COURSE OVERVIEW IE0224
Instrument Documents

Course Title
Instrument Documents

Course Date/Venue
Session 1: April 06-10, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
Session 2: September 08-12, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
IE0224

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 Instrument Documents. It covers the importance of instrument documents in engineering and process control; the types of instrument documents and standards and regulations; the purpose and structure of an instrument index and creating and maintaining an instrument index; the piping and instrumentation diagrams (P&IDs) including instrument data sheets; and the key components of loop diagrams, wiring diagrams and hook-up drawings.

Further, the course will also discuss the instrument calibration records and integrating functional specification documents (FSD) with other documents; the cause and effect diagrams and instrument procurement documentation; the instrument tagging and numbering systems, communication and network diagrams; the safety instrumented system (SIS) documentation, as-built documentation and instrument maintenance and troubleshooting records; and the Discuss the importance of version control in projects, document control processes and the common tools for document management.

During this interactive course, participants will learn the document creation, cloud-based documentation and digital twin and instrument documents; the risks related to instrumentation systems, cybersecurity documentation requirements and incident response plans; and the errors and inconsistencies and best practices for document review including tools for document validation.

Course Objectives

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

- Apply and gain an in-depth knowledge on instrument documents
- Discuss the importance of instrument documents in engineering and process control
- Identify the types of instrument documents and review standards and regulations
- Explain the purpose and structure of an instrument index and create and maintain an instrument index
- Illustrate piping and instrumentation diagrams (P&IDs) including instrument data sheets
- Identify the key components of loop diagrams and illustrate wiring diagrams and hook-up drawings
- Document instrument calibration records and integrate functional specification documents (FSD) with other documents
- Develop cause and effect diagrams and apply instrument procurement documentation
- Recognize instrument tagging and numbering systems and describe communication and network diagrams
- Carryout safety instrumented system (SIS) documentation, as-built documentation and instrument maintenance and troubleshooting records
- Discuss the importance of version control in projects, document control processes and identify the common tools for document management
- Automate document creation and develop cloud-based documentation and digital twin and instrument documents
- Recognize risks related to instrumentation systems, cybersecurity documentation requirements and incident response plans
- Identify errors and inconsistencies and apply best practices for document review including tools for document validation

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 conveniently saved in a **Tablet PC**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of instrument documents for instrumentation engineers, control systems engineers, process engineers, maintenance personnel, project managers, design engineers, field technicians and those who involved in the design, installation, operation and maintenance of instrumentation systems.

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: -

- 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.

- 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.

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 **30 years** of extensive experience within the **Oil**, **Gas**, **Power**, **Petroleum**, **Petrochemical** and **Utilities** industries. His experience widely covers in the areas of **Flow Measurement** Devices, **Water Network** Pipe Materials & Fittings, **Mapping & Inventory** of Pipes & Fittings in the Water Supply System, **Water Distribution System** Operator, **Sewer System and Sewage Flows**, **Ultrasonic Inspection**, and **Advanced Visual Techniques** of Predictive Maintenance, Water Meter Reading (**MMR**), **Network Management & Supervision**, **Leakage Prevention & Control**, Waste Water Treatment, **Water Utility Regulation and Economics**, **Health & Safety Rules & Regulations**, **Safety Management**, **Accident Investigation**, Advanced Distributed Control System (**DCS**), **DCS** Operation & Configuration, **DCS** Troubleshooting, **DCS Yokogawa** ProSafe-RS Safety Instrumented System, **DCS Yokogawa** Centum VP, **DCS Emerson** DeltaV, **DCS GE Mark VI**, Programable Logic Controller (**PLC**), Supervisory Control & Data Acquisition (**SCADA**) Systems, **Process Control**, **Control Systems & Data Communications**, **Instrumentation**, **Automation**, **Valve Tuning**, Safety Instrumented Systems (**SIS**), Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**), **Telemetry** Systems, **Boiler Control & Instrumentation**, Advanced Process Control (**APC**) Technology, Practical **Fiber-Optics** Technology, **Compressor** Control & Protection, **GE Gas Turbines**, **Alarm** Management Systems, **Engine** Management System, **Fieldbus** Systems, **NEC** (National Electrical Code), **NESC** (National Electrical Safety Code), **Electrical Safety**, **Electrical Hazards** Assessment, **Electrical Equipment**, Electrical Transient Analysis Program (**ETAP**), Power **Quality**, Power **Network**, Power **Distribution**, **Distribution Systems**, **Power Systems Control**, **Power Systems Security**, Power **Electronics**, **Power System** Harmonics, **Power System** Planning, Control & Stability, **Power Flow** Analysis, **Smart Grid & Renewable** Integration, **Power System Protection & Relaying**, Economic Dispatch & Grid Stability Constraints in Power Plants, Electrical Demand Side Management (DSM), Electrical **Substations**, **Substation Automation** Systems & Application (IEC 61850), **Distribution Network** System Design, **Distribution Network Load**, Electrical **Distribution** Systems, **Load Forecasting** & System Upgrade (Distribution), **Overhead Power Line** Maintenance & Patrolling, High Voltage **Switching** Operations, Industrial **UPS Systems & Battery** Power Supplies, Electric **Motors & Variable Speed Drives**, **Generator** Maintenance & Troubleshooting, **Generator** Excitation Systems & AVR, **Transformer** Maintenance & Testing, Lock-Out & Tag-Out (**LOTO**), Confined Workspaces and **Earthing & Grounding**, 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**, Egyptian Electricity Holding, Egyptian Refining Company (ERC), **GASCO**, Tahrir Petrochemicals Project, and **ACETO** industries as the **Instrumentation & Electrical Service Project Manager**, **Energy Management Engineer**, **Department Head**, **Assistant Professor**, **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 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 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 Program

The following program is planned for this course. However, the course instructor(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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***Overview of Instrumentation*** *Definition & Scope of Instrumentation • Importance of Instrument Documents in Engineering & Process Control • Key Stakeholders Involved (Engineers, Technicians, Designers) • Relation of Instruments to System Automation*
0900 – 0930	***Types of Instrument Documents*** *Data sheets • Instrument Index • Loop diagrams • P&IDs (Piping & Instrumentation Diagrams)*
0930 – 0945	*Break*
0945 – 1130	***Standards & Regulations*** *Importance of Following Standards • ISA (International Society of Automation) Standards • ISO Standards for Instrumentation • Safety & Compliance Requirements*
1130 – 1230	***Instrument Index*** *Purpose & Structure of an Instrument Index • Elements of the Instrument Index (Tags, Descriptions, Locations) • How to Create & Maintain an Instrument Index • Using Software Tools for Instrument Indexing*
1230 – 1245	*Break*
1245- 1330	***Piping & Instrumentation Diagrams (P&IDs)*** *Understanding the Purpose of P&IDs • Components of a P&ID (Symbols, Lines, Valves) • Reading & Interpreting a P&ID • Common Mistakes in P&ID Interpretation*
1330 - 1420	***Instrument Data Sheets***

	Definition & Purpose of Data Sheets • Information Included in a Typical Instrument Data Sheet • Customizing Data Sheets for Different Instruments • Common Templates & Software Tools for Data Sheets
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

0730 – 0830	***Loop Diagrams*** *Definition & Purpose of Loop Diagrams • Key Components of Loop Diagrams (Signals, Devices, Connections) • Understanding the Loop Numbering System • Practical Examples of Loop Diagram Creation*
0830 – 0930	***Wiring Diagrams & Hook-Up Drawings*** *Purpose & Importance in Instrumentation • Components of Wiring Diagrams • Hook-Up Details for Process Instruments • Challenges in Developing Accurate Wiring & Hook-Up Diagrams*
0930 – 0945	*Break*
0945 – 1130	***Instrument Calibration Records*** *Importance of Calibration in Process Industries • Types of Calibration documents • Recording Calibration Results • Standards for Calibration Documentation*
1130 – 1230	***Functional Specification Documents (FSD)*** *Definition & Role of FSD in Instrumentation • How to Define Functions & Requirements • Integration of FSD with Other Documents • Ensuring Accuracy & Clarity in FSD*
1230 – 1245	*Break*
1245 - 1330	***Cause & Effect Diagrams*** *Understanding Cause-&-Effect Relationships in Systems • Role in Troubleshooting & Analysis • Developing Cause & Effect Diagrams • Common Issues & Solutions*
1330 - 1420	***Instrument Procurement Documentation*** *Requirements for Procurement Documents • Vendor Communication & Specifications • Inspection Test Plans (ITPs) • Ensuring Compliance with Project Specifications*
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

0730 – 0830	***Instrument Tagging & Numbering Systems*** *Definition of Instrument Tags • Common Tagging Conventions (ISA, Project-Specific) • Consistency in Numbering Across Documents • Challenges & Best Practices in Tagging*
0830 – 0930	***Communication & Network Diagrams*** *Role in Modern Instrumentation • Components of Network Diagrams • Protocols Used in Industrial Instrumentation (HART, Modbus, Profibus) • Integrating Communication Diagrams with Other Documents*
0930 – 0945	*Break*

0945 – 1130	***Safety Instrumented System (SIS) Documentation*** *Role of SIS in Industrial Processes • SIS-Related Documentation (SIL Reports, Safety Requirements Specifications) • Standards for SIS Documentation (IEC 61508, IEC 61511) • Case studies of Effective SIS Documentation*
1130 – 1230	***As-Built Documentation*** *Importance of As-Built Documents • Differences Between As-Designed & As-Built • Processes for Updating Documentation • Quality Control in As-Built Documentation*
1230 – 1245	*Break*
1245 - 1330	***Instrument Maintenance & Troubleshooting Records*** *Documentation Required for Maintenance Schedules • Troubleshooting Logs & Reports • Integrating Maintenance Records with Historical Data • Tools for Digital Maintenance Recordkeeping*
1330 - 1420	***Document Revision & Control*** *Importance of Version Control in Projects • Document Control Processes • Common Tools for Document Management • Challenges in Maintaining Updated Documents*
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

0730 – 0830	***Software for Instrumentation Documentation*** *Overview of Software Tools (AutoCAD, SmartPlant, Aveva) • Choosing the Right Software for the Project • Benefits of Digital Documentation • Integration with Other Tools & Systems*
0830 – 0930	***Automation of Documentation*** *Advantages of Automating Document Creation • Tools & Platforms for Automation • Customization & Scalability of Automation • Cost & Resource Savings*
0930 – 0945	*Break*
0945 – 1130	***Cloud-Based Documentation*** *Benefits of Cloud-Based Systems for Instrumentation • Security & Accessibility Considerations • Collaborative Tools for Teams • Industry Examples of Successful Cloud Implementation*
1130 – 1230	***Digital Twin & Instrument Documents*** *Definition & Importance of Digital Twins • Role of Instrumentation Data in Creating Digital Twins • Integrating Digital Twins with Project Documents • Examples of Digital Twins in Industrial Applications*
1230 – 1245	*Break*
1245 - 1330	***Cybersecurity in Instrumentation Systems*** *Risks Related to Instrumentation Systems • Cybersecurity Documentation Requirements • Standards & Best Practices (IEC 62443) • Incident Response Plans*

1330 - 1420	***Case Studies on Modern Documentation*** *Real-World Examples of Instrumentation Projects • Challenges Faced in Documentation • Lessons Learned & Best Practices • Group Discussions & Brainstorming Sessions*
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

0730 – 0830	***Reviewing Instrument Documentation*** *Identifying Errors & Inconsistencies • Best Practices for Document Review • Tools for Document Validation • Peer Review Exercises*
0830 – 0930	***Hands-On Exercises*** *Creating an Instrument Index for a Sample Project • Designing a Simple P&ID • Preparing a Calibration Record • Developing a Loop Diagram*
0930 – 0945	*Break*
0945 – 1130	***Group Project*** *Team-Based Documentation for a Mock Process • Assigning Roles & Responsibilities • Developing & Reviewing Key Documents • Presentation of Group Work*
1130 - 1245	***Industry-Specific Applications*** *Instrument Documentation in Oil & Gas • Power Generation & Renewable Energy Projects • Pharmaceutical & Food Industries • Case Studies from Specific Industries*
1230 – 1245	*Break*
1245 - 1345	***Future Trends in Instrumentation Documentation*** *Emerging Technologies & Their Impact • Role of Artificial Intelligence & Machine Learning • Evolving Standards & Regulations • Preparing for the Future of Digital Instrumentation*
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”, “Schneider Electric Magelis HMISTU”, “Siemens SIMATIC Step 7 Professional Software”, “HMI SCADA” and “AutoCAD”.

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

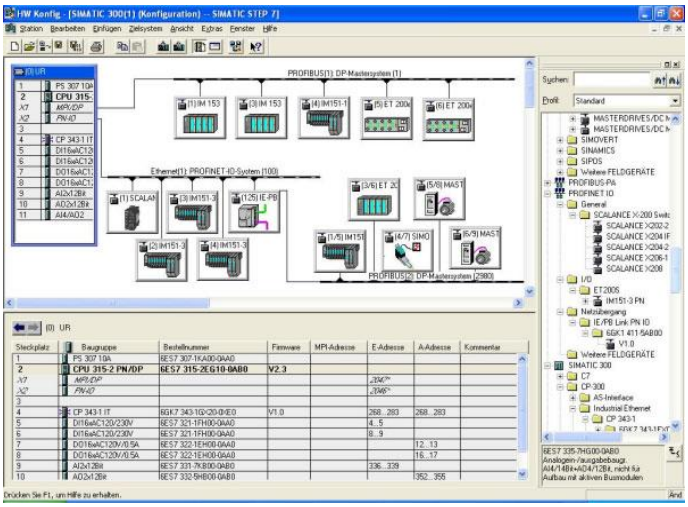
Siemens S7-400 Simulator

Siemens SIMATIC S7-300

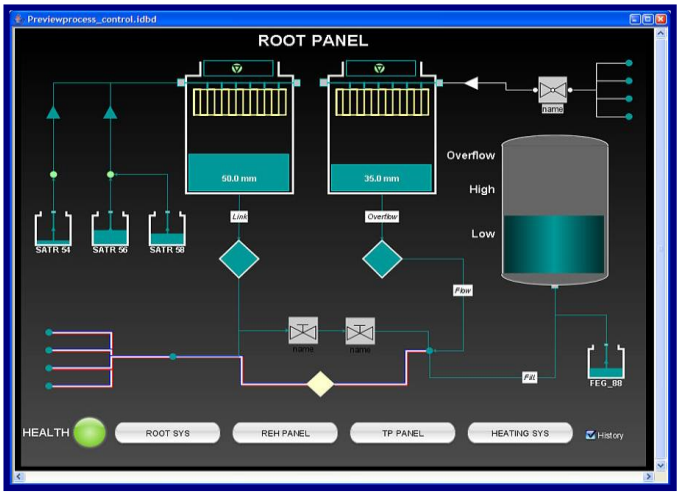
Siemens S7-200 Simulator

GE Fanuc Series 90-30 PLC Simulator

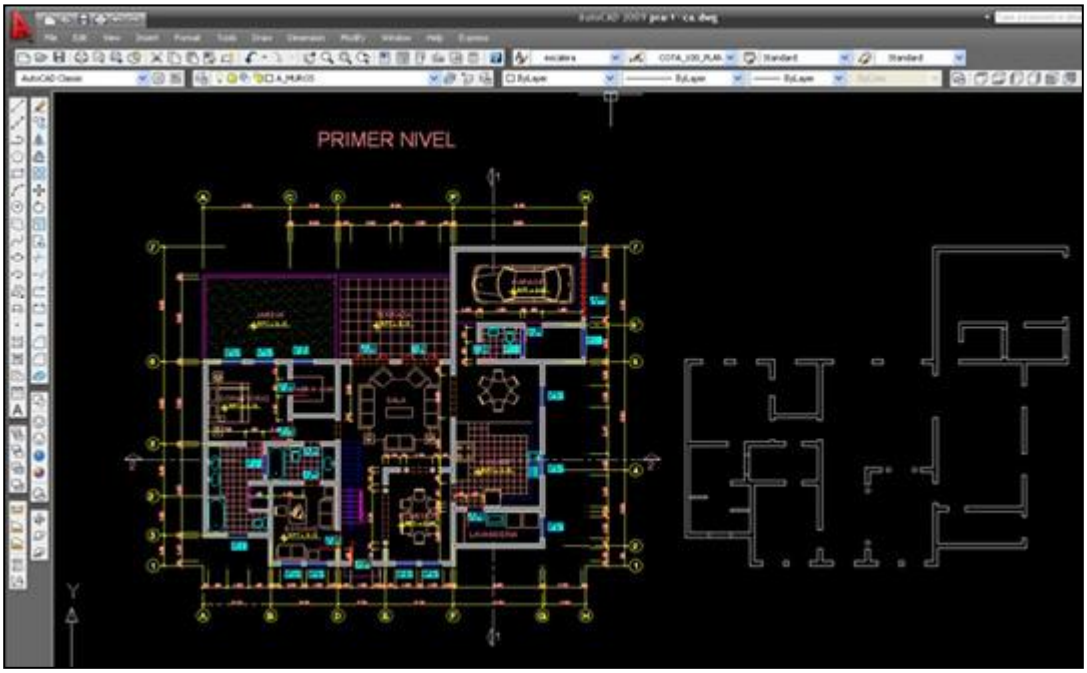
Schneider Electric Magelis HMISTU



Siemens SIMATIC Step 7
Professional Software



HMI SCADA



AutoCAD

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