Bluegrass
EDUCATIONAL TECHNOLOGIES, LLC

FESTO

nc3 NATIONAL COALITION OF CERTIFICATION CENTERS

| LEARNING THAT WORKS.SM

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Program Overview

Festo Didactic is a leading provider of technical education equipment and training. Festo's educational solutions evolved from its world-class automation and engineering division and integrates the latest trends in each learning system it offers. The innovative product range allows educators and trainers to equip their classroom with the technology they need, from individual workstations to complete Learning Factories, as well as training and consulting, courseware solutions, and digital learning.

FICP is a comprehensive certification program developed by industry experts and educators that ensures students have qualifying skills upon graduation, including soft skills such as effective communication, managing others and critical thinking. FICP is easily integrated with existing certificate, associate's and bachelor's degree programs, and offers four levels of certification.

- Career Exploration Certifications
- Fundamentals: Level 1 Certifications
- Applied: Level 2 Certifications
- Advanced: Level 3 Certifications

Certifications
NC3 Industry 4.0

Career Exploration Certifications
- Bionics 4 Education
- Introduction to Mechatronics
- Introduction to Exploring Electricity
- Introduction to Mechanisms
- Introduction to CAD
- Introduction to Exploring Electronics
- Introduction to Process Engineering
- Introduction to Aerodynamics
- Introduction to Alternative Energy
- Introduction to Environmental Technologies
- Introduction to Robotics

Fundamentals: Level 1 Certifications
- Fundamentals of Electricity - AC
- Fundamentals of Electricity - DC
- Fundamentals of Fluid Power - Pneumatics
- Fundamentals of Fluid Power - Hydraulics
- Fundamentals of Industry 4.0
- Fundamentals of Mechanical Systems
- Fundamentals of Sensor Technology
- Fundamentals of PLCs - Allen Bradley
- Fundamentals of PLCs - Siemens
- Fundamentals of Robotics
- Fundamentals of Industrial Wiring
- Fundamentals of Product Automation
- Certified Industry 4.0 Associate - Fundamentals (Capstone Exam)*

Applied: Level 2 Certifications
- Applied Industrial Motor Controls*
- Applied Fluid Power*
- Applied Mechanical Systems*
- Applied Principles of Smart Sensors*
- Applied PLC Technology II: Allen Bradley/Siemens*
- Applied Robotics*
- Applied Industry 4.0*
- Applied Product ID Fundamentals*
- Certified Industry 4.0 Technician - Applied (Capstone Exam)*

Advanced: Level 3 Certifications
- Advanced Industrial Communications*
- Advanced PLC Technology*
- Advanced Smart Maintenance*
- Advanced Industry 4.0*
- Advanced Product ID*
- Advanced Robotics*

*Pre-requisite Required

Where Can I Use These **Certifications?**

Career Exploration Certifications: Introduction

- Elementary School
- Middle School
- High School
- Post Secondary Education

Fundamentals: Level 1 Certifications

- Electromechanical Technician
- Production Technician
- Industrial Maintenance Technician

Applied: Level 2 Certifications

- Mechatronics Technician
- Automation Technician
- Applications Engineer

Advanced: Level 3 Certifications

- Industry 4.0 Operator
- Industry 4.0 Technician
- Mechatronics Engineer

NC3 **Career Exploration** certified students are introduced to various aspects of technical education with the idea of discovery. The certifications are designed to allow students to explore their interests in technical fields. The student can determine if a career path in a technical field is of interest to them.

NC3 certified students in **Level 1** are well-rounded machine operators/ technicians, with responsibility for efficient operation of the equipment. They ensure the system is running at maximum capacity with an understanding of the role of each component and device. They can identify malfunctions and make minor repairs.

NC3 certified students through **Level 2** are skilled technicians able to assess and analyze the system as a whole. They can manage, investigate, repair and troubleshoot I4.0 systems to maximize operation and process control. They understand how individual components interact with each other to make the whole system run efficiently.

NC3 certified students through **Level 3** understand the design and engineering of complex I4.0 Systems. Their responsibilities will include applying systems engineering practices, such as engineering, process management, and quality assurance management, in a project with the goal to implement, maintain, or improve I4.0 systems.

Career Exploration

Introduction

Career Exploration
Bionics 4 Education

Units - 10 / Labs - 8

The **Exploring Bionics** teacher resources offer learners a hands-on, interdisciplinary introduction to how biological systems inspire technological innovations. Through interactive models and digital resources, students explore how natural mechanisms—from chameleon tongues to fish fins—can inform design and engineering solutions. This course emphasizes systems thinking, problem solving, and real-world relevance while strengthening STEM literacy through experiential learning. These lesson plans do not lead to an industry certification but introduce students to an array of concepts that can be applied in future certifications.

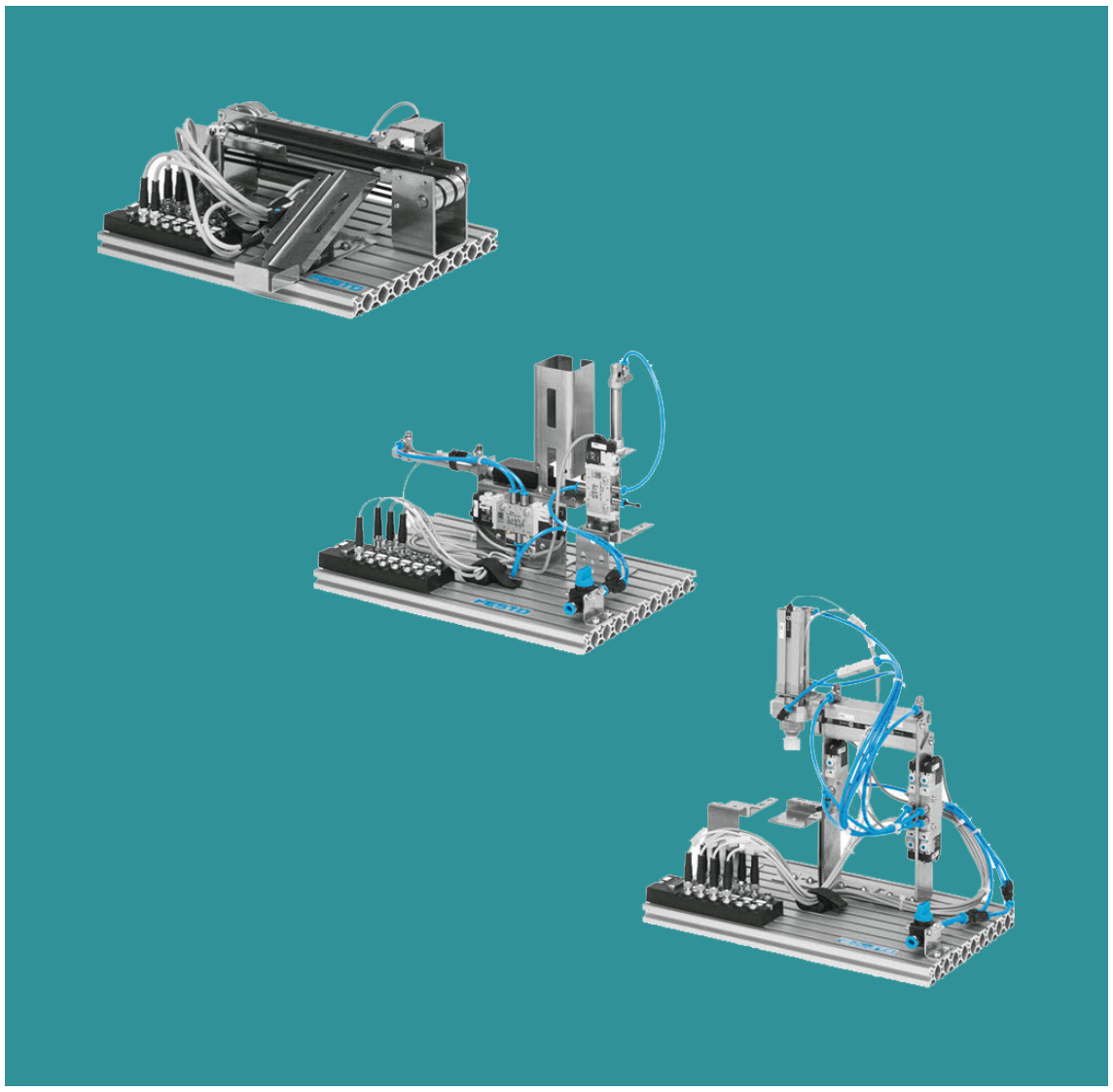
Industry Recognized Certification Topics

- Introduction to Bionics and Bioinspiration
- Functional Analysis of Biological Systems
- Technical Translation of Natural Phenomena
- Sensor-Actuator Learning through the Bionic Flower
- Electromagnetic Spectrum and Light Absorption in Plants
- Folding Structures and Force Distribution in Nature
- Use of Light, Color, and LED Technology in Smart Devices
- Programming and System Control of
- Autonomous Bionic Systems

Industry Recognized Certification Competencies

- Understanding the Foundations of Bionics
- Functional & Structural Biology Analysis
- Hands-On Technical Application
- Sensor and Actuator Integration
- Light and Color in Natural and Engineered Systems
- Engineering Design and Material Properties
- Programming and Automation of Bionic Systems
- STEM Integration and Career Awareness

Career Exploration
Introduction to Mechatronics



Units - 12 / Labs - 9 / Projects - 3

This certification in Mechatronics serves as an introduction, providing foundational knowledge and hands-on skills in mechanical, electrical, and control technology. Students will gain competencies in operating and maintaining pneumatics, electrical systems, sensors, actuators, and controls. By working with real-world automation devices, students will also enhance their STEM (Science, Technology, Engineering, and Math) skills. These core automation, production, and manufacturing skills are in high demand. Upon earning the certification, students will be prepared for advanced Mechatronics and Industry 4.0 training, as well as for roles such as certified production technicians and operators. The certification is derived from extensive industry-based curriculum.

Industry Recognized Certification Topics

- Introduction to engineering basics
- Automation history and basics
- Technical terms and symbology
- Electronics and circuit design:
- Basics of relays, sensors, valves, actuators, gripper, control and logic systems
- Basics of mechanical systems and motors
- Universal PLC and digital logic programming basics
- Control and logic circuits
- Industrial networking and communication
- Simulation and modeling
- Scientific principles and laws
- Maintenance and troubleshooting
- Techniques for maintaining automated systems.
- Safety and compliance standards
- Energy management

Industry Recognized Certification Competencies

- Understanding the Foundations of Bionics
- Functional & Structural Biology Analysis
- Hands-On Technical Application
- Sensor and Actuator Integration
- Light and Color in Natural and Engineered
- Systems
- Engineering Design and Material Properties
- Programming and Automation of Bionic Systems
- STEM Integration and Career Awareness

Career Exploration

Introduction to Exploring Electricity

Units - 16 / Labs - 7

The **Exploring Electricity** certification introduces learners to electrical theory, safety, and practical wiring skills.Through an instructor-led, hands-on curriculum using the Exploring Electricity Trainer and digital multimeters, learners build and test circuits using lamps, switches, resistors, and motors. The program progresses from foundational electrical properties to applied circuit design, with integrated projects and an engineering design challenge to simulate real-world applications.

Industry Recognized Certification Topics

- Electrical Safety
- Electrical Properties: Voltage, Current, Resistance
- Multimeter Measurement Techniques
- Series and Parallel Circuit Design
- Circuit Wiring and Switching
- Ohm’s Law and Electrical Power Calculations
- Three-Way Switching Systems
- Project-Based Applications (Lighting Systems, Relays, and Alarms)

Industry Recognized Certification Competencies

- Electrical Safety and Best Practices
- Measurement and Testing
- Circuit Design and Wiring
- Ohm’s Law and Power Calculations
- Electrical Diagrams and Symbol Recognition
- Project-Based Applications and Engineering Design
- Career Awareness and Technical Skills Application

Career Exploration
Introduction to Mechanisms

Units - 8 / Labs - 8

The Introduction to Mechanisms certification provides foundational knowledge of mechanical systems essential to modern engineering and industrial applications. This certification emphasizes understanding how mechanical components such as levers, gears, cams, and linkages function individually and within integrated systems. Participants will learn to design, analyze, and troubleshoot mechanisms, using key mechanical principles to enhance system efficiency and performance. Through hands-on practice, learners will gain the ability to calculate mechanical advantage, evaluate kinematic behavior, and apply mechanical principles to solve real-world industrial challenges.

Industry Recognized Certification Topics

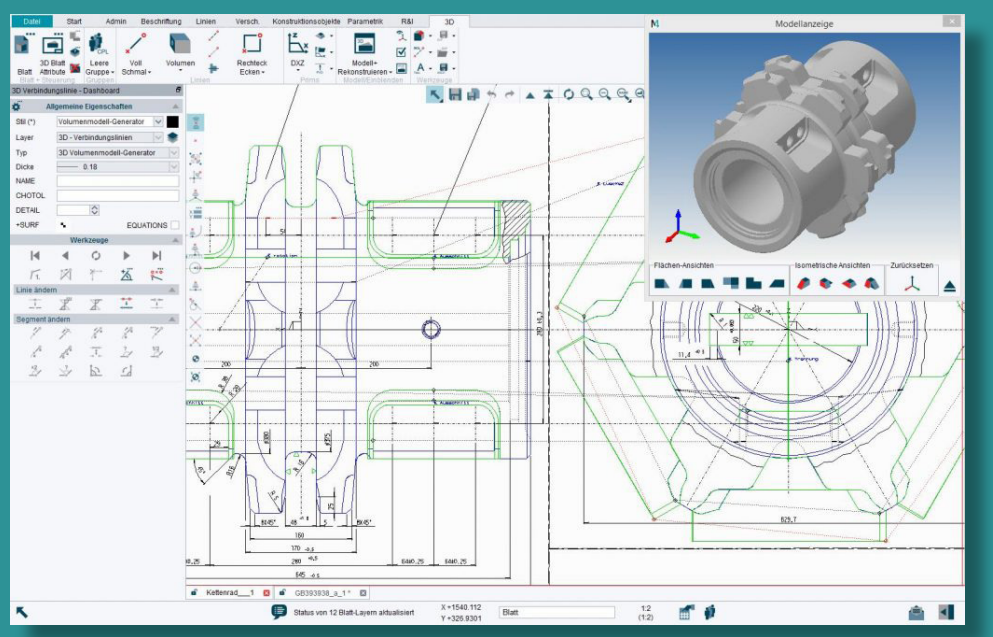
- Mechanical Components and Principles
- Gears and Gear Trains
- Levers and Mechanical Advantage
- Kinematics of Mechanisms
- Mechanical Linkages
- Troubleshooting Mechanical Systems
- System Optimization and Maintenance

Industry Recognized Certification Competencies

- Identify and Explain Mechanical Components
- Calculate Mechanical Advantage
- Analyze and Design Gear Trains
- Perform Kinematic Analysis
- Design and Optimize Linkages
- Troubleshoot Mechanical Failures
- Optimize System Performance

Career Exploration

Introduction to CAD



Units - 7 / Labs - 7

This certification introduces participants to the principles and tools of 3D Computer-Aided Design (CAD) using Onshape. The program emphasizes cloud-based design, collaboration, and the integration of modeling, simulation, and output generation for physical and digital manufacturing. Through a sequence of structured units and labs, students progress from basic sketching to modeling, assembly, annotation, and output for both technical documentation and 3D printing.

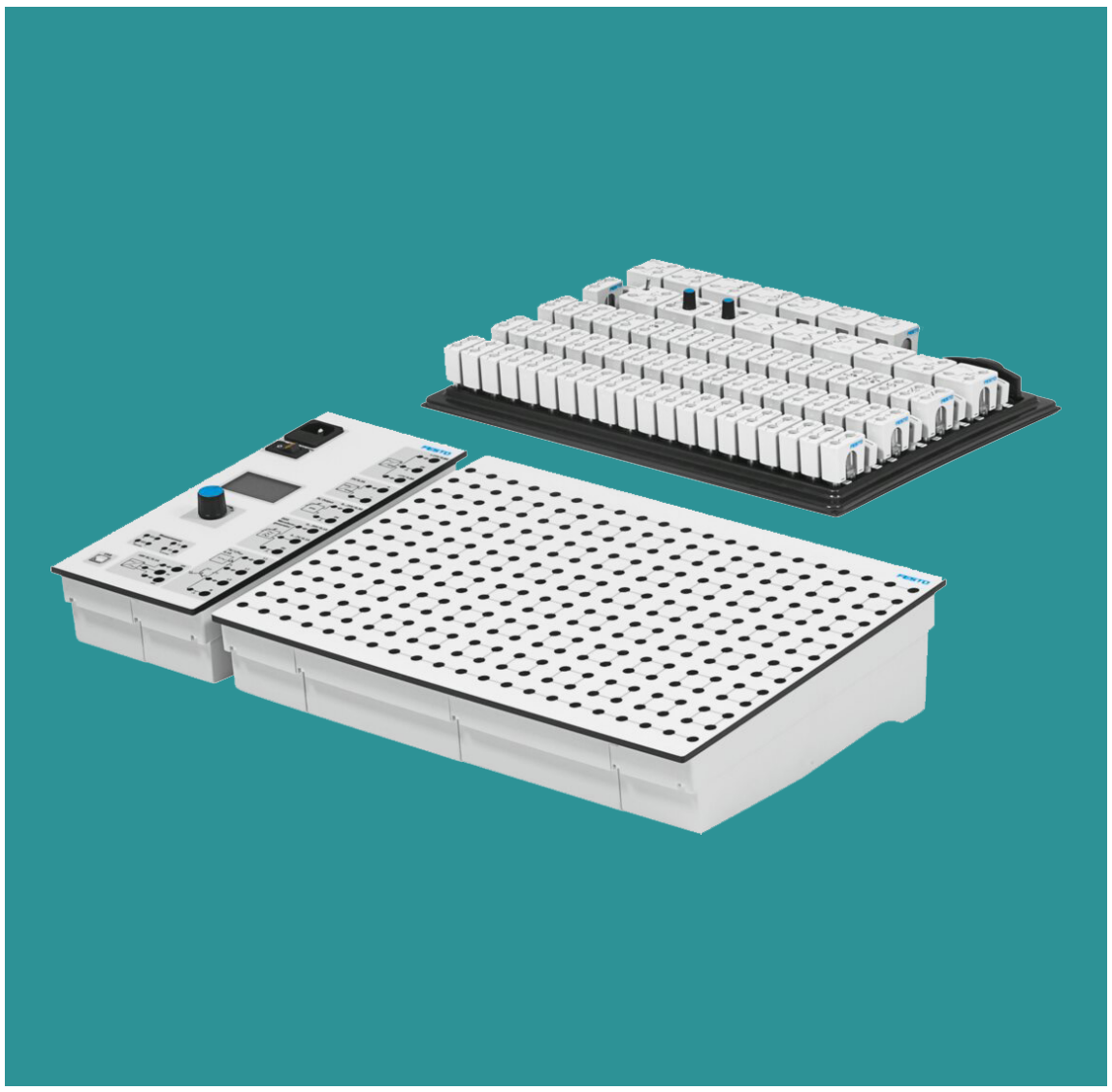
Industry Recognized Certification Topics

- History and Applications of CAD
- 2D Sketching Tools and Best Practices
- Creating Primary and Additional 3D Features
- Multi-Part Assemblies and Mate Connectors
- Output Drawings with Annotations and GD&T
- Exporting Models for 3D Printing
- Project-Based Design and Documentation

Industry Recognized Certification Competencies

- Explain the Role of CAD in Industry
- Create Accurate 2D Sketches
- Develop 3D Models
- Design and Assemble Components
- Generate 2D Technical Drawings
- Prepare for 3D Printing
- Apply Design for Manufacturing Principles

Career Exploration
Introduction to Exploratoring Electronics



Units - 16 / Labs - 5

The Introduction to Exploratory Electronics certification is designed to provide foundational knowledge in electronics, including circuit analysis, component identification, and measurement techniques. This certification equips learners with hands-on experience in assembling and troubleshooting basic electronic circuits while integrating industry relevant applications. This certification aligns with industry standards in electronics and electrical engineering fundamentals. It serves as an entry point for further specialization in areas such as automation, embedded systems, and advanced circuit design. Learners completing this certification may pursue roles in electrical engineering, technical support, and product development.

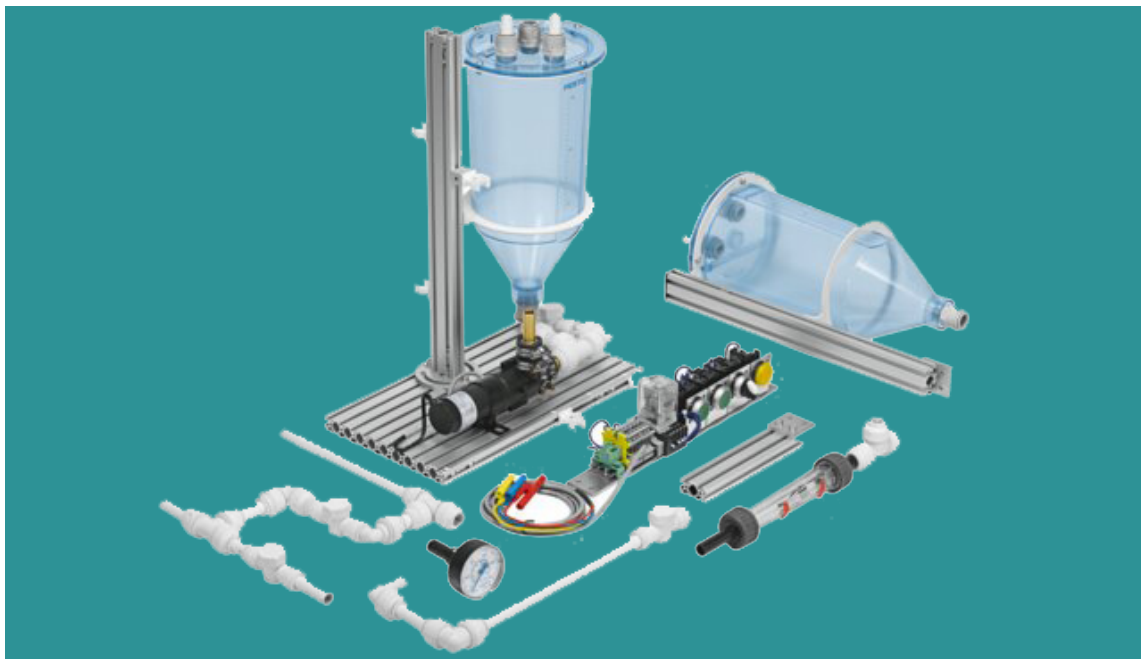
Industry Recognized Certification Topics

- Fundamentals of Electronics
- Electronic Components and Their Functions
- Circuit Analysis and Design
- Measurement and Testing Equipment
- Digital and Analog Electronics
- Microcontrollers and Embedded Systems
- Applications and Industry Relevance

Industry Recognized Certification Competencies

- Understanding Basic Electronic Principles
- Component Identification and Usage
- Circuit Assembly and Debugging
- Proficiency in Measurement Tools
- Logical and Computational Thinking
- Industry Awareness and Practical Applications

Career Exploration
Introduction to Process Engineering



Units - 9 / Labs - 5

The **Introduction to Process Engineering Certification** provides foundational knowledge in the field of process engineering, covering key topics such as materials science, pressure systems, vacuum systems, chemical processing, and electrical applications. This course is ideal for students entering advanced manufacturing, semiconductor fabrication, and related industries, and it aligns with modern industry needs for high-demand roles.

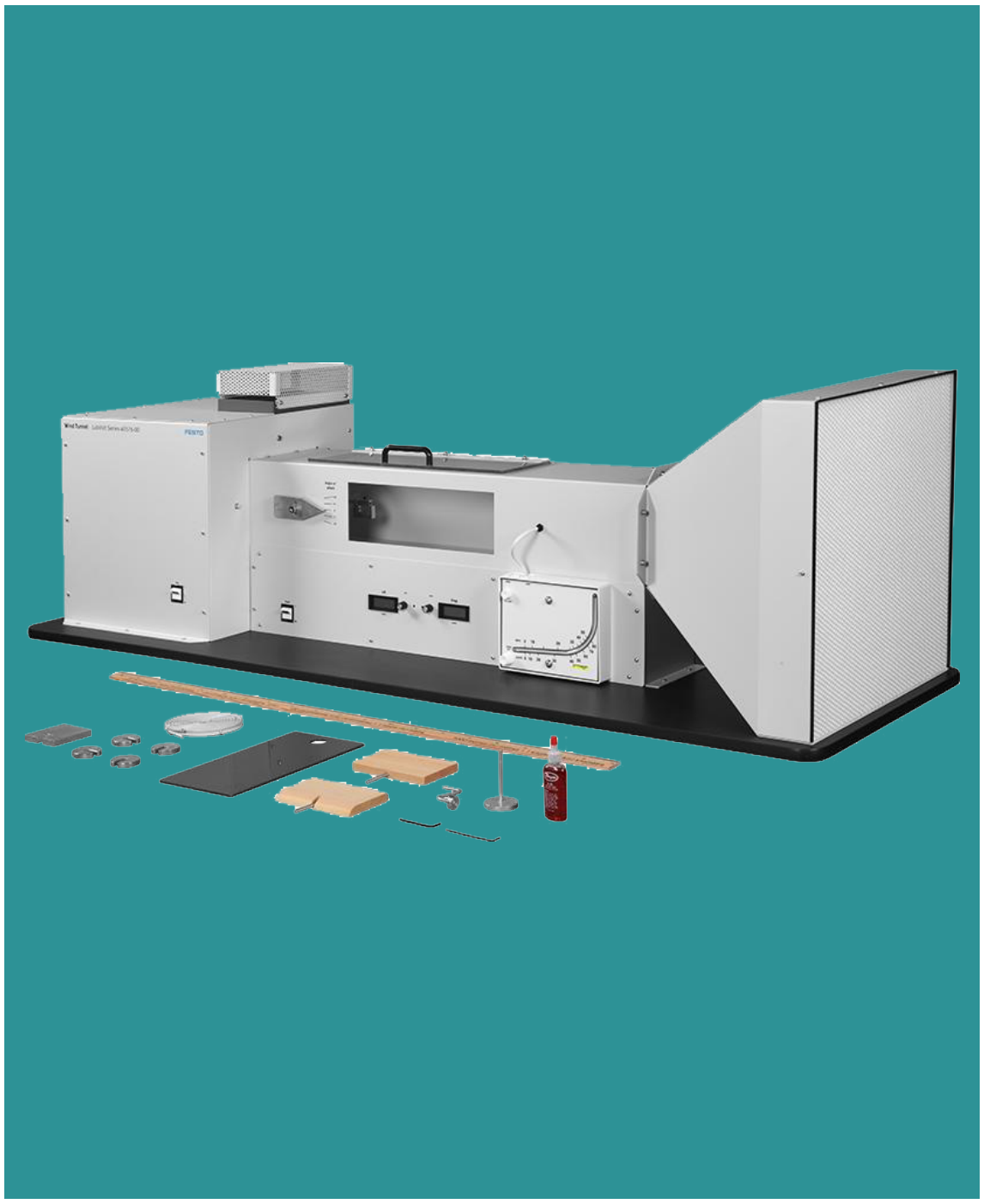
Industry Recognized Certification Topics

- Process Engineering General, Mechanical,
- Electrical and Fluid Power Safety
- Introduction to Process Engineering
- Materials and Matter
- States of Matter and Heat Transfer
- Fluid Properties and Flow
- Pumps and Valves
- Pressure and Vacuum Systems
- Chemical Concepts
- Electrical Principles
- Diagrams and Instrumentation

Industry Recognized Certification Competencies

- Define process engineering and its industrial applications
- Explore careers in semiconductor and advanced manufacturing
- Identify common engineering materials: metals, polymers, ceramics, composites
- Understand atomic structure and basic material properties
- Describe solids, liquids, and gases in terms of energy and behavior
- Explain the principles of heat transfer and phase changes
- Define viscosity, density, and flow characteristics
- Differentiate between laminar and turbulent flow in process systems
- Recognize common types of pumps and valves
- Understand their role in controlling flow and pressure in systems
- Measure and interpret pressure in various units
- Explain vacuum generation and its importance in
- Process environments
- Identify atoms, molecules, and chemical reactions
- Describe acids, bases, pH levels, and safe chemical handling
- Understand voltage, current, resistance, and simple circuits
- Apply basic electrical safety and measurement practices
- Read and interpret Piping & Instrumentation
- Diagrams (P&IDs)
- Recognize symbols and components used in industrial schematic

Career Exploration
Introduction to Aerodynamics



Units - 4 / Labs - 4

The Introduction to Aerodynamics certification provides a foundational understanding of the principles that govern the movement of air over objects, with a particular emphasis on aeronautics and wind tunnel applications. Participants will explore key aerodynamic concepts, including forces such as lift, drag, thrust, and weight, and how they influence the behavior of aircraft and other objects in motion. The course covers the design of airfoils, streamlined structures, and aircraft control principles, with practical lab activities utilizing wind tunnels to simulate and measure aerodynamic forces. By the end of the course, participants will be equipped with the skills to analyze, design, and optimize objects for aerodynamic efficiency. This certification focuses on both theoretical knowledge and hands-on lab activities, giving participants the ability to apply aerodynamic concepts in real-world scenarios through wind tunnel experimentation and design optimization.

Industry Recognized Certification Topics

- Safety in Wind Tunnel Operations
- Basic Aerodynamic Concepts
- Airfoil Design and Principles of Lift
- Streamlined Design and Drag Reduction
- Wind Tunnel Testing and Measurement
- Aircraft Control Principles
- Experimental Validation Using Wind Tunnel

Industry Recognized Certification Competencies

- Understand and Apply Basic Aerodynamic Principles
- Design and Analyze Airfoils
- Streamlining and Drag Reduction
- Operate and Analyze Wind Tunnel Experiments
- Aircraft Control and Stability
- Troubleshoot and Optimize Aerodynamic Systems

Career Exploration
Introduction to Alternative Energy

Units - 13 / Labs - 11

This certification provides participants with both theoretical insights and practical skills in alternative energy, including solar, wind, and hydro energy systems, preparing them for roles in sustainable energy management and design. The Introduction to Alternative Energy certification provides a comprehensive overview of various energy sources, focusing on renewable energy options and their environmental impact. Participants gain knowledge about different energy types, the fundamentals of energy conversion, and the design considerations necessary for implementing alternative energy systems. The course covers solar, wind, and hydro energy, as well as methods for calculating energy efficiency and implementing sustainable practices. Through hands-on lab activities and real-world project challenges, learners develop practical skills for measuring, calculating, and optimizing energy use. This certification equips participants with the foundational knowledge needed to evaluate and deploy alternative energ technologies effectively

Industry Recognized Certification Topics

- Safety in Alternative Energy Systems
- Fundamentals of Energy
- Energy Measurement Units and Calculations
- Solar Energy Systems
- Wind Energy Systems
- Hydro Energy and Tidal Systems
- Energy Conservation and Efficiency
- Project-Based Learning in Alternative Energy

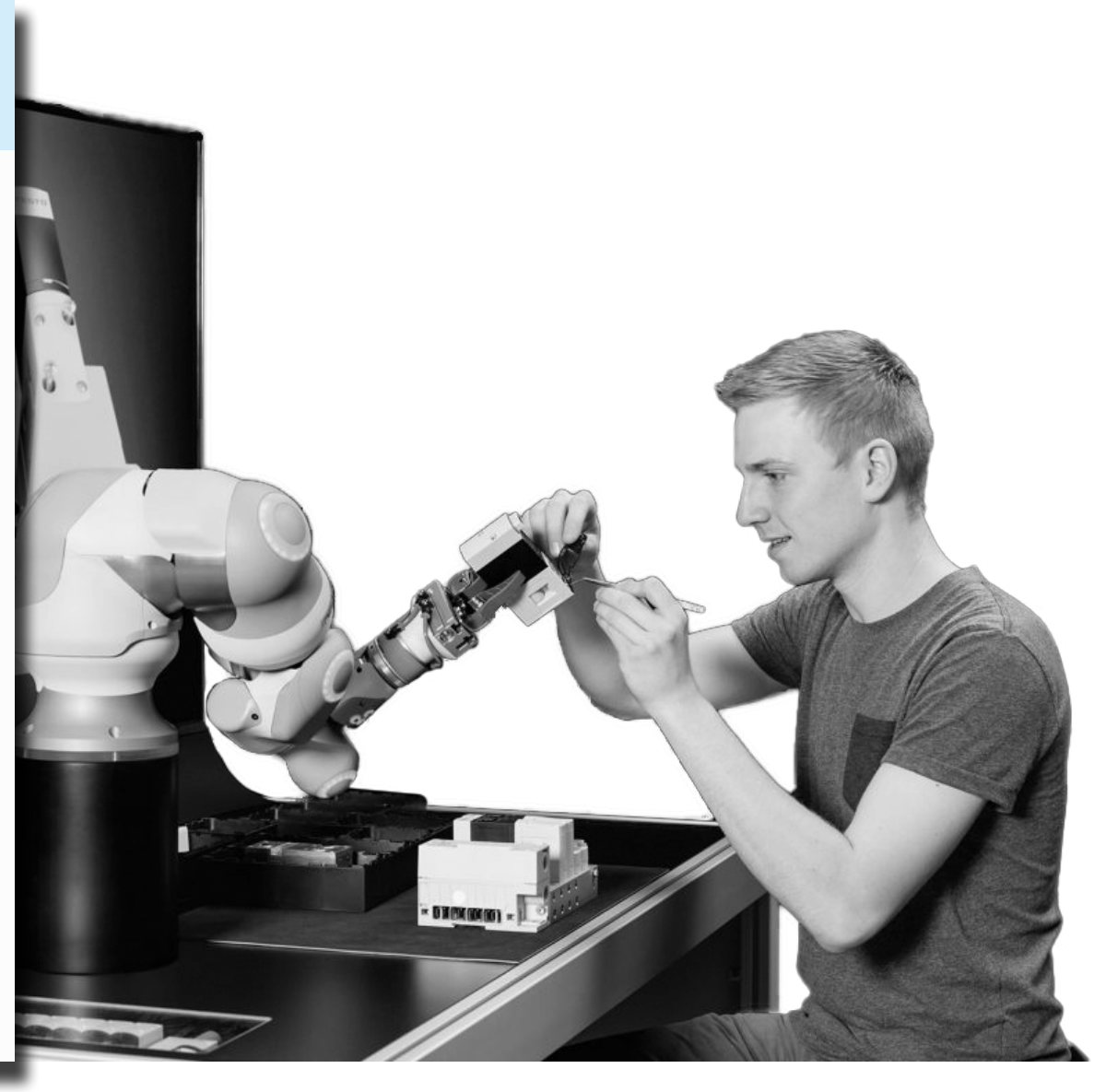
Industry Recognized Certification Competencies

- Understand and Apply Fundamentals of Energy
- Measure and Calculate Energy Use
- Design and Optimize Solar Energy Systems
- Operate and Analyze Wind Energy Systems
- Implement and Troubleshoot Hydro and Tidal Systems
- Optimize Energy Conservation
- Develop and Present Alternative Energy Projects

Career Exploration
Introduction to Robotics

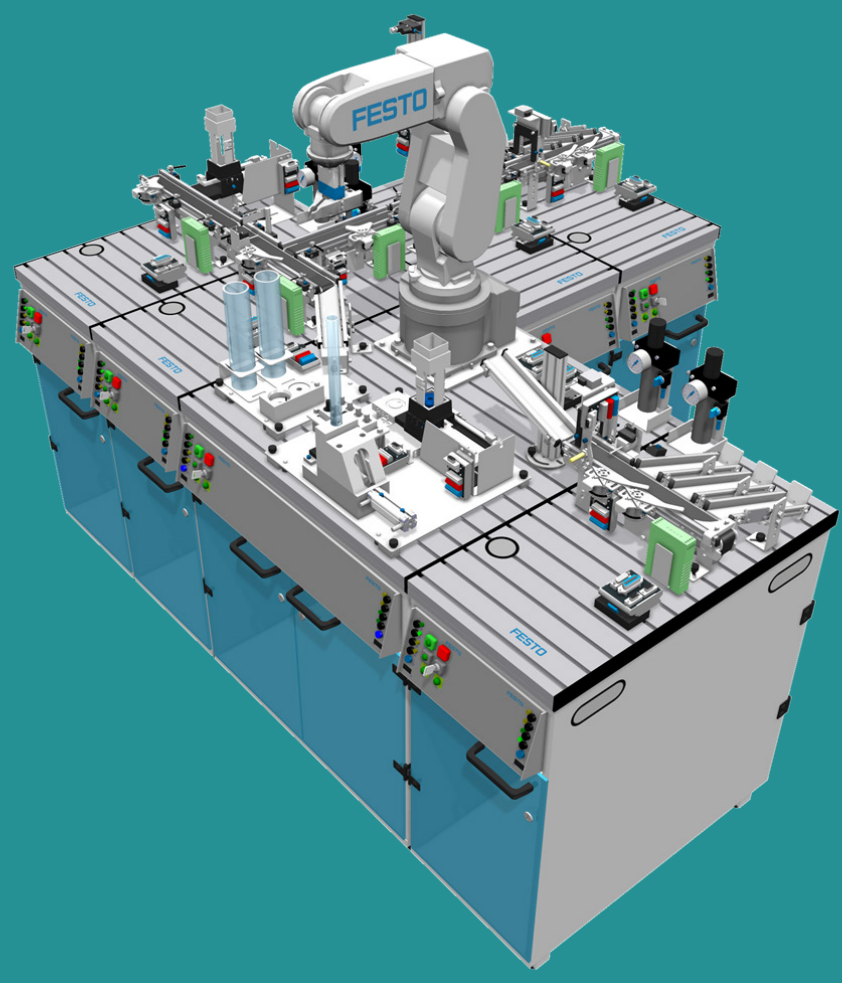
Units - 11 / Labs - 11

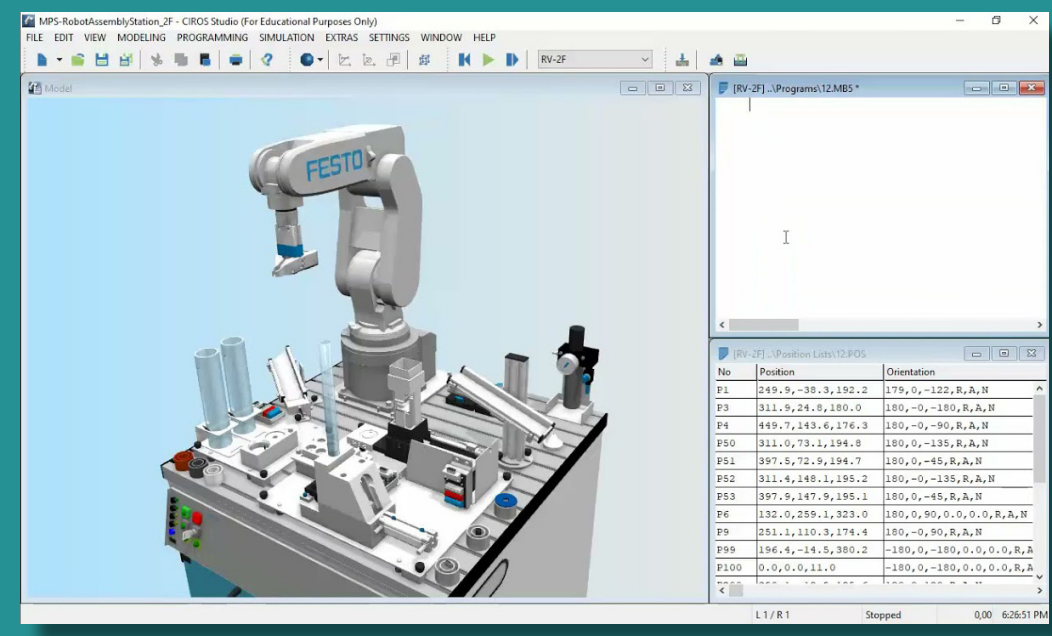
This certification provides foundational knowledge and hands on skills in robotics for industrial training environments. Emphasis is on robot safety and risk mitigation, robot components and coordinate systems, robot programming and motion, peripheral interfaces, commissioning and testing, and systematic troubleshooting. The program combines instructor led theory with paired lab work and practical exercises to develop competencies for operating, programming, and maintaining robotic systems.



Industry Recognized Certification Topics

- Robotics overview and historical context
- Applications of robotics across industry and non industrial domains
- Robot safety, risk assessment, and machine safety standards
- System documentation and site requirements
- Robot components and anatomy
- Coordinate systems and frames of reference
- Robot motion fundamentals
- Teach point methodology and program structure
- Robotic programming languages and applications
- Peripherals and I/O integration
- Commissioning and testing
- Troubleshooting and diagnostic approaches for robot systems and peripherals
- Human robot collaboration concepts and safety
- Maintenance planning and preventive maintenance for robotic systems
- Optional awareness topics: Industry 4.0 implications for robotics and Green Production/ environmental considerations

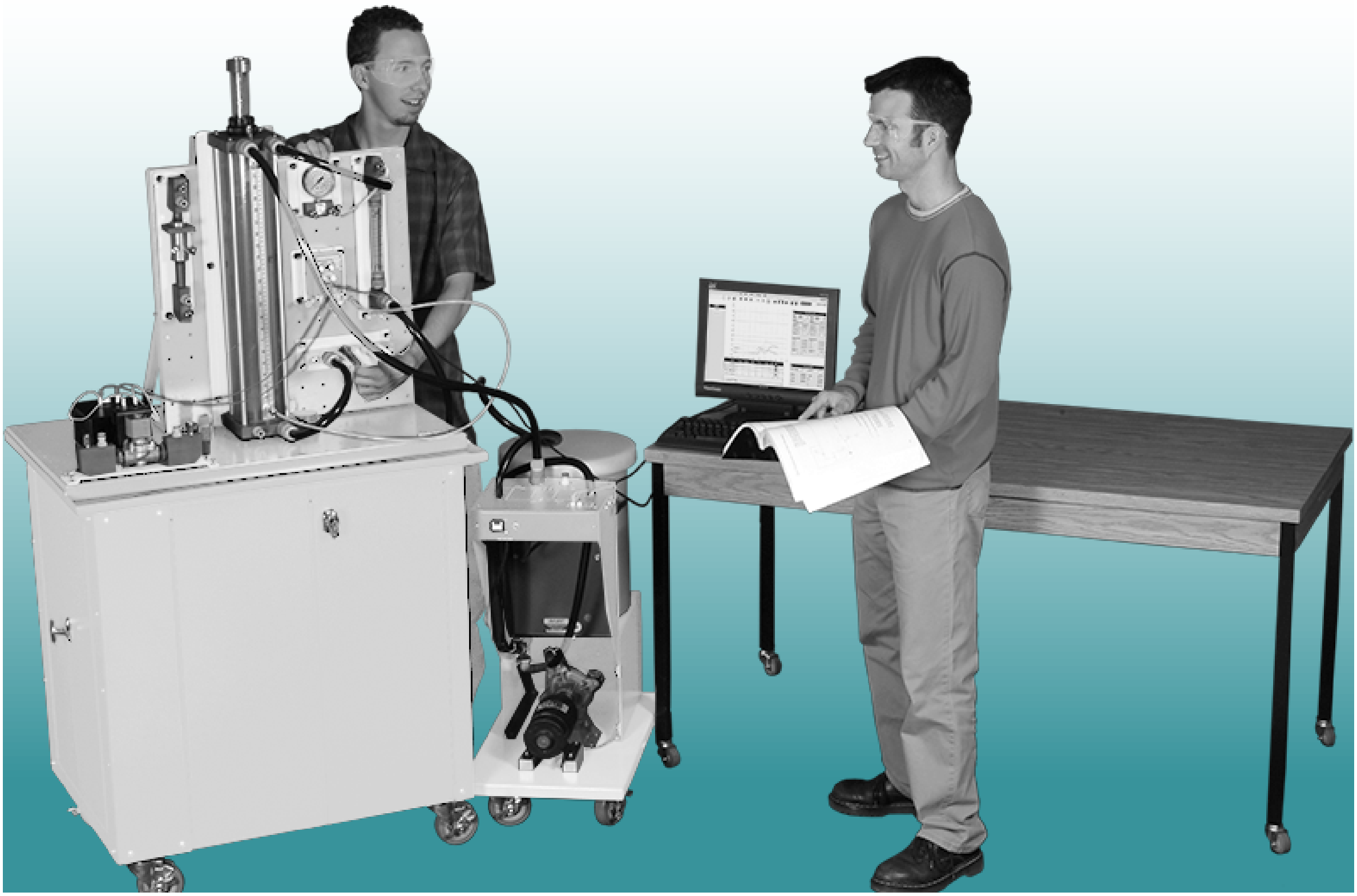




Industry Recognized Certification Competencies

- Explain the historical development of robotics and typical industrial applications
- Apply robot safety standards, perform basic risk assessments, and identify required protective measures
- Locate, interpret, and use required system documentation: operating instructions, installation and commissioning guides, maintenance procedures, and protective device descriptions
- Identify robot components and describe the function of joints, links, end effectors, sensors, and safety devices
- Define coordinate systems and teach points in the appropriate frame of reference
- Describe and program basic joint and Cartesian
- motions; understand motion interpolation and trajectory considerations
- Create structured robot programs using teach points and program flow best practices for repeatable tasks
- Interface peripherals and configure basic I/O for grippers, conveyors, vision systems, and other external devices
- Commission a robot cell: perform teach point
- verification, payload validation, reach and envelope tests, and basic calibration
- Perform troubleshooting and diagnostics on robot hardware, sensors, I/O, and peripheral interfaces using systematic methods
- Demonstrate safe operation procedures: start/stop sequences, emergency stop verification, interlock checks, and guarding compliance
- Implement preventive maintenance tasks and document maintenance per manufacturer procedures
- Demonstrate programming, motion, and troubleshooting competencies in instructor led labs and paired exercises
- Adhere to course delivery constraints and curriculum controls for distribution of course materials

Fundamentals:
Level 1 Certifications



Level 1 Certifications:
Fundamentals of Electricity - AC

Units - 6 / Labs - 6

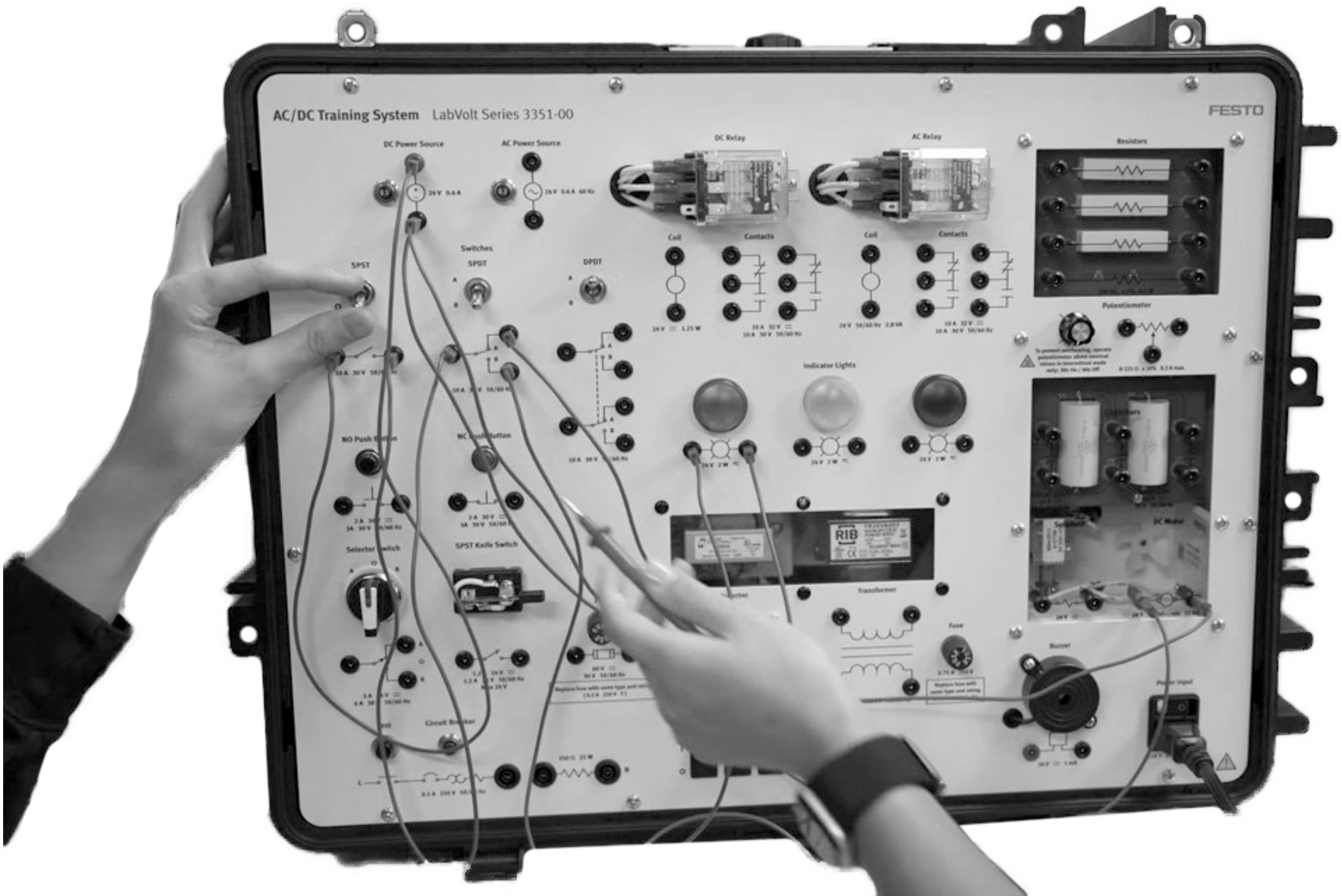
Reduce production downtime, boost efficiency, and enhance output through a comprehensive understanding of alternating current (AC) electricity and safe operational practices. These industry-recognized certifications are tailored to equip students with the vital knowledge and skills necessary for handling AC electricity safely and effectively. Th practical lab components of the training enable students to construct, test, and troubleshoot AC circuits, utilizing various instruments to measure and calculate operating voltages and currents, ensuring optimal circuit functionality. This certification is derived from comprehensive content on the subject of industrial electricity.

Industry Recognized Certification Competencies

- Define and explain the working principles, history, & fundamentals of an electrical circuit
- Understand and apply the concepts of current, voltage, electrical power, and resistance
- Design, build, interpret, read symbols of circuit diagrams and parallel AC circuits using Kirchhoff's laws
- Implement circuits for controlling indicator lights and motors using relays
- Connect and troubleshoot circuits with capacitors, inductors, and transformers
- Measure circuit parameters, current, voltage, and resistance using an ammeter, voltmeter, and ohmmeter
- Operate multimeters for comprehensive electrical measurements
- Calculate reactance of series and parallel capacitors and inductors
- Identify and connect electrical power sources and loads
- Explore and apply electromagnetism and electromagnets
- Explore applications and operations of AC capacitors, inductors, and transformers
- Use capacitors to store electrical energy and explore RC circuits
- Apply Ohm's law, power calculations, and voltage dividers in circuit design
- Explain, implement, and troubleshoot contactors and AC relays AC voltage and current sine waves
- Operate transformers, including step-up and step-down transformers
- Explain the power network and distribution network
- Troubleshoot complex AC circuits, transformers, and other AC components using ohmmeters and voltmeters

Industry Recognized Certification Topics

- Basic concepts of electrical circuits
- Ohm's and Kirchhoff's laws
- Using measuring instruments (voltmeters, ammeters, ohmmeters, etc.)
- Solving series and parallel circuits
- Electromagnetism & Electrical distribution
- Troubleshooting electrical circuits
- Exploration of common electrical components such as power sources, resistors, inductors, capacitors, transformers, switches, relays and motors
- Basics of AC Capacitors
- Electrical Measurement Equipment
- Basic Electrical Wiring
- Basics of the Inductor, Transformers, Relays,
- Contactors, and Circuit Breakers
- Basics of Electrical Panels
- Basics of Fuses
- Basics of Distribution Network
- Basics of Troubleshooting



Level 1 Certifications:
Fundamentals of Electricity - DC

Units - 10 / Labs - 10

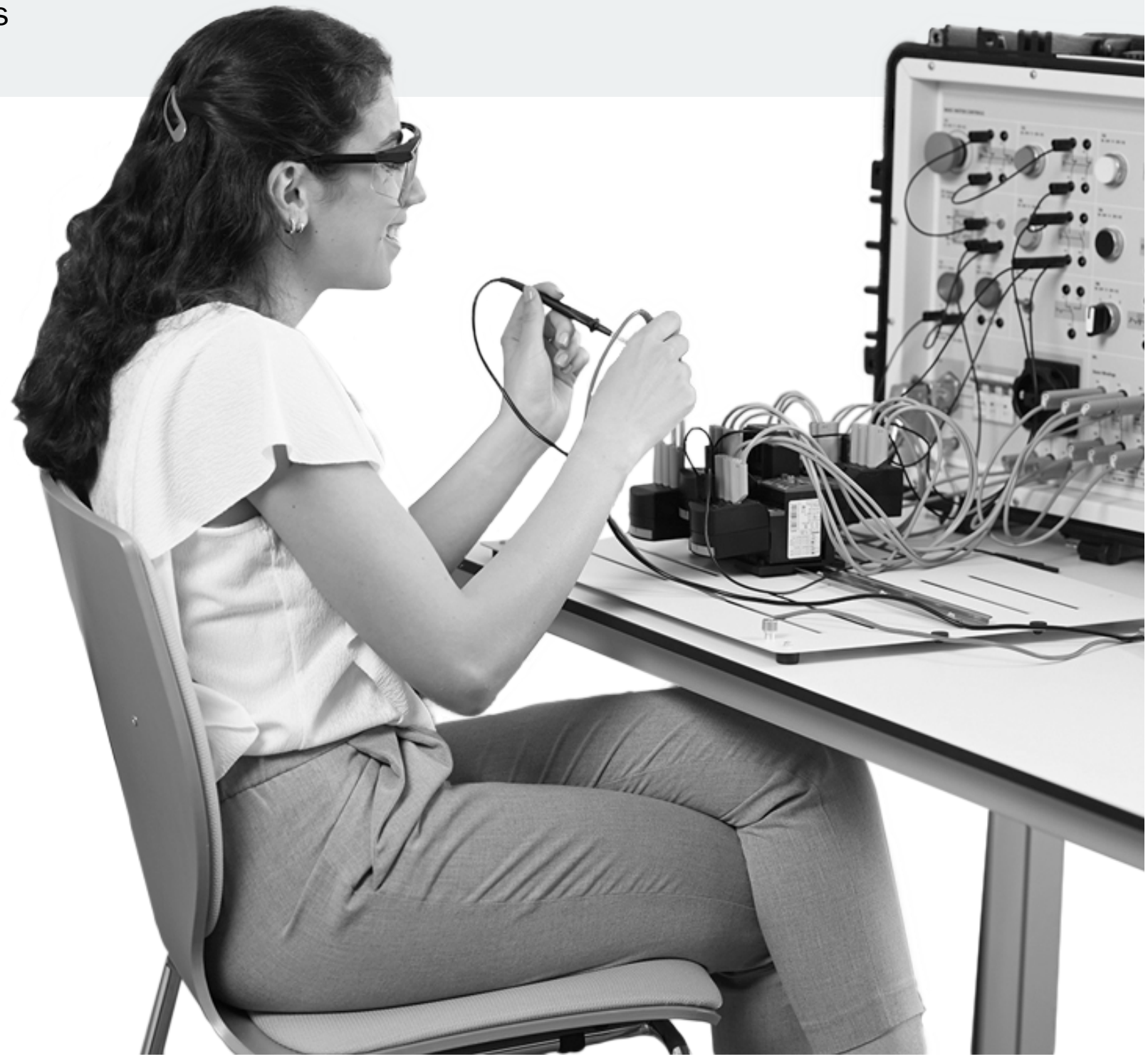
Decrease production downtime, improve efficiency, and increase output with a solid understanding of direct current (DC) electricity and safe working practices. These industry-recognized certifications are designed to provide students with the essential knowledge and skills to handle DC electricity safely and effectively. The hands-on lab components of the training allow students to build, test, and troubleshoot DC circuits, using various instruments to measure and calculate operating voltages and currents, ensuring optimal circuit performance. This certification is derived from comprehensive content on the subject of industrial electricity.

Industry Recognized Certification Competencies

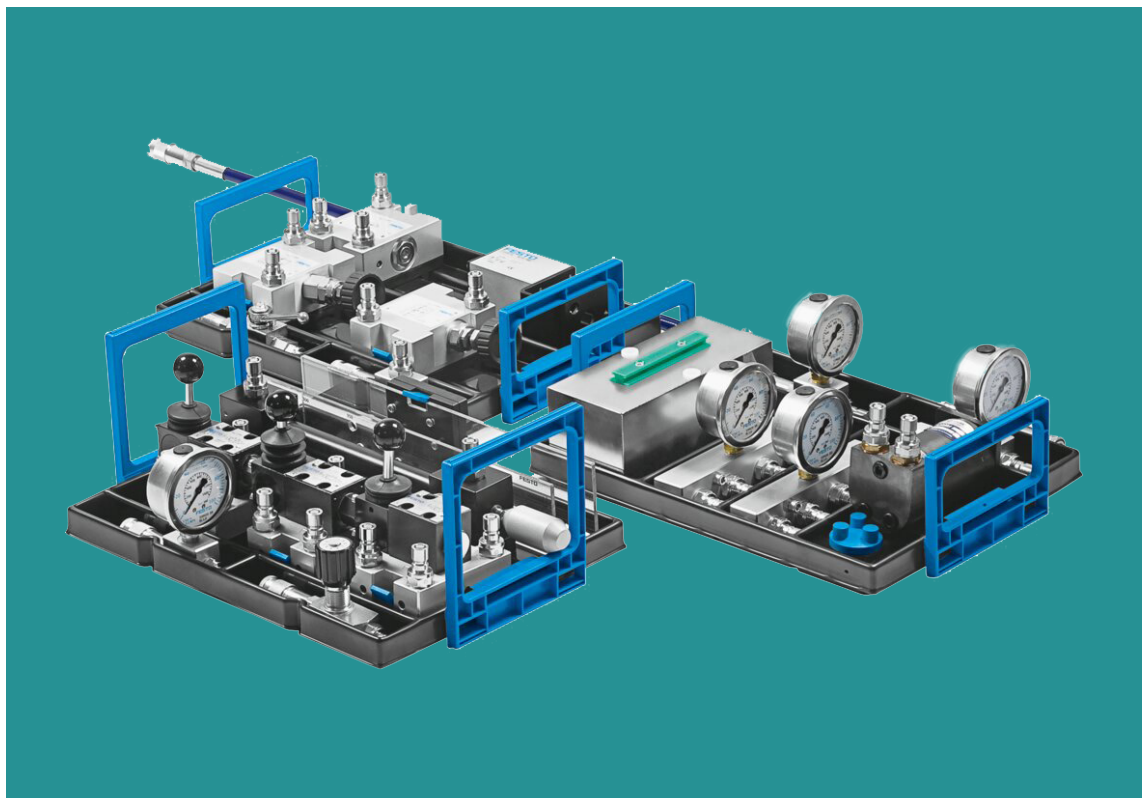
- Describe the history and fundamentals of electricity and application of circuit design
- Define and explain the working principles of an electrical circuit
- Interpret and read symbols and circuit diagrams, Use capacitors to store electrical energy and explore resistor-capacitor (RC) circuits, Differentiate and configure different types of switches
- Identify and connect different types of electrical power sources and loads
- Understand and apply the concepts of current, voltage, electrical power, and resistance
- Connect and troubleshoot various DC power circuits with different switches and loads
- Design and build series and parallel circuits, and calculate equivalent resistance using Kirchhoff’s laws
- Implement circuits with specific applications, such as car horn, interior lights, three-way switch, and car fan, light, and horn, Identify and troubleshoot short circuits, open circuits, and continuity issues
- Control indicator lights and motors using relays, Apply Ohm’s law, power calculations, and voltage dividers
- Explore and apply electromagnetism and electromagnets and differentiate conductors and insulators
- Measure current, voltage, and resistance using an ammeter, voltmeter, and ohmmeter
- Introduce and operate multimeters for comprehensive electrical measurements
- Charge, discharge, and measure capacitors in various configurations
- Explore applications and operations of DC capacitors and relays
- Understand and connect circuits containing solenoids and DC motors

Industry Recognized Certification Topics

- Electrical Engineering History
- Electricity Basics
- Basic Electrical Wiring
- Ohm's Law
- Kirchhoff's Voltage and Current Laws
- Using Measuring Instruments (voltmeters, ammeters, ohmmeters, etc.)
- Solving Series and Parallel Circuits
- Basics of DC Capacitors
- Basics of DC Relays
- Basics of Electromagnetism
- Basics of Magnetism
- Basics of the DC Motor
- Basics of the Solenoid
- Electrical Components (power sources, resistors, inductors, capacitors, transformers, switches, relays, motors)
- Electrical Measurement Equipment
- Electrical Resistance
- Troubleshooting Electrical Circuits



Level 1 Certifications:
Fundamentals of Fluid Power - Pneumatics



Units - 4 / Labs - 12

This pneumatic training certification covers the use of compressed air for control and signaling. It provides a comprehensive overview of compressors, storage, dryers, distribution, and the design, construction, and operation of various actuators, valves, and ancillary equipment. Relevant ISO symbols are introduced and included in circuit diagrams. This certification ensures competence in the safe operation and maintenance of one of the most common automation elements in industry.

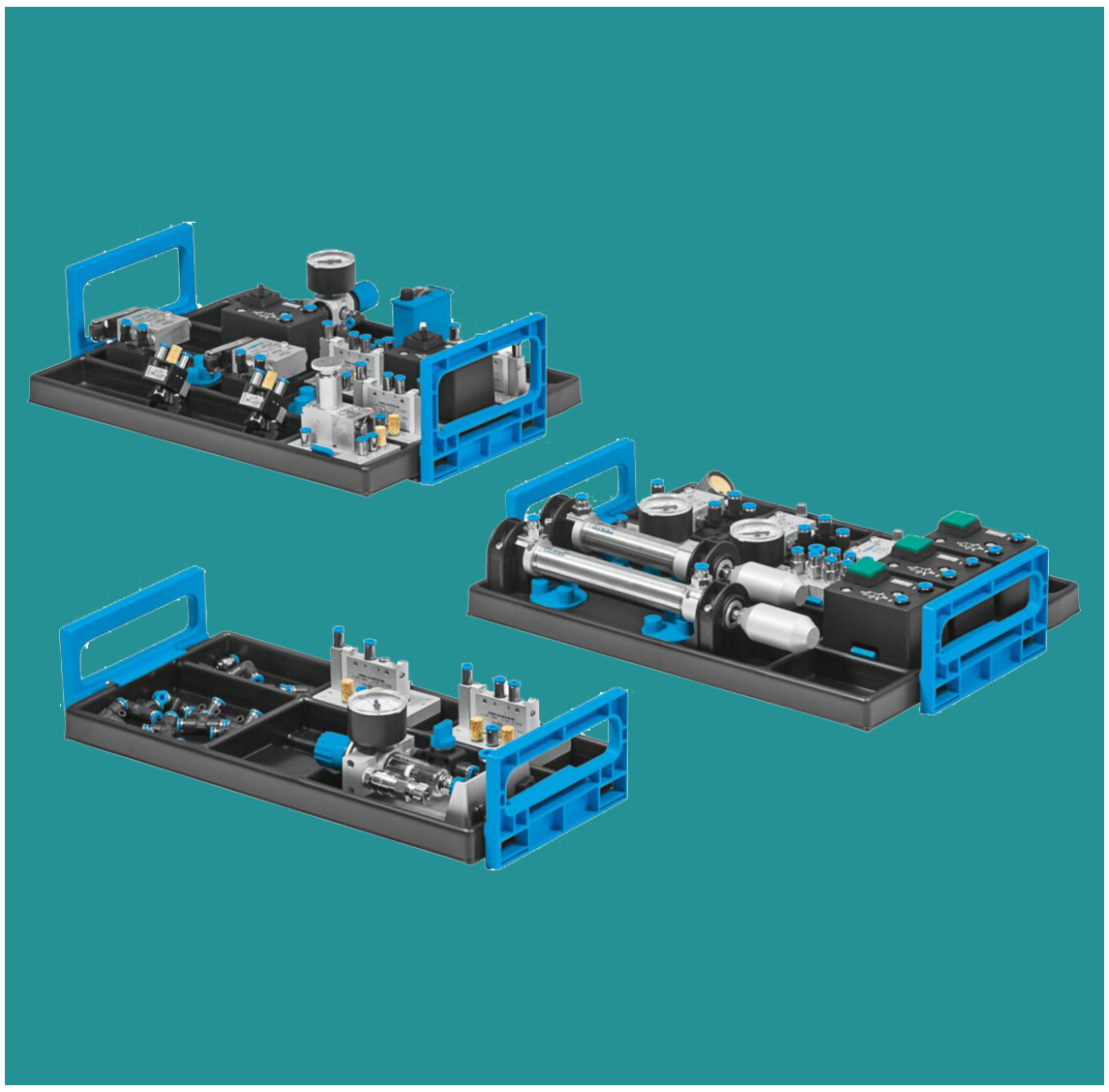
Industry Recognized Certification Topics

- Safety practices and basis design principles for creating for working with pneumatic systems
- Pascal and Boyle's Laws
- Structure, function and application of single acting and double-acting cylinders
- Calculating basic parameters
- Direct and indirect actuation
- Application and function of 3/2 and 5/2-way valves
- Methods of actuation of directional control valves
- Analyzing circuits
- Options for pressure measurement
- Pressure-dependent control systems
- Distinguishing flow control
- Logic operations: explaining and implementing AND/OR/NOT operations
- Function and application of limit switches
- Time delay valves
- Realizing oscillating movement
- Economic considerations of using pneumatic components

Industry Recognized Certification Competencies

- Demonstrate safety standards and best practices adhering to safety protocols in pneumatic systems
- Interpret and draw pneumatic symbols
- Identify components of a pneumatic system
- Utilize circuit simulation software to design, test and optimize circuits
- Understand the principles and applications of vacuum systems
- Construct and troubleshoot pneumatic circuits
- Understand the practical application of Pascal and Boyles law
- Explain and understand conditioning and distribution of air
- Determine root cause of component failure
- Make speed adjustments to actuators
- Explain the force/pressure/area relationship
- Describe the different states an actuator can assume and the importance of each
- Utilize simulation software to demonstrate basic diagnostic principles
- Identify/explain function of pneumatic components

Level 1 Certifications:
Fundamentals of Fluid Power - Hydraulics



Units - 3 / Labs - 12

This hydraulic training certification equips students with comprehensive knowledge of hydraulic components' construction and operation. By examining a wide range of hydraulic equipment, the certification delves into fundamental hydraulic principles and the specifics of individual components. It covers key elements such as valves that control pressure, flow rate, sequence, and direction. Through practical exercises and standard symbol circuits, students gain hands-on experience in operating these valves. Additionally, the certification emphasizes maintenance practices and a systematic approach to fault finding, ensuring students are prepared for real-world applications.

Industry Recognized Certification Topics

- Equipment and circuit diagram symbols, reading and interpreting basic hydraulic circuit diagrams
- Physical principles of hydraulics
- Structure and mode of operation of basic components
- Measure volumetric flow and pressure
- Technology and characteristic data of valves and drive elements
- Intensive training for industrial practice: setting up systems in accordance with circuit diagrams, commissioning systems
- Fundamentals of proportional hydraulics

Industry Recognized Certification Competencies

- Design, assemble, test, and troubleshoot basic hydraulic circuits
- Identify and describe the construction, design features, and operation of hydraulic components
- Interpret technical specifications and data relating to hydraulic components and systems
- Identify and explain graphical symbols for hydraulic components
- Describe fundamentals of oil flow

Level 1 Certifications:
Fundamentals of Industry 4.0

Units - 1

The **Fundamentals of Industry 4.0** certification introduces learners to the fourth industrial revolution and the digital transformation of manufacturing and production systems. Students gain foundational knowledge about cyberphysical systems, smart factories, automation, data analytics, and emerging digital and biological technologies impacting the future of industry. Learners explore historical industrial shifts and gain perspective on how interconnected systems, automation, and data integration shape modern manufacturing.
This certification is ideal for students entering manufacturing, engineering, information technology, or related pathways, and it emphasizes the integration of technology and industry-driven innovation.

Industry Recognized Certification Topics

- History and Evolution of Industrial Revolutions
- Core Concepts of Industry 4.0 and CyberPhysical Systems
- Smart Factory, Smart Maintenance, and
- Predictive Technologies
- Internet of Things and Machine-to-Machine Communication
- Automation Pyramid and Hierarchical System Design
- Data Analytics, Big Data, and Cloud Computing
- Human-Robot Collaboration and Safety
- Digital Twins, Digital Shadows, and Simulation
- Definitions and Case Studies of Industry 4.0 Integration

Industry Recognized Certification Competencies

- Industrial History and Frameworks
- Terminology and Technology Integration
- Smart Manufacturing Systems
- Automation Pyramid Mapping
- Data, Connectivity, and Decision Making
- Collaborative Robotics and Augmented Intelligence
- Problem Solving through Case Study
- Workforce Awareness and Future Trends

Level 1 Certifications:
Fundamentals of Mechanical Systems

Units - 26 / Labs - 26

Mechanical systems are the driving force behind most industrial applications, with gears, drives, bearings, pulleys, and more found in nearly everything that moves. The Mechanical Systems certification covers the installation, use, maintenance, and troubleshooting of mechanical drive components and systems. The curriculum is organized into topics focused on industry-relevant components, emphasizing practical, hands-on tasks to develop expertise in operating and maintaining these essential systems.

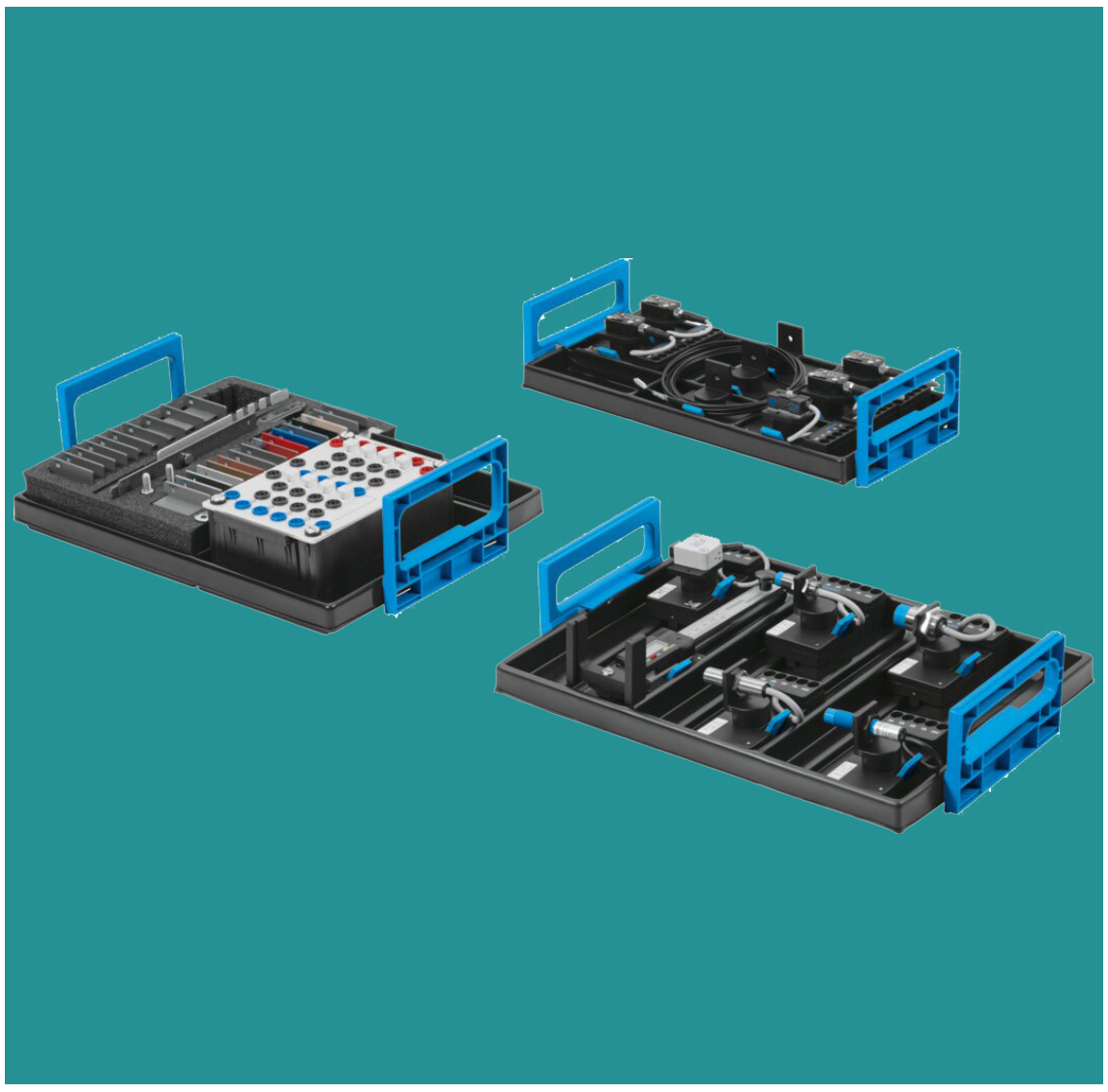
Industry Recognized Certification Topics

- Safety protocols and risk management strategies
- Mechanical system design principles
- Mechanical properties of materials
- Introduction to mechanical drive systems
- Belt, chains, and gear drives
- Couplings and shaft alignment
- Bearings and linear bearings
- Gaskets, seals, ball screws, clutches, and brakes
- Laser alignment, lubrication, and vibration analysis

Industry Recognized Certification Competencies

- Machine safety & Mechanical drawing
- Identification of the components of a mechanical system, including: belt drives, chain drives, gear drives, & couplings
- Important calculations: speed, torque, force and system efficiency
- Motors, keys, and soft foot alignment
- Belt drives, chain drives, alignment and couplings, lubrication
- Gear drives, bearings, gaskets and seals
- Understand and demonstrate techniques for diagnosing and solving vibration issues
- Describe strategies for maintaining system reliability and longevity
- Understand environmental consideration and mitigation strategies
- Clutches and brakes, ball screw and linear bearings

Level 1 Certifications:
Fundamentals of PLC - Sensors



Units - 12 / Labs - 12

As manufacturing and industry become increasingly automated, understanding sensors is crucial. Sensors act as the eyes, ears, touch, and feel of automated systems, sending signals to the system's "brain" to trigger appropriate responses. This certification introduces participants to various sensors commonly used in industrial automation. Hands-on experience is central to teaching sensor fundamentals, with practical examples demonstrating the operational principles of different sensors. Special attention is given to selecting the right sensor, proper connection, correct settings, and functional checks. The certification is derived from an extensive library of industry specific industry technology training.

Industry Recognized Certification Topics

- Configuration, function and coefficients of the sensors used
- Basic principles of connection and circuit technology
- Influence of shape, material, surface and color of the object on the switching characteristics of sensors
- Terms which describe coefficients and functional behavior
- Configuration of logic circuits
- Selecting appropriate sensors by taking into account certain parameters
- Calibration of sensors
- Signal processing
- Safety standards
- Application-specific sensors

Industry Recognized Certification Competencies

- Understand and explain fundamentals of sensor technology, signal processing and filtering
- Recognize sensor functionality and select the appropriate sensor for various industrial applications, calibration and maintenance of sensors
- Interpret the language, symbology, and protocols commonly used in the sensor field
- Explain how the various types of sensors work and function
- Make electrical connections and test the sensor for proper operation
- Troubleshoot, repair/replace a faulty sensor
- Configuration and function of sensors used
- Basic principles of connection and circuit technology, configuration of logic circuits
- Selection of appropriate sensors by considering specific parameters

Level 1 Certifications:
Fundamentals of PLC - Allen Bradley

Units - 6 / Labs - 5 / Projects - 1

To work efficiently with a PLC, it's essential to be well-versed in the specific programming environment and languages. This certification is designed to meet that need. Students will gain hands-on experience with high-end products from Rockwell Automation/ Allen Bradley, allowing them to work directly with industrial control equipment. Realistic examples are used to motivate students and help them develop the skills necessary to operate PLC-controlled systems, which are prevalent in our daily lives. As a Rockwell Encompass Partner, Festo provides training that is perfectly suited to this environment. This certification is derived from extensive industry based content to reflect the key topics and competencies building a foundation of PLC understanding.

Industry Recognized Certification Topics

- Control relays
- Communication protocols
- Programming techniques
- HMI integration
- Networks
- Basic design and operation
- PLC sections: input, logic and output
- Input types: discrete, analog and digital
- Memory types: ROM and RAM
- Logic processing: addressing and scanning
- Output types: discrete, analog and digital
- Numbering systems: decimal, binary, octal, hex and ASCII
- Boolean functions: identity, AND/OR/NOT circuits
- Basic troubleshooting: using a PLC as a troubleshooting tool

Industry Recognized Certification Competencies

- Explain the operation and design of various relays
- State/explain the three PLC sections
- State/explain the three types of input devices
- State/explain the types of memory in a PLC
- Explain different types of PLC addressing
- State/explain the three types of output devices
- Convert different numbering systems used in a PLC
- Explain various boolean gates/truth tables
- Demonstrate how to use a PLC for troubleshooting to resolve problems quicker
- Understand and apply communication protocols
- Integrate and configure HMI's
- Understand PLC networks

Level 1 Certifications:
Fundamentals of PLC - Siemens

Units - 6 / Labs - 5 / Projects - 1

To work efficiently with a PLC, it's essential to be well-versed in the specific programming environment and languages. This certification is designed to meet that need. Students will gain hands-on experience with high-end products from Siemens, allowing them to work directly with industrial control equipment. Realistic examples are used to motivate students and help them develop the skills necessary to operate PLC-controlled systems, which are prevalent in our daily lives. This certification is derived from extensive industry based content to reflect the key topics and competencies building a foundation of PLC understanding.

Industry Recognized Certification Topics

- Control relays
- Communication Protocols
- Programming techniques
- HMI Integration
- Networks
- Basic design and operation
- PLC sections: input, logic and output
- Input types: discrete, analog and digital
- Memory types: ROM and RAM
- Logic processing: addressing and scanning
- Output types: discrete, analog and digital
- Numbering systems: decimal, binary, octal, hex and ASCII
- Boolean functions: identity, AND/OR/NOT circuits
- Basic troubleshooting: using a PLC as a troubleshooting tool

Industry Recognized Certification Competencies

- Explain the operation and design of various relays
- State/explain the three PLC sections
- State/explain the three types of input devices
- State/explain the types of memory in a PLC
- Explain different types of PLC addressing
- State/explain the three types of output devices
- Convert different numbering systems used in a PLC
- Explain various Boolean gates/truth tables
- Demonstrate how to use a PLC for troubleshooting to resolve problems quicker
- Understand and apply communication protocols
- Integrate and configure HMI's
- Understand PLC Networks

Level 1 Certifications:
Fundamentals of Robotics

Units - 6 / Labs - 3 / Projects - 3

Today and in the future, robots are becoming increasingly prevalent in various industries. They are used for everything from repetitive tasks to complex interactions with humans. This certification is designed to introduce students to different types of robots and how they can enhance productivity in industrial applications. While robots can take over low-skilled tasks, they still require skilled individuals to program, operate, and maintain them.
Upon completing this certification, students will have hands-on experience with various types and brands of robots. They will learn how to program robots, teach positions, and work safely with these essential elements of modern industry.

Industry Recognized Certification Topics

- Introduction to industrial robotics
- Robotics and work place safety
- Kinematics and dyanamics of motion and forces in robotic systems
- Familiarization with various robots types
- Robot programming languages
- Point-to-point and task programs
- Program editing
- Control overview
- Industrial applications
- Troubleshooting and maintenance
- Calibration and accuracy
- Human-Robot Interaction

Industry Recognized Certification Competencies

- Identify and explain the design and function of various types of robotic systems
- Safely operate and maintain robotic systems
- Commission and teach robotic programs and positions, optimize robot paths and movement
- Understand and define control instructions
- Utilize conditional statements
- Troubleshoot and diagnose robotic systems
- Understand the fundamentals of robot himematics and dynamics
- Understand the various types and uses of end effectors, Utilize simulation and offline programming tools
- Understand network and communication protocols, Implement human-robot collaboration
- Analyze and improve robotic system performance, Incorporate sensors and other applications with a robot application

Level 1 Certifications:
Fundamentals of Industrial Wiring Systems

Units - 14 / Labs - 12

This certification provides participants with both theoretical insights and practical skills in industrial wiring systems, preparing them for roles in electrical installation, maintenance, and troubleshooting. The Industrial Wiring Systems certification provides a comprehensive overview of electrical enclosures, conduits, power distribution, and motor control systems, focusing on safety, and installation standards. Participants gain knowledge about electrical conduit types, panelboards, circuit breakers, and grounding techniques. The course covers wiring installation, conduit bending, and troubleshooting techniques. Through hands-on lab activities and real-world project challenges, learners develop practical skills for designing, implementing, and maintaining industrial electrical systems. This certification equips participants with the foundational knowledge needed to evaluate and deploy industrial wiring solutions.

Industry Recognized Certification Topics

- Safety Procedures in Industrial Wiring
- Electrical Enclosures and Conduits
- Power Distribution and Circuit Protection
- Conduit Bending and Wire Pulling Techniques
- Panelboard and Motor Control Wiring
- Troubleshooting and Maintenance
- Hands-on Application in Industrial Wiring Systems

Industry Recognized Certification Competencies

- Understand and Apply Industrial Wiring Principles
- Install and Maintain Electrical Enclosures and Conduits
- Operate and Troubleshoot Electrical Power Distribution
- Implement Safe Wiring Practices and Grounding Techniques
- Analyze and Apply Electrical Troubleshooting Methods
- Develop and Present Industrial Wiring Projects

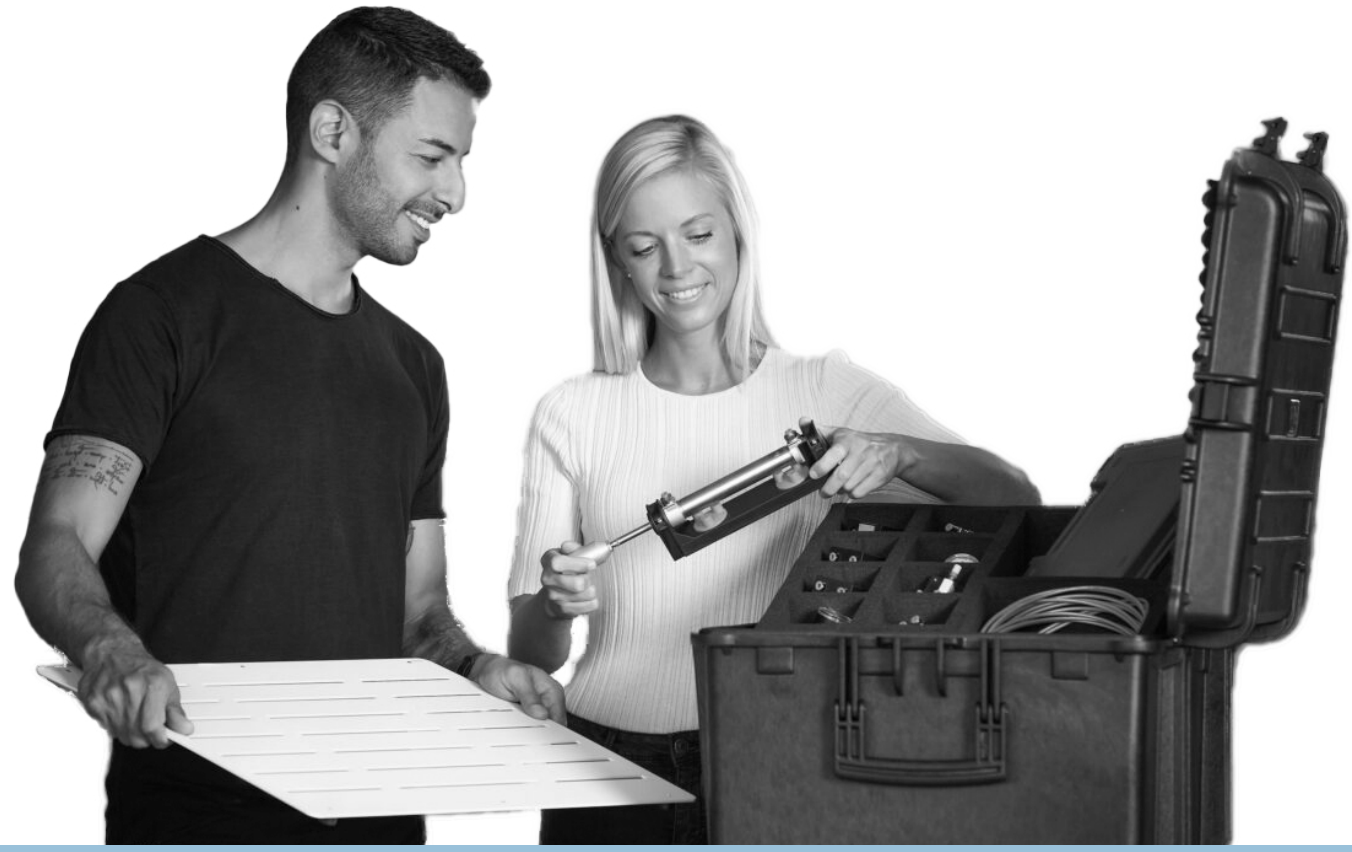
Level 1 Certifications:
Fundamentals of Product Automation

Units - 11 / Labs - 11

This certification provides foundational knowledge and hands on skills in production automation, preparing learners to safely assemble, commission, and maintain electromechanical production systems. Emphasizing Industry 4.0 principles, basic electrical and mechanical systems, motor control, PLCs, sensors and actuators, fluid power, and systematic troubleshooting, the program combines instructor led theory with paired lab work and simulation tools to develop practical competencies for industrial automation environments.

Industry Recognized Certification Topics

- Industry 4.0 concepts and network integration
- Industrial and wiring safety; lockout/tagout and safe work practices
- Print reading, BOMs, and dimensional metrology
- Tools, fasteners, and mechanical assembly techniques
- CNC basics
- Mechanical drives, motors, and flexible drive concepts
- Motor control and frequency inverter basics
- Fluid power basics and assembly
- Electrical systems, hard wired control, and control cabinet wiring
- Electrical distribution networks
- Circuit protection devices and selection basics
- Basic electrical wiring practices and grounding earthing considerations
- Common AC components
- AC waveforms, sinusoidal behavior, and basic reactance/impedance concepts
- Electrical measurement equipment and measurement best practices
- Sensors, actuators, and I/O integration
- Conveyor and material handling system commissioning
- Preventive and corrective maintenance practices, cycle time analysis
- Lean production, 5S, value stream mapping, and OPEX basics
- Plan Do Check Act problem solving and quality tools
- Technical documentation, lab procedures, and required accessories/tools
- Digital learning and simulation support



Industry Recognized Certification Competencies

- Explain Industry 4.0 concepts and integrate basic networked I/O elements
- Apply industrial and electrical safety procedures
- Read, interpret, and produce technical drawings, BOMs, and dimensional measurement records
- Perform semi precision and precision dimensional measurements
- Select and use appropriate tools and fasteners for mechanical assembly
- Describe basic CNC operation and programming concepts
- Assemble, align, and troubleshoot mechanical drives, conveyors, and drive components
- Replace, wire, commission, and troubleshoot DC and AC motors
- Implement hard wired control logic and wire control enclosures
- Size, wire, and explain basic electrical distribution and panel components
- Select and apply appropriate circuit protection devices for basic control panels
- Apply basic grounding and earthing practices in panel and machine wiring
- Identify and explain the function of common AC components and perform basic tests to validate operation
- Measure voltage, current, resistance, and basic AC parameters using appropriate measurement devices
- Calculate and interpret reactance/impedance for simple circuits and apply Ohm's law and power calculations
- Mount, align, and validate sensor types and integrate sensors
- Program, commission, and troubleshoot PLC sequences for conveyor, distribution, and sorting applications
- Conduct systematic commissioning, diagnostic testing, and fault isolation on electromechanical assemblies
- Perform preventive maintenance, basic repairs, and wear item replacement
- Apply cycle time analysis to optimize production flows
- Apply lean methods and PDCA problem solving to laboratory setups
- Use simulation and eLearning tools to design, simulate, and validate circuits and control logic
- Follow assembly and wiring documentation for torque specs, wiring diagrams, part lists, and safety instructions

Level 1 Certifications:

Certified Industry 4.0 Associate – Fundamentals Capstone Exam

Students who pass the Certified Industry 4.0 Associate – Fundamentals comprehensive knowledge exam will be well rounded machine operators/ technicians, with responsibility for efficient operation of the equipment. They will ensure that the system is running at maximum capacity with an understanding of the role of each component and device. They can identify malfunctions and make minor repairs. To be eligible for the Certified Industry 4.0 Associate – Fundamentals comprehensive knowledge exam students must complete all other Level 1 Certifications listed as prerequisites.

Prerequisite Certifications

- Fundamentals of Industry 4.0
- Fundamentals of Fluid Power - Hydraulics
- Fundamentals of Fluid Power – Pneumatics
- Fundamentals of Electricity – DC
- Fundamentals of Electricity – AC
- Fundamentals of Mechanical Systems
- Fundamentals of Sensor Technology
- Fundamentals of PLCs
- Fundamentals of Robotics

School Requirement

- Must meet all equipment requirements to teach all Level 1 Certifications
- Must have an NC3 certified instructor for each Level 1 Certification
- Must be a Leadership School which requires NC3 membership

Core Competencies

- Understand and implement safe operation and maintenance of machines and processes
- Troubleshoot, address common issues in electromechanical systems
- Perform routine maintenance activities
- Read and interpret schematics, blueprints, and technical drawings
- Operate and maintain fluid power systems
- Effectively work in a team environment and communicate clearly and efficiently with direct and indirect colleagues
- Perform basic robot programming and operation
- Identify and explain the components/ functions of a PLC and perform basic PLC programming
- Describe the function of various sensors and select the correct sensors for different applications
- Understand and explain the basic concepts and terms of Industry 4.0 and how digitalization is impacting the industry, our daily lives, and cyber-security

Applied:
Level 2 Certifications

Level 2 Certifications:
Applied Industrial Motor Controls

Units - 6 / Labs - 5

The **Applied Industrial Motor Controls** certification introduces learners to the essential components, circuits, and troubleshooting techniques used in industrial motor control systems. This course builds both technical and soft skills through hands-on exercises using fault-enabled training systems. Learners explore the operation of individual components such as relays, contactors, and starters, then apply that knowledge in real-world industrial circuit scenarios.
This certification prepares students to install, commission, and troubleshoot a range of common electric motor controllers used in manufacturing and processing facilities.

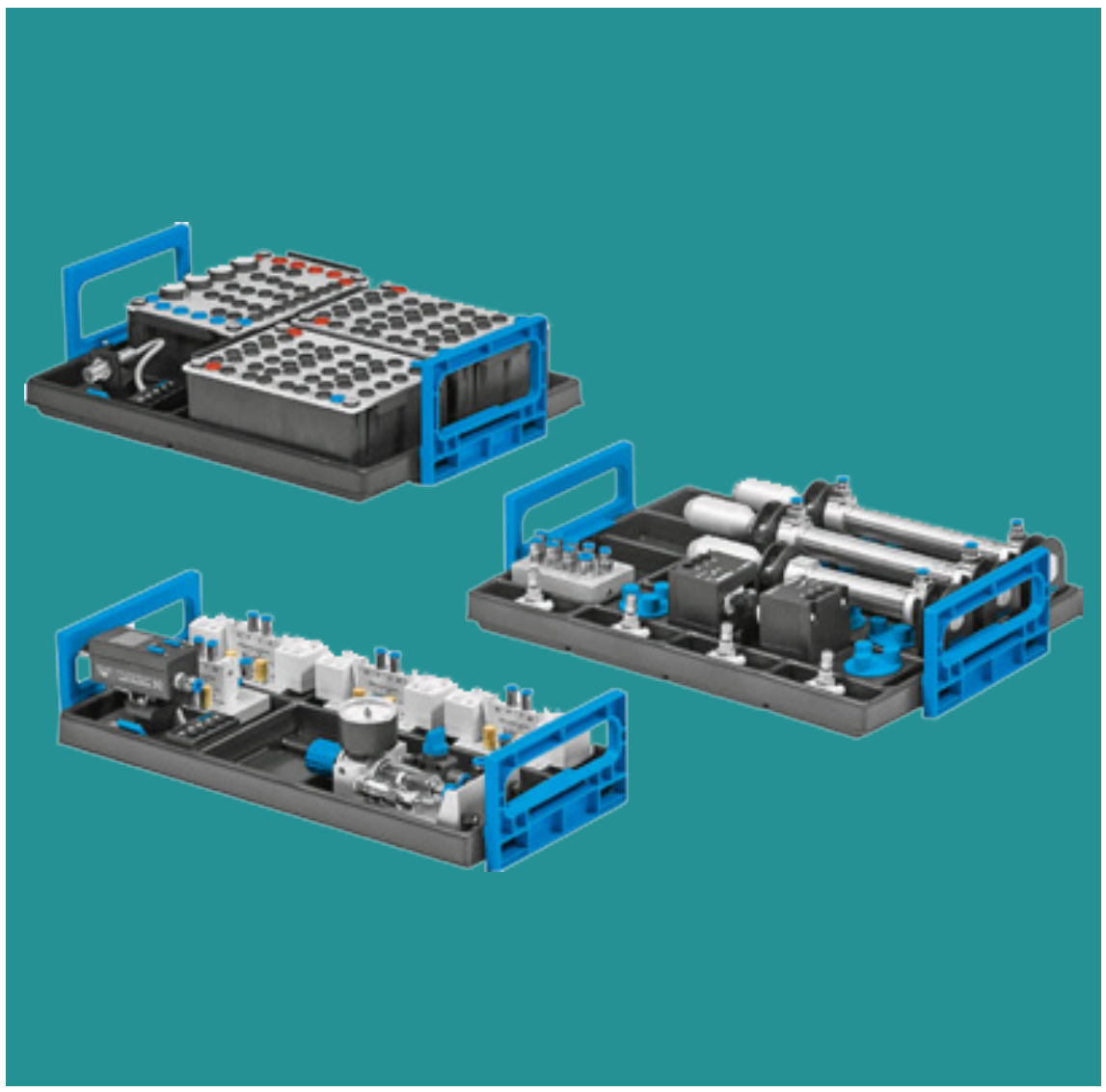
Industry Recognized Certification Topics

- Safety Protocols in Motor Control Environments
- Principles of Industrial Electric Motors
- Contactors, Relays, and Pilot Devices
- Control Circuit Operation and Assembly
- Three-Phase Motor Operation and Reversing
- Braking and Reduced Voltage Starters
- Use of Wiring Diagrams and Schematics for Troubleshooting

Industry Recognized Certification Competencies

- Industrial Electrical Safety
- Component Operation and Function
- Motor Circuit Construction
- Troubleshooting and Diagnostics
- Control Schematic Interpretation
- Motor Protection and Efficiency Strategies

Level 2 Certifications:
Applied Fluid Power



Units - 10 / Labs - 7

Maintenance, Troubleshooting & Vacuum Technology
This Applied Fluid Power certification expands upon the foundational skills learned in Fluid Power. The program is divided into two integrated modules: Maintenance & Troubleshooting and Vacuum Technology. Learners develop advanced competencies in setting up, analyzing, and maintaining electro-pneumatic systems while gaining specialized knowledge in vacuum-based handling technologies.
Through hands-on training using industrial-grade components, students diagnose faults, interpret electro-pneumatic schematics, and apply troubleshooting methodologies that reflect real-world applications in automation and robotics.

Industry Recognized Certification Topics

Maintenance & Troubleshooting Module (Fluid Power Systems)
- Setup and commissioning of pneumatic/ electropneumatic systems
- GRAFCET-based control task analysis (DIN EN 60848)
- Pneumatic/electro-pneumatic circuit design
- Component failure modes and behavior
- Disassembly, inspection, and repair practices
- Root cause analysis and Electro-pneumatic troubleshooting **Vacuum Technology Module**
- Introduction to vacuum systems and principles
- Generation and application of vacuum in handling system
- Vacuum component types and selection
- Suction cup design and material compatibility and vacuum-based automation circuits

Industry Recognized Certification Competencies

- System Commissioning & Setup
- Troubleshooting & Diagnostics
- Standards & Control Interpretation
- Component Integration
- Vacuum System Design
- Circuit Design and Analysis

Level 2 Certifications:
Applied Mechanical Systems

Units - 6 / Labs - 5

The **Applied Mechanical Systems** certification provides hands-on training in the installation, operation, maintenance, and troubleshooting of key mechanical components found throughout industrial systems. Learners will work with industrial-grade gears, bearings, couplings, ball screws, and seals to understand their function and integration in machinery.

Through safe and structured labs, students develop the ability to align shafts, reduce system backlash, and apply mechanical power transmission concepts in real-world contexts.

This certification is ideal for those pursuing roles in manufacturing, maintenance, and mechatronics, and builds on Level 1 mechanical system knowledge.

Industry Recognized Certification Topics

- Bearings and Seals
- Shaft Alignment and Couplings
- Ball Screws and Linear Bearings
- Clutches and Brakes
- Mechanical Assembly and Maintenance Practices

Industry Recognized Certification Competencies

- Mechanical Drive Installation & Identification
- Component-Level Familiarization
- Shaft Alignment and Coupling Techniques
- Ball Screw Analysis and Adjustment
- System Lubrication and Maintenance
- Coupling Types and Applications

Level 2 Certifications:
Applied Smart Sensors

Units - 6 / Labs - 6

This certification provides students with an understanding of smart sensor technology and its integration into industrial systems. It focuses on hands-on exploration of sensor functionality, communication protocols, data acquisition, and system-level decision-making based on sensor data. Learners apply engineering and troubleshooting practices using simulation tools and real-world labs to build competencies in configuring, analyzing, and optimizing sensor systems.

Industry Recognized Certification Topics

- Sensor Theory and Classification
- Smart Sensor Communication Protocols (IO-Link, ASi, etc.)
- Analog vs. Digital Signal Processing
- Real-Time Monitoring and Control
- Sensor System Configuration and Diagnostics
- Data Logging and Cloud Connectivity
- Industrial Networking Basics for Sensors
- Project-Based Learning in Sensor Integration

Industry Recognized Certification Competencies

- Classify and Select Sensors for Applications
- Implement Smart Communication Protocols
- Analyze Sensor Signals and Data
- Configure and Test Sensor Networks
- Integrate Sensor Data into Control Systems
- Apply Data Logging and Cloud Connectivity
- Complete Project-Based Labs.

Level 2 Certifications:
Applied PLC Technology II
Allen Bradley or Siemens

Units - 6 / Labs - 5

The **Applied PLC Technology** certification builds on foundational skills developed in the fundamentals of PLC. This course advances learners' capabilities in PLC programming by introducing more complex ladder logic applications, program modification, HMI (Human Machine Interface) development, and basic networking concepts. Learners gain hands-on experience using industry-standard PLC hardware and software, including systems from Allen Bradley or Siemens.

This certification is designed for students seeking to apply automation technologies in real-world industrial environments, supporting roles in systems integration, troubleshooting, and production optimization.

Industry Recognized Certification Topics

- Ladder Logic Programming
- Basic PLC Operations and Programming Functions
- Uploading and Downloading PLC Programs
- Program Modifications and Testing
- Human Machine Interface (HMI) Design
- Basic Networking Concepts for Industrial Systems
- System Troubleshooting and Fault Diagnosis

Industry Recognized Certification Competencies

- Ladder Logic Programming
- Program Management
- Core PLC Functionality
- Program Modification
- HMI Programming
- Networking Fundamentals

Level 2 Certifications:
Applied Robotics

Units - 7 / Labs - 3

The Applied Robotics certification combines theory with hands-on practice, training participants to work with advanced robotics systems while adhering to industry standards for safety, precision, and efficiency. This in-depth certification emphasizes programming, safety, operation, and workcell interfacing, using various robots or Universal cobots for practical applications. Students learn to program, control, and troubleshoot robots/cobots, with focused instruction on safety protocols, robot classifications, component functions, and I/O communication. By certification completion, participants are equipped with the skills needed to integrate robotics seamlessly into industrial environments.

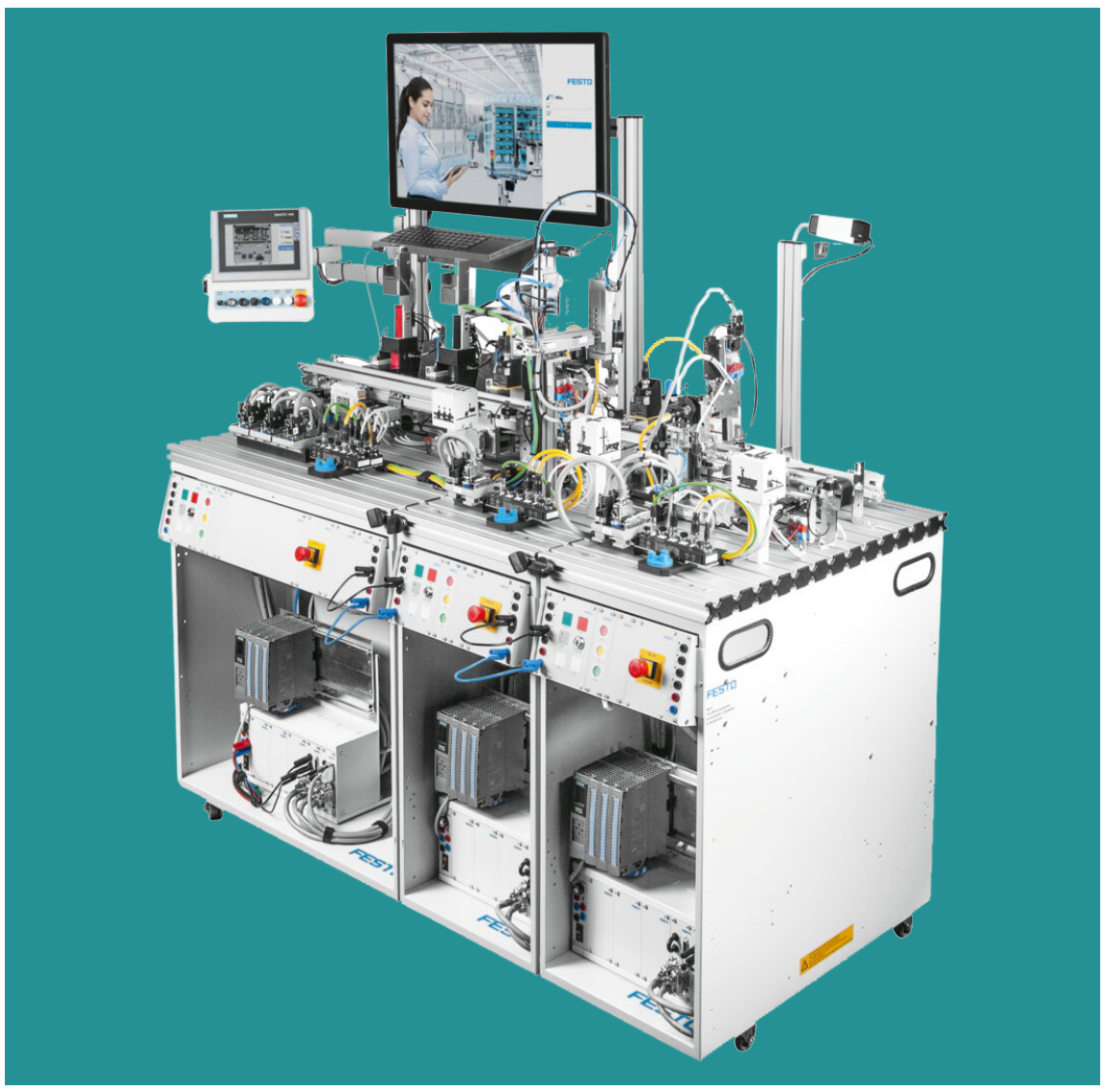
Industry Recognized Certification Topics

- Introduction to Industrial Robotics
- Robotics Safety and Risk Management
- Classification and Components of Industrial Robots
- Robot/Cobot Operation and Control
- Robot/Cobot Programming Fundamentals
- Work Cell Interfacing and I/O Communication

Industry Recognized Certification Competencies

- Understand Industrial Robotics Fundamentals
- Implement Safety Protocols and Hazard Management
- Classify and Describe Robot Components
- Operate and Control Robots/Cobots
- Develop and Troubleshoot Robot/Cobot Programs
- Interface Robots with Work Cells and I/O Systems

Level 2 Certifications:
Applied Industry 4.0



Units - 6 / Labs - 5

The **Applied Industry 4.0** certification builds on foundational digital manufacturing knowledge by focusing on advanced system integration through the Industrial Internet of Things (IIoT), MES (Manufacturing Execution Systems), data safety, and real-time data processing. Learners work with real-world automation equipment to simulate and optimize smart production processes. Through guided lab activities, students configure web services, integrate HMI applications, and apply 3D modeling to improve production efficiency. This course strengthens key technical skills necessary to thrive in connected manufacturing environments where data flows seamlessly across systems and networks.

Industry Recognized Certification Topics

- Manufacturing Execution Systems (MES)
- Human Machine Interfaces (HMI) and Equipment Integration
- Data Safety and Secure Communication
- 3D Modeling of Industrial Systems
- RFID Tracking and Product Identification
- Network Technology and Condition Monitoring
- Smart Production System Optimization

Industry Recognized Certification Competencies

- MES Integration and Configuration
- HMI System Integration
- Data Communication and Web Services
- Data Security Awareness
- Application of 3D Modeling
- Smart Factory Optimization
- RFID and Digital Identification

Level 2 Certifications:

Certified Industry 4.0 Technician – Applied Capstone Exam

Students who pass the Certified Industry 4.0 Technician – Applied comprehensive knowledge exam students will be skilled technicians who are able to assess and analyze the system as a whole. They can manage, investigate, repair and troubleshoot I4.0 systems to maximize operation and process control. They understand how individual components interact with each other to make the whole system run efficiently. To be eligible for the Certified Industry 4.0 Technician – Applied comprehensive knowledge exam students must complete the Industry 4.0 Associate - Fundamentals and all Level 2 Certifications listed as prerequisites.

Prerequisite Certifications

- Industry 4.0 Associate - Fundamentals
- Applied Industry 4.0
- Applied of Fluid Power
- Applied Mechanical Systems
- Applied PLCs
- Applied Robotics
- Applied Product ID Fundamentals

School Requirement

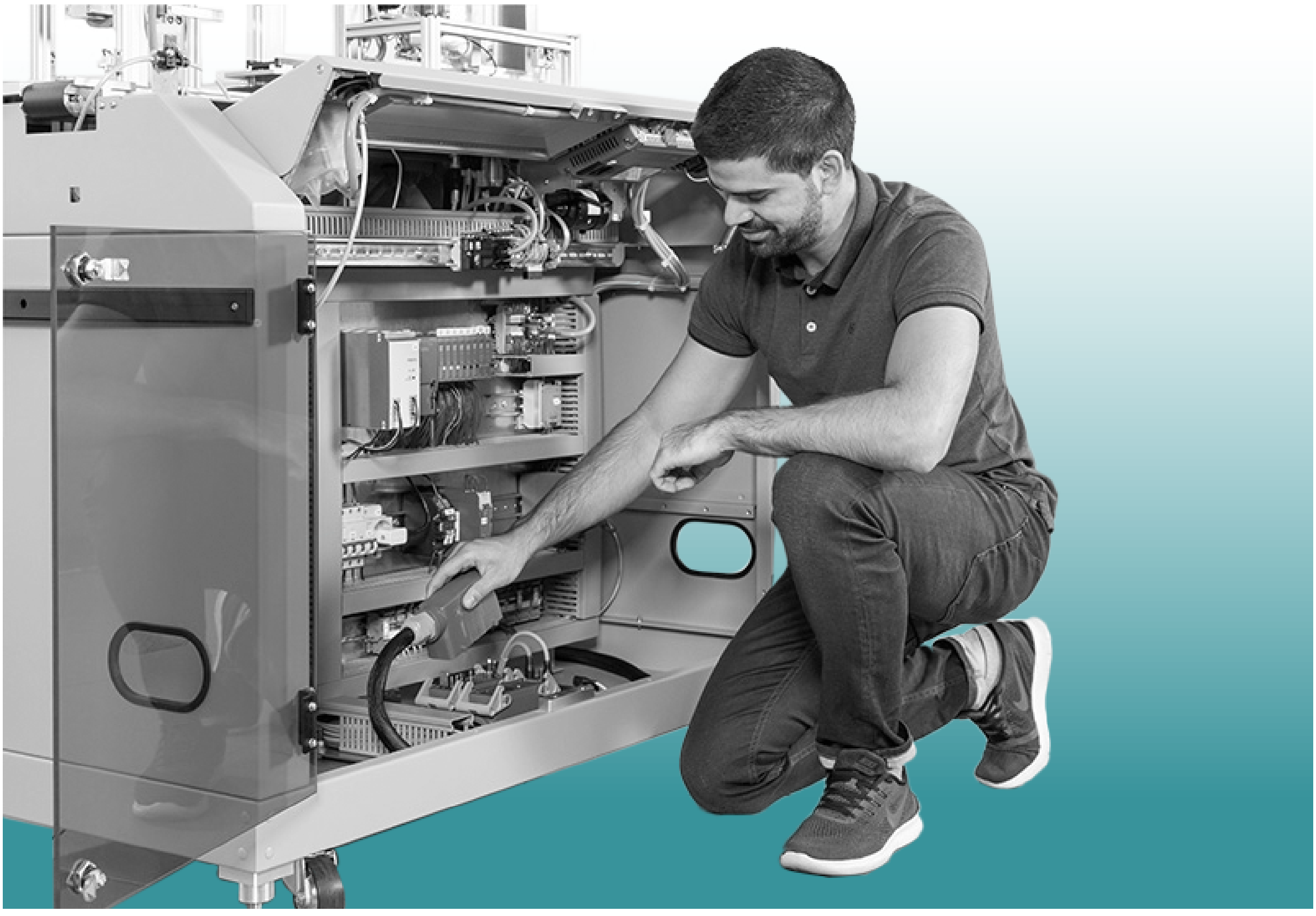
- Must meet all equipment requirements to teach all Level 1 & 2 Certifications
- Must have an NC3 certified instructor for each Level 1 & 2 Certification
- Must be a Leadership School which requires NC3 membership

Core Competencies

- Set up, commission and systematically troubleshoot complex electro-pneumatic systems
- Calculate cost to generate and use compressed air and identify system inefficiencies for correction
- Understand, describe, implement, and maintain vacuum systems
- Understand and Utilize CoDeSys for programming and troubleshooting
- Modify a current PLC program and integrate HMI (Human-Machine Interface) Applications
- Describe and explain the function of RFID, Barcodes/QR Codes, and Vision Systems
- Program and edit complex robot applications, incorporating sensors and other automated elements
- Understand and incorporate critical safety measures, such as machine guarding, for robotic systems
- Understand and explain basic networking fundamentals
- Define and configure Manufacturing Execution System (MES) and related functionality
- Utilize web services/email push delivery and explain the importance of data security
- Explain how 3D Modeling of systems impacts production systems

Advanced:

Level 3 Certifications



Level 3 Certifications:
Advanced Industrial Communication

Units - 6 / Labs -6

This certification is structured to encompass the full scope of industrial communication, emphasizing network communication, security, and system verification in an Industry 4.0 setting. This certification focuses on industrial communication and network integration within the Industry 4.0 environment. Students gain hands-on experience with advanced communication protocols, network configuration, and system validation techniques essential for modern automated systems.

Industry Recognized Certification Topics

- OPC UA
- Overview of Industrial Development and Fourth Industrial Revolution
- Understanding and Benefits of OPC-UA
- Integration with PROFINET and Time Sensitive Networking (TSN)
- IP Addresses and Net Masks
- Internet Protocol (IPv4) Basics
- Subnet Masks and CIDR Notation
- Network and Broadcast Addressing
- Functional Principle of a Router
- Basic Routing Procedures
- Static and Default Routes
- Firewall Function
- Firewall Functionality and IP Rules
- Firewall Functional Principles and Evaluation Sequence, Virtual Local Networks (VLAN)
- VLAN Technology and Trunk Connections
- Coding VLAN Identification and Dynamic VLANs
- Inter-VLAN Routing
- Introduction to Factory Acceptance Test (FAT)
- – Typical Headings, Benefits, & Structure of FAT

Industry Recognized Certification Competencies

- Implement OPC-UA Communication
- Configure Network Components
- Apply Routing Principles
- Design and Manage Firewalls
- Establish and Manage VLANs
- Conduct Factory Acceptance Testing (FAT)

Level 3 Certifications:
Advanced PLC Technology
Allen Bradley or Siemens

Units - 8 / Labs - 5

The advanced PLC module builds on foundational and applied knowledge, focusing on deeper integration of PLC programming with other essential elements like Human Machine Interface (HMI) systems. Students learn to program, modify, and adapt PLC functions to address dynamic industrial applications, ensuring seamless integration of all the components within the CP Lab. The PLC acts as the central controller, coordinating interactions between actuators, sensors, and information systems, which are vital for teaching complex automation processes. Mastery of these skills is highly valued in modern industry due to the increasing reliance on automated and connected systems.

Industry Recognized Certification Topics

- Ladder Logic Programming
- HMI (Human Machine Interface)
- Advanced Functions: Operation and Programming
- Advanced Networking
- Program Modifications
- Troubleshooting
- Uploading and Downloading Programs to a PLC

Industry Recognized Certification Competencies

- Program Complex PLC Systems
- Design and Implement Industrial Networks
- Upload, Download, and Manage Distributed PLC Systems
- Program Advanced PLC Functions
- Write, Customize and Optimize PLC Programs
- Develop Advanced HMI Applications
- Troubleshoot and Maintain IIoT-Connected Systems

Level 3 Certifications:
Advanced Smart Maintenance

Units - 6 / Labs - 4

This certification provides a comprehensive approach to smart maintenance within an Industry 4.0 framework, emphasizing practical skills and strategic knowledge. The certification focuses on smart maintenance strategies and technologies in the context of Industry 4.0. Students will gain hands-on experience with advanced maintenance concepts, integrating predictive maintenance, cyber-physical systems (CPS), and process optimization.

Industry Recognized Certification Topics

- Advanced Maintenance Concepts
- Smart Maintenance and Industry 4.0 Integration
- Maintenance Strategies:
- Reactive
- Preventive
- Risk-Oriented
- Predictive Maintenance
- Maintenance Tools and Techniques:
- Pneumatic Valves
- DC Motors
- Encoders
- Sensors

Industry Recognized Certification Competencies

- Understand Maintenance Concepts
- Implement Smart Maintenance
- Select Appropriate Maintenance Strategies
- Operate and Troubleshoot Equipment
- Perform Predictive Maintenance
- Track and Optimize OEE

Level 3 Certifications:
Advanced Industry 4.0

Units - 6 / Labs - 6

Industry 4.0 marks the fourth industrial revolution, integrating digital technologies like the Internet of Things (IoT), Cyber-Physical Systems (CPS), and advanced data analytics into manufacturing. This certification provides an in-depth exploration of how these digital advancements transform production, logistics, and maintenance. It emphasizes the creation of efficient, adaptable, and data-driven manufacturing systems. Participants will engage with concepts such as lean manufacturing, safety and risk management, and production planning within a connected, intelligent factory framework. This certification equips individuals with the skills necessary to design, implement, and optimize Industry 4.0 systems, preparing them for the evolving demands of modern industry.

Industry Recognized Certification Topics

- History and Evolution of Industry 4.0
- Cyber-Physical Systems (CPS)
- Lean Methods
- Network Topologies
- Safety and Risk Management
- Production Planning & Manufacturing Execution
- Systems (MES

Industry Recognized Certification Competencies

- Understand Industry 4.0 Evolution
- Implement and Integrate Cyber-Physical Systems (CPS)
- Apply Lean Manufacturing Methods
- Design and Manage Network Topologies
- Perform Safety and Risk Management:
- Utilize Production Planning and MES

Level 3 Certifications:
Advanced Product ID

Units - 6 / Labs - 4

Mastering product identification and real-time decision-making is essential for Industry 4.0 operations. This certification provides in-depth knowledge and practical skills in integrating key technologies such as RFID (Radio Frequency Identification), Vision Systems, and automated decision-making into modern industrial environments. Participants will actively engage with RFID Tags, Readers, and Writers to understand how to track and manage products through various stages of an automated workflow. Additionally, they will learn to utilize Vision Systems for scanning QR codes and barcodes, enhancing the precision and speed of product tracking, sorting, and quality control. By exploring these technologies, learners gain hands-on experience in programming, integrating, and troubleshooting advanced Product ID systems. This certification equips participants with the necessary skills to enhance efficiency, accuracy, and data-driven decision-making in real-world smart factory applications, ensuring they are well-prepared to meet the demands of modern automated industries.

Industry Recognized Certification Topics

- Product Identification
- RFID Technologies
- Vision Systems
- Computer Codes
- Numbering Systems

Industry Recognized Certification Competencies

- Determine Optimal Product ID Devices
- Understand Product ID Elements
- Set and Optimize Inspection Goals
- Minimize Inspection Time
- Identify Features or Defects
- Configure RFID Frequencies
- Integrate Various Barcode Types
- Data Analytics & Optimization
- Integration with IIoT Systems
- Multi-Technology Tracking
- Advanced Data Communication
- Cybersecurity in Product ID
- Remote Monitoring & Control
- Customizing Solutions for Industry Needs

Level 3 Certifications:
Advanced Robotics

Units - 9 / Labs - 9

The Advanced Robotics certification provides in-depth training on robotic systems, their history, and modern applications. Participants will gain comprehensive knowledge of robotics, focusing on key topics such as cyberphysical systems, safety protocols, robot control, and automation. This certification emphasizes hands-on learning, where participants will engage in programming, operating, and troubleshooting advanced robotic systems. The training prepares learners for practical applications in manufacturing, engineering, and industrial automation, leveraging the latest in robotics technology and standards. This certification provides participants with both theoretical knowledge and hands-on experience in advanced robotics, covering topics from basic principles to cutting edge technologies in automation and control.

Industry Recognized Certification Topics

- History of Robotics
- Cyber-Physical Systems (CPS) in Robotics
- Lean Methods in Robotics
- Network Topologies in Robotic Systems
- Robotic Safety and Hazards
- Production Planning and MES Integration in Robotics
- Robotic Programming and Control Systems
- Standards for Industrial and Collaborative Robots
- Robot Geometry and Degrees of Freedom
- Path Planning and Motion Control

Industry Recognized Certification Competencies

- Understand the Evolution of Robotics
- Implement Cyber-Physical Systems (CPS)
- Apply Lean Manufacturing Techniques
- Design and Analyze Network Topologies
- Identify and Mitigate Robotic Hazards
- Plan and Implement Robotic Production
- Program and Troubleshoot Robotic Systems
- Apply International Robotics Standards
- Analyze Robot Geometry and Degrees of Freedom
- Optimize Path Planning and Motion Control

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