COURSE OVERVIEW IE0527
Maintain Instrumented Protection System (IPS) & Process Control System

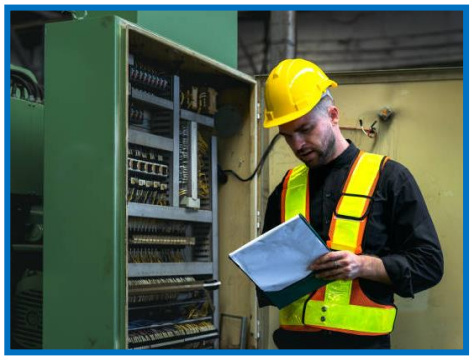
Course Title
Maintain Instrumented Protection System (IPS) & Process Control System

Course Date/Venue
October 27-31, 2024/Sharjah Meeting Room, The Tower Plaza Hotel, Dubai, UAE

Course Reference
IE0527

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 our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Instrumented Protection System (IPS) & Process Control System Maintenance. It covers the types, regulatory requirements and standards of IPS; the fundamentals of process control systems, safety instrumented systems (SIS) and IPS design principles; the process control system design and programmable logic controllers (PLCs); the IPS installation procedures, process control system installation and IPS commissioning; and the commissioning of process control systems.

During this interactive course, participants will learn the operational readiness and handover, safety and compliance check; the preventive maintenance and process control systems troubleshooting; the performance monitoring and optimization, documentation, record-keeping and advanced control strategies; integrating IPS with process control systems; the cybersecurity for IPS and process control systems; the reliability and availability engineering, remote monitoring and control; the emerging trends and technologies; and the emergency response drills.

Course Objectives

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

- Apply and gain an in-depth knowledge on instrumented protection system (IPS) and process control system maintenance
- Discuss the types, regulatory requirements and standards of IPS
- Explain the fundamentals of process control systems, safety instrumented systems (SIS) and IPS design principles
- Discuss process control system design and programmable logic controllers (PLCs)
- Carryout IPS installation procedures, process control system installation and IPS commissioning
- Commission process control systems through process testing of control loops, calibration and tuning and system handover procedures
- Employ operational readiness and handover, safety and compliance check as well as preventive maintenance of IPS
- Apply preventive maintenance of process control systems and troubleshoot IPS and process control systems
- Carryout performance monitoring and optimization, documentation and record-keeping and advanced control strategies
- Integrate IPS with process control systems and recognize cybersecurity for IPS and process control systems
- Discuss reliability and availability engineering as well as apply remote monitoring and control
- Explain the emerging trends and technologies and develop emergency response drills

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 an overview of all significant aspects and considerations of instrumented protection system (IPS) and process control system maintenance for process control engineers and supervisors, instrumentation and control system engineers, instrumentation engineers and technologists, process engineers, electrical engineers and supervisors and for all power plant system and control operators.

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 Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), 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 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:

Dr. Ahmed El-Sayed, PhD, MSc, BSc, is a **Senior Electrical & Instrumentation Engineer** with over **35 years** of extensive experience in the **Oil**, **Gas**, **Power**, **Petroleum**, **Petrochemical** and **Water** & **Utilities**. He specializes in **Instrumentation Protection Devices** Maintenance & Testing, **SIPROTEC 7**, **Protection Devices** Troubleshooting, Water **Meter Calibration**, Liquid & Gas Flowmetering & **Meter Calibration**, **Testing & Calibration of Energy Meters**, **DCS & ESD** System Architecture, **Distributed Control System**, **DCS** & **SCADA**, Distributed Control System (**DCS**) Selection & Troubleshooting, Advanced **DCS Yokogawa**, **Yokogawa CENTUM VP DCS**, **Modern Distributed Control System** (**DCS**) **& Process Instrumentation**, **Cyber Security** of Industrial System, **DCS System** (**Honeywell**), **DCS Experion** System, **DCS Siemens Telepherm XP**, **Relay Coordination Using ETAP Software**, **Power System Study on** ETAP, ETAP-Power System Analysis, Flow Measurement Foundation, **Operation, Maintenance & Troubleshooting of ABB/Schneider HV Switchgear,** Instrumentation Measurement & Control System, **Flow** Measurement, **Pressure** Measurement, **Level & Temperature** Measurement, **Measurement Devices & Control System**, **Instrumentation & Control** Systems, **Control System** Orientation, Uninterruptible Power Supply (**UPS**) **Battery Charger**, **Industrial UPS Systems Construction & Operation**, **Test Lead-Acid & Ni-cad Battery Systems**, **Hazards & Safe Work Practice**s, **Transformer** Operational Principles, Selection & Troubleshooting; **High Voltage Technology** & **Safety**, **HV & LV Transformers**, **Control Valves & Actuators**, **Electrical Safety**, **Protection Relay Application**, **Maintenance & Testing**, **NEC** (National Electrical Code), **NESC** (National Electrical Safety Code), **Electrical Equipment** & **classic Control Systems** for **Electricians**, **Electrical Safety**, **Electrical Hazards Assessment**, **Electrical Equipment**, **Personal Protective Equipment**, Lock-Out & Tag-Out (**LOTO**), Confined Workspaces, Alerting Techniques, Electrical Transient Analysis Program (**ETAP**), Power **Quality**, Power **Network**, Power **Distribution**, **Distribution Systems**, **Power Systems Control**, **Power Systems Security**, Power **Electronics**, Electrical **Substations**, **UPS** & **Battery System**, **Earthing & Grounding**, **Load Forecasting**, Power **Generation**, **Protective Systems**, **Electrical Generators**, **Power** & **Distribution Transformers**, **Electrical Motors**, **Switchgears**, **Transformers**, **AC** & **DC Drives**, **Variable Speed Drives** & **Generators**, **Generator Protection**, **GE Gas Turbines**, PLC, SCADA, DCS, Process Control, Control Systems & Data Communications, Instrumentation, Automation, Valve Tuning, SIS, SIL, ESD, **Alarm Management** Systems, **Energy** Management System, Engine Management System, Bearing & Rotating Machine, Fieldbus Systems and Fiber Optics Technology. He is currently the **Systems Control Manager** of **Siemens** where he is in-charge of Security & Control of Power **Transmission Distribution** & **High Voltage** Systems and he further takes part in the Load Records Evaluation & Transmission Services Pricing.

During his career life, Dr. Ahmed has been actively involved in different Power System Activities including Roles in Power System Planning, Analysis, Engineering, **HV Substation** Design, Electrical Service Pricing, Evaluations & Tariffs, Project Management, Teaching and Consulting. His vast industrial experience was honed greatly when he joined many International and National Companies such as **Siemens**, **Electricity Authority** and **ACETO** industries as the **Instrumentation & Electrical Service Project Manager**, **Instrumentation & Control Engineer**, **Fire Protection Engineer**, **Energy Management Engineer**, **Department Head**, **Assistant Professor**, **Instrumentation & Control Instructor**, **Project Coordinator**, **Project Assistant and Managing Board Member** where he focused more on dealing with Technology Transfer, System Integration Process and Improving Localization. He was further greatly involved in manufacturing some of **Power System** and **Control & Instrumentation Components** such as Series of Digital Protection **Relays**, MV **VFD**, **PLC** and **SCADA** System with intelligent features.

Dr. Ahmed is well-versed in different electrical and instrumentation fields like **ETAP**, Load Management Concepts, **PLC** Programming, Installation, Operation and Troubleshooting, **AC Drives** Theory, Application and Troubleshooting, Industrial Power Systems Analysis, AC & DC **Motors**, Electric Motor **Protection**, **DCS SCADA**, **Control** and Maintenance Techniques, Industrial Intelligent Control System, **Power Quality** Standards, Power Generators and Voltage Regulators, Circuit Breaker and Switchgear Application and Testing Techniques, **Transformer** and **Switchgear** Application, Grounding for Industrial and Commercial Assets, Power Quality and **Harmonics**, **Protective Relays** (O/C Protection, Line Differential, Bus Bar Protection and **Breaker Failure Relay**) and Project Management Basics (PMB).

Dr. Ahmed has **PhD**, **Master's** & **Bachelor's** degree in **Electrical Engineering** from the **University of Wisconsin Madison**, **USA** and **Ain Shams University**, respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/ Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), an active member of IEEE and ISA as well as numerous technical and scientific papers published internationally in the areas of Power Quality, Superconductive Magnetic Energy Storage, SMES role in Power Systems, Power System **Blackout** Analysis, and Intelligent Load Shedding Techniques for preventing Power System Blackouts, HV **Substation Automation** and Power System Stability.

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 Program

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

Day 1: ***Sunday, 27th of October 2024***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Instrumented Protection Systems (IPS)*** *Definition & Importance • Types of IPS • Regulatory Requirements & Standards*
0930 – 0945	*Break*
0945 – 1030	***Fundamentals of Process Control Systems*** *Basic Concepts of Process Control • Key Components & Architecture • Control Strategies & Algorithms*
1030 – 1130	***Safety Instrumented Systems (SIS)*** *Introduction to SIS • Functional Safety & SIL (Safety Integrity Level) • Lifecycle of SIS*
1130 – 1215	***IPS Design Principles*** *Design Considerations • Selection of Sensors, Actuators & Controllers • Redundancy & Fault Tolerance*
1215 – 1230	*Break*
1230 – 1330	***Process Control System Design*** *Control Loop Design • Feedback & Feedforward Control • Advanced Control Strategies*
1330 – 1420	***Basics of Programmable Logic Controllers (PLCs)*** *Basic Architecture & Operation • Programming & Configuration • PLCs in IPS & Process Control Systems*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2: Monday, 28th of October 2024

0730 – 0830	***IPS Installation Procedures*** *Site Preparation & Safety Measures • Installation of Sensors & Actuators • Wiring & Signal Testing*
0830 – 0930	***Process Control System Installation*** *Hardware & Software Installation • Network & Communication Setup • System Integration*
0930 – 0945	*Break*
0945 – 1100	***Commissioning of IPS*** *Pre-commissioning Checks • Functional Testing & Verification • Documentation & Reporting*
1100 – 1215	***Commissioning of Process Control Systems*** *Testing of Control Loops • Calibration and Tuning • System Handover Procedures*
1215 – 1230	*Break*
1230 – 1330	***Operational Readiness & Handover*** *Operator Training & Familiarization • Start-up Procedures • Transition to Steady-State Operations*
1330 – 1420	***Safety & Compliance Checks*** *Ensuring Regulatory Compliance • Safety Audits & Inspections • Risk Assessment & Mitigation*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3: Tuesday, 29th of October 2024

0730 – 0830	***Preventive Maintenance of IPS*** *Scheduled Inspections & Testing • Calibration & Recalibration Procedures • Replacement of Critical Components*
0830 – 0930	***Preventive Maintenance of Process Control Systems*** *Routine Maintenance Activities • Software Updates & Patches • Backup & Recovery Procedures*
0930 – 0945	*Break*
0945 – 1100	***Troubleshooting IPS*** *Common IPS Issues & Failures • Diagnostic Tools & Techniques • Corrective Actions & Repairs*
1100 – 1215	***Troubleshooting Process Control Systems*** *Identifying Control System Malfunctions • Root Cause Analysis • System Restoration Procedures*
1215 – 1230	*Break*
1230 – 1330	***Performance Monitoring & Optimization*** *Monitoring System Performance • Analyzing Performance Data • Implementing Improvements*
1330 – 1420	***Documentation & Record-Keeping*** *Maintenance Logs & Records • Incident Reporting • Compliance Documentation*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4: Wednesday, 30th of October 2024

0730 – 0830	***Advanced Control Strategies*** *Model Predictive Control (MPC) • Adaptive Control • Multivariable Control*
0830 – 0930	***Integration of IPS with Process Control Systems*** *Communication Protocols & Standards • Data Exchange & Interoperability • Integrated Safety & Control Systems*
0930 – 0945	*Break*
0945 – 1100	***Cybersecurity for IPS & Process Control Systems*** *Threats & Vulnerabilities • Cybersecurity Best Practices • Incident Response & Recovery*
1100 – 1215	***Reliability & Availability Engineering*** *Ensuring System Reliability • Redundancy & Failover Mechanisms • Availability Optimization*
1215 – 1230	*Break*
1230 – 1330	***Remote Monitoring & Control*** *Remote Access Technologies • Benefits & Challenges • Case Studies & Applications*
1330 – 1420	***Emerging Trends & Technologies*** *Industrial Internet of Things (IIoT) • Machine Learning & Artificial Intelligence in Control Systems • Future of IPS & Process Control Systems*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5: Thursday, 31st of October 2024

0730 – 0830	***Hands-on IPS Maintenance*** *Practical Exercises in Calibration & Testing • Fault Diagnosis & Correction • Real-World Case Studies*
0830 – 0930	***Hands-on Process Control System Maintenance*** *Control Loop Tuning Exercises • System Integration & Testing • Troubleshooting Scenarios*
0930 – 0945	*Break*
0945 – 1100	***Simulation & Modeling*** *Using Simulation Tools for Training • Modeling Control Systems • Analyzing Simulation Results*
1100 – 1230	***Emergency Response Drills*** *Simulated Emergency Scenarios • Response Procedures & Best Practices • Post-Drill Analysis & Feedback*
1230 – 1245	*Break*
1245 – 1345	***Group Projects & Presentations*** *Group Work on IPS & Process Control Challenges • Presentation of Findings & Solutions • Peer Review & Feedback*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
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” and “Automation Simulator”.

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

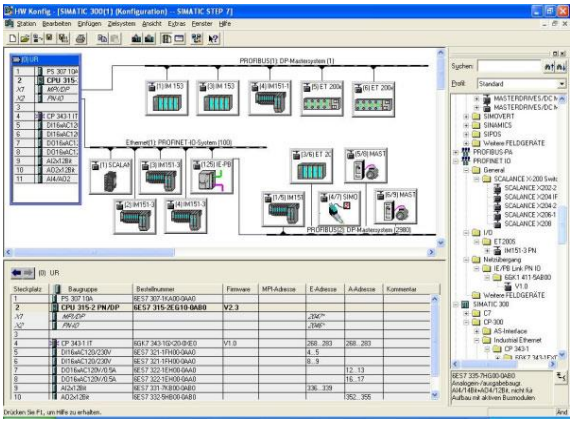
Siemens S7-1200 Simulator

Siemens S7-400 Simulator

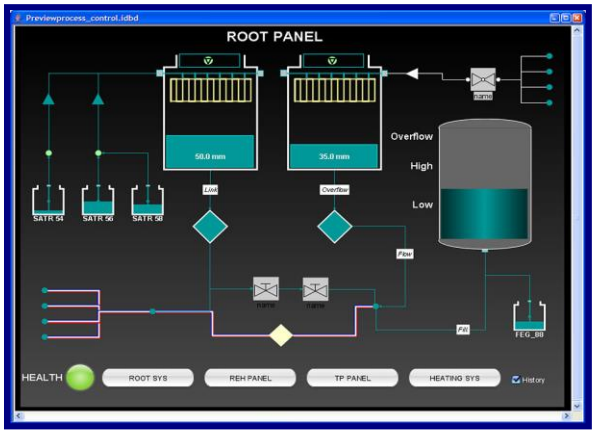
Siemens SIMATIC S7-300

Siemens S7-200 Simulator

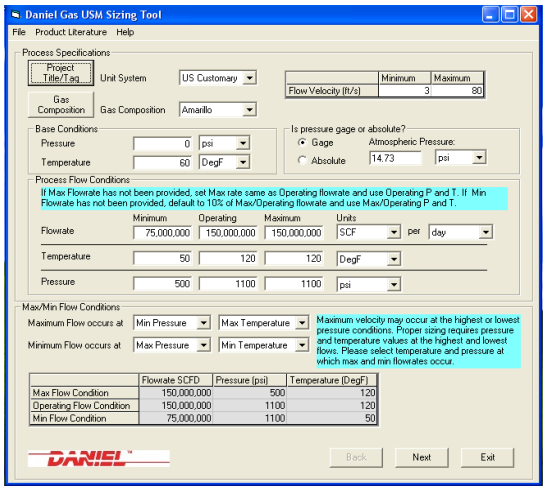
GE Fanuc Series 90-30 PLC Simulator



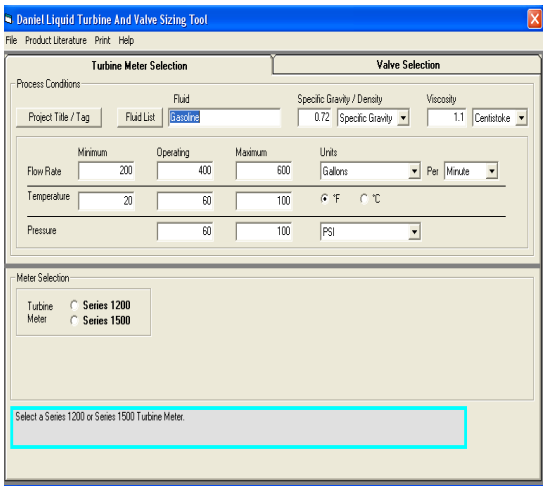
Siemens SIMATIC Step 7 Professional Software



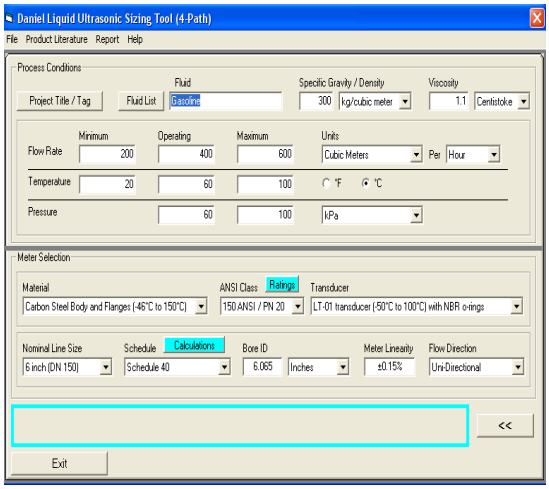
HMI SCADA



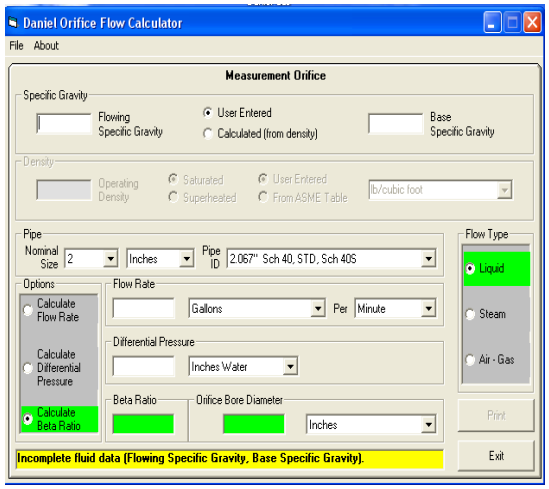
Gas Ultrasonic Meter (USM) Sizing Tool Simulator



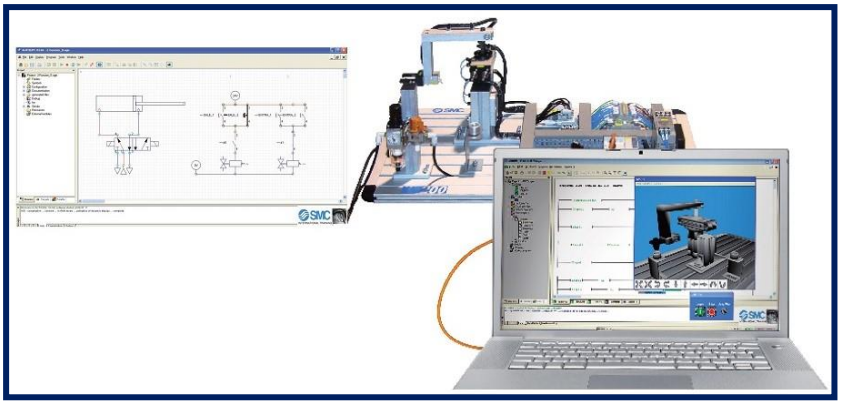
Liquid Turbine Meter and Control Valve Sizing Tool Simulator



Liquid Ultrasonic Meter Sizing Tool Simulator



Orifice Flow Calculator Simulator



AutoSIM – 200 Automation Simulator

Course Coordinator

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