JAN-DEC
2021

CROWN
TRAINING & DEVELOPMENT, INC.

TECHNICAL TRAINING & SUPPORT SERVICES

for Industrial Processes and Manufacturers

DOCUMENTATION AND DRAWING SERVICES

INVENTORY MANAGEMENT SUPPORT

NFPA 70E ARC FLASH ASSESSMENTS AND LABELING

PREVENTATIVE & PREDICTIVE MAINTENANCE SERVICES

SAFETY AND INDUSTRIAL APPAREL

SAFETY PROGRAM ASSISTANCE

TECHNICAL STAFFING AND FIELD SUPPORT

TECHNICAL TRAINING AND PROGRAM SUPPORT

NEW - LIVE WEBCASTED COURSES ARE AVAILABLE

Increase Knowledge - Improve Job Satisfaction - Better Productivity - Reduce Costs

PURCHASE COURSES ONLINE AT CROWNTRAINING.COM

2642 E. 84TH PLACE I MERRILLVILLE, IN I 219-947-0845 I INFO@CROWNTRAINING.COM

Table of Contents

Table of Contents

**** These courses are also available in a Live Webcasted Version!**

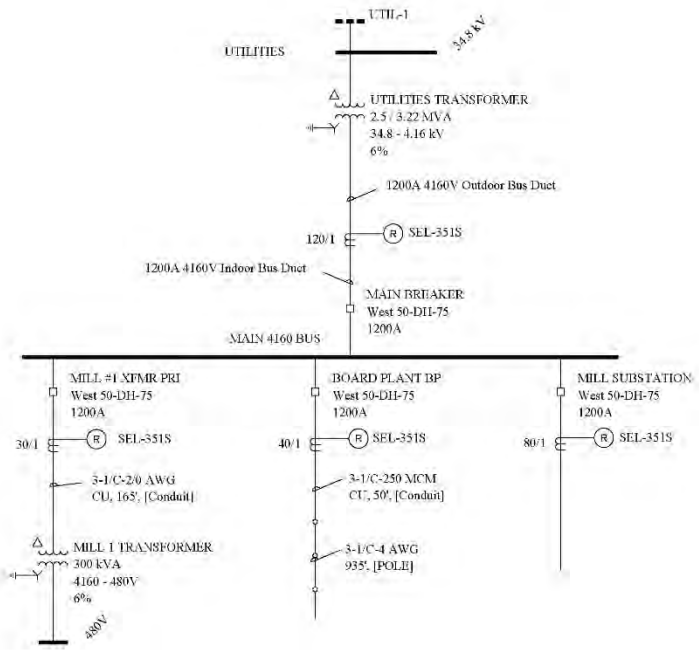
Our Services

Crown Training & Development (CT&D) is a technical training and support services company for industrial processes and manufacturers. CT&D was established in September of 1999 and is located in Merrillville, Indiana. Our company provides the following services that can help you achieve your goals.

Documentation and Drawing Services

CT&D can print, revise, or develop any of the following:

- One-line Diagrams
- Electrical Drawings
- P&IDs
- LOTOs
- SJPs
- ECPs
- SOPs
- Maintenance Manuals
- Training Manuals
- Troubleshooting Guides



Inventory Management Support

CT&D can provide the following tasks to help manage your parts inventory system:

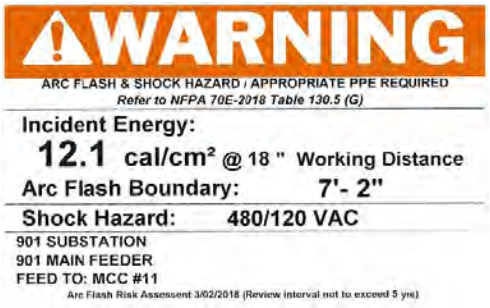
- Map and Label Storage Areas
- Locate, Verify, Count, and Tag Inventory Items
- Bin Organization
- BOM Assistance
- Update Data into Management System
- Relocate Items as Required

Our Services

NFPA 70E Arc Flash Assessments/Labeling

CT&D can provide the following to help make your facility compliant with NFPA 70E Arc Flash Hazard Labeling:

- Gather your existing one-Line diagrams, or develop new ones if necessary
- Collect your existing electrical equipment data
- Perform an Arc Flash Hazard Analysis using EasyPower software and based upon NFPA 70E and IEEE 1584 standards
- Provide a report of the data collected and information to appear on label
- Recommend corrective actions if necessary.
- Print and affix labels on corresponding pieces of equipment
- Update one-line diagrams as required
- Provide appropriate training



Preventive/Predictive Maintenance Services

- Infrared Thermography
- Power Quality Analysis/Improvement
- Program Development and Management
- Reliability Centered Maintenance (RCM)
- Root Cause Analysis
- Ultrasound and Vibration Analysis

Safety and Industrial Apparel

CT&D is an authorized Bulwark and Red Kap Apparel supplier. Please contact us for a catalog and our competitive pricing. Also, see our ad on the back cover.

Bulwark FR

RED KAP 1923

Safety Program Assistance

CT&D can assist your safety program with any of the following:

- Audits
- ECPs
- General Industry Safety Training
- Inspection Preparation
- LOTOs
- PPE
- Program Development and Facilitation
- Safety Manuals/Logs
- SJPs

Our Services

Technical Staffing and Field Support

CT&D can supplement your existing workforce by providing support professionals in any of the following areas:

- CAD
- Consulting
- Electrical
- Maintenance
- Mechanical
- Operations
- Process Automation
- Project Management
- Quality
- Reliability
- Safety
- Supervision
- Training Coordination/Program Management

Technical Training and Program Support

CT&D can help satisfy your training needs in any of the following areas:

- Catalog Courses
- Customized Training
- Drives
- Electrical and Mechanical Maintenance Programs
- HMI
- Instrumentation
- Needs Assessments
- NFPA 70E
- On-site Training
- PLCs
- Process Lines and Facilities
- Program and Curriculum Development and Management
- Reliability
- Safety
- Systems
- Testing (Written and Practical)

Advantages

Benefits

- Increased Knowledge
- Greater Job Satisfaction
- Better Productivity
- Improved Maintenance and Troubleshooting Techniques
- Reduced Costs
- Achieved Goals

Experienced Staff

Our Instructors and Consultants each average over 30 years of experience in industry and training.

Facilities and Equipment

CT&D offers its' customers a state of the art Technical Training Center in Merrillville, Indiana and uses the latest equipment and software.

Flexibility

CT&D always works with its' customers to schedule training and services when it's convenient for them.

Hands-on and Practical

Our training is always hands-on and practical. Classes are very interactive. Our instructors don't just read out of a book. They provide useful information by passing on their years of experience and are known for making difficult subjects easy to understand.

Hardware and Software Expertise

CT&D personnel are familiar with a variety of manufacturer hardware and software such as:

- ABB
- Allen-Bradley
- Autodesk
- Avtron
- Control Techniques
- Cutler-Hammer
- EasyPower
- Eaton
- General Electric
- Intellution
- Magnetek
- Modicon
- OMNI Flow Computers
- Omron
- P&H
- Reliance
- Rexroth
- Robicon
- Rockwell Automation
- Rosemont
- SEL
- Siemens
- Square D
- Vickers
- Westinghouse
- Wonderware

Satisfied Customers

Abbott Labs
Air Products & Chemicals
Alumina Partners of Jam.
Amgen
AM General
Ameren Energy Generating
American Licorice
Ann Arbor Machine
Apollo America Corporation
Applied Power & Controls
Arcelor Mittal Steel
Bacardi & Co.
Bayer Corporation
Boeing
BP US Pipelines & Logistics
Bull Moose Tube
Car.-Sweetwater Paper
Cargill, Inc.
Central Processing Eng.
CFC International
Chemical Lime Company
Chevron Phillips
Citizens Gas & Coke Util.
Clyde's Donuts
Compania Electrica
Conagra Foods
Con. Grain & Barge
Control Techniques
Corn Products
CSL Behring
Cummins, Inc.
Dome Pipeline
Dominion Troy Energy
Dow Chemical
DTE Energy
DuPont
East Bay Municipal Utility
Eastman Chemical
Exxon Mobil
Feralloy Processing Co.
Fermilab
Finning Canada
Flame Logic
Ford Motor Company
General Electric
General Mills
Georgia Pacific
Gerber Food Products
Glenmount Global Solutions
Goodrich
Great Lakes Metals
Harley Davidson
Honeywell
Hydro Aluminum
IBEW/NCEA
I/N Tek & I/N Kote
Indiana Pickling Processing
ISA
Jupiter Aluminum
Kelloggs
Kinder Morgan
Knauf Fiber Glass
Littelfuse
Magnetek
Maple Leaf Farms
Marathon Ashland Pipeline
Marathon Petroleum
McGill Machine Rebuild
Meade Electric
Merit Steel
Metro. Water Rec. District
Minnesota State University
M-TEC
NASA Glenn Research
National Gypsum
Natural Ovens
Navy Public Works
Nestle
Niagara LaSalle
Nicor Gas
NIPSCO/NISOURCE
NLMK Indiana
Northern Electric
Novelis
NS Wheeling-Nisshin
Nucor Steel
Ohio State University
Pall Medical Corp.
Pfizer
Prairie Packaging
Praxair
Precoat Metals
Purdue University
Regen. Pharmaceuticals
Roche Vitamins, Inc.
Sargent & Lundy
Scheffer, Inc.
Siemens
Solo Cup
Sonoco Packaging
Steel Technologies
Steel Warehouse
Sullair
Swagelok
Tate & Lyle
The Ohmart Corp.
Thermal Process
Unilever
US Filter Control Systems
US Gypsum
USS POSCO
U.S. Steel
United Parcel Systems
Virgin Is. Water & Power
Visteon
Walker Die Casting
West Shore Pipeline
Weyerhaeuser Products
Whallon Machinery
Worthington Industries

Testimonials

"Well prepared and presented. Instructor relates well with students, and firmly grounds the training with practical applications."

"Of all the electrical classes I have been in, this was the most informative and helpful in my day to day job."

"The course was very well set up. The instructor was knowledgeable about the industry and the equipment"

"The course was fun, informative, and educational. The instructor was fantastic. He was very enthusiastic and knowledgeable about the drives, and how they work."

"Instructor put you at ease and made you feel comfortable."

"I learned a lot of useful information. The instructor was able to present the material at the level we needed, based on our knowledge coming into the course. He was very flexible in his plan, based on our needs."

"Crown trainers are always well prepared and keep topics interesting."

"Excellent presentation of drive information and basics! Instructor presents information in a way that all of the classroom attendees can understand. Very good labs."

"The content of this class was excellent! They incorporated our actual equipment into classroom setting very professionally. One of the better classes I've taken! Visuals of our actual equipment were clear and informative."

"Instructor explained any questions you have without making you feel bad. He did a great job. Great program!"

"The instructor always made sure we understood the material before going further. I'm glad I came, and will suggest it to others as well."

"Glad we had real problems to work on. Especially the communications problems rack to rack. The small class helped a lot to foster Q & A's.

Experience and Industries Served

CT&D instructors and consultants average over 30 years of experience and have provided a variety of services in the following industries.

Automotive

Consumer Products

Biotechnology

Food

Experience and Industries Served

Industrial Gases & Chemicals

Metals

Material Handling

Packaging

Experience and Industries Served

Petroleum & Pipeline

Transportation

Pharmaceutical

Utilities

Training Options

Catalog Courses

CT&D delivers regularly scheduled catalog courses throughout the year at its' Technical Training Center in Merrillville, Indiana. Topics include:

- Computer Aided Design (CAD)
- Drives
- Electrical
- Human Machine Interface (HMI)
- Instrumentation
- Maintenance
- Mechanical
- Process Lines and Facilities
- Programmable Logic Controllers (PLCs)
- Safety

Please see the Table of Contents for more specific topics.

Live Webcasted Courses

Select Courses can be delivered via:

Live webcasts with instructor presentation, demonstration, and question & answer sessions.

or

Live instructor led webcasts which are designed to provide the same content and learning as our inhouse courses.

Please see the Table of Contents for specific courses highlighted.

Mentoring

CT&D can provide an onsite mentor that is familiar with your facilities applications and who will emphasize maintenance and troubleshooting techniques to your employees.

On-Site Training

Courses delivered inhouse at the CT&D Technical Training Center can also be delivered on-site at the customers' location.

Customized Training

CT&D can customize training to fit your application and emphasize maintenance and troubleshooting techniques.

Catalog Courses

Computer Aided Design (CAD)

Basic AutoCAD:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

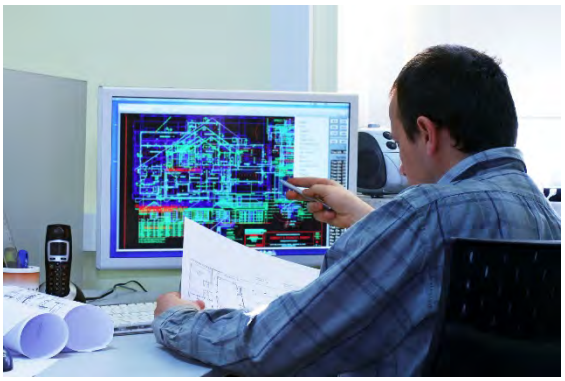
This course is an introduction to computer-aided drafting (CAD) using the AutoCAD software program.

This course comprises topics including: graphics and text windows, user interface, basic commands, creating drawings, editing drawings, organizing, printing, dimensioning, annotating, creating templates, and advanced layouts, and an introduction to 3-D.

Poly-lines and splines, hatching, printing, creating and setting up paper space layouts, blocks, attributes, and external references are also covered.

Prerequisites: Prior experience with Microsoft Windows

Jan. 4-7	Apr. 5-8	Jul. 12-15
Oct. 4-7		



Advanced AutoCAD:

Please call for availability *$1450*

This course is a continuation of the Basic AutoCAD class, using the AutoCAD software program.

This course comprises topics including: advanced text, tables, advanced annotation, dynamic block, attributes, sheet sets, managing layers, CAD standards, system setup, and customization. The course applies the AutoCAD program to electrical and mechanical drawings.

Additional topics include: editing electrical drawings, mechanical drawings, piping and instrument drawings, rendering, and PLC drawings.

Prerequisites: Basic AutoCAD

Drives

Allen-Bradley PowerFlex AC Drive:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is for engineering and maintenance personnel responsible for installing, maintaining, and troubleshooting drive systems that utilize the PowerFlex AC Drive.

Topics include: Configuration switches and jumpers within the drive, drive terminal points, critical drive parameters, using the keypad to view and change parameters, reading and interpreting control block diagrams, using the display to aid in troubleshooting. .

Labs include: Configuration and start-up the drive, interface the drive with a PLC, configuring Digital I/O, Speed References, Skip Frequencies, Ramp Rates, Stop Modes, using Drive Software, Troubleshooting, and configuring communication modules for data transfer.

Prerequisites: None

Jan. 4-7	Apr. 5-8	Jul. 12-15
Oct. 4-7		

Live Webcasted Version: Allen-Bradley PowerFlex AC Drive

4 sessions: Monday – Thursday *$850*

Same as above, however this course is delivered in four 3.5-hour sessions with instructor presentation, demonstration, and a question & answer session.

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Jan. 11-14	Apr. 12-15
	Jul. 19-22	Oct. 11-14
6 to 9:30 PM:	Jan. 4-7	Apr. 5-8
	Jul. 12-15	Oct. 4-7

All Times CST

- ***Customized scheduling for a group is available.***

Catalog Courses

Drives

Allen-Bradley PowerFlex DC Drive:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is for engineering and maintenance personnel responsible for installing, maintaining, and troubleshooting the PowerFlex DC Drive.

Topics include: Sswitches/jumpers, , parameters, control block diagrams, and troubleshooting.

Labs include: Drive startup, configuring Digital I/O, Drive Software, Troubleshooting, and communications.

Prerequisites: None

Jan. 11-14	Apr. 12-15	Jul. 19-22
Oct. 11-14		

Live Webcasted Version: Allen-Bradley PowerFlex DC Drive

4 sessions: Monday – Thursday *$850*

Same as above, however this course is delivered in four 3.5-hour sessions with instructor presentation, demonstration, and a question & answer session.

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Jan.18-21	Apr. 19-22
	Jul. 26-29	Oct. 18-21
6 to 9:30 PM:	Jan. 11-14	Apr. 12-15
	Jul. 19-22	Oct. 11-14

All Times CST

- ***Customized scheduling for a group is available***

Siemens 6RA70 Drive:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is for engineering and maintenance personnel responsible for installing, maintaining, and troubleshooting the 6RA70 DC Drive.

Topics include: Hardware configurations, software configuration, analog & digital I/O, and troubleshooting

Lab exercises include: Parameter settings, analog & binary I/O configuration, and troubleshooting.

Prerequisites: None

Jan. 18-21	Apr. 19-22	Jul. 26-29
Oct. 18-21		

Drives

Siemens 6RA80 Drive:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is for engineering and maintenance personnel responsible for installing, maintaining, and troubleshooting drive systems that utilize the 6RA80 DC Drive.

Topics include: Drive and electrical safety, DC drive basics, drive hardware, drive diagrams, setting-up and commissioning the drive, optimizing and tuning the drive, operating the drive (via CUD, BOP20, AOP30), configuring the drives analog and digital I/O and feedback options, troubleshooting the Drive, use Starter PC software, and PROFIBUS Communications.

Lab exercises include: Power section connections, parameter settings, drive initial setup requirements, self-tuning, analog & binary I/O configuration, troubleshooting, and diagnostic features of the hardware and software.

Prerequisites: None

Jan. 4-7	Apr. 5-8	Jul. 12-15
Oct. 4-7		

Live Webcasted Version: Siemens 6RA80 Drive

4 sessions: Monday – Thursday *$850*

Same as above, however this course is delivered in four 3.5-hour sessions with instructor presentation, demonstration, and a question & answer session.

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Jan. 11-14	Apr.12-15
	Jul. 19-22	Oct. 11-14
6 to 9:30 PM:	Jan. 4-7	Apr. 5-8
	Jul. 12-15	Oct. 4-7

All Times CST

- ***Customized scheduling for a group is available***

Catalog Courses

Electrical

Basic Industrial Electricity:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

Course topics include: Basic electrical wiring, electrical safety and theory, Digital multi-meters, lighting circuits, electro-mechanical relays, motor operation, and basic motor control.

Prerequisites: None

Jan. 18-21 Apr. 19-22 Jul. 26-29
Oct. 18-21

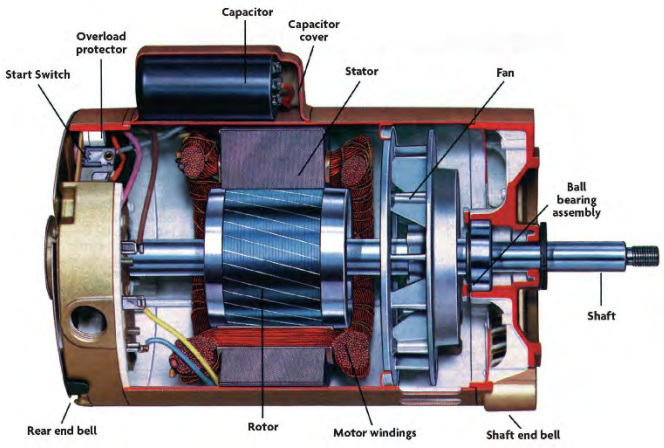
Electrical Control Circuits and Troubleshooting:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

Course topics include: Control circuits, troubleshooting, two-wire control with manual selection, overload protection, three-wire control-start/stop/jog/inch circuits, sequence start and stop, automatic sequence starting, reversing circuits, plug and anti-plug circuits, two speed motor control, and reduced voltage starting circuits.

Prerequisites: None

Jan. 25-28 Apr. 26-29 Aug. 2-5
Oct. 25-28



Electrical

Electrical Power Systems:

8 am to 4 pm cst *5 days: Monday – Friday* *$1650*

This course covers industrial power distribution. This course comprises topics including: an overview of the NFPA 70E PPE requirements, working on or racking a switchgear breaker in/out, power system distribution using single line diagrams, types of breaker X/Y closing schemes, synchronous motor field application control, 3-phase AC transformer connections, instrument transformers, circuit protection and relay coordination.

Prerequisites: None

Feb. 1-5 May 3-7 Aug. 9-13
Nov. 1-5

Motor Maintenance and Troubleshooting:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is designed for motor maintenance personnel. This class presents the procedures needed to locate and correct a malfunction in an electric motor quickly and efficiently.

Topics include: Electrical safety, magnetism, transformers, motors, DC motor control, motor maintenance, brakes, AC motor control, and AC motors.

Prerequisites: None

Feb. 8-11 May 10-13 Aug. 2-5
Nov. 8-11

Catalog Courses

Electrical

Reading Electrical Drawings:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This is a four-day class designed to improve your ability to read, interpret and analyze electrical ladder diagrams.

Topics covered: Electrical symbols, ladder diagram layout, basic rules of ladder drawings, and types of control devices, differences between electromechanical and solid-state relays, and the role of the programmable controllers and drives in electrical control.

Prerequisites: None

Feb. 15-18	May 10-13	Aug. 16-19
Nov. 15-18		

Live Webcasted Version: Reading Electrical Drawings

8 session: Monday – Thursday *$1450*

Same as above, however this course is delivered in eight 3.5-hour sessions using instructor led presentations, demonstrations and remote access hands-on labs which are designed to provide the same content and learning as our inhouse courses.

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Mar. 1-11	Jun. 7-17
	Sep. 13-23	Dec. 6-16
6 to 9:30 PM:	Feb. 15-25	May 17-27
	Aug. 23-Sep. 2	Nov. 29-Dec. 9

All Times CST

- ***Customized scheduling for a group is available***

Resolvers and Encoders:

8 am to 4 pm cst *1 day: Friday* *$650*

This course is intended to explain the construction, operation, and application of each of these devices.

Upon completion of this course the students will be able to explain in detail how an objects rotational velocity, direction, and position can be determined by properly selecting and applying these devices.

Prerequisites: None

Feb. 19	May 28	Aug. 27
Nov. 19		

Electrical

SEL-351 Feeder Protection Relay Maintenance and Troubleshooting:

8 am to 4 pm cst *2 days: Wednesday-Thursday* *$950*

This course is designed for those who work with power distribution protection devices.

Students will learn how to operate the front panel controls and interpret the front panel display. They will also utilize the acSELerator Quickset SEL–5030 software to upload/download settings, retrieve and analyze fault records, and analyze event reports. Apply methods to troubleshoot and commission power distribution protection.

Prerequisites: None

Feb. 17-18	May 26-27	Aug. 25-26
Nov. 17-18		

SEL-710 Motor Protection Relay Maintenance and Troubleshooting:

8 am to 4 pm cst *2 days: Monday – Tuesday* *$950*

This course is designed for those who work with motor circuit protection devices.

Students will learn how to operate the front panel controls and interpret the front panel display. They will also utilize software to upload/download settings, retrieve and analyze fault records, analyze event reports and motor trends, and commission motor protection.

Prerequisites: None

Feb. 15-16	May 24-25	Aug.23-24
Nov. 15-16		

Sensors:

8 am to 4 pm cst *5 days: Monday – Friday* *$1650*

This course comprises topics involving: application and theory of contact limit switches, continuing through photoelectric, ultrasonic, inductive, capacitive and RF types.

Additional topics include: thermocouples, pressure sensor, liquid flow sensor, gas flow sensor, oxygen sensor, carbon dioxide detector, light sensors, , photocells, infra-red sensor, motion sensors.

Prerequisites: None

Mar. 1-5	May 24-28	Aug. 30-Sep. 3
Nov. 15-19		

Catalog Courses

Electrical

Switchgear Breaker Safety and Maintenance:

8 am to 4 pm cst *3 days: Monday – Wednesday* *$1350*

This course is a comprehensive overview of medium voltage circuit breakers used in industrial applications and covers main components, operation (single-line, 3 line diagram, connection and interconnection diagrams) and minor maintenance. It also covers the insertion/removal (Racking) of circuit breakers, arc-flash protection, safety, and PPE requirements.

Topics include: Status indicators, protective relaying (ANSI/IEE device numbering), and substation components, Control schemes: stored energy and magnetic, X-Y anti-pump control circuit, and breaker trip circuits.

Prerequisites: None

Mar. 8-10 Jun. 7-9 Sep 13-15
Nov. 29-Dec. 1

Electrical

System Troubleshooting I:

8 am to 4 pm cst *5 days: Monday – Friday* *$1650*

This course is for those who are responsible for maintaining a PLC control system and who are familiar with basic ladder logic, controller concepts, safety devices and safety schemes, and electrical test equipment.

This course comprises topics including: system overview, troubleshooting procedures, test measurements, PLC safety devices, discrete inputs, discrete outputs, analog inputs, and analog outputs.

Participants will troubleshoot controller problems, digital I/O problems, analog I/O problems, and power supply problems.

Prerequisites: None

Mar. 15-19 Jun. 14-18 Sep. 13-17
Nov.15-19

System Troubleshooting II:

8 am to 4 pm cst *5 days: Monday – Friday* *$1650*

This course is a continuation of System Troubleshooting I. This course comprises topics including: the troubleshooting of valve operators, pump starters, motor drives, PID controllers and communications.

Participants will also troubleshoot motor starter circuits, motor drives controlled manually and by a PLC, PID controllers, and communications.

Prerequisites: None

Mar. 22-26 Jun-21-25 Sep. 27-Oct. 1
Dec. 13-17

Catalog Courses

Human Machine Interface (HMI)

Allen-Bradley Basic FactoryTalk View ME

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course provides you with the skills necessary to develop FactoryTalk View Machine Edition (ME) applications that run on a PC or PanelView Plus terminals.

You will create new applications; work with FactoryTalk View ME software and RSLinx Enterprise software. You will practice creating, configuring, and animating graphic objects on graphic displays.

Also covered are creating, configuring messages and alarms to alerting operators, trending and how to set up security for graphic displays or for rights to perform certain actions. You will then prepare a PanelView Plus terminal for operation and download FactoryTalk View ME applications to a PanelView Plus terminal.

Prerequisites: Working knowledge of Windows environment

Feb. 22-25	May 10-13	Aug. 2-6
Nov. 1-4		

Live Webcasted Version: Allen-Bradley Basic FactoryTalk View ME

8 sessions: Monday – Thursday *$1450*

Same as above, however this course is delivered in eight 3.5-hour sessions using instructor led presentations, demonstrations and labs which are designed to provide the same content and learning as our inhouse courses

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Mar. 1-11	Jun. 7-17
	Aug. 23-Sep. 2	Nov. 8-18
6 to 9:30 PM:	Feb. 22-Mar. 4	May 17-27
	Aug. 16-26	Nov. 1-11

All Times CST

- ***Customized scheduling for a group is available***

Human Machine Interface (HMI)

GE Fanuc Basic Proficy HMI/SCADA Cimplicity:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

Participants will configure a project and I/O Drivers to communicate with Cimplicity. Create and edit Point Database Tags and Graphic Screens. Configure a system for operator controls, alarming, logging, and security. Develop and modify operator screens, alarm viewers, and trend charts.

Prerequisites: Working knowledge of Windows environment

Mar. 29-Apr. 1	Jun.21-24	Sep. 27-30
Dec. 13-16		

GE Fanuc Proficy HMI/SCADA iFix:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is designed for those who develop, configure, and use applications with an iFIX system. Participants will configure iFIX nodes and I/O Drivers to communicate with iFIX. Create and edit Process Database Tags and Graphic Screens. Configure a system for operator controls, alarming, logging, and security. Develop operator screens, alarm screens, and trend screens.

Prerequisites: Working knowledge of Windows environment

Mar. 15-18	Jun. 7-10	Aug. 30-Sep. 2
Nov. 15-18		

Live Webcasted Version: GE Fanuc Poficy HMI/SCADA iFix

8 sessions: Monday – Thursday *$1450*

Same as above, however this course is delivered in eight 3.5-hour sessions using instructor led presentations, demonstrations and labs which are designed to provide the same content and learning as our inhouse courses

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Mar. 22-Apr. 1	Jun. 21-Jul. 1
	Sep. 13-23	Nov. 29-Dec. 9
6 to 9:30 PM:	Mar. 15-25	Jun. 7-17
	Sep. 13-23	Nov. 29-Dec. 9

All Times CST

- ***Customized scheduling for a group is available***

Catalog Courses

Instrumentation

Basic Instrumentation:

8 am to 4 pm cst *5 days: Monday – Friday* *$1650*

This course uses classroom and laboratory exercises to build a foundation in industrial measurement and control.

The basic concepts of pressure, level, flow, temperature, reading and interpreting basic piping and instrument drawings (P&ID) are included.

Students will calibrate transmitters and test measurement loops.

Prerequisites: None

Mar. 8-12	Jun. 7-11	Aug. 30-Sep. 3
Nov. 15-19		

Applied Instrumentation:

8 am to 4 pm cst *5 days: Monday – Friday* *$1650*

This course covers installation, calibration, and maintenance of measurement devices.

An examination of the devices used in measurement and control systems, such as PID (Proportional, Integral, and Derivative) controllers, transmitters, transducers, and recorders are covered.

Topics include: loop characteristics, test equipment, calibration, and configuration, maintenance and installation, working in hazardous locations, and trends. Reading and interpreting advanced Piping and Instrument Drawings (P&ID) will also be included.

Prerequisites: Knowledge of Basic Instrumentation

Mar. 15-19	Jun. 14-18	Sep. 13-17
Nov. 29-Dec. 3		

Instrumentation

Piping and Instrument Diagram (P&ID) Print Reading and Red-Lining:

8 am to 4 pm cst *2 days: Thursday-Friday* *$950*

This is a two-day class designed to improve your ability to read and interpret piping and instrument diagrams.

Topics include: the importance of P&IDs, identifying and describing the parts of a typical P&ID, using a legend sheets to identify symbols and labels used in a P&ID, explanation of instrument and control loops, redlining and marking-up a P&ID, submitting redlines and verification of corrected P&IDs.

Prerequisites: None

Mar. 25-26	Jun. 24-25	Sep. 23-24
Dec. 9-10		

Live Webcasted Version: Piping and Instrument Diagram (P&ID) Print Reading and Red Lining

4 sessions: Monday – Thursday *$950*

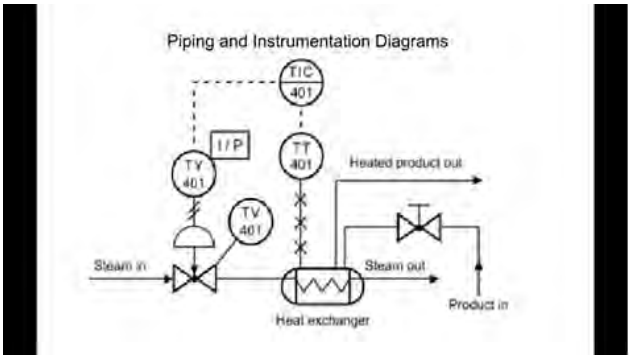
Same as above, however this course is delivered in four 3.5-hour sessions using instructor led presentations, demonstrations and labs which are designed to provide the same content and learning as our inhouse courses

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Mar. 29-Apr. 1 Sep. 27-30	Jun. 28-Jul. 1 Dec. 13-16
6 to 9:30 PM:	Mar. 22-25 Sep. 20-23	Jun. 21-24 Dec. 6-9

All Times CST

- ***Customized scheduling for a group is available***



Catalog Courses

Instrumentation

Scales:

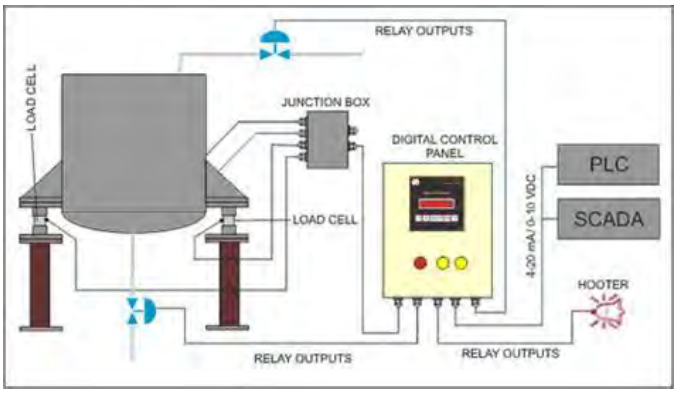
8 am to 4 pm cst *3 days: Monday – Wednesday* *$1250*

This course presents an introduction to Weighing Systems.

The following topics are covered: Tension strain gage load cells, motion weighing, how a load cell works, how to troubleshoot load cell and weighing systems, calibration methods, and how Handbook 44 applies to weighing systems.

Prerequisites: None

Mar. 22-24 Jun. 28-30 Sep. 20-22
Nov. 8-10



Instrumentation

Troubleshooting and Tuning PID Loops:

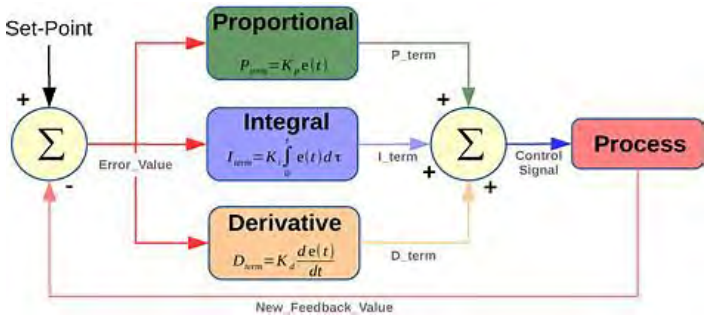
8 am to 4 pm cst *5 days: Monday – Friday* *$1650*

This course reviews and then build upon the concepts of proportional, integral and derivative control with advanced topics such as cascade, ratio and feed-forward control being covered.

Various methods of controller tuning are reviewed and practiced. Control loop troubleshooting techniques for single-loop and multi-loop systems are included. A review of reading and interpreting advanced Piping and Instrument Drawings (P&ID) is also covered.

Prerequisites: None

Mar. 29-Apr. 2 Jun. 28-Jul. 2 Sep. 27-Oct. 1
Dec. 13-17



Catalog Courses

Maintenance

Basic Troubleshooting Skills:

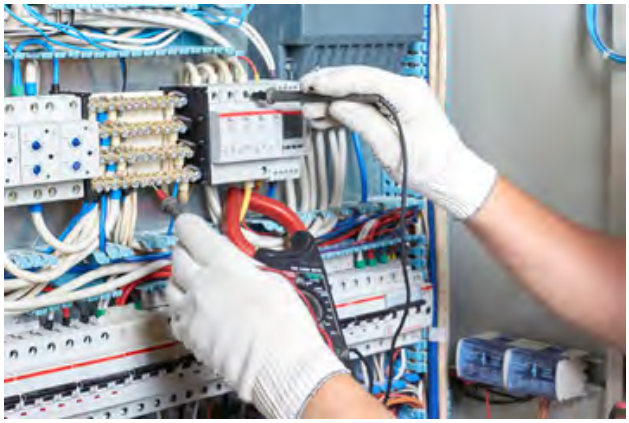
8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is designed to improve your ability to logically troubleshoot electrical issues, distinguish between electrical/mechanical problems, "divide and conquer" problems, and increase your troubleshooting efficiency.

Course topics include: Basics of troubleshooting, basics of electrical troubleshooting, basics of "Controls" troubleshooting, troubleshooting DC Drive issues, troubleshooting DC Motor issues, troubleshooting AC Motor issues, troubleshooting AC Drive issues, the basics of a process/process line, troubleshooting process/process line issues. These topics are all presented in a way that, a normal electrical maintenance person, will greatly benefit.

Prerequisites: None

Jan. 25-28 Apr. 26-29 Jul. 26-29
Oct. 25-28



Maintenance

Industrial Maintenance Planning and Scheduling:

8 am to 4 pm cst *2 days: Monday – Tuesday* *$950*

This course provides the various types of maintenance principles and best practices utilized to strive towards world class maintenance planning, scheduling and implementation.

Topics include: Emergency breakdowns, job scoping, CMMS philosophy, Risk Prioritization, planning Safety, PM, Continuous improvement - PDCA, required resources/tools/materials-standards, procedures and effective scheduling.

Prerequisites: None

Feb. 1-2 May 3-4 Aug. 2-3
Nov. 1-2

Introduction to Infrared Thermography:

8 am to 4 pm cst *2 days: Monday – Tuesday* *$950*

This course provides a basic understanding of infrared thermography philosophy, IR camera capabilities - considerations and options, and includes various industrial applications (PM inspections, power distribution, electro-mechanical, etc.).

Topics include: camera operation, safety, imaging, reports, camera maintenance, certification, and industrial applications (switchgear, bus ducts, MCC's, motors–pumps, distribution panels–breakers, etc.)

Prerequisites: None

Feb. 8-9 May 10-11 Aug. 9-10
Nov. 8-9

Introduction to Reliability Centered Maintenance (RCM):

8 am to 4 pm cst *3 days: Monday – Wednesday* *$1250*

This introductory course provides the necessary philosophy, fundamentals and best practices supporting today's World Class Maintenance organizations.

Topics include: maintenance tracking and failure analysis, measurements and statistics, risk assessment and prioritization, scheduling and various problem-solving methods are provided to improve reliability.

Prerequisites: None

Feb. 15-17 May 17-19 Aug. 16-18
Nov. 15-17

Catalog Courses

Maintenance

Introduction to Vibration Measurement and Analysis:

8 am to 4 pm cst *2 days: Monday – Tuesday* *$950*

This course provides a basic understanding of vibration theory, measurement fundamentals and monitoring tools, required for vibration measurement, monitoring and analysis of vibration-related industrial system applications.

Topics include: displacement, velocity, acceleration measurements in terms of mass and speed.
Also included: monitoring methods, vibration as a PM tool and equipment maintenance practices.

Prerequisites: None

Feb. 22-23 May 24-25 Aug. 30-31
Nov. 29-30

Outage Planning, Plant Shutdowns and Turnarounds:

8 am to 4 pm cst *2 days: Thursday-Friday* *$950*

This course provides project leaders and maintenance managers with an overview of the different types of process plant shutdowns (planned, unplanned, emergency), managing events, efficient plant turnarounds and start-up philosophies.

Topics include: 5 phases - initiating, planning, executing, controlling, closing. Disaster recovery, scheduling, estimation, contractor and safety management, managing human resources, tracking critical milestones and post shut down review.

Prerequisites: None

Feb. 4-5 May 6-7 Aug. 5-6
Nov. 4-5

Maintenance

Preventive and Predictive Maintenance:

8 am to 4 pm cst *2 days: Thursday-Friday* *$950*

This course provides the necessary fundamentals and best practices required to prevent and predict failures at the equipment or process level. Understanding process and equipment specifications, failure tracking statistics, and scheduled action items, are key to a successful maintenance program.

Topics include: maintenance tracking, measurements and statistics, root cause failure analysis, risk assessment and prioritization, inspections, scheduling and integration of best practices.

Prerequisites: None

Feb. 11-12 May 13-14 Aug. 12-13
Nov. 11-12

Root Cause Failure Analysis and Problem Solving Tools:

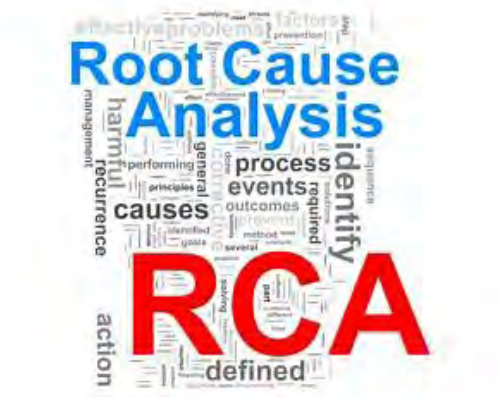
8 am to 4 pm cst *2 days: Thursday-Friday* *$950*

This course provides the necessary philosophy, fundamentals and problem-solving methodology to reduce future (equipment, system or process) failures, resultant from the development of a Root Cause Failure Analysis. The analysis process utilizes problem-solving tools that identifies Corrective Actions which includes risk assessment and prioritization.

Topics include: measurements and statistics, root cause failure analysis, risk assessment and prioritization, analytical analysis and corrective actions that can be applied across safety, environmental, quality, production and maintenance.

Prerequisites: None

Feb. 25-26 May 27-28 Sep. 2-3
Dec. 2-3



Catalog Courses

Mechanical

Basic Hydraulics and Pneumatics:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is designed for those who are responsible for the operation and maintenance of industrial hydraulic systems. Also, those who simply wish to acquire a basic knowledge of hydraulic systems will benefit from this course.

Basic hydraulic principles and laws will be covered, along with detailed descriptions of the theory and operation of all essential components.

Hands on exercises will be conducted using industrial grade equipment. Various pumps will be discussed including power requirements to drive these pumps.

Detailed maintenance practices directed to promote reliable equipment service is part of the presentation. Troubleshooting and construction of basic systems are incorporated in the lab exercises.

Prerequisites: None

Mar. 8-11	Jun. 14-17	Aug. 30-Sep. 2
Oct. 25-28		

Basic Machine Alignment:

8 am to 4 pm cst *2 days: Monday – Tuesday* *$1150*

This course presents the basics of Machine Alignment. Assessments, Tools, and Field Exercises are included in the curriculum.

Upon completion, the student should be able to: discuss why alignment is beneficial, read and interpret measuring instruments, describe a soft foot, make shim size calculations, demonstrate straight edge alignment techniques, demonstrate the use of a dial indicator in an alignment application.

Prerequisites: None

Mar. 15-16	Jun. 21-22	Sep.13-14
Dec. 13-14		

Mechanical

Reading Mechanical Drawings:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course provides the student with the fundamentals essential to reading and interpreting Basic Mechanical Prints.

Topics include: Drawing symbols, drawing types including sections, and views. Dimensioning and tolerances will be covered in detail. Students will be provided with classroom labs including reading prints and sketching exercises.

Prerequisites: None

Feb. 15-18	May 17-20	Aug. 9-12
Nov. 29-Dec. 2		

Live Webcasted Version: Reading Mechanical Drawings

8 sessions: Monday – Thursday *$1450*

Same as above, however this course is delivered in eight 3.5-hour sessions using instructor led presentations, demonstrations and labs which are designed to provide the same content and learning as our inhouse courses

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Feb. 22-Mar. 4	Jun. 7-17
	Aug. 23-Sep. 2	Dec. 6-16
6 to 9:30 PM:	Mar. 8-18	Jun. 21-Jul. 1
	Sep. 20-30	Dec. 6-16

All Times CST

- ***Customized scheduling for a group is available***

Catalog Courses

Process Lines and Facilities

Blast Furnace Stoves Operation:

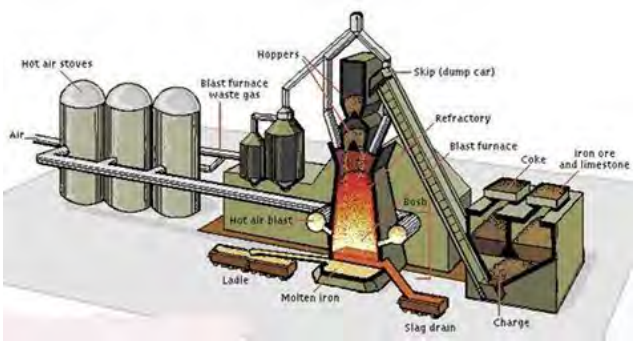
8 am to 4 pm cst *3 days: Monday – Wednesday* *$1250*

This course covers the basic stove design and the different valves required to operate the stoves. The modes of operation and the sequence of operation in Auto, Semi-Auto, Manual, and Maintenance will be discussed. The physical location of stove valves and instrumentation will be covered, Blast Furnace gas cleaning system, back drafting operation and snort Valve operation will be presented.

The course also displays the control system and PLC screens use to monitor and control the operation of the stoves.

Prerequisites: None

Jan. 4-6	Apr. 5-7	Jul. 12-14
Oct. 4-6		



Conveyor Systems:

8 am to 4 pm cst *2 days: Thursday-Friday* *$1150*

This course is an introduction to conveyor systems. The central theme will be safety when working on and around conveyors.

Topics covered will include conveyor types and construction. Drive systems, alignment and safety interlocks. Sequencing and speed matching. Inspection and troubleshooting conveyor problems. Maintenance and repair of conveyors and associated equipment. Students will be encouraged to discuss issues involving conveyors at their work locations.

Prerequisites: None

Jan. 7-8	Apr. 8-9	Jul. 15-16
Oct. 7-8		

Process Lines and Facilities

Process Line Fundamentals and Tension Analysis:

8 am to 4 pm cst *5 days: Monday – Friday* *$1650*

This course consists of subjects designed to provide an understanding of the various drives, which make up a process line and the application of electric motors, controls, and power supplies needed to satisfy their requirements. Practical application problems will be solved as part of the course.

Included in the course are discussions on DC Motors, AC Motors, Multiple Motor Drives, Bridles, Helper Drives, Generators, Thyristor Power Supplies, Variable Frequency Power Supplies, Reels, Storage Devices, Levelers, and Side Trimmers.

A practical discussion of the principles of bridle operation and the engineering required to obtain successful operation will be reviewed. An in depth discussion of reels, their components, and their operation on various types of process lines will be presented.

Tension Analysis calculations of a typical line will be discussed including how to calculate and handle bending and friction losses. During this course, students are encouraged to bring up particular problems for analysis.

Prerequisites: None

Jan. 4-8	Apr.5-9	Jul. 12-16
Oct. 4-8		

Live Webcasted Version: Process Line Fundamentals and Tension Analysis

10 sessions: Monday – Friday *$1650*

Same as above, however this course is delivered in ten 3.5-hour sessions using instructor led presentations, demonstrations and labs which are designed to provide the same content and learning as our inhouse courses

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Feb. 15-26	May 17-28
	Aug. 16-27	Nov. 29-Dec. 10
6 to 9:30 PM:	Jan. 11-22	Apr. 12-23
	Jul. 12-23	Oct. 11-22

All Times CST

- ***Customized scheduling for a group is available***

Catalog Courses

Process Lines and Facilities

Steel Finishing Processes Overview:

8 am to 4 pm cst 3 days: Monday – Wednesday $1250

This course introduces the Hot Strip Mill where red hot slabs are rolled into strips, the product then proceeds to a pickling facility to be cleaned prior to cold rolling.

This course comprises topics including: how the cold rolling process which reduces the thickness and carefully controls the cross section shape, and annealing facilities.

Additional topics include: tempering the strip to achieve the desired final metallurgical quality, and coating methods.

Prerequisites: None

Jan. 25-27 Apr.19-21 Jul. 19-21
Oct. 18-20

Process Lines and Facilities

Steel Making Processes Overview:

8 am to 4 pm cst 3 days: Monday – Wednesday $1250

This course gives an overview of the initial phases of steel making; beginning with Coke production, and other ingredients fed into a blast furnace to make iron.

This course comprises topics including: furnace operation, and the conversion of iron into steel.

Additional topics include: continuous casters that make slabs, which will then be rolled into a hot band at the hot strip mill, equipment names, and various terms unique to the entire process.

Prerequisites: None

Jan. 11-13 Apr. 12-14 Jul. 12-14
Oct. 11-13

Catalog Courses

Programmable Logic Controllers

Basic ControlLogix Maintenance and Troubleshooting:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is for those who have little or no working experience with ControlLogix systems and who need to interpret, make changes to, and/or Draft Ladder Logic. Participants will identify the hardware associated with a Basic ControlLogix system, create and modify a Studio 5000 project, establish communications with a Controller, create and monitor Data Tags, document and search Ladder Logic.

Topics include: Communications, Software Menus, Digital and Analog I/O Modules, Basic Instructions, Troubleshooting Features.

Labs include: Configuring Communications Drivers and Setting IP Addresses, Configuring Digital and Analog I/O Modules, Modifying and Programming Instructions Relays (Bit), Timers and Counters, Program Control, Compare Compute, and Math and Analog Scaling.

Prerequisites: None

Jan. 18-21	Apr.5-8	Jul. 19-22
Oct. 18-21		

Live Webcasted Version: Basic ControlLogix Maintenance and Troubleshooting

8 sessions: Monday – Thursday *$1450*

Same as above, however this course is delivered in eight 3.5-hour sessions using instructor led presentations, demonstrations and labs which are designed to provide the same content and learning as our inhouse courses

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Jan. 25-Feb. 4	Apr. 19-29
	Jul.26-Aug. 5	Nov. 1-11
6 to 9:30 PM:	Jan. 25-Feb. 4	May 3-13
	Aug. 2-12	Oct. 25-Nov. 4

All Times CST

- ***Customized scheduling for a group is available***

Programmable Logic Controllers

Advanced ControlLogix Maintenance and Troubleshooting:

8 am to 4 pm cst *4 days: Monday – Thursday* *$1450*

This course is for those who develop, debug, program or maintain ControlLogix Controllers using Ladder Logic, Function Block, and Structured Text programming. Students will be able to establish communications to a ControlLogix controller, explain the organization of a ControlLogix application, Perform routine maintenance, Create a new project, configure I/O, download/upload projects, going online, change processor modes, create and monitor tags, and edit the program.

Topics include: Major, Minor and I/O Faults, GSV and SSV Instructions, Ethernet Communications, ControlNet Communications, and ADD-ON Instructions, and an Introduction to Ladder Diagram Programming, Function Block Programming, and Structured Test Programming.

Labs include: Creating and Programming Fault Routines, Configuring and Scheduling an Ethernet and ControlNet LAN and Programing an ADD-ON Instructions.

Prerequisites: None

Feb. 8-11	May 17-20	Aug. 16-19
Oct. 25-28		

Catalog Courses

Programmable Logic Controllers

GE Fanuc Basic PACSystems RX3i:

8 am to 4 pm cst 4 days: Monday – Thursday $1450

This course examines the Series RX3i basic hardware and Proficy Machine Edition software. The power supply, CPU, discrete analog I/O modules are covered as well as project creation, hardware configuration, addressing, program organization and basic programming.

This course includes: Routine maintenance such as: going online, uploading/downloading, project backup, changing modes of operation, battery replacement, setting of the PLC time/date, changing addresses and editing variable descriptions.

Exercises include: Hardware configuration, programming basic instructions (relays, timers, counters, math, and compare), examples of control circuits, alarm circuits and analog scaling, and troubleshooting features of the software and I/O card maintenance.

Prerequisites: None

Jan. 18-21 Apr. 26-29 Jul. 26-29
Oct. 18-21

Live Webcasted Version: GE Fanuc Basic PACSystems RX3i

8 sessions: Monday – Thursday $1450

Same as above, however this course is delivered in eight 3.5-hour sessions using instructor led presentations, demonstrations and labs which are designed to provide the same content and learning as our inhouse courses

Student Requirements: Computer with a camera, microphone, and internet connection.

8 to 11:30 AM:	Feb. 1-11	May 3-13
	Aug. 9-19	Nov. 1-11
6 to 9:30 PM:	Feb. 1-11	Apr. 26-May 6
	Aug. 2-12	Oct. 25-Nov. 4

All Times CST

- ***Customized scheduling for a group is available***

Programmable Logic Controllers

GE Fanuc Advanced PACSystems RX3i:

8 am to 4 pm cst 4 days: Monday – Thursday $1450

This course covers advanced instructions (data transfer, bit manipulation, user defined function blocks, and PID loops), Genius I/O installation and configuration, Genius Hand-Held Monitor, and troubleshooting.

Topics include: Ethernet Global Data, Genius communications, and Genius I/O hardware.

Hands-on exercise include: Programming user defined function blocks, Genius LAN setup and configuration, transferring data on an Ethernet LAN and a Genius LAN, and PID loops.

Prerequisites: None

Feb. 8-11 May 3-6 Aug. 23-26
Oct. 25-28

Catalog Courses

SAFETY

Accident Investigations and Disaster Recovery Guidelines:

8 am to 4 pm cst *2 days: Monday – Tuesday* *$850*

This course provides best practices required for successful accident investigations, accident response actions, required resources and disaster recovery guidelines.

Topics include: Types of accidents – incidents, 9 accident investigation steps, human behaviors, causal analysis, corrective actions, JSA, investigation forms, risk assessment, IDEM and disaster recovery guidelines.

Prerequisites: None

Jan. 25-26 Apr. 26-27 Jul. 26-27
Oct. 11-12

General Industrial Safety:

8 am to 4 pm cst *2 days: Wednesday - Thursday* *$850*

This program is intended to provide instruction on a variety of general industry safety and health standards to entry-level participants.

Course topics covered include: Introduction to OSHA, Inspections, Citations and penalties, walking and working surfaces, means of Egress and fire protection, hazardous materials, personal protective equipment, machine guarding, hazard communication, blood borne pathogens, and safety and health programs.

Prerequisites: None

Jan. 27-28 Apr. 28-29 Jul. 28-29
Oct. 13-14

SAFETY

Job Safety Analysis (Procedure Development):

8 am to 4 pm cst *2 days: Monday – Tuesday* *$850*

This course provides the necessary philosophy and tools required for employees to develop successful job safety analysis and procedures for their organizations, thereby preliminarily minimizing job safety hazard conditions and risks, to employees and company assets.

Topics include: job safety statistics, required resources, hazard identification, risk assessment, root cause, FMEA – failure mode cause and effect, HEA - Human Error Analysis, training and controls, PPE and procedures, and review.

Prerequisites: None

Mar. 1-2 May 24-25 Aug. 16-17
Nov. 8-9

Lock Out Tag Out Program (Compliance & Procedures):

8 am to 4 pm cst *2 days: Wednesday - Thursday* *$850*

This course provides the necessary requirements for organization's to maintain compliance with OSHA Lock Out Tag Out Standard for "the Control of Hazardous Energy ….. procedures and guidance".

Topics include: review of OSHA 29 CFR 1910.147 standard, program, procedures, energy control points, tagout tags, training, tools, devices, arc flash, group lock out, resources and PPE.

Prerequisites: None

Mar. 3-4 May 26-27 Aug. 18-19
Nov. 10-11

Catalog Courses

SAFETY

NFPA 70E Standard for Electrical Safety in the Workplace:

8 am to 4 pm cst *1 day: Friday* *$450*

This 8 hour course is based upon the NFPA 70E Standard for Electrical Safety in the Workplace.

Topics include: OSHA and NFPA 70E. Mitigating Shock Hazards, Arc Flash Hazards and Arc Blast Hazards by selecting the appropriate protective strategies. Safe electrical work practices. Determining shock boundaries and arc flash boundaries. Selecting and using Personal Protective Equipment (apparel, tools, and test equipment). Reading and interpreting arc flash labels. Inspecting and maintaining PPE.

Prerequisites: None

Jan. 29	Mar. 5	Apr. 2
Apr. 30	May 28	Jul. 2
Jul. 30	Aug. 20	Oct. 1
Oct. 15	Nov. 12	Dec. 17

SAFETY

Safety, Health and Environmental Auditing Program:

8 am to 4 pm cst *2 days: Monday – Tuesday* *$850*

This course provides organizations with the required fundamentals to develop and implement a safety audit program. Risk assessment, safety records - procedures, policy and regulations determines the baselines for various types of safety audit scopes and auditing measures.

Topics include: risk analysis, scope, resources, inspections vs. audits, checklist development, auditors – training, scheduling, measurements, JSA - corrective actions, reporting and improvement monitoring.

Prerequisites: None

Mar. 29-30	Jun. 28-29	Sep. 27-28
Dec. 13-14		

SOP/SJP (Procedure Development):

8 am to 4 pm cst *2 days: Wednesday - Thursday* *$850*

This course provides the basic fundamentals and best practices for developing SOP (Standard Operating Procedures) and JSP (Job Safety Procedures).

Topics: Defining Scope, Resources, Process and Work-flow diagrams, Procedure Development, Sign-off, Implementation, Metrics, Review and Improvement Process.

Prerequisites: None

Mar. 31-Apr. 1	Jun. 30-Jul. 1	Sep. 29-30
Dec. 15-16		

Electrical Maintenance Program

Course Description	Contact Hours
DC Electricity I	**40**
This course is an introduction to DC electricity and covers how to solve trade-related problems using basic mathematical skills. This course comprises topics including: how changes in the value of voltage, current or resistance affect the circuit, the methods of producing electromotive force (EMF), resistor types and ratings. Participants will connect and analyze a series resistive circuit, parallel resistive circuit, and series-parallel resistive circuits.	Week 1
DC Electricity II	**40**
This course is a continuation of DC Electricity I. This course comprises topics including: the requirements for installation and maintenance of batteries, the characteristics of magnetic and electromagnetic materials, the generation of electricity in dc generators, the properties of conductors, semiconductors, insulators and fiber optic cables. Participants will splice, tap and terminate conductors, connect switching circuits using schematic and wiring diagrams, and determine the conductors required for installations.	Week 2
Applications of DC Electricity	**40**
This course is a continuation to DC Electricity II. This course comprises topics including: relays and controls, inductance, capacitance, time constants, wave shaping, and an introduction to DC motors. Participants will connect and use electrical meters to measure circuit properties of a full voltage starter.	Week 3
AC Electricity I	**40**
This course is an introduction to alternating current and covers how to solve trade-related problems using basic mathematical skills. This course comprises topics including: the fundamentals of alternating current (AC) and the characteristics of AC circuits. Components covered are resistors, inductors in circuits, capacitors in circuits, calculating power, reactive power and apparent power in AC circuits. Participants will also connect and analyze AC series circuits containing resistors, inductors and/or capacitors.	Week 4

Electrical Maintenance Program

Course Description	Contact Hours
AC Electricity II	**40**
This course is a continuation of AC Electricity I. This course comprises topics involving: AC series circuits that contain resistors and inductors, resistors and capacitors, and resistors, inductors, and capacitors (RLC), and parallel AC circuits containing resistors, inductors or capacitors. Additionally power factor correction and transformers are covered.	Week 5
Applications of AC Electricity	**40**
This course is a continuation of AC Electricity II. This course comprises topics involving: three-phase induction motors, relays and contactors, timers and smart relays, control and protective devices for a motor branch circuit. Participants will connect and analyze full voltage non-reversing (FVNR) motor control circuits and full voltage reversing (FVR) motor control circuits.	Week 6
Reading Electrical Drawings	**40**
This course presents the basic electrical device symbols and drawing practices used in the various drawing types. This course comprises topics involving: layout and equipment drawings, conduit and cable schedules, single line diagrams, connection diagrams, schematics (prints), and elementary drawings. Programmable Logic Controller (PLC) I/O prints, crane control prints, and motor control prints are also included.	Week 7
Basic AutoCAD	**40**
This course is an introduction to computer-aided drafting (CAD) using the AutoCAD software program. This course comprises topics including: graphics and text windows, user interface, basic commands, creating drawings, editing drawings, organizing, printing, dimensioning, annotating, creating templates, and advanced layouts, and an introduction to 3-D. Poly-lines and splines, hatching, printing, creating and setting up paper space layouts, blocks, attributes, and external references are also covered.	Week 8

Electrical Maintenance Program

Course Description	Contact Hours
Advanced AutoCAD	**40**
This course is a continuation of the Basic AutoCAD class, using the AutoCAD software program. This course comprises topics including: advanced text, tables, advanced annotation, dynamic block, attributes, sheet sets, managing layers, CAD standards, system setup, and customization. The course applies the AutoCAD program to electrical and mechanical drawings. Additional topics include: editing electrical drawings, mechanical drawings, piping and instrument drawings, rendering, and PLC drawings.	Week 9
Electrical Safety and Codes	**40**
This course covers NFPA 70E Electrical Safety in the Workplace and NFPA 70 National Electrical Code for general industry. This course comprises topics including: electrical hazards, arc flash hazards, interpreting arc flash labels, describing the requirements for qualified personnel, identifying the types of and required personal protective equipment. Additional topics include: branch-circuits, feeders, switchboards, panelboards, disconnects, over-current protection, grounding, wiring, switches, lighting, and emergency systems codes.	Week 10
Analog Electronics	**40**
This course is an introduction to analog electronic components and basic circuits. This course comprises topics including: the operation and symbols for diodes, zener diodes, light emitting diodes, transistors, junction field effect transistors, metal oxide semiconductor field effect transistors, silicon controlled rectifiers, TRIACs, unijunction transistors, DIACs, and IGBTs. Circuit applications such as clippers, clampers, regulators, optical isolators, DC power supplies and filters, and SCR/IGBT packages are also covered.	Week 11
Digital Electronics	**40**
This course is an introduction to Digital Electronic components and their basic circuits. This course comprises topics including: number systems and conversion, the basic logic gates, advanced logic gates, Boolean expressions, truth tables, encoding and decoding, and types of flip-flops. Applications such as counters, registers, math, analog to digital conversion, and digital to analog conversion in PLCs and other electronic equipment are also covered.	Week 12

Electrical Maintenance Program

Course Description	Contact Hours
Applied Electronics	**40**
This course covers basic electronic circuits typically used in an industrial environment. This course comprises topics including: bipolar transistor amplifiers, typical amplifiers and switches, amplifier classes, signal coupling, field effect transistor amplifiers, operational amplifiers, and oscillators. Applications such as function block programming, analog input and output cards, motor drive controls, summing junctions, speed reference generation and selection, and motor drive diagrams are also covered.	Week 13
Electrical Power Systems	**40**
This course covers industrial power distribution. This course comprises topics including: an overview of the NFPA 70E PPE requirements, working on or racking a switchgear breaker in/out, power system distribution using single line diagrams, types of breaker X/Y closing schemes, synchronous motor field application control, 3 phase AC transformer connections, instrument transformers, circuit protection and relay coordination.	Week 14
Motor Maintenance and Troubleshooting	**40**
This course covers the construction, operation, maintenance and troubleshooting of AC and DC Motors. This course comprises topics including: electricity and motors, magnets and magnetic fields, DC motor parts, DC generators, DC motor types and operation, AC motor theory and operation, motor lead identification and connections. Additional topics include: troubleshooting, testing and maintenance of DC motors and AC motors, and motor test equipment.	Week 15
Electrical Control Circuits and Troubleshooting	**40**
This is a continuation of Motor Maintenance and Troubleshooting, which encompasses motor control circuits. This course comprises topics including: two-wire control with manual selection, overload protection, three-wire control, start/stop/jog/inch circuits, sequence start and stop, automatic sequence starting, reversing circuits, plug and anti-plug circuits, two speed motor control, and reduced voltage starting circuits. Additional topics include: wiring, testing and troubleshooting of control circuits.	Week 16

Electrical Maintenance Program

Course Description	Contact Hours
ControlLogix Maintenance and Troubleshooting	**40**
This course is an introduction for those who need to interpret and edit ladder logic, and also maintain or troubleshoot an AB ContolLogix PLC. This course comprises topics including: configuring the CPU, communications modules, digital I/O modules, analog I/O modules, troubleshooting, and reading I/O diagrams. Additional topics include: modifying and programming relays (Bit) instructions, timer instructions, counter instructions, program control instructions, compare instructions, compute instructions, math instructions, and also analog input and output scaling are also covered.	Week 17
AC/DC Drives	**40**
This course comprises DC Drive topics including: the DC motor armature, counter-emf, regenerative and dynamic braking, shunt, series, and compound motors, base speed, constant torque, constant horsepower, feedback, and DC motor quadrant operation. This course also comprises AC Drive topics including: AC motor stator, rotor, concepts of locked rotor, torque, synchronous speed and motor slip, AC motor code letters, AC motor torque, and identifying motor leads. Configuring a DC drive and an AC drive and troubleshooting techniques are also covered.	Week 18
Basic Instrumentation	**40**
This course introduces the concepts of temperature, level, flow and pressure. This course comprises topics including: types of control, piping and instrument drawings (P&ID), hand switches, limit switches, proximity switches, pressure switches, level switches, flow switches, temperature switches, and current loops. Additional topics include: operation and calibration of pressure transmitters, level transmitters, flow transmitters, current to pneumatic converters (I/P), pneumatic to current converters (P/I), pressure to level conversion, level to pressure conversion, differential pressure, and square root extractors are also covered.	Week 19
Applied Instrumentation	**40**
This course is a continuation of Basic Instrumentation and covers the concepts of closed loop control and tuning. This course comprises topics involving: feedback, on/off control, proportional control, integral control, derivative control, pneumatic controllers, analog electronic controllers, digital electronic controllers, PID tuning, and process safety. Additional topics include: loop tuning of various control schemes using GE Fanuc PLC PID's, AB ControlLogix PLC PID's, Rosemont electronic PID controller, and Moore controller.	Week 20

Electrical Maintenance Program

Course Description	Contact Hours
Human Machine Interface (HMI)	**40**
This course provides the tools to develop FactoryTalk View Machine Edition (ME) applications that run on a PC or Panel View Plus terminals. This course comprises topics including: creating new applications, FactoryTalk View ME software and RSLinx Enterprise software, creating, configuring, and animating graphic objects in graphic displays. Additional topics include: creating, configuring messages and alarms, trending, security for graphic displays or for rights to perform certain actions, and downloading FactoryTalk View ME applications to a Panel View Plus terminal.	Week 21
System Troubleshooting I	**40**
This course is for those who are responsible for maintaining a PLC control system and who are familiar with basic ladder logic, controller concepts, safety devices and safety schemes, and electrical test equipment. This course comprises topics including: system overview, troubleshooting procedures, test measurements, PLC safety devices, discrete inputs, discrete outputs, analog inputs, and analog outputs. Participants will troubleshoot controller problems, digital I/O problems, analog I/O problems, and power supply problems.	Week 22
System Troubleshooting II	**40**
This course is a continuation of System Troubleshooting I. This course comprises topics including: the troubleshooting of valve starters, pump starters, motor drives, PID controllers and communications. Participants will also troubleshoot motor starter circuits, motor drives controlled manually and by a PLC, PID controllers, and communications.	Week 23
Curriculum Total	**Hours**
Total curriculum hours over a 23-month period:	**920**

Customized programs as well as flexible and “fast-track” scheduling are available.

Please contact us for more information and to enroll!

Mechanical Maintenance Program

Course Description	Contact Hours
Introduction to Basic Machines	**40**
This course provides an overview of mechanical systems. Simple machines, such as the lever, inclined plane, and wheel are the building blocks of most complex mechanical systems. This course comprises topics including: how machines manipulate mechanical forces, distance and friction, mechanical advantage. With the foundational information presented in this class, users will be prepared to understand more complex mechanical systems.	Week 1
Hand Tools and Shop Equipment	**40**
This course is an introduction to safety, maintenance, and operation of the equipment and tools typically found in repair shop facility. This course comprises topics including: grinder operation, wheel inspection and dressing, and rest plate adjustment. Additional topics include: the drill press, properly securing the work piece, drill bit speed for various materials, abrasive saw inspection, band saw inspection, and proper methods of cutting.	Week 2
Precision Measurement	**40**
This course is an introduction to craft level math and use of precision measurement instruments. This course comprises topics including: fractions, decimals, conversions, right triangle geometry, applications, tolerances, areas and volumes, weights, pump curves, square corners, shaft alignment, dynamic balancing, hydraulic force, and pressure. Additional topics include: measurement tools, scales, micrometers, and vernier scales.	Week 3
Basic Rigging, Inspection and Signaling	**32**
This course introduces the concepts of rigging and crane safety. This course comprises topics including: calculating the loading on various rigging components in the lift, choosing correctly rated components, understanding component limitations, load weight, balance, and rigging geometry effects. Additional topics include: planning a lift, signals, slings, hitches, hardware, chains, wire rope, inspection and maintenance of rigging equipment.	Week 4

Mechanical Maintenance Program

Course Description	Contact Hours
Burning and Welding	**40**
This course is an introduction to burning and welding theory. Emphasis is placed on safety, and proper handling of gas cylinders. This course comprises topics including: welding preparation, rod selection and identification, post welding procedures such as preening and post heating, fuel and oxygen pressure settings, and other related topics.	Week 5
Critical Inspection Requirements	**40**
This course is an introduction to critical inspections and their regulatory requirements. This course comprises topics involving: structural, crane, and lifting device inspections, regulatory requirements regarding what to inspect and when to inspect it are covered, common structures and components are reviewed, failure modes, what to inspect for on common structures and equipment components.	Week 6
Fasteners	**40**
This course is an introduction to threading standards. This course comprises topics including: bolt specifications and grades, tightening and torque, tightening techniques such as heat expanding and impact driving, thread cutting and repair, methods of fastener, snap rings, pins, rivets and adhesives.	Week 7
Lubrication and Oil Analysis	**40**
This course is an introduction to lubrication and oil analysis. This course comprises topics including: types of lubrication systems and their maintenance requirements, ring, bath, splash, constant level, and forced feed lubrication systems, lubrication schedules, how to change common types of oil filters, and how to properly handle and store lubricants to prevent contamination. Additional topics include: oil sampling methods, preparation of the oil for analysis, and contamination materials that may indicate potential failure.	Week 8

Mechanical Maintenance Program

Course Description	Contact Hours
Bearings	**40**
This course provides a comprehensive coverage of bearings. This course comprises topics involving: bearing types ranging from insert bearings through roller and spherical bearings, proper care and handling, proper installations including heat and forced fits as well as preloading of the bearings as required.	Week 9
Gears and Gearboxes	**40**
This course provides an in-depth coverage of gear boxes. This course comprises topics involving: types, torque and inertia relationships on the input and output shafting, lubrication and bearings will also be addressed.	Week 10
Power Transmission	**40**
This course is an introduction to power transmission. This course introduces topics including: installing and maintaining mechanical drives, belts, chains, gears, proper lubrication, bearings, proper alignment, fastening techniques, troubleshooting, spotting the symptoms of failure and selection of the appropriate remedy.	Week 11
Reading Mechanical Drawings	**40**
This course is an introduction to the fundamentals essential for reading and interpreting Basic Mechanical Prints. This course comprises topics involving: drawing tools, measurement tools, tolerances, clearances and fits, types of drawings/prints, types of material, bolts and fasteners, and types of gearing and couplings. Additional topic include: symbols, piping and instrument diagrams, hydraulic prints and pneumatic prints.	Week 12
Energy Control	**40**
This course covers the recognition of all forms of stored energy that are a danger. This course comprises topics involving: methods of isolation and removal of hazards, methods of documentation and coordination of activities with multiple craft involvement.	Week 13

Mechanical Maintenance Program

Course Description	Contact Hours
Basic Machine Alignment	**40**
This course is an introduction to alignment from the foundation to final operation of the equipment. This course comprises topics including: measurement tools, alignment exercises using a straight edge, alignment using dial indicators, and alignment using a laser. Additional topics will include: elements of rigging and power transmission.	Week 14
Vibration and Balance	**16**
This is an introductory level course in vibration monitoring theory. This course comprises topics including: displacement, velocity, acceleration measurements, and selection of monitoring methods as impacted by equipment mass and speed. Additional topics include: vibration as a predictive maintenance tool, the importance of balancing, and balancing techniques.	Week 15
Materials, Fits and Finishes	**40**
This course is an extensive coverage of the properties of the materials commonly used in industrial equipment. The characteristics of steel will be of particular importance. This course comprises topics including: strength, hardness, thermal expansion, grades, wear, weld-ability, machine-ability, and stress/strain. Additional topics include: fits and clearances, and the importance of finishing requirements for specific applications.	Week 16
Pipefitting	**16**
The course includes coverage of the most widely accepted materials used for pipe, fittings, and valves. The participant will learn how to use the tools of the trades, with emphasis on safety. This course comprises topics including: the methods used to join pipe, the procedures for supporting, installing, and testing piping systems. Additional topics include: common plumbing fixtures, installation and maintenance, and a review of tanks, pumps, and boilers.	Week 17

Mechanical Maintenance Program

Course Description	
Pumps, Packing and Seals	**24**
This course explains pumps and their operation. This course comprises topics including: reciprocating pumps, rotary pumps, special-purpose pumps, diaphragm pumps, and pumps used for corrosive or abrasive materials. Additional topics include: the maintenance of pumps, the replacement of packing glands, seals, and bearings.	Week 18
Valves / Regulators	**16**
This course is an introduction to valves used in industry. This course comprises topics including: construction, best uses, limitations, gate valves, globe valves, ball valves, diaphragm valves, disc valves, butterfly valves, and check valves. Additional topics include: seats, trim, materials, actuators, regulating pressures and flows.	Week 19
Basic Hydraulics and Pneumatics	**40**
This course introduces basic hydraulic principles and laws, along with detailed descriptions of the theory and operation of all essential components. This course comprises topics including: types of hydraulic fluids and their characteristics, components of the hydraulic system and their functions, filters, strainers, reservoirs, accumulators, pumps, piping, tubing, hoses, control valves, relief valves, actuating devices, cylinders, and hydraulic motors. Additional topics include: Hydraulic and pneumatic components, power requirements, maintenance practices, troubleshooting, and construction.	Week 20
Curriculum Total	**Hours**
Total curriculum hours over a 20-month period:	**704**

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2642 East 84th Place, Merrillville, IN 46410
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From Indianapolis: I-65 North to exit 253A turn off onto ramp towards US 30 (East) Take to Colorado Street (xfinity store on right), turn right. Take to 84th Place and make a right. Take 84th Place approximately ½ mile and then turn right into CT&D complex.

From South Bend: Take I-80 (I-94) West. At I-80 Exit 12A turn onto ramp towards I-65 Indianapolis. Merge onto I-65 (South-West). At I-65 exit 253A, turn off onto ramps towards US 30 Valparaiso. Continue East on US 30 to Colorado Street (xfinity store on right). Make a right on Colorado Street and take to 84th Place. Make a right on 84th Place. Take approximately ½ mile and then turn right into the CT&D complex.

From Chicago: Take I-294 South to I-80/94 East to I-65 South in Indiana. At I-65 exit 253A, turn off onto ramp towards US-30 Valparaiso. Continue East on US 30 to Colorado Street (xfinity store on right). Make a right onto Colorado Street and take to 84th Place. Make a right onto 84th Place. Take approximately ½ mile and then turn right into CT&D complex.

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219-736-9500

Hilton Garden Inn Merrillville
7775 Mississippi St.
Merrillville, IN.
219-769-7100

Holiday Inn Express & Suites Merrillville
8460 Mississippi St.
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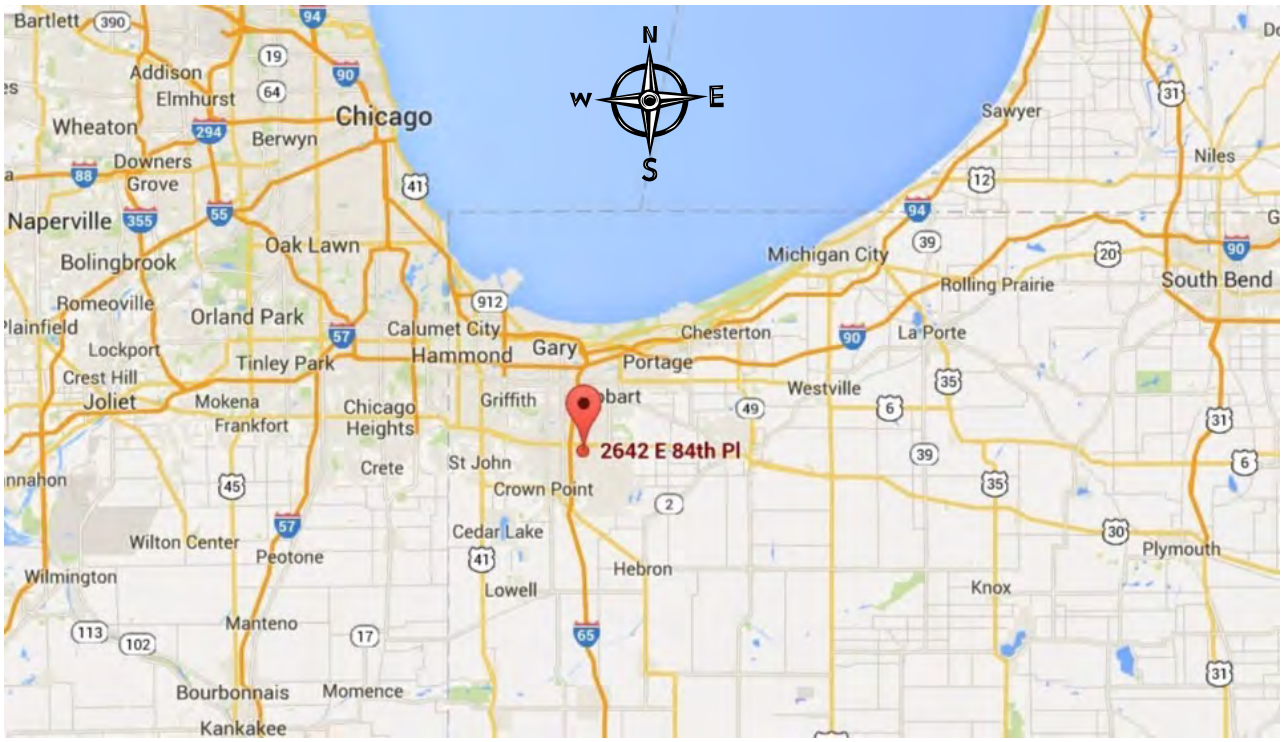
219-472-1200

Map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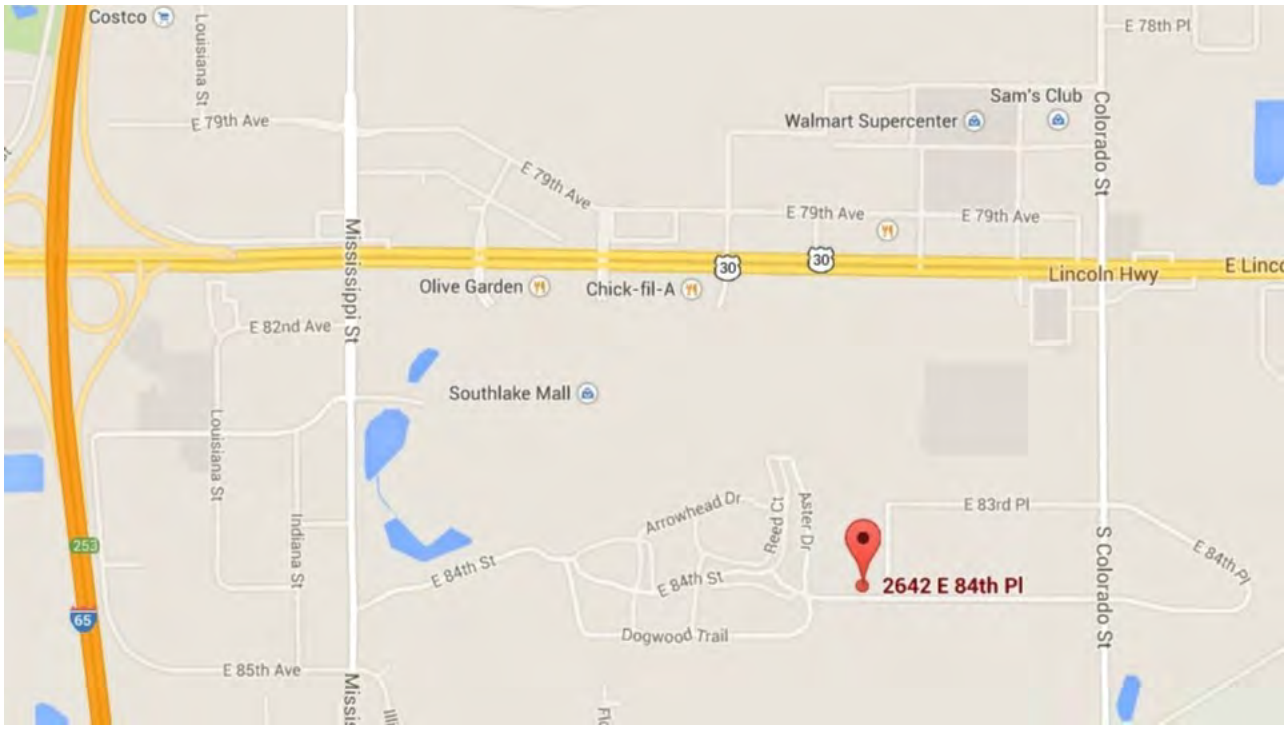
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