COURSE OVERVIEW EE0599
Transmission System Dispatch
Basics, Operations, Tools & Technology

Course Title
Transmission System Dispatch: Basics, Operations, Tools and Technology

Course Date/Venue
October 21-25, 2024/Al Sarab Ballroom 1 Meeting Room, Mezzanine Floor, Jannah Burj Al Sarab Hotel, Abu Dhabi, UAE

Course Reference
EE0599

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 detailed and up-to-date overview of Transmission System Dispatch: Basics, Operations, Tools & Technology. It covers the basic components and structure of transmission system and its importance in the power grid; the roles and responsibilities of a dispatcher and the basics of electrical power systems; the tools and techniques for load flow analysis including the grid codes and standards; the real time operation and monitoring; and the techniques for controlling and dispatching power.

Further, the course will also discuss the emergency operation procedures and handling system contingencies; the emergencies and outage management and reporting; the voltage stability, managing reactive power flow and advanced dispatching tools; the functions and components of energy management system (EMS), wide monitoring system (WAMS), phasor measurement unit (PMU's) and applications in transmission system monitoring and control; the dynamic line rating (DLR), cybersecurity in transmission systems and causes of grid congestion; and the techniques for managing and mitigating congestion.

During this interactive course, participants will learn to integrate renewables into the transmission grid, planning and managing grid interconnections and electricity markets including the role of transmission dispatch in market operations; the reliability and resilience planning, transmission dispatching and smart grids and digital transformation; the sustainability and environmental considerations and collaboration in grid management; and the techniques for effective communication and collaboration.

Course Objectives

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

- Apply and gain an in-depth knowledge of transmission system dispatch operations, tools and technology
- Discuss the basic components and structure of transmission systems and its importance in the power grid
- Identify the roles and responsibilities of a dispatcher and the basics of electrical power systems
- Recognize the tools and techniques for load flow analysis including the grid codes and standards
- Carryout real time operation and monitoring as well as the techniques for controlling and dispatching power
- Employ emergency operation procedures, handling system contingencies and emergencies and outage management and reporting
- Maintain voltage stability, manage reactive power flow and identify advanced dispatching tools
- Discuss the functions and components of energy management system (EMS) including wide monitoring system (WAMS), phasor measurement units (PMU's) and applications in transmission system monitoring and control
- Recognize dynamic line rating (DLR), cybersecurity in transmission systems, causes of grid congestion and techniques for managing and mitigating congestion
- Integrate renewables into the transmission grid, plan and manage grid interconnections and discuss electricity markets including the role of transmission dispatch in market operations
- Apply reliability and resilience planning, transmission dispatching and smart grids and digital transformation
- Explain sustainability and environmental considerations and apply collaboration in grid management as well as techniques for effective communication and collaboration

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 transmission system dispatch for managers, supervisors, engineers and those who are involved in the field of electrical and instrumentation inspection including inspection engineers, electrical engineers, electrical inspection engineers and instrumentation engineers.

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. Herman Eksten, PE, PgDiP, is a **Senior Electrical Engineer** with over **40 years** of extensive experience within the **Petrochemical**, **Oil & Gas** and **Power** industries specializing in **Electrical Safety**, Certified **HV Electrical Safety**, **Low Voltage Electrical Safety**, **Electrical Circuits**: Series and Parallel Connection, **Electrical Faults & Protective Devices**, Risk Control Methods, **LOTO – Breakers** Operation in Electricity Substation, **LOTO** Principles and Procedures, **Arc Flash Risk Assessment**, Safety in **Power Electronic Equipment & Lasers**, **Circuit Breakers & Switchgears**, **Switchgear Assets Management**, **Circuit Breakers Control Circuits**, **Substation Maintenance** Techniques, **High Voltage Operation, Electrical Protection**, **Overhead Lines & Substation**, **Transmission System** Dispatch, **Power Supply**, **High Voltage Substation**, **Electrical Protection Design**, **Earthing & Lightning Protection Design, Underground Equipment**, **Distribution Network Maintenance & Construction**, **Transformers Operation & Maintenance**, **Electric Power System, Power Plant Management**, **Substation Commissioning & Troubleshooting**, **Cable Splicing & Termination, Electrical Installation & Maintenance**, **Power Generation Operation & Control, Switchgear Life Assessment**, **Structured Cabling, Electric Power System, Power System Stability, Power System Planning & Economics**, **Power Flow** Analysis, **Combined Cycle Power Plant**, **UPS & Battery System, Variable Speed Drives,** and **HV Motors & Transformers**. He is currently the **Lead Electrical Engineer** of **SNC-LAVALIN** wherein he is responsible for basic designs and successful implementation of electrical engineering to plant overhead lines and substations.

During his career life, Mr. Eksten held various positions such as the **Lead Electrical Engineer**, **Operations Manager**, **Project Engineer**, **Technical Specialist**, **Customer Executive**, **District Manager**, **Electrical Protection Specialist**, **High-Voltage Operator** and **Apprentice Electrician** for FOX Consulting, UHDE (ThyssenKrupp Engineering), TWP Projects/Consulting (EPMC-Mining), ISKHUS Power, Rural Maintenance (PTY) Energia de Mocambique Lda., Vigeo (PTY) Ltd and ESKOM.

Mr. Eksten is a **Registered Professional Engineering Technologist** and has a Postgraduate Diploma in Management Development Programme and a National Higher Diploma (NHD) in Electrical Power Engineering. Further, he is a **Certified Instructor/Trainer**, a Senior member of the South African Institute Electrical Engineers (**SAIEE**) and holds a Certificate of Registration Membership Scheme from the Engineering Council of South Africa (**ESCA**). He has further delivered numerous trainings, courses, seminars, workshops and conferences internationally.

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.

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 course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1: ***Monday, 21st of October 2024***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Transmission Systems*** *Basic Components & Structure of Transmission Systems • Importance of Transmission Systems in the Power Grid*
0930 - 0945	*Break*
0945 – 1045	***Roles & Responsibilities of a Dispatcher*** *Key Functions & Daily Tasks • Communication & Coordination with Other Departments*
1045 – 1145	***Basics of Electrical Power Systems*** *Principles of AC & DC Power • Power Flow & System Stability*
1145 - 1230	***Introduction to Load Flow Analysis*** *Understanding Load Flow Studies • Tools & Techniques for Load Flow Analysis*
1230 – 1245	*Break*
1245 – 1330	***Grid Codes & Standards*** *Regulatory Framework & Compliance Requirements • National & International Standards (IEEE, IEC)*
1330 - 1420	***Case Studies on Transmission Systems*** *Examples of Transmission System Operations • Key Lessons & Best Practices*
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: ***Tuesday, 22nd of October 2024***

0730 – 0830	***Real-Time Operation & Monitoring*** *Real-Time Data Acquisition & Monitoring • SCADA Systems & their Role in Transmission Operations*
0830 – 0930	***System Control & Dispatch*** *Techniques for Controlling & Dispatching Power • Balancing Supply & Demand in Real-Time*

0930 – 0945	Break
0945 – 1130	***Emergency Operation Procedures*** *Handling System Contingencies & Emergencies • Black Start Procedures & System Restoration*
1130 - 1230	***Outage Management & Reporting*** *Planning and Managing Outages and Reporting Documentation Requirements*
1230 – 1245	Break
1245 – 1330	***Voltage Control & Reactive Power Management*** *Techniques for Maintaining Voltage Stability • Managing Reactive Power Flow*
1330 - 1420	***Hands-On Exercise: Real-Time Monitoring & Control*** *Practical Exercise Using SCADA Simulation Software*
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: Wednesday, 23rd of October 2024

0730 – 0830	***Advanced Dispatching Tools*** *Overview of Advanced Dispatching Tools & Software • Applications & Benefits of Using Advanced Tools*
0830 – 0930	***Energy Management Systems (EMS)*** *Functions & Components of EMS • Integration with Other Grid Systems*
0930 – 0945	Break
0945 – 1100	***Wide Area Monitoring Systems (WAMS)*** *Introduction to WAMS & PMUs (Phasor Measurement Units) • Applications in Transmission System Monitoring & Control*
1100 - 1230	***Dynamic Line Rating (DLR)*** *Principles & Benefits of DLR • Implementation & Operational Considerations*
1230 – 1245	Break
1245 – 1330	***Cybersecurity in Transmission Systems*** *Cyber Threats & Vulnerabilities • Best Practices for Securing Transmission Systems*
1330 – 1400	***Case Studies on Advanced Technologies*** *Examples of Advanced Technologies in Action • Key Takeaways & Lessons Learned*
1400 -1420	***Hands-On Exercise: Using Advanced Dispatch Tools*** *Practical Exercise on Using Advanced Dispatching Tools*
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: Thursday, 24th of October 2024

0730 – 0830	***Managing Grid Congestion*** *Causes of Grid Congestion • Techniques for Managing & Mitigating Congestion*
0830 – 0930	***Integration of Renewable Energy Sources*** *Challenges of Integrating Renewables into the Transmission Grid • Solutions & Best Practices*
0930 – 0945	Break

0945 – 1100	***Interconnection & Grid Expansion*** *Planning & Managing Grid Interconnections • Strategies for Grid Expansion*
1100 - 1230	***Market Operations & Participation*** *Understanding Electricity Markets • Role of Transmission Dispatch in Market Operations*
1230 – 1245	*Break*
1245 – 1330	***Reliability & Resilience Planning*** *Ensuring System Reliability & Resilience • Planning for Extreme Weather Events & Natural Disasters*
1330 – 1400	***Case Studies on Operational Challenges*** *Analysis of Real-World Operational Challenges • Solutions & Best Practices*
1400 - 1420	***Hands-On Exercise: Managing Grid Congestion*** *Practical Exercise on Congestion Management Techniques*
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 5: Friday, 25th of October 2024

0730 – 0930	***Future Trends in Transmission Systems*** *Emerging Technologies & their Impact on Transmission Systems • Future Developments in Transmission Dispatching*
0930 – 1030	***Smart Grids & Digital Transformation*** *Introduction to Smart Grids • Role of Digital Technologies in Transforming Transmission Systems*
1030 – 1045	*Break*
1045 - 1130	***Sustainability & Environmental Considerations*** *Environmental Impacts of Transmission Systems • Strategies for Sustainable Transmission Operations*
1130 – 1145	*Break*
1145 - 1345	***Collaborative Grid Management*** *Importance of Collaboration in Grid Management • Techniques for Effective Communication & Collaboration*
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" 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

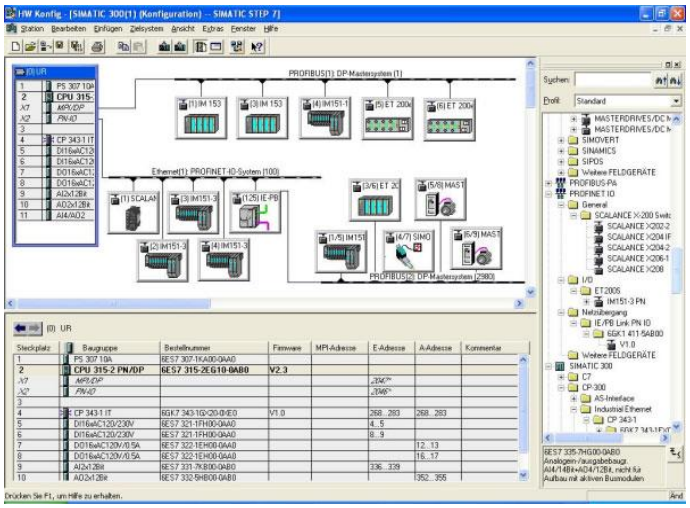
Siemens S7-1200 Simulator

Siemens S7-400 Simulator

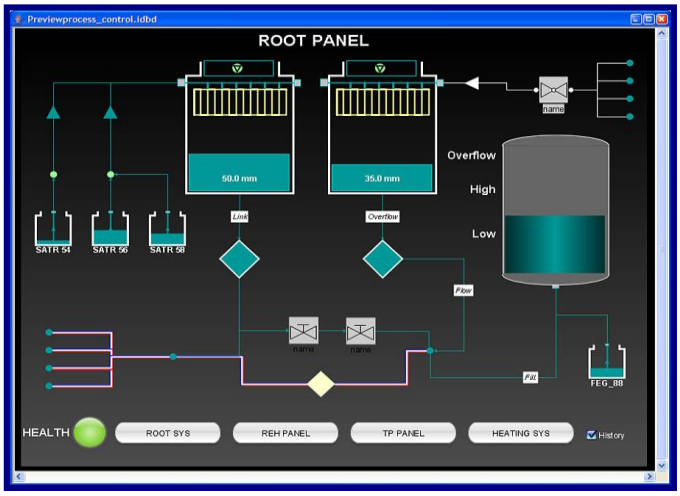
Siemens SIMATIC S7-300

Siemens S7-200 Simulator

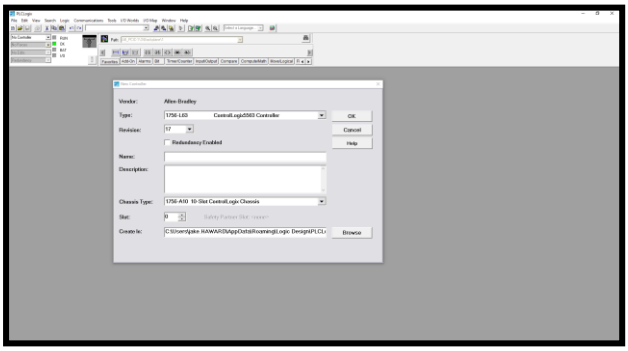
GE Fanuc Series 90-30 PLC Simulator

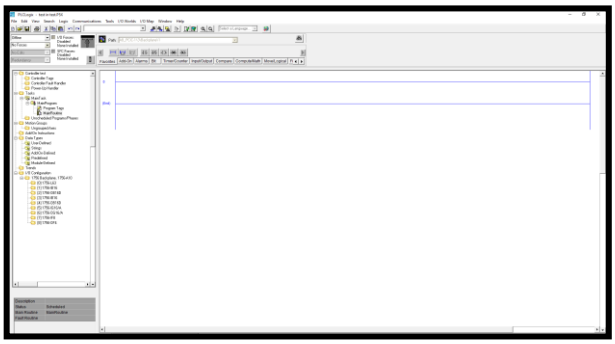


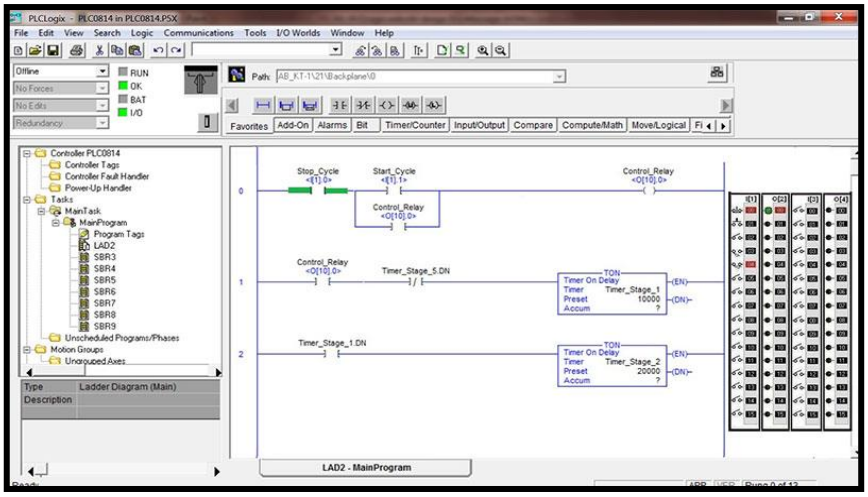
Siemens SIMATIC Step 7
Professional Software

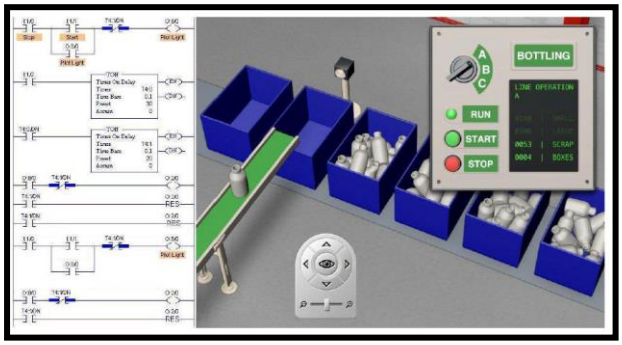


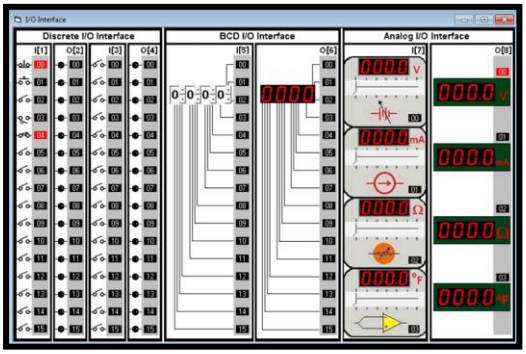
HMI SCADA











PLCLogix 5000 Software

Course Coordinator

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