COURSE OVERVIEW EE1112
132/33KV and 33/132KV Transformer

Course Title
132/33KV and 33/132KV Transformer

Course Reference
EE1112

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

Course Date/Venue

Session(s)	Date	Venue
1	May 18-22, 2025	Boardroom, Sheraton Dubai Creek Hotel & Towers, Dubai, UAE
2	June 16-20, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
3	August 03-07, 2025	Boardroom, Sheraton Dubai Creek Hotel & Towers, Dubai, UAE
4	October 27-31, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

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 132/33KV and 33/132KV Transformer. It covers the purpose and basic components of transformers including transformer types, construction and rating and specification; the safety considerations in transformer handling, transformer standards and codes; the pre-installation planning, transport and handling and installation procedures; the initial testing, verification of transformer specifications and troubleshooting during installation; the transformer overcurrent relays, time-current characteristics, coordination with downstream protection and settings and adjustments; and the differential protection, gas and Buchholz relay protection, temperature monitoring and protection.

During this interactive course, participants will learn the protection against lightning and surges and protection coordination; the operating characteristics of 132/33kv transformers, load tap changer (LTC) operation, voltage control and regulation and transformer load conditions; the online monitoring techniques, vibration monitoring in transformers and preventive maintenance; the transformer oil management, oil filtration and replacement, monitoring of oil quality and handling and disposal of contaminated oil; the end-of-life transformer considerations and advancements in transformer technology; and the innovative maintenance practices.

Course Objectives

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

- Apply and gain an in-depth knowledge on 132/33KV and 33/132KV transformer
- Discuss the purpose and basic components of transformers including transformer types, construction and rating and specification
- Explain safety considerations in 132/33KV transformer handling, transformer standards and codes
- Carryout pre-installation planning, transport and handling and installation procedures of 132/33KV transformers
- Employ initial testing, verification of transformer specifications and troubleshooting during installation
- Discuss transformer overcurrent relays, time-current characteristics, coordination with downstream protection and settings and adjustments
- Describe differential protection, gas and Buchholz relay protection, temperature monitoring and protection
- Apply protection against lightning and surges and protection coordination
- Explain the operating characteristics of 132/33kv transformers, load tap changer (LTC) operation, voltage control and regulation and transformer load conditions
- Carryout online monitoring techniques, vibration monitoring in transformers and preventive maintenance
- Identify common transformer failures, diagnose electrical and mechanical faults and test equipment for troubleshooting
- Apply transformer oil management, oil filtration and replacement, monitoring of oil quality and handling and disposal of contaminated oil
- Discuss end-of-life transformer considerations and advancements in transformer technology
- Employ innovative maintenance practices covering predictive maintenance using AI and IoT, smart sensors for early fault detection and integration of drones for transformer inspections

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 132/33KV and 33/132KV transformer for power system engineers or electrical engineers, generation plant engineers, substation engineers, commissioning engineers, protection engineers, protection and relay engineers, testing engineers, substation maintenance technicians, health, safety and environment (HSE) officer, transformer manufacturer representative, and other technical staff.

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.

  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.

- 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.

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.

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. Pan Marave, PE, MSc, BEng, is a **Senior Electrical & Instrumentation Engineer** with over **30 years** of extensive experience in **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries. His expertise includes **Circuit Breaker**, **HV Switchgear Maintenance**, **HV/LV Electrical** Authorisation, Basic **Electricity**, **Electrical & Special Hazards**, **Personnel Protection**, **HV/LV Equipment**, **Motor Controllers**, **Electrical Switching** Practices, **Emergency Planning**, **Safety Management**, Safety Instrumented Systems (**SIS**), Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**); **DCS**, **SCADA** & **PLC**; **Measurement** (**Flow**, **Temperature**, **Pressure**); **Process Analyzers** & **Analytical Instrumentation**; **Process Control**, **Instrumentation** & **Safeguarding**; **Process Controller**, **Control Loop & Valve Tuning**; Industrial **Distribution Systems**; Industrial **Control & Control Systems**, Power Systems **Protection & Relaying**; **Earthing**, **Bonding**, **Grounding**, **Lightning & Surge Protection**; Electric Power **Substation** & **Systems**; Electrical Engineering Principles; **Motor Control Circuit**; **Electrical Fault Analysis**; Electrical Networks & Distribution **Cables**; **Circuit Breakers**, **Switchgears**, **Transformers**, **Hazardous Areas Classification** and **Detailed Engineering Drawings**, **Codes** & **Standards**. Furthermore, he is also well-versed in Microprocessors Structure, Lead Auditor (**ISO 9000:2000**), **ISO 9002**, Quality Assurance, and Projects & Contracts Management.

Presently, Mr. Marave is the **Technical Advisor** of **Chamber of Industry & Commerce** in Greece. Prior to this, he gained his thorough practical experience through several positions as the **Technical Instructor**, **Engineering Manager**, **Electronics & Instruments Head**, **Electrical**, **Electronics & Instruments Maintenance Superintendent**, **Assistant General Technical Manager** and **Engineering Supervisor** of various international companies such as the **Alumil** Mylonas, **Athens Papermill**, **Astropol** and the **Science Technical Education**.

Mr. Marave is a **Registered Professional Engineer** and has **Master's** and **Bachelor's** degrees in **Electrical Engineering** from the **Polytechnic Institute of New York** and **Pratt Institute of New York** (**USA**) respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and an active member of the **Technical Chamber** and the Institute of Electrical and Electronics Engineer (**IEEE**) in Greece. He has presented and delivered **numerous international** courses, conferences, trainings and workshops worldwide.

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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Transformers*** *Definition and Purpose of Transformers • Basic Components of a Transformer • Operating Principles (Electromagnetic Induction) • Transformer Efficiency*
0930 - 0945	*Break*
0945 – 1045	***Transformer Types*** *Single-Phase versus Three-Phase Transformers • Step-Up and Step-Down Transformers • Dry-Type and Oil-Filled Transformers • Special Transformer Designs for Refineries*
1045 - 1145	***132/33KV Transformer Construction*** *Core Design and Materials • Windings: Primary and Secondary • Insulation Materials and Their Properties • Cooling Systems: ONAN, ONAF, and OFAF*
1145 - 1230	***132/33KV Transformer Rating & Specification*** *Voltage and Power Ratings • Impedance and Short Circuit Impedance • Load Factors and Voltage Regulation • Derating of Transformers*
1230 – 1245	*Break*
1245 – 1330	***Safety Considerations in 132/33KV Transformer Handling*** *Personal Protective Equipment (PPE) for Transformers • Safe Operation and Switching Procedures • Hazardous Voltage Areas and Precautions • Risk Assessment and Safety Planning*
1330 - 1420	***132/33KV Transformer Standards & Codes*** *IEC 60076 Standards for Power Transformers • IEEE Standards and National Electrical Code (NEC) • Local and International Safety Standards • Environmental Compliance*
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	***Pre-Installation Planning of 132/33KV Transformers*** *Site Evaluation and Transformer Location • Electrical and Mechanical Requirements • Transformer Foundation and Support Structures • Connection to Electrical Systems*
0830 – 0930	***Transport & Handling of 132/33KV Transformers*** *Transformer Shipping Considerations • Handling During Transport • Lifting and Placement on Site • Precautions During Movement*
0930 - 0945	*Break*
0945 – 1130	***Installation Procedures of 132/33KV Transformers*** *Installation of Bushings and Tap Changers • Proper Grounding and Bonding Techniques • Cooling System Installation • Electrical Connections (Primary and Secondary)*
1130 - 1230	***Initial Testing of 132/33KV Transformers*** *Insulation Resistance Test • Turns Ratio Test • Winding Resistance Test • Power Factor and Loss Measurement*
1230 - 1245	*Break*
1245 - 1330	***Commissioning Checklist of 132/33KV Transformers*** *Verification of Transformer Specifications • Control and Protection Systems • Final Inspection and Test Reports • Documenting Commissioning Results*
1330 - 1420	***Troubleshooting During Installation*** *Common Installation Issues • Identification of Electrical Faults • Mechanical Faults and Cooling Failures • Ensuring Compliance with Safety Standards*
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	***Overcurrent Protection of 132/33KV Transformers*** *Transformer Overcurrent Relays • Time-Current Characteristics • Coordination with Downstream Protection • Settings and Adjustments*
0830 – 0930	***Differential Protection of 132/33KV Transformers*** *Basics of Differential Protection • Current Transformer (CT) Configuration • Fault Detection and Isolation • Practical Application in 132/33kV Transformers*
0930 - 0945	*Break*
0945 – 1130	***Gas and Buchholz Relay Protection of 132/33KV Transformers*** *Function of Buchholz Relay • Detecting Transformer Faults • Protective Relays for Oil Transformers • Alarming and Trip Mechanisms*
1130 - 1230	***Temperature Monitoring & Protection of 132/33KV Transformers*** *Temperature Sensors and Their Role • Overheating Protection Systems • Oil Temperature versus Ambient Temperature • Control Systems for Temperature Regulation*
1230 - 1245	*Break*
1245 - 1330	***Protection Against Lightning & Surges of 132/33KV Transformers*** *Lightning Protection Design • Surge Arresters and Their Functions • Transformer Bushing Insulation • Testing Surge Protection Devices*

1330 - 1420	***Protection Coordination*** *Coordination Between Protection Devices • Sequence of Operation During Faults • Coordination Studies and Settings • Real-World Case Studies of Protection Failures*
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	***Operational Principles of 132/33KV Transformers*** *Operating Characteristics of 132/33kV Transformers • Load Tap Changer (LTC) Operation • Voltage Control and Regulation • Transformer Load Conditions*
0830 – 0930	***Monitoring & Diagnostics of 132/33KV Transformers*** *Online Monitoring Techniques • Use of SCADA Systems for Monitoring • Regular Diagnostic Tests: Oil Analysis, Gas Analysis • Vibration Monitoring in Transformers*
0930 - 0945	*Break*
0945 – 1130	***Preventive Maintenance of 132/33KV Transformers*** *Scheduled Maintenance Tasks • Checking Insulation Levels • Cleaning and Lubrication of Tap Changers • Oil Sampling and Testing*
1130 - 1230	***Fault Detection & Troubleshooting of 132/33KV Transformers*** *Identifying Common Transformer Failures • Diagnosis of Electrical Faults: Short Circuits, Overloads • Mechanical Faults: Winding Displacement, Core Problems • Use of Test Equipment for Troubleshooting*
1230 - 1245	*Break*
1245 - 1330	***Transformer Oil Management*** *Oil Types and Characteristics • Oil Filtration and Replacement • Monitoring of Oil Quality (Dielectric Strength) • Handling and Disposal of Contaminated Oil*
1330 - 1420	***End-of-Life Transformer Considerations*** *Understanding Transformer Lifespan • Decommissioning Procedures • Environmental Impact and Recycling • Disposal of Transformers*
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*

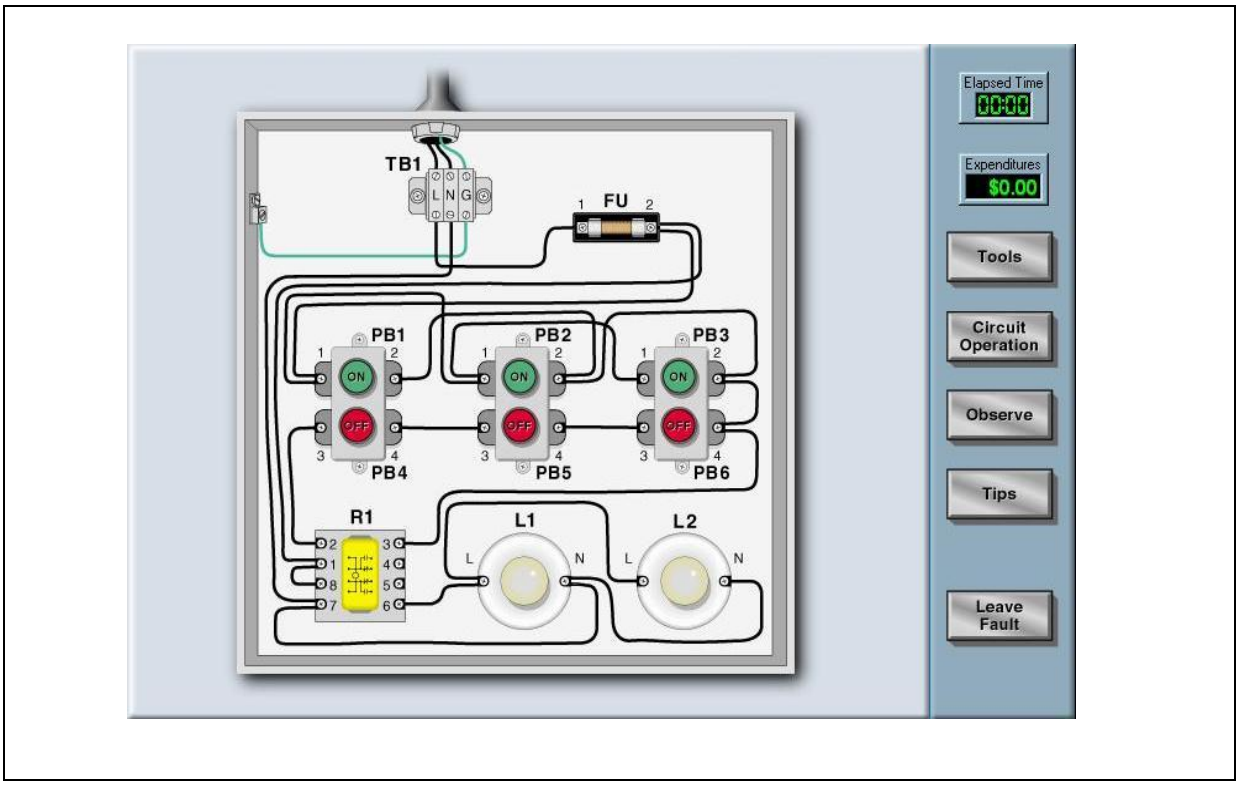
Day 5

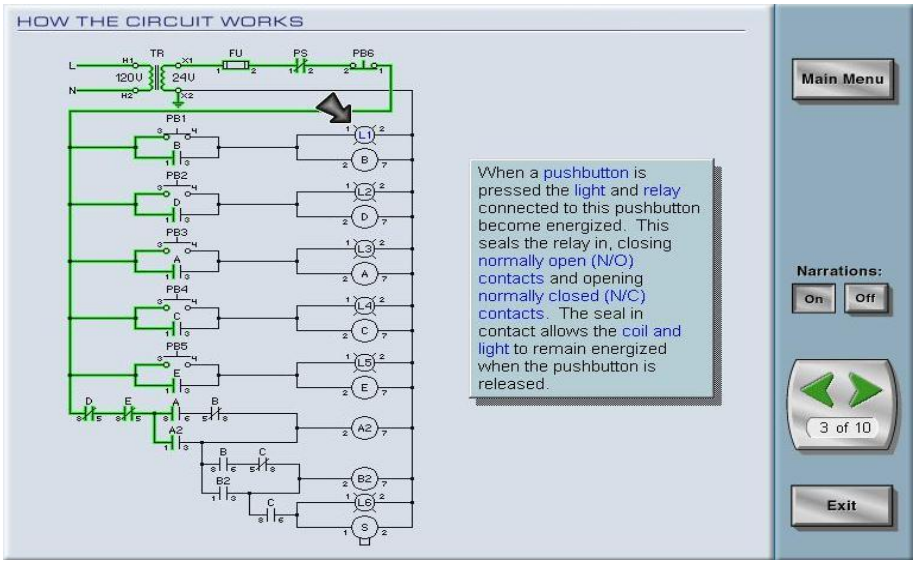
0730 – 0930	***Case Study 1: 132/33KV Transformer Fault Analysis*** *Fault Type Identification • Root Cause Analysis of a Major Transformer Failure • Solutions and Corrective Measures • Industry Lessons Learned*
0930 - 0945	*Break*
0945 - 1100	***Case Study 2: High Voltage Transformer Protection*** *Protection Scheme for 132/33kV Systems • Coordination Between Relays and Circuit Breakers • Handling Major Protection Failures • Real-World Example from ADNOC Refining*
0945 – 1100	***Advancements in Transformer Technology*** *Modern Developments in Transformer Design • High Efficiency and Low Loss Transformers • Smart Transformers with Digital Monitoring • Use of Renewable Energy in Transformer Systems*

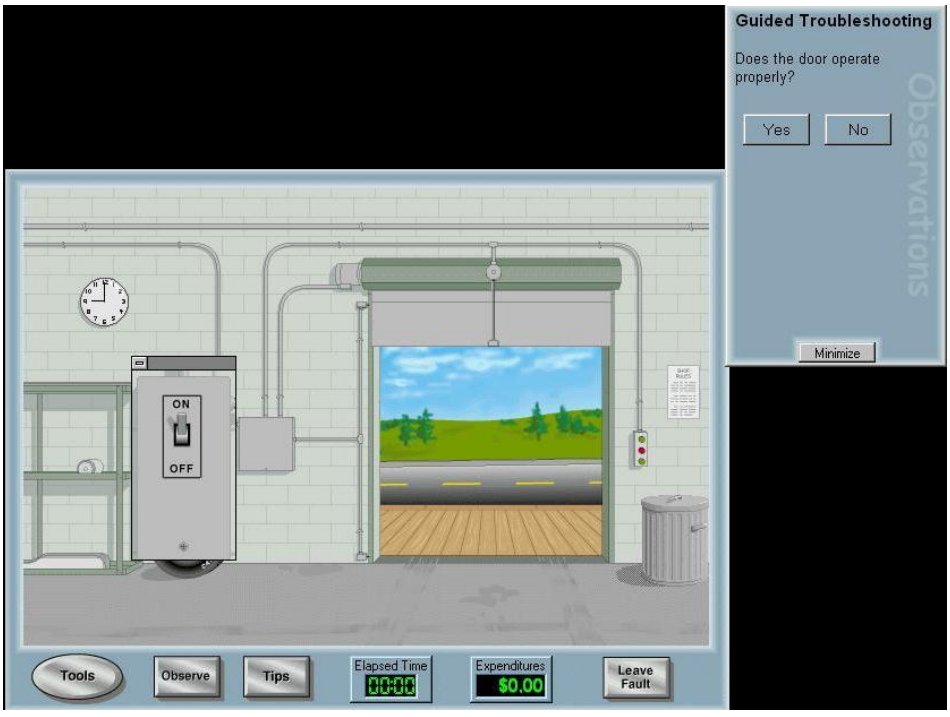
1100 – 1230	***Innovative Maintenance Practices of 132/33KV Transformers*** *Predictive Maintenance Using AI and IoT • Smart Sensors for Early Fault Detection • Integration of Drones for Transformer Inspections • Impact of Remote Monitoring Systems*
1230 - 1245	*Break*
1245 - 1345	***Refinery-Specific Transformer Challenges*** *Transformers in Hazardous Areas and Classified Zones • Dealing with Extreme Temperatures and Chemical Exposure • Reliability in the Refining Industry • Design Considerations for Refineries*
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)

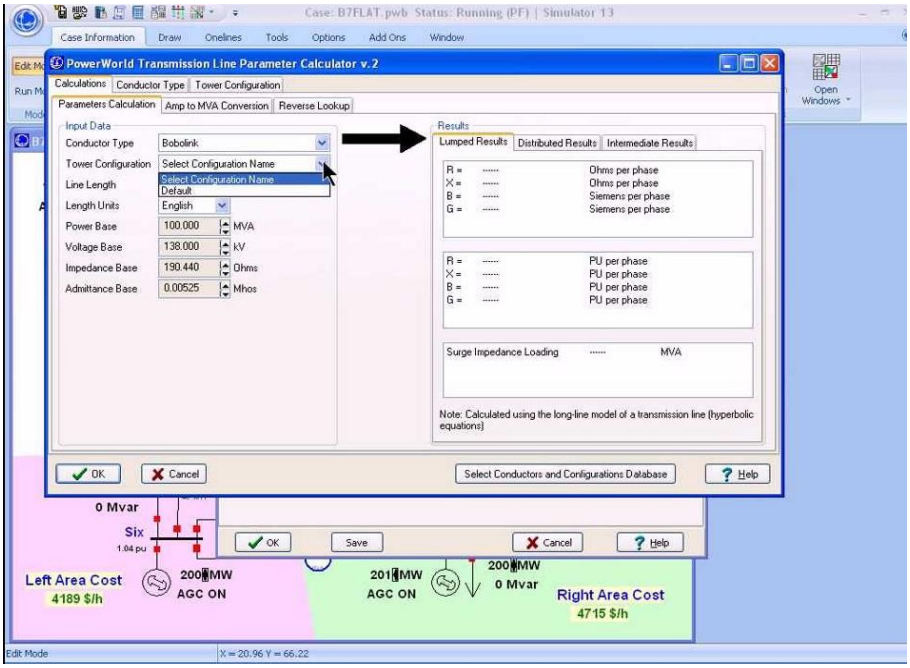
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using our state-of-the-art simulator "Simutech Troubleshooting Electrical Circuits V4.1", Power World" and "ETAP software".



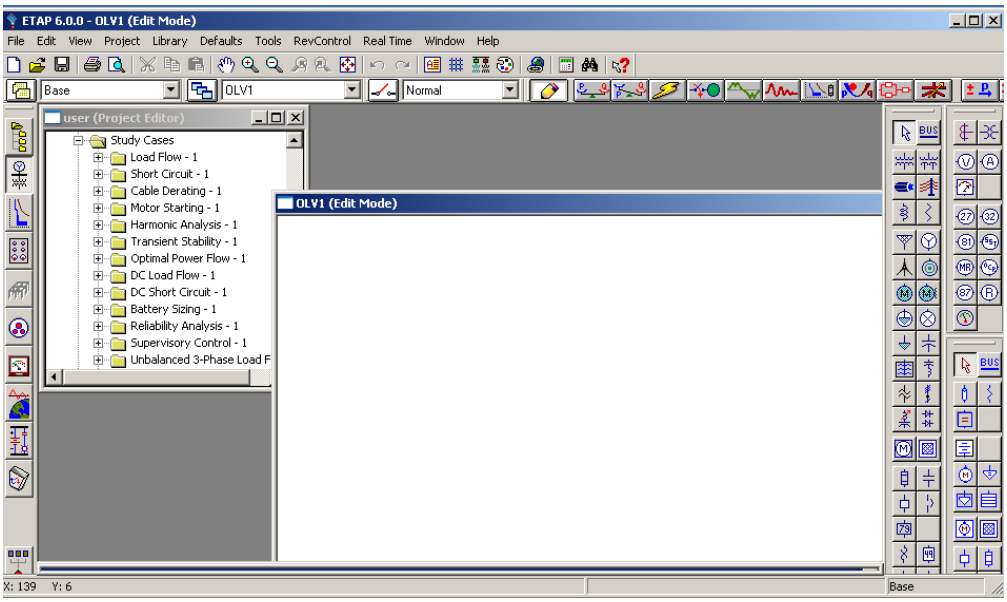




Simutech Troubleshooting Electrical Circuits V4.1



Power World Simulator



ETAP Software Simulator

Course Coordinator

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