chart" for each system
  - Checks condition of hydraulic filters
  - Check system for water
- Makes up a crimped hose assembly
  - Replace a hose assembly
  - Inspect hose applications for twist and minimum bend radius
- Services and charges accumulators
- Assists technicians in start-up and commissioning
- Promotes safe working conditions with pressurized systems

## Fluid Power Mobile Hydraulic Technician Certification

Applies fluid power theory and related knowledge to test and troubleshoot operational mobile hydraulic systems and applications. A Mobile Hydraulic Technician reads mobile schematics, performs basic cylinder and hydraulic motor calculations and is able to supervise system installations and commissioning. All Technician certifications require a three (3) hour written and a three (3) hour Job Performance (hands on) test.

### Agenda Topics:

This class is a review in preparation for taking the Mobile Hydraulic Technician certification exam for which you will need to demonstrate:

- Sets-up and tests systems and components under direction of engineering and scientific staff.
- Recommends modifications to circuit and components to improve performance.
- Supervises system installation, flushing and commissioning.
- Provides leak-free piping.
- Knows how, where and when to take fluid samples and read lab reports.
- Can establish ISO cleanliness level for a system.
- Can devise the Target Cleanliness Chart.
- Understands accumulator use and operation.
- Understands hydrostatic drives.
- Sets pump load sensing and compensator controls.
- Understands basic electrical controls and their application.
- Calculates decompression volume.
- Understands regenerative circuits and their use.
- Understands sequence and counterbalance circuits and associated valving.
- Does troubleshooting and supervises required replacements, repair or adjustment.

### Course Schedule

#### Fluid Power Mobile Hydraulic Mechanic Certification

FPMHM

Virginia Beach VA.....Sept 13-16, 2016  
Denver CO.....Jun 20-23, 2017

Virginia Beach VA.....Sept 12-15, 2017

#### Fluid Power Mobile Hydraulic Technician Certification

FPMHT

Virginia Beach VA.....Sept 13-16, 2016  
Denver CO.....Jun 20-23, 2017

Virginia Beach VA.....Sept 12-15, 2017

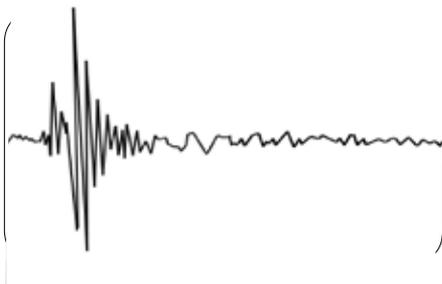
## Vibration Analysis

This three day course was developed to assist individuals who work in the field on various equipment to learn how to use, read, and apply the instruments and feedbacks related to vibration on rotating machinery.

Basic vibration theory will be discussed along with the existing maintenance systems, predictive and preventative maintenance programs, and procedures for a good condition monitoring system. You may not walk out as an expert, however, you will leave the seminar with a very good understanding of what is necessary to make a valuable contribution at your facility.

### Agenda Topics:

- Vibration basics
- Concepts and theories
- Instruments
- Typical Vibration Problems
- Techniques
- Machine Diagnostics
- Trending
- Acoustics



## Infrared Thermography

Thermography can be used to monitor the condition of structures, plant machinery, and systems. It is a predictive maintenance technique using an infrared camera designed to monitor the emission of infrared energy. Infrared Thermography is a useful tool for maintenance of electrical and mechanical industrial systems.

### Agenda Topics:

- Discuss the basics of infrared
- Demonstrate the use of an infrared camera
- Cover the theories associated with basic infrared
- Cover safety procedures
- Types of infrared problems



### Related Training

#### **Pneumatic Systems and Principles**

Improve your ability to install, maintain and troubleshoot pneumatic automation systems. *Go to page 31 for more details.*

#### **Fundamentals of Programmable Logic Controllers**

Focus on the fundamentals of PLCs from setting up communications to uploading and downloading programs to troubleshooting and modifying the system. *Go to page 16 for more details.*

#### **Hydraulics Training and System Troubleshooting**

Using the hands-on hydraulic trainers you will construct, operate and troubleshoot systems using common hydraulic components. *Go to page 30 for more details.*

## Predictive Maintenance

Understand the different methods of predictive maintenance.

Understand the future commitments needed/required to invest in an effective predictive maintenance program.

Know what type of maintenance program you want to incorporate within your facility.

How much equipment you need/want to purchase to implement an effective program.

### Agenda Topics:

- Intro to Predictive maintenance
- Financial Implications and Cost Justification
- Vibration Monitoring Analysis
- Infrared Thermography
- Tribology – Oil Analysis
- Ultrasonic Testing
- Failure-Mode Analysis
- Identify all possible failures within a system
- Establishing a Predictive Maintenance Program



## Oil Analysis

Understand terminology of oil analysis.

Apply industry best practices of oil analysis within their predictive maintenance program.

Apply effective techniques for operation and use of oil analysis equipment.

Interpret data correctly to increase equipment reliability.

### Agenda Topics:

- Lubrication Fundamentals
- Oil Analysis & Conditions-Based Maintenance
- Reliability Centered Maintenance
- Contamination Control
- Oil Sampling Methods
- Oil Testing & Analysis
- Targets, Limits, Diagnostics and Data Management
- Guidelines for Selecting and Working with Commercial Oil Analysis



### Related Training

#### Pneumatic Systems and Principles

Improve your ability to install, maintain and troubleshoot pneumatic automation systems. *Go to page 31 for more details.*

#### Fundamentals of Programmable Logic Controllers

Focus on the fundamentals of PLCs from setting up communications to uploading and downloading programs to troubleshooting and modifying the system. *Go to page 16 for more details.*

#### Hydraulics Training and System Troubleshooting

Using the hands-on hydraulic trainers you will construct, operate and troubleshoot systems using common hydraulic components. *Go to page 30 for more details.*

## Ultrasound Testing

Teach maintenance personnel to operate ultrasonic tester to enable a preventative/planned maintenance approach to system maintenance. Flaw detection an thickness gauge of machinery material.

This will help to evaluate a machine and detect flaws that cannot be seen by the human eye. This helps improve predictive maintenance programs and reduce downtime through flaw detection.

### Agenda Topics:

- Introduction to Ultrasonic Testing
- Basic Principles of Acoustics
- Equipment
- Transducer Operations and theory
- Basic Ultrasonic Testing Methods
- Principles of Ultrasonics
- Equipment Calibration
- Evaluation of Base Material Product Forms
- Ultrasonic Testing Application
- Transducer Characteristics
- Evaluation Standards
- Leak Detection



## Predictive Maintenance (5-Day)

This training will give you an overview of what predictive maintenance means. This five-day training introduces the basics of Infrared Thermography, Oil Analysis, Ultrasound Testing and Vibration Analysis. You'll have the opportunity to review various equipment and techniques that can be used for predictive maintenance processes within your facility. Learn what new technologies exist in the maintenance world and see how they can be implemented within your existing maintenance programs. This training is imperative if you are looking for cost savings. The strategies learned during this training will help you to find positive alternatives to maintenance so that your equipment won't run-to-fail. Learn how to reduce downtime and increase productivity through best-practices of preventative maintenance.

### Agenda Topics:

- Understand the different methods of predictive maintenance.
- Identify what type of maintenance program you want to incorporate within your facility.
- Understand the future commitments needed/required to invest in an effective predictive maintenance program.
- Determine how much equipment you need/want to purchase to implement an effective program.
- Learn the basics of Infrared Thermography, Oil Analysis, Ultrasound Testing, and Vibration Analysis.

## Related Training

### Pneumatic Systems and Principles

Improve your ability to install, maintain and troubleshoot pneumatic automation systems. *Go to page 31 for more details.*

### Fundamentals of Programmable Logic Controllers

Focus on the fundamentals of PLCs from setting up communications to uploading and downloading programs to troubleshooting and modifying the system. *Go to page 16 for more details.*

### Hydraulics Training and System Troubleshooting

Using the hands-on hydraulic trainers you will construct, operate and troubleshoot systems using common hydraulic components. *Go to page 30 for more details.*

## National Fire Alarm and Signaling Code (NFPA 72)

Being up-to-date with basics of the National Fire Alarm Code® (NFPA 72) will help improve your fire alarm and signaling system's reliability. Learn the fundamentals of fire alarm systems, fire alarm equipment for dwelling units, initiating devices, emergency communication systems (including mass notification) and more.

Gain knowledge to ensure that your fire alarm system is working properly to achieve maximum reliability, safety and compliance.

Learn to identify various components of a typical fire alarm system, recognize differences in requirements between NFPA 72, ADA (ADAAG) and UFAS documents and be able to layout a fire alarm system using basic components (i.e., manual alarm stations, alarm bells, detectors, etc.).

### Agenda Topics:

- Fundamentals of fire alarm systems
- Fire warning equipment for dwelling units
- Protected premises fire alarm systems
- Supervising station fire alarm systems
- Initiating devices
- Notification appliances for fire alarm systems
- Inspecting, testing and maintenance
- The relevancy of the Fire Alarm Code® and Signaling Code



### Course Schedule

## NICET® I and II Fire Alarm Systems

Prepare for the NICET Certification exams.

Learn test-taking strategies . Review reference materials needed to maximize the NICET test experience.

This class is helpful to personnel working in the fire alarm industry who engage in a combination of fire alarm system activities including layout, equipment selection, installation, acceptance testing, troubleshooting and servicing.

NICET Level I is for trainees and entry level technicians who perform limited job tasks under frequent supervision. NICET Level II is for technicians who perform routine tasks under general daily supervision.



### Agenda Topics:

- Introduction to NICET
- Understand NICET operational policies
- Review the four certification criteria
- Review the examination requirement chart
- Discuss NICET test strategies
- NICET Level I element review
- NICET Level II element review



### National Fire Alarm & Signaling Code® / NICET® I & II (5-Day)

FA5N

Denver CO.....Aug 15-19, 2016  
Virginia Beach VA.....Oct 17-21, 2016

Denver CO.....Apr 3-7, 2017  
Virginia Beach VA.....May 15-19, 2017

Denver CO.....Oct 23-27, 2017  
Virginia Beach VA.....Dec 4-8, 2017



### National Fire Alarm & Signaling Code®

FA5

Denver CO.....Aug 15-17, 2016  
Virginia Beach VA.....Oct 17-19, 2016

Denver CO.....Apr 3-5, 2017  
Virginia Beach VA.....May 15-17, 2017

Denver CO.....Oct 23-25, 2017  
Virginia Beach VA.....Dec 4-6, 2017



### NICET® I & II (Test Prep)

5N

Denver CO.....Aug 18-19, 2016  
Virginia Beach VA.....Oct 20-21, 2016

Denver CO.....Apr 6-7, 2017  
Virginia Beach VA.....May 18-19, 2017

Denver CO.....Oct 26-27, 2017  
Virginia Beach VA.....Dec 7-8, 2017

## International Plumbing Code

Learn the requirements for installation and inspection of plumbing systems to ensure your compliance with the International Plumbing Code, which is the standard for the installation and inspection of plumbing systems. It explains the proper plumbing standards for a wide variety of technicians and personnel and it establishes minimum regulations for plumbing systems using prescriptive and performance-related provisions. Learn many of the Code's details to give attendees a comprehensive view of the Code. Among many of the details that will be discussed will be a full explanation on plumbing fixtures, including prohibited fixtures.



### Agenda Topics:

- Administrative concepts
- General regulations
- Fixtures, faucets and fixture fittings
- Water heater
- Water supply and distribution
- Sanitary drainage
- Indirect/special waste
- Vents
- Traps, interceptors and separators
- Storm drain
- Special piping

## Lockout / Tagout Requirements and Procedures

This course presents OSHA's basic Hazardous Energy Control program and more. Review methods used to protect employees from injury due to the release of hazardous levels of energy and take an in-depth look at the regulatory standard addressing Lockout/Tagout.

This course is designed to meet and exceed the safety training requirements defined in the OSHA Control of Hazardous Energy standard paragraph 29 CFR 1910.147 and the Lockout/Tagout procedures of 29 CFR 1910.333 Selection of Work Practices.

### Agenda Topics:

- Introduction to OSHA
- Definitions of hazardous energy
- Types of energy sources
- Machine guards
- Lockout/Tagout
- Develop a written program
- Program inspection requirements
- Develop Lockout/Tagout equipment checklist
- Set up employee training and communication



## Related Training

### Hazard Waste Operation and Emergency Response

Learn how to respond safely to an emergency, identify the materials released, and control the spill until further response is necessary.

*Go to page 44 for more details.*

### OSHA Safety Training

Receive the information that is necessary for you to train and inform employees properly on OSHA standards. Learn to design and implement employee protection programs. Review and discuss the OSH Act, including citation and penalties and how to avoid them.

*Go to page 42 for more details.*

### NFPA 70E/Arc Flash Electrical Safety

Learn how current NFPA 70E standards apply to a facility, why safe electrical work practices are important, and what can be done to ensure your organization meets all government standards for electrical safety.

*Go to page 6 for more details.*

## OSHA Safety Training

Receive the information that is necessary for you to train and inform employees properly on OSHA standards. Learn to design and implement employee protection programs. Review and discuss the OSH Act, including citation and penalties and how to avoid them. Learn how to become recognized by the U.S. Department of Labor as having been trained by an OSHA-authorized trainer.

### Agenda Topics:

- Locate and apply OSHA safety and health standards, policies and procedures
- Identify common violations
- CFR Part 1930 – Inspections, Citations and Penalties
- Hazard violations
- Basic electrical safety
- Control of hazardous energy/electrical safe work practices
- Walking working surfaces, Subpart D
- OSHA instructions on Subpart D
- Materials handling and storage, Subpart N
- Introduction to industrial hygiene/bloodborne pathogens, Subpart Z
- Hazard communication/asbestos
- Permit-required confined space
- Welding, cutting and brazing, Subpart Q
- Personal protective equipment, Subpart I
- Means of egress, Subpart E
- Fire protection, Subpart L:
- Hazardous materials, Subpart H
- Basics of machine safeguarding
- Machinery and machine guarding, Subpart O
- Recordkeeping—29 CFR 1094

## Confined Space Entry

This comprehensive lecture course will benefit anyone who has identified permit-required spaces and must develop a written program for identifying and evaluating hazards, preventing unauthorized entry and establishing safe entry procedures. This includes safety personnel, maintenance personnel, facility managers, supervisors and personnel who might work in confined spaces.

### Agenda Topics:

- Evaluation and determination of confined spaces
- Hazards of confined spaces
- Personnel duties and responsibilities
- Non-permit spaces
- Permit space programs
- Written programs
- Training
- Entry permit
- Entry conditions
- Atmospheric testing
- Personal protective equipment
- Rescue operations Workbook
- 29 CFR 1910.146—Permit Required Confined Space



### Course Schedule



#### OSHA 10 Hour Safety Training

OH

Denver CO.....Oct 17-18, 2016



#### OSHA 30 Hour Safety Training

OS

Denver CO.....Oct 17-20, 2016

## Fall protection

This course satisfies the requirements of OSHA 29 CFR 1926.502 and 1910.66 for the training of all persons who climb or work on elevated surfaces where the risk of a fall is present.

You'll learn the importance of a fall protection plan and gain knowledge about the safe use of ladders, the function of guardrails and other fall protection practices. You'll also learn about the components of a fall arrest system and when the use of a body harness may be necessary.



### Agenda Topics:

- Introduction to OSHA Standards
- Fall protection plans
- Job safety analysis
- Fall protection systems
- Fall protection equipment
- Implementation of fall protection programs including policies and documentation

## NFPA 101 Life Safety Code

Learn and/or review the requirements that influence the safety of people and protection of property and equipment.

This class is designed for building inspectors, building managers, facility engineers, safety inspectors, code enforcers, engineers, architects, building owners and insurers, building product manufacturers including fire suppression and alarm systems—anyone in a building-related field.

### Agenda Topics:

- General, Sections 1-1 through 1-8
- Fundamental requirements
- Definitions, Sections 3-1 through 3-2
- Classification of occupancy and hazard of contents
- Means of Egress, Section 5-1 through 5-12
- Features of Fire Protection Section 6-1 through 6-6
- Building service and fire protection equipment, Section 7-1 through 7-7
- Means of egress requirements
- Protection, special provisions, building services and services and operating features.
- One and two family dwellings, Section 21-1 through 21-4
- Small facilities. large facilities, suitability of an apartment building to house, a board and care occupancy and operating features.



## Related Training

### National Fire Alarm Code (NFPA 72)

Learn the fundamentals of fire alarm systems, fire alarm equipment for dwelling units, initiating devices, emergency communication systems (including mass notification) and more.

*Go to page 40 for more details.*

### Lockout/Tagout Requirements and Procedures

Review methods used to protect employees from injury due to the release of hazardous levels of energy and take an in-depth look at the regulatory standard addressing Lockout/Tagout.

*Go to page 41 for more details.*

### Laboratory Standards

Gain an understanding of different types of hazards, and how to protect health and safety. Receive information on chemicals and Material Safety Data Sheets (MSDS).

*Go to page 45 for more details.*

## Hazard Communication and Bloodborne Pathogens

Receive the information that is necessary for you to train and inform employees properly on OSHA standards. Learn to design and implement employee protection programs. Review and discuss the OSH Act, including citation and penalties and how to avoid them. Learn how to become recognized by the U.S. Department of Labor as having been trained by an OSHA-authorized trainer.

### Agenda Topics:

- The regulatory basis
- Epidemiology and symptoms
- Transmission modes
- Engineering controls and safe work practices
- Personal protective equipment and decontamination
- Review of the standard, and who is covered
- Definition of bloodborne pathogens, the different diseases and the symptoms of each disease
- Demonstration of a decon kit
- Student participation in a decon exercise
- The requirements of the medical program, availability and declination of vaccinations



## Hazardous Waste Operations and Emergency Response

This course satisfies the requirements of OSHA 29 CFR 1910.120 for the training of personnel who respond to emergency releases of hazardous materials. Learn how to respond safely to an emergency, identify the materials released, and control the spill until further response is necessary.

### Agenda Topics:

- Overview of regulations
- Basic characteristics and properties of hazardous materials
- Personal protective equipment (including hands-on)
- Identification of hazardous materials
- Size-up strategy and tactics
- Table-top exercise
- Size-up strategy and tactics
- Initial site control and reconnaissance
- Incident control: confinement, containment and cleanup
- Decontamination
- Dress-out exercise
- Overview of regulations
- Properties and characteristics of hazardous materials
- Identification of hazardous materials
- Toxicology and industrial hygiene
- Monitoring and instrumentation
- Personal protective equipment
- Emergency response plans
- Site control
- Decontamination
- Spill containment and cleanup
- Fire safety
- Confined space entry

### Related Training

#### OSHA Safety Training

Receive the information that is necessary for you to train and inform employees properly on OSHA standards. Design and implement employee protection programs. Review and discuss the OSH Act, including citation and penalties and how to avoid them. *Go to page 42 for more details.*

#### Fall Protection

This course satisfies the requirements of OSHA 29 CFR 1926.502 and 1910.66 for the training of all persons who climb or work on elevated surfaces where the risk of a fall is present. *Go to page 43 for more details.*

#### Confined Space Entry

This comprehensive one-day lecture course will benefit anyone who has identified permit-required spaces and must develop a written program for identifying and evaluating hazards, preventing unauthorized entry and establishing safe entry procedure. *Go to page 42 for more details.*

## DOT Hazardous Materials

This course meets the requirement of the EPA for the initial and/or retraining of all personnel involved in hazardous waste management. This includes anyone who reads and interprets RCRA regulation, develops facility procedures, and trains other employees.



## Laboratory Standards

This course meets the training requirements of 29 CFR 1910.1450, for personnel working in a laboratory who are potentially exposed to hazardous materials. Gain an understanding of different types of hazards, and how to protect health and safety. Receive information on chemicals and Material Safety Data Sheets (MSDS).

### Agenda Topics:

- Chemical hygiene plan
- Physical and health hazards
- Engineering controls
- Safe work procedures
- Personal protective equipment
- Labels and labeling requirements
- Material safety data sheets
- Emergency procedures



## Related Training

### OSHA Safety Training

Receive the information that is necessary for you to train and inform employees properly on OSHA standards. Design and implement employee protection programs. Review and discuss the OSH Act, including citation and penalties and how to avoid them. *Go to page 42 for more details.*

### NICET® I and II

This class is helpful to personnel working in the fire alarm industry who engage in a combination of fire alarm system activities including layout, equipment selection, installation, acceptance testing, troubleshooting and servicing. *Go to page 40 for more details.*

### Lockout/Tagout Requirements and Procedures

Review methods used to protect employees from injury due to the release of hazardous levels of energy and take an in-depth look at the regulatory standard addressing Lockout/Tagout. *Go to page 41 for more details.*

## Natural Gas Safety

Learn the general safety practices in both outside distribution systems and inside equipment piping. It will help you understand the codes and standards as applied to natural gas usage in commercial and industrial facilities. Learn about leak testing, materials of construction, attachment methods, lockout/tagout and blanking requirements, corrosion control as well as venting requirements in this thorough and comprehensive course.

### Agenda Topics:

- Usage of natural gas
- General Safety Practices
- Physical Properties of Natural Gas
- Materials of Construction
- Cathodic Protection From Corrosion
- Maintenance
- Indoor and Outdoor Instruction



## Maintenance Manager

A well run maintenance organization can have a positive impact on company profits. Take the opportunity to learn how to build a comprehensive maintenance program for your team. Learn how to develop a step-by-step plan to take your maintenance group to the next level of operation. Discover how to get the most return from preventive maintenance and its investment. Gain techniques to effectively plan the maintenance process and work. Learn to identify and minimize wasted time.

### Agenda Topics:

- Transition maintenance from reactive to proactive mode
- Reduce equipment downtime, output (OEE) and reliability
- Reduce injury and scrap rates
- Reduce maintenance and energy costs
- Improve OSHA compliance
- Create your maintenance vision
- Identify and discuss your critical pieces of equipment
- Maintenance mapping: locate waste in your current maintenance process
- Create zero equipment stoppages and failure
- The four phases of approaching zero stoppages
- Overall equipment effectiveness: case studies
- How to develop lubrication excellence and evaluate your lubrication strategy
- Developing condition-based preventive maintenance
- PM optimization and predictive maintenance
- Planning and scheduling
- Barriers to world class maintenance
- Measurements
- Develop a plan going forward

### Course Schedule



**Natural Gas Maintenance & Safety**

**NG**

Denver CO.....Aug 2-4, 2016

## LICENSING BOARD INFORMATION

The following Licensing Boards accept NTT training as continued education for license renewal. Please call 877.652.1026 for specific class approvals.

### Alabama

AL Board for Pro Engineers & Land Surveyors  
*License Type:* Pro Engineers  
Board for Heating & Air Conditioning Contractors  
*License Type:* HVAC

### Alaska

AK State Board of Reg. for Architects, Engineers & Land Surveyors  
*License Type:* Pro Engineers  
Division of Occupational License (DOL)  
*License Type:* Electrical  
Division of Water Operator Training & Certification Program  
*License Type:* Water & Wastewater

### California

California Water Environment Association (CWEA)  
*License Type:* Wastewater  
Sacramento Office of Education  
*License Type:* Electric  
Calif Dept. of Education  
*License Type:* Electric

### Colorado

Dept. of Regulatory Agencies (DORA)  
*License Type:* Electric  
Colorado Dept. of Health and Environment  
Colorado Water and Wastewater Facility Operators Certification Board  
*License Type:* Wastewater and Plumbers

### Delaware

Delaware Board of Electrical Examiners  
*License Type:* Electrical

### Florida

Dept. of Business & Pro Regulation (DBPR)  
*License Type:* Electrical  
Miami Dade County  
*License Type:* Electrical  
FL Water & Pollution Control Operators Association  
*License Type:* Water & Wastewater  
Florida Board of Pro Engineers (FBPE)  
*License Type:* Pro Engineers

### Georgia

Construction Industries License Board (CILB)  
*License Type:* Electrical  
GA Board of Pro Engineers & Land Surveyors  
*License Type:* Pro Engineers  
Secretary of State Georgia  
*License Type:* Plumbing  
Professional Licensing Board Division  
*License Type:* HVAC

### Idaho

Department of Building Safety Electrical Bureau (DBS)  
*License Type:* Electrical  
State of Idaho Licensure of Professional Engineers and Professional Land Surveyors  
*License Type:* Pro Engineers

### Illinois

IL Department of Financial & Pro Regulation  
*License Type:* Pro Engineers  
Illinois Environmental Protection Agency (EPA)  
*License Type:* Drinking Water Operator

### Indiana

Indiana Department of Environmental Management (IDEM)  
*License Type:* Water and Wastewater  
State Board of Registration for Professional Engineers  
*License Type:* Pro Engineers

### Iowa

Professional Licensing Bureau for Engineers & Land Surveyors  
*License Type:* Electrical & Pro Engineers

### Kansas

KS State Board of Technical Professions  
*License Type:* Pro Engineers

### Kentucky

Dept. for Environmental Protection (DEP)  
*License Type:* Water & Wastewater  
Office of Housing, Buildings & Construction (OHBC)  
*License Type:* Electrical

### Louisiana

LA State License Board for Contractors  
*License Type:* Contractors  
Pro Engineering & Land Surveying Board  
*License Type:* Pro Engineers  
Louisiana Professional Engineering and Land Surveying Board  
*License Type:* Pro Engineers

### Maine

Board of Regulatory for Pro Engineers  
*License Type:* Pro Engineers  
Office of License & Reg, Electricians' Exam Board (OLR)  
*License Type:* Electrical

### Maryland

Board of Water Works & Waste Systems Operators  
*License Type:* Water & Wastewater  
Cecil County Electrical Board (CCEB)  
*License Type:* Electrical

### Massachusetts

Bureau of Certification of Operators (BCO)  
*License Type:* Water  
Department of Environmental Protection (DEP)  
*License Type:* Wastewater

### Michigan

Bureau of Construction Codes, Electrical Division (BCC)  
*License Type:* Electrical  
Michigan Department of Environmental Quality (MDEQ)  
*License Type:* Water & Wastewater

### Minnesota

Board of Engineering  
*License Type:* Pro Engineers  
Department of Labor & Industries (DL&I)  
*License Type:* Electrical

### Mississippi

Mississippi Board of Professional Engineers  
*License Type:* Pro Engineers

### Missouri

Department of Natural Resources (DNR)  
*License Type:* Water & Wastewater  
MO Board for Architects, Pro Engineers & Land Surveyors (MOAPELS)  
*License Type:* Pro Engineers

### Montana

Montana State Electrical Board  
*License Type:* Electrical  
MT Department of Labor & Industry—Business Standards  
*License Type:* Pro Engineers

### Nebraska

Board of Engineers & Architects  
*License Type:* Pro Engineers  
Nebraska State Electrical Board  
*License Type:* Electrical

### Nevada

Board of Pro Engineers & Land Surveyors  
*License Type:* Pro Engineers  
Division of Environmental Protection (DEP)  
*License Type:* Drinking Water Operator

## LICENSING BOARD INFORMATION (continued)

The following Licensing Boards accept NTT training as continued education for license renewal. Please call 877.652.1026 for specific class approvals.

### New Hampshire

NH Joint Board of License & Certification  
*License Type:* Pro Engineers

### New Jersey

Board of Examiners of Electrical Contractors (BEEC)  
*License Type:* Electrical  
State Board of Professional Engineers and Land Surveyors  
*License Type:* Pro Engineers

### New Mexico

Environment Department  
*License Type:* Water & Wastewater  
NM State Board of License for Pro Engineers & Pro Surveyors  
*License Type:* Pro Engineers  
Regulation & Lic Dept., Construction Industries Division (CID)  
*License Type:* Electrical

### New York

Department of Environmental Conservation (NYSDEC)  
*License Type:* Wastewater Treatment Plant Operators  
State Education Department  
*License Type:* Pro Engineers

### North Carolina

Board of Examiners for Engineers & Land Surveyors (BEES)  
*License Type:* Pro Engineers  
Board of Examiners of Electrical Contractors (BEES)  
*License Type:* Electrical

### North Dakota

North Dakota Board of Registration for Professional Engineers and Land Surveyors  
*License Type:* Pro Engineers

### Ohio

Board of Reg. for Pro Engineers and Surveyors (PEPS)  
*License Type:* Pro Engineers  
Ohio Construction Industry License Board (OCILB)  
*License Type:* Electrical and Contractors  
Ohio Environmental Protection Agency (OEPA)  
*License Type:* Water & Wastewater

### Oklahoma

Construction Industries Board (CIB)  
*License Type:* Electrical  
Oklahoma Pro Engineers and Land Surveyors (PELS)  
*License Type:* Pro Engineers  
Oklahoma State Board for Professional Engineers and Land Surveyors  
*License Type:* Pro Engineers

### Oregon

Board of Examiners for Engineers & Land Surveyors (BEELS)  
*License Type:* Electrical  
Building Codes Division  
*License Type:* Pro Engineers  
Oregon Board of Examiners for Engineering and Land Surveyors  
*License Type:* Pro Engineers

### Pennsylvania

Department of Environmental Protection (DEP)  
*License Type:* Water & Wastewater  
Uniform Construction Code (UCC)  
*License Type:* Electrical  
Pennsylvania State Registration Board of Professional Engineers, Surveyors and Geologists  
*License Type:* Pro Engineers

### South Carolina

South Carolina State Board of Regulation for Professional Engineers  
*License Type:* Pro Engineers

### South Dakota

South Dakota Board of Technical Professions  
*License Type:* Pro Engineers

### Tennessee

Board for Architectural & Engineering Examiners  
*License Type:* Pro Engineers

### Texas

Texas Board for Pro Engineers (TBPE)  
*License Type:* Pro Engineers  
Texas Department of License & Regulation (TDLR)  
*License Type:* Electrical  
Texas Commission of Environmental Quality - Water and Wastewater  
*License Type:* Water & Wastewater

### Utah

Department of Occupational & Pro License (DOPL)  
*License Type:* Electrical  
Utah Division of Occupational and Professional Licensing  
Board of Professional Engineers  
*License Type:* Pro Engineers

### Virginia

Department of Pro & Occupational Regulations (DPOR)  
*License Type:* Electrical, Pro Engineers, Water & Wastewater

### Washington

Dept. of Ecology, Wastewater Certification Program  
*License Type:* Wastewater Treatment Plant Operators  
Washington Department of Labor & Industries (L&I)  
*License Type:* Electrical, Plumbing  
Washington Environmental Training Center (WETRC)  
*License Type:* Drinking Water Operator

### West Virginia

Board of Reg. for Pro Engineers (BRPE)  
*License Type:* Pro Engineers

### Wisconsin

Department of Natural Resources (DNR)  
*License Type:* Water & Wastewater Safety & Buildings Division  
*License Type:* Electrical and Plumbing  
Wisconsin Department of Safety - Electrical, Plumbing and HVAC  
*License Type:* HVAC and Plumbing  
Wisconsin Society of Professional Engineers  
*License Type:* Pro Engineers

### Wyoming

Board of Reg. for Pro Engineers and Pro Land Surveyors  
*License Type:* Pro Engineers  
Wyoming Fire Marshal  
*License Type:* Electrical  
Wyoming Department of Environmental Quality  
*License Type:* Wastewater



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# SKILL CIRCUIT

ONLINE

## Skill Circuit™ Online training is good for business

- **Skill Circuit™ Online** provides a valuable addition to any hands-on instructor lead training
- Online assessment assists in establishing a documented process for qualifying workers
- Continued education fosters knowledge retention and improves productivity
- E-learning anchors hands-on instructor lead training so workers can retain and recall it
- **Skill Circuit™ Online** simplifies training management, data and reporting

## Skill Circuit™ Online Training Options



Pre Instructor Led  
Training



Integrated Info  
Training



Post Instructor Led  
Training



Standalone Online  
Training

## Supplement to NTT Seminars

Courses with Skill Circuit provide the added benefit to help tailor your seminar before it starts then anchoring the trainings so people can retain and recall it.

## Trades Learning Paths

### Electrical Trades Learning Path

- NFPA 70E Arc Flash Electrical Safety with Practical Demonstration
- 1910.269 High Voltage Electrical Safety
- Electrical Systems in Hazardous Locations
- Basics of Industrial Electricity
- Troubleshooting Electrical Control Circuits
- Electrical Print Reading

*"The Fundamentals"*

#### *Skill Development Step 1*

- National Electric Code ® NEC
- Grounding and Bonding
- Substation Maintenance Safety
- Variable Frequency Drives
- Programmable Logic Controllers
- Understanding & Troubleshooting Electrical Motors

- Fiber Optic Installation and Maintenance
- Instrumentation Process Control
- Tuning DDC / Process Control Loops
- Industrial Electronics

#### *Skill Development Step 2*

### HVAC Trades Learning Path

- NFPA 70E (Electrical Safety)
- Air Conditioning & Refrigeration
- Heating Ventilation and Industrial Electricity
- Troubleshooting Electrical Control Circuits
- Understanding and Troubleshooting Electric Motors

*"The Fundamentals"*

#### *Skill Development Step 1*

- Chilled Water Systems
- Boilers
- Pneumatic Comfort Controls
- Centrifugal Pumps
- Variable Frequency Drives
- Programmable Logic Controls

- Tuning DDC / Process Control Loops
- Brazing
- Instrumentation Process Control
- Advanced Air Conditioning & Refrigeration
- Air & Water Balancing

#### *Skill Development Step 2*

### Mechanical Trades Learning Path

- NFPA 70E Arc Flash Electrical Safety
- Troubleshooting Electrical Control Circuits
- Understanding & Troubleshooting Electrical Motors
- Mechanical Drives / Power Transmissions
- Bearings and Lubrication
- Shaft Alignment

*"The Fundamentals"*

#### *Skill Development Step 1*

- Welding Principles and Procedures
- Conveyors
- Hydraulics Training and System Troubleshooting
- Pneumatics Systems and Principles
- Electro – Pneumatics Training

- Instrumentation Process Control
- Vibration Analysis
- Ball Screw Applications & Techniques
- Machine Tool Alignment

#### *Skill Development Step 2*



## Hands-On & Practical

### NTT Training Programs

- Electrical Safety
- National Electrical Code®
- Electrical and Electronics
- Fluid Power
- HVAC
- Compliance
- Mechanical and Industrial Systems
- Consulting For Your Specific Needs

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