COURSE OVERVIEW IE0501
Plant Equipment & Control System Protection

Course Title
Plant Equipment & Control System Protection

Course Date/Venue
January 12-16, 2025/TBA Meeting Room, The H Dubai Hotel, Sheikh Zayed Road, Dubai, UAE

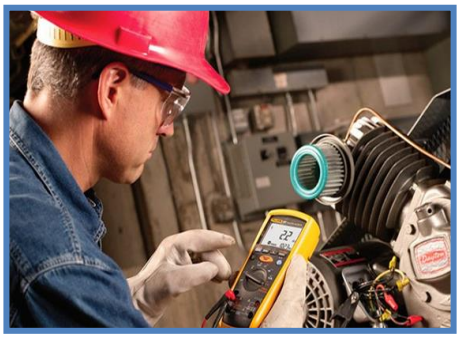
Course Reference
IE0501

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Description

This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using one of our state-of-the-art simulators.

This course is designed to provide participants with a complete and up-to-date overview of Plant Equipment and Control System Protection. It covers the basic operations and flow of processes in oil and gas production; the types of equipment used in oil and gas plants covering pumps, compressors and turbines; the basic components and functions of control systems used in oil and gas operations; the principles of equipment protection and other international safety standards applicable in oil and gas operations; and the basic techniques for assessing and managing risks associated with equipment and control systems.



Further, the course will also discuss the different types of control systems (DCS, SCADA, PLC); the types, functions and importance of various sensors and transmitters in system control; the control system communication protocols like MODBUS, Profibus and ethernet in plant communications; the cybersecurity threats and protection mechanisms; troubleshooting control systems and the techniques for protecting pumps, compressors and valves against mechanical failures; the electrical protection for plant equipment covering fuses, circuit breakers and relays in protecting electrical equipment; and the environmental factors and the impact of environmental conditions on equipment and mitigation strategies.

During the interactive course, participants will learn the routine monitoring techniques and preventative maintenance planning; the use of protective gear and equipment in the field; the PID control, feedforward control and other advanced control strategies; utilizing condition monitoring and predictive diagnostics for early problem detection; the instrument calibration and validation and control system with enterprise resource planning; the tools and techniques for decision-making based on real-time data; the importance, components and operation of emergency shutdown systems (ESDs) in oil and gas production; and the hazardous area classification and protection, fire and gas detection systems and emergency response procedures.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on plant equipment and control system protection
- Discuss the basic operations and flow of processes in oil and gas production and identify the types of equipment used in oil and gas plants covering pumps, compressors and turbines
- Recognize basic components and functions of control systems used in oil and gas operations
- Explain principles of equipment protection and other international safety standards applicable in oil and gas operations
- Carryout basic techniques for assessing and managing risks associated with equipment and control systems
- Identify the different types of control systems (DCS, SCADA, PLC) as well as the types, functions and importance of various sensors and transmitters in system control
- Recognize control system communication protocols like MODBUS, Profibus and ethernet in plant communications
- Access cybersecurity threats and protection mechanisms and troubleshoot control systems
- Employ techniques for protecting pumps, compressors and valves against mechanical failures
- Apply electrical protection for plant equipment covering fuses, circuit breakers and relays in protecting electrical equipment
- Discuss the environmental factors and the impact of environmental conditions on equipment and mitigation strategies
- Carryout routine monitoring techniques and preventative maintenance planning as well as use protective gear and equipment in the field
- Illustrate PID control, feedforward control and other advanced control strategies and utilize condition monitoring and predictive diagnostics for early problem detection
- Carryout instrument calibration and validation and integrate control system with enterprise resource planning
- Identify tools and techniques for decision-making based on real-time data and discuss the importance, components and operation of emergency shutdown systems (ESDs) in oil and gas production
- Apply the hazardous area classification and protection, fire and gas detection systems and emergency response procedures

Exclusive Smart Training Kit - H-STK®

*Participants of this course will receive the exclusive "Haward Smart Training Kit" (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials, sample video clips of the instructor's actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides various troubleshooting techniques of plant equipment and control system protection for field operators.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

- The International Accreditors for Continuing Education and Training (IACET - USA)

  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

  Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

  Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:

Mr. Barry Pretorius is a **Senior Electrical & Instrumentation Engineer** with almost **45** years of extensive experience within the **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries. His expertise widely covers in the areas of Distributed Control System (**DCS**), **DCS** Operations & Techniques, **Plant Control** and Protection Systems, **Process Control & Instrumentation**, **Cascade Control Loops**, **Split-Range Control Loops**, **Capacity Control** & Other Advanced Control Schemes, **Safety Instrumented Systems**, **Plant Automation** Operations & Maintenance, Programmable Logic Controller (**PLC**), **Siemens PLC** Simatic S7-400/S7-300/S7-200, **PLC & SCADA** for Automation & Process Control, **Artificial Intelligence**, **Allen Bradley PLC** Programing and Hardware Trouble Shooting, Schneider **SCADA System**, **Wonder Ware**, **Emerson**, **Honeywell**, **Honeywell** Safety Manager PLC, **Yokogawa**, Advanced **DCS Yokogawa**, **Endress & Hauser**, Field Commissioning and Start up Testing Pre Operations, System Factory Acceptance Test (**FAT**), FactoryLink ECS, Modicon 484, Rockwell Automation, System Site Acceptance Test (**SAT**), **SCADA HMI & PLC** Control Logic, **Cyber Security** Practitioner, **Cyber Security** of Industrial Control System, **IT Cyber Security** Best Practices, **Cybersecurity** Fundamentals, **Ethical Hacking & Penetration Testing**, **Cybersecurity** Risk Management, **Cybersecurity** Threat Intelligence, **OT Whitelisting** for Better Industrial Control System Defense, **NESA** Standard and Compliance Workshop, **OT**, **Cyber Attacks** Awareness - Malware/Ransom Ware / Virus /Trojan/ Philsing, **Information Security Manager**, **Security System** Installation and Maintenance, Implementation, Systems Testing, Commissioning and Startup, **Foxboro DCS & Triconics**, **SIS** Systems, Advanced **DC Drives**, Motion Control, **Hydraulics**, **Pneumatics and Control Systems** Engineering, **Electrical & Automation Control Systems**, **HV/MV Switchgear**, **LV & MV** Switchgears & Circuit Breakers, **High Voltage Electrical Safety**, **LV & HV Electrical System**, **HV Equipment** Inspection & Maintenance, **LV Distribution Switchgear & Equipment**, **Electrical Safety**, **Electrical** Maintenance, **Transformers**, **Medium & High Voltage Equipment**, **Circuit Breakers**, **Cable & Overhead Line** Troubleshooting & Maintenance, **Electrical Drawing & Schematics**, **Voltage Distribution**, **Power Distribution**, **Filters**, **Automation System**, **Electrical Variable Speed Drives**, **Power** Systems, **Power Generation**, **Diesel Generators**, **Power Stations**, Uninterruptible Power Systems (**UPS**), **Battery Chargers**, **AC & DC Transmission**, **CCTV** Installation, **Data & Fire Alarm** System, **Evacuation** Systems and **Electrical Motors & Variable Speed Drives**, & Control of Electrical and Electronic devices.

During Mr. Pretorius's career life, he has gained his practical experience through several significant positions and dedication as the **Technical Director**, **Automation System's Software Manager**, **Site Manager**, **Senior Lead Technical Analyst**, **Project Team Leader**, **Automation Team Leader**, **Automation System's Senior Project Engineer**, **Senior Project & Commissioning Engineer**, **Senior Instrumentation & Control Engineer**, **Electrical Engineer**, **Project Engineer**, **Pre-Operations Startup Engineer**, **PLC Specialist**, **Radio Technician**, **A.T.E Technician** and **Senior Instructor/Trainer** from various companies like the ADNOC Sour Gas, Ras Al Khair Aluminum Smelter, Johnson Matthey Pty. Ltd, Craigcor Engineering, Unitronics South Africa Pty (Ltd), Bridgestone/Firestone South Africa Pty (Ltd) and South African Defense Force.

Mr. Pretorius's has a **Bachelor** of **Technology** in **Electrical Engineering** (**Heavy Current**). Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), received numerous awards from various institutions and delivered numerous trainings, courses, workshops, seminars and conferences internationally.

Course Program

The following program is planned for this course. However, the course director(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Sunday, 12th of January 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Oil & Gas Production Processes****: Understanding the Basic Operations & Flow of Processes in Oil & Gas Production*
0930 – 0945	*Break*
0945 – 1045	***Fundamentals of Plant Equipment:*** *Types of Equipment Used in Oil & Gas Plants, Such as Pumps, Compressors & Turbines*
1045 – 1145	***Introduction to Control Systems****: Basic Components & Functions of Control Systems Used in Oil & Gas Operations*
1145 – 1230	***Principles of Equipment Protection:*** *Introduction to Protection Methods & Devices for Mechanical & Electrical Equipment*
1230 – 1245	*Break*
1245 – 1330	***Safety Standards & Compliance:*** *Overview of International Safety Standards Applicable in Oil & Gas Operations*
1330 - 1420	***Risk Assessment & Management:*** *Basic Techniques for Assessing & Managing Risks Associated with Equipment & Control Systems*
1420 - 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: ***Monday, 13th of January 2025***

0730 – 0830	***Control System Architectures:*** *Detailed Discussion on Different Types of Control Systems (DCS, SCADA, PLC)*
0830- - 0930	***Sensor & Transmitter Technologies:*** *Types, Functions & Importance of Various Sensors & Transmitters in System Control*
0930 – 0945	*Break*
0945 – 1100	***Control System Communication Protocols:*** *Understanding Protocols Like Modbus, Profibus & Ethernet in Plant Communications*
1100 – 1230	***Cybersecurity for Control Systems:*** *Introduction to Cybersecurity Threats & Protection Mechanisms*
1230 – 1245	*Break*
1245 – 1330	***Troubleshooting Control Systems:*** *Common Issues & Troubleshooting Techniques for Field Operators*
1330 - 1420	***Hands-On Simulation:*** *Practical Session on Interacting with a Simulated Control System*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: ***Tuesday, 14th of January 2025***

0730 – 0830	***Mechanical Equipment Protection Methods****: Techniques for Protecting Pumps, Compressors & Valves Against Mechanical Failures*
0830- - 0930	***Electrical Protection for Plant Equipment****: Understanding Fuses, Circuit Breakers & Relays in Protecting Electrical Equipment*
0930 – 0945	*Break*

0945 – 1100	***Environmental Factors & Equipment Protection**: Impact of Environmental Conditions on Equipment & Mitigation Strategies*
1100 – 1230	***Monitoring & Maintenance Strategies:** Routine Monitoring Techniques & Preventative Maintenance Planning*
1230 – 1245	*Break*
1245 – 1330	***Use of Protective Gear & Equipment:** Training on the Correct Use of Personal Protective Equipment (PPE) in the Field*
1330 - 1420	***Case Study Review**: Examining Past Incidents of Equipment Failure & Learning from these Scenarios*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 4: ***Wednesday, 15th of January 2025***

0730 – 0830	***Advanced Control Algorithms:** An Introduction to PID Control, Feedforward Control & Other Advanced Control Strategies*
0830- - 0930	***Predictive Maintenance Technologies:** Utilizing Condition Monitoring & Predictive Diagnostics for Early Problem Detection*
0930 – 0945	*Break*
0945 – 1100	***Instrument Calibration & Validation:** Procedures for Ensuring the Accuracy & Reliability of Control System Instruments*
1100 – 1230	***Integration of Control Systems with ERP:** How Control Systems Integrate with Enterprise Resource Planning for Optimized Operations*
1230 – 1245	*Break*
1245 – 1330	***Decision Support Systems**: Tools & Techniques for Decision-Making Based on Real-Time Data*
1330 - 1420	***Workshop: Diagnostic Techniques:** Practical Exercises on Diagnosing & Correcting Issues in Control Systems*
1420 - 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 5: ***Thursday, 16th of January 2025***

0730 – 0830	***Emergency Shutdown Systems (ESD)**: Importance, Components & Operation of ESDs in Oil & Gas Production*
0830 - 0930	***Hazardous Area Classification & Protection:** Understanding Zones & Requirements for Equipment in Hazardous Areas*
0930 – 0945	*Break*
0945 – 1100	***Fire & Gas Detection Systems**: Overview of Systems Used for Early Detection of Fire & Gas Leaks*
1100 – 1230	***Emergency Response Procedures**: Detailed Action Plans for Different Types of Emergencies*
1230 – 1245	*Break*
1245 – 1345	***Simulation Exercise:** Real-Life Emergency Response Simulation Involving Equipment & Control Systems*
1345 - 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using one of our state-of-the-art simulators "Allen Bradley SLC 500", "AB Micrologix 1000 (Digital or Analog)", "AB SLC5/03", "AB WS5610 PLC", "Siemens S7-1200", "Siemens S7-400", "Siemens SIMATIC S7-300", "Siemens S7-200", "GE Fanuc Series 90-30 PLC", "Siemens SIMATIC Step 7 Professional Software", "HMI SCADA", "Gas Ultrasonic Meter Sizing Tool", "Liquid Turbine Meter and Control Valve Sizing Tool", "Liquid Ultrasonic Meter Sizing Tool" , "Orifice Flow Calculator", "Automation Simulator" and "PLCLogix 5000 Software".

Allen Bradley SLC 500 Simulator

Allen Bradley Micrologix 1000 Simulator (Digital)

Allen Bradley Micrologix 1000 Simulator (Analog)

Allen Bradley SLC 5/03

Allen Bradley WS5610 PLC Simulator PLC5

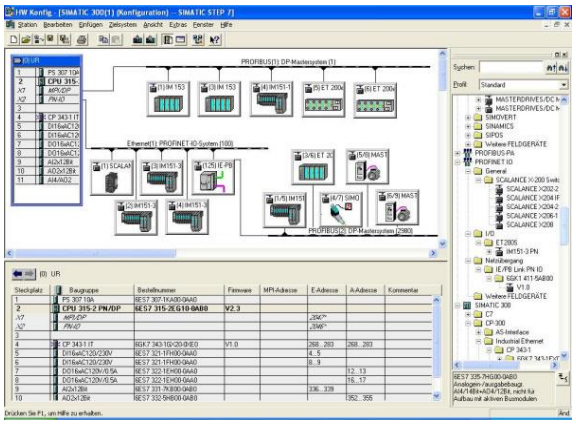
Siemens S7-1200 Simulator

Siemens S7-400 Simulator

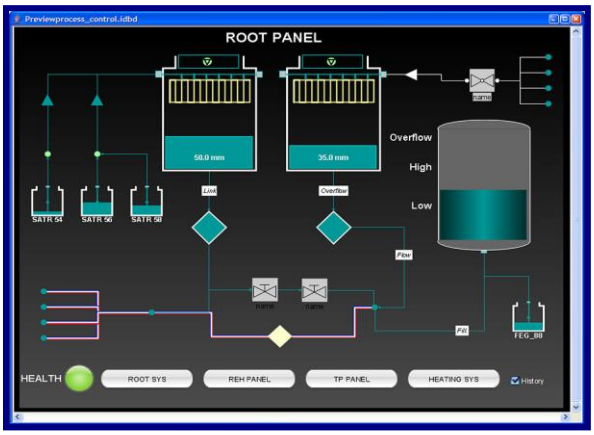
Siemens SIMATIC S7-300

Siemens S7-200 Simulator

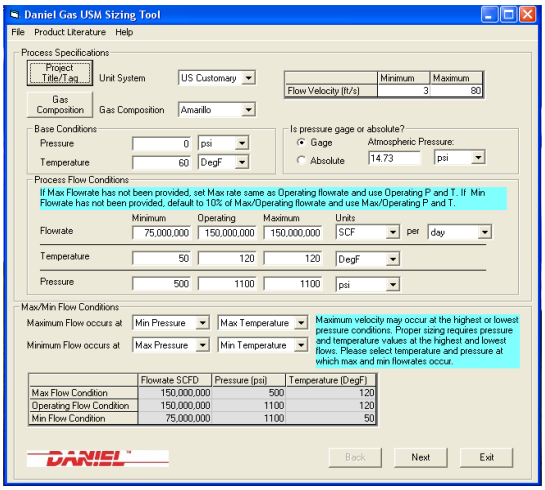
GE Fanuc Series 90-30 PLC Simulator



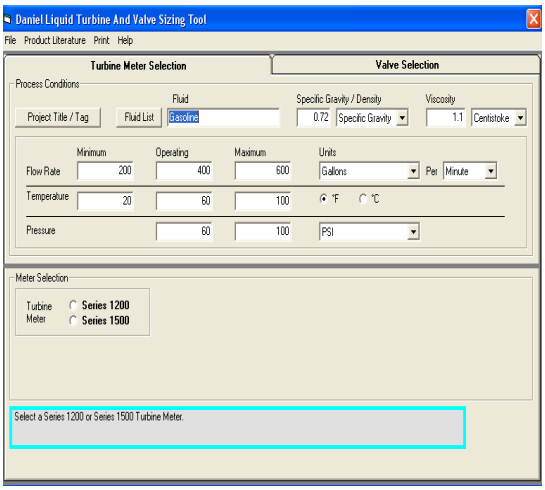
Siemens SIMATIC Step 7 Professional Software



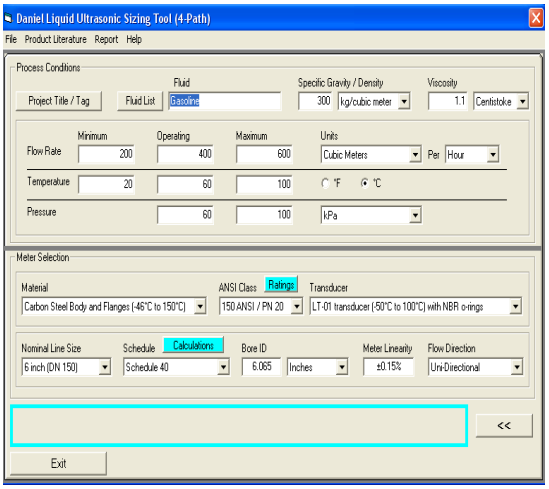
HMI SCADA



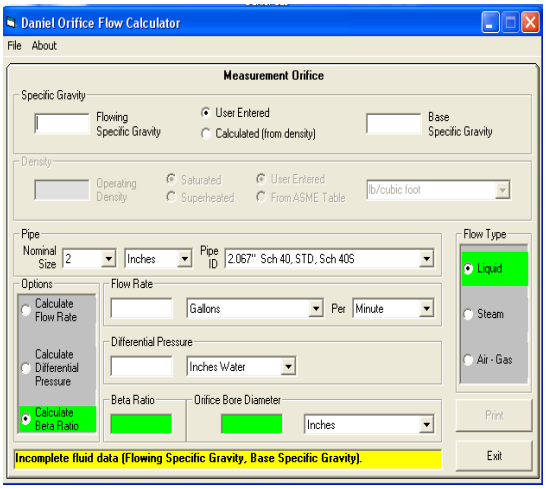
Gas Ultrasonic Meter (USM) Sizing Tool Simulator



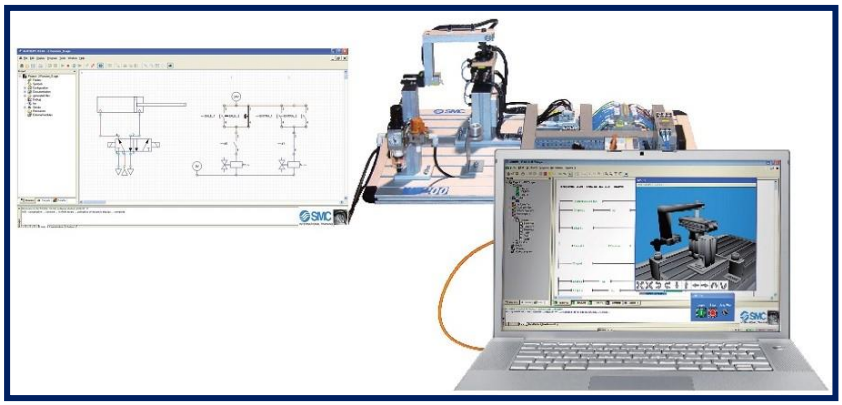
Liquid Turbine Meter and Control Valve Sizing Tool Simulator



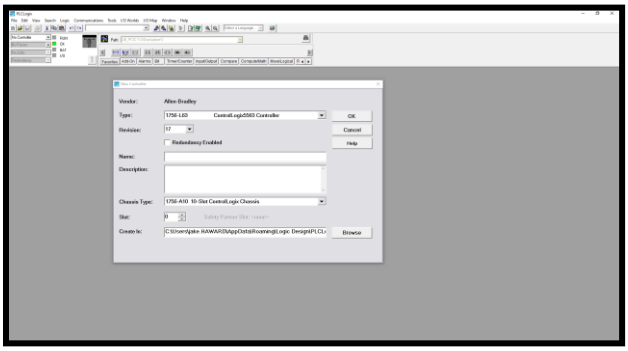
Liquid Ultrasonic Meter Sizing Tool Simulator

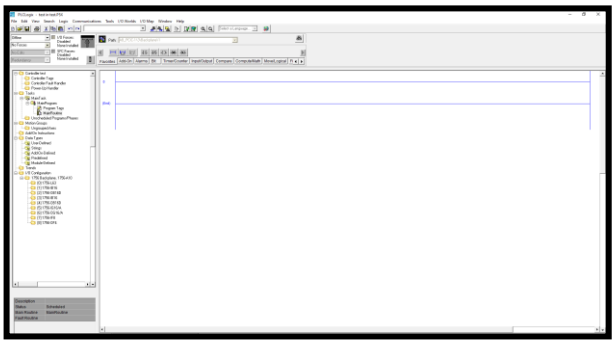


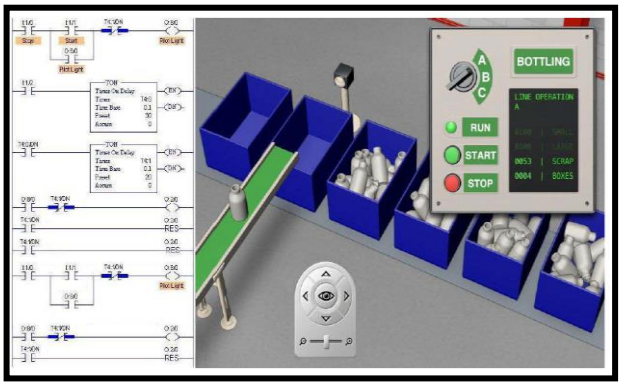
Orifice Flow Calculator Simulator

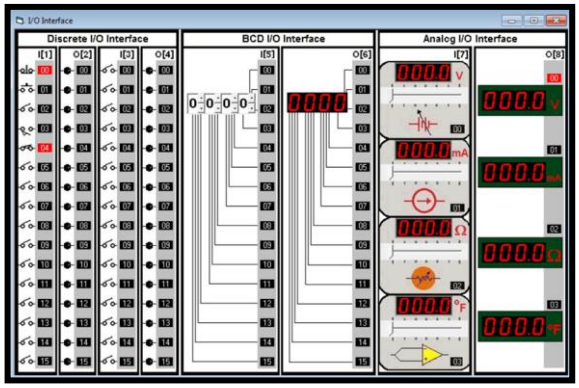


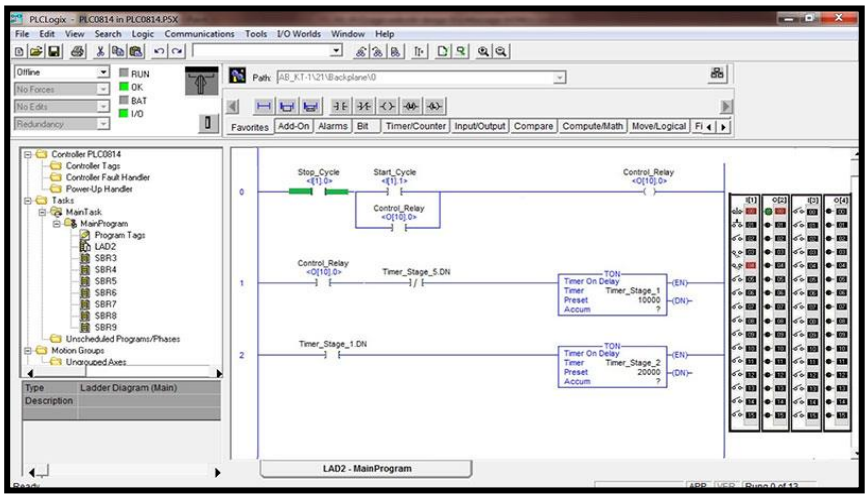
AutoSIM – 200 Automation Simulator











PLCLogix 5000 Software

Course Coordinator

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