COURSE OVERVIEW EE1129
Electrical Maintenance & Troubleshooting

Course Title
Electrical Maintenance & Troubleshooting

Course Reference
EE1129

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

Course Date/Venue

Session(s)	Course Date	Venue
1	June 15-19, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
2	August 17-21, 2025	Olivine Meeting Room, Fairmont Nile City, Cairo, Egypt
3	November 09-13, 2025	Safir Meeting Room, Divan Istanbul, Taksim, Turkey

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 Electrical Maintenance and Troubleshooting. It covers the various types of electrical maintenance and basic electrical theory; the types of electrical circuits, electrical components and reading electrical schematics and symbols; the measurement instruments, transformers, motors, generators, switchgear, circuit breakers, and contactors; the electrical safety practices, Lockout/Tagout (LOTO) procedures; and the causes and consequences of arc flash.

During this interactive course, participants will learn the electrical fire hazards and prevention, systematic troubleshooting process and the use of multimeters, clamp meters and insulation testers; the motor and transformer failures, circuit breaker and fuse testing and common electrical faults; the preventive maintenance strategies, predictive maintenance techniques, maintenance scheduling and documentation and electrical panel and cable inspection; the workplace electrical standards, the IEC/NEC/IEEE compliance, local authority regulations, inspection reporting requirements and importance of code-compliant installations; the PLC interface and control panel checks, I/O troubleshooting, basic ladder logic interpretation; and the panel wiring integrity checks.

Course Objectives

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

- Apply and gain an in-depth knowledge on electrical maintenance and troubleshooting
- Discuss the various types of electrical maintenance and basic electrical theory
- Identify types of electrical circuits and electrical components and read electrical schematics and symbols
- Recognize measurement instruments, transformers, motors and generators including switchgear, circuit breakers and contactors
- Carryout electrical safety practices and lockout/tagout (LOTO) procedures and identify the causes and consequences of arc flash
- Apply electrical fire hazards and prevention, systematic troubleshooting process and the use of multimeters, clamp meters and insulation testers
- Diagnose motor and transformer failures, apply circuit breaker and fuse testing and identify common electrical faults
- Employ preventive maintenance strategies, predictive maintenance techniques, maintenance scheduling and documentation and electrical panel and cable inspection
- Review workplace electrical standards covering IEC/NEC/IEEE compliance, local authority regulations, inspection reporting requirements and importance of code-compliant installations
- Apply PLC interface and control panel checks, I/O troubleshooting, basic ladder logic interpretation and panel wiring integrity checks

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 electrical maintenance and troubleshooting for electrical technicians, maintenance electricians, instrumentation technicians, electrical supervisors, maintenance supervisors, electrical engineers (junior to mid-level), plant operators with electrical exposure, facility maintenance staff, utility technicians, shift engineers, HVAC technicians (with electrical duties), technical trainers in electrical field, personnel involved in preventive or corrective maintenance and other technical staff.

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: -

- 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:

Mr. Herman Eksten, PE, PgDiP, is a **Senior Electrical Engineer** with over **30 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.

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

Dubai	**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.
Cairo	**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.
Istanbul	**US$ 6,000** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Electrical Maintenance*** *Purpose & Scope of Maintenance • Types: Corrective, Preventive, Predictive • Maintenance Challenges in Industrial Settings • Key Competencies for Electrical Technicians*
0930 – 0945	*Break*
0945 – 1030	***Basic Electrical Theory*** *Ohm's Law & Its Applications • Power & Energy Equations • Voltage, Current, Resistance Relationship • Real versus Reactive Power in AC Circuits*
1030 – 1130	***Types of Electrical Circuits – AC/DC*** *Characteristics of AC versus DC Systems • Series & Parallel Circuits • Single-Phase versus Three-Phase Supply • Frequency, RMS & Peak Values*
1130 – 1215	***Electrical Components – Resistors, Capacitors, Inductors*** *Identification & Function of Basic Components • Behavior in AC & DC Circuits • Series & Parallel Configurations • Practical Applications in Electrical Systems*
1215 – 1230	*Break*
1230 – 1330	***Reading Electrical Schematics & Symbols*** *Standard Electrical Symbols (IEC/ANSI) • Interpreting Wiring Diagrams • Schematic versus Layout Drawings • Hands-On Practice with Sample Diagrams*
1330 – 1420	***Measurement Instruments Overview*** *Introduction to Multimeters & Clamp Meters • Voltage & Current Measurement Techniques • Continuity & Resistance Testing • Instrument Safety & 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

0730 – 0830	***Transformers, Motors & Generators Overview*** *Types & Working Principles • Common Issues & Symptoms of Failure • Efficiency & Maintenance Needs • Inspection Checklists*
0830 – 0930	***Switchgear, Circuit Breakers & Contactors*** *LV/MV Switchgear Components • Operating Principles & Classifications • Fault Detection & Isolation • Inspection & Maintenance Guidelines*
0930 – 0945	*Break*
0945 – 1100	***Electrical Safety Practices & PPE*** *Key Safety Standards (NFPA 70E, OSHA) • Personal Protective Equipment (PPE) Types • Safe Work Practices & Hazard Identification • Grounding & Bonding Principles*
1100 – 1215	***Lockout/Tagout (LOTO) Procedures*** *Purpose & Regulatory Requirements • Steps in LOTO Application • Tags, Locks & Verification • Group Lockout Scenarios*
1215 – 1230	*Break*
1230 – 1330	***Basics of Arc Flash Hazards*** *Causes & Consequences of Arc Flash • Incident Energy & Boundary Calculations • Arc-Rated PPE Selection • Arc Flash Labeling & Risk Reduction*
1330 – 1420	***Electrical Fire Hazards & Prevention*** *Common Causes of Electrical Fires • Fire Detection & Suppression Systems • NFPA Compliance Overview • Response Strategies for Electrical Fires*
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	***Systematic Troubleshooting Process*** *Problem Identification & Isolation • Fault Trees & Logic Flowcharts • Documentation of Faults • Decision-Making Under Pressure*
0830 – 0930	***Use of Multimeters, Clamp Meters & Insulation Testers*** *Functions & Limitations of Each Tool • Measuring Continuity, Resistance & Insulation Resistance • Interpreting Test Results • Safety Measures During Testing*
0930 – 0945	*Break*
0945 – 1100	***Diagnosing Motor & Transformer Failures*** *Overheating & Insulation Breakdown • Bearing & Winding Failures • Vibration & Noise Diagnostics • Megger & Winding Resistance Tests*
1100 – 1215	***Circuit Breaker & Fuse Testing*** *Visual & Functional Inspection • Testing Tripping Mechanisms • Replacing Faulty Breakers/Fuses • Preventive Maintenance Best Practices*
1215 – 1230	*Break*
1230 – 1330	***Common Electrical Faults & Case Studies*** *Short Circuits, Ground Faults, Overloads • Voltage Drop & Harmonics Issues • Hands-On Case Analysis • Root Cause Determination Techniques*

1330 – 1420	***Hands-On Troubleshooting Exercises*** *Simulated Equipment Faults • Guided Troubleshooting Process • Fault Logging & Reporting • Peer Learning & Review*
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	***Preventive Maintenance Strategies*** *Developing PM Checklists • Component-Based Maintenance Schedules • Importance of Visual Inspections • Lubrication & Tightening Tasks*
0830 – 0930	***Predictive Maintenance Techniques*** *Infrared Thermography Overview • Vibration Monitoring Basics • Ultrasonic Detection & Oil Analysis • Integrating Predictive Tools with CMMS*
0930 – 0945	*Break*
0945 – 1100	***Maintenance Scheduling & Documentation*** *Planning & Prioritizing Tasks • Maintenance Logs & Tracking • Software for Scheduling & Reporting • KPI Monitoring & Reporting*
1100 – 1215	***Electrical Panel & Cable Inspection*** *Panel Layout & Heat Buildup Issues • Cable Gland & Insulation Checks • Identifying Signs of Wear or Damage • Corrective Actions & Tagging*
1215 – 1230	*Break*
1230 – 1420	***Hands-On Lab: Simulated Maintenance Tasks*** *Panel Inspection Simulation • Thermography Tool Demo • Cable Testing with Megger • Documentation of Findings*
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*

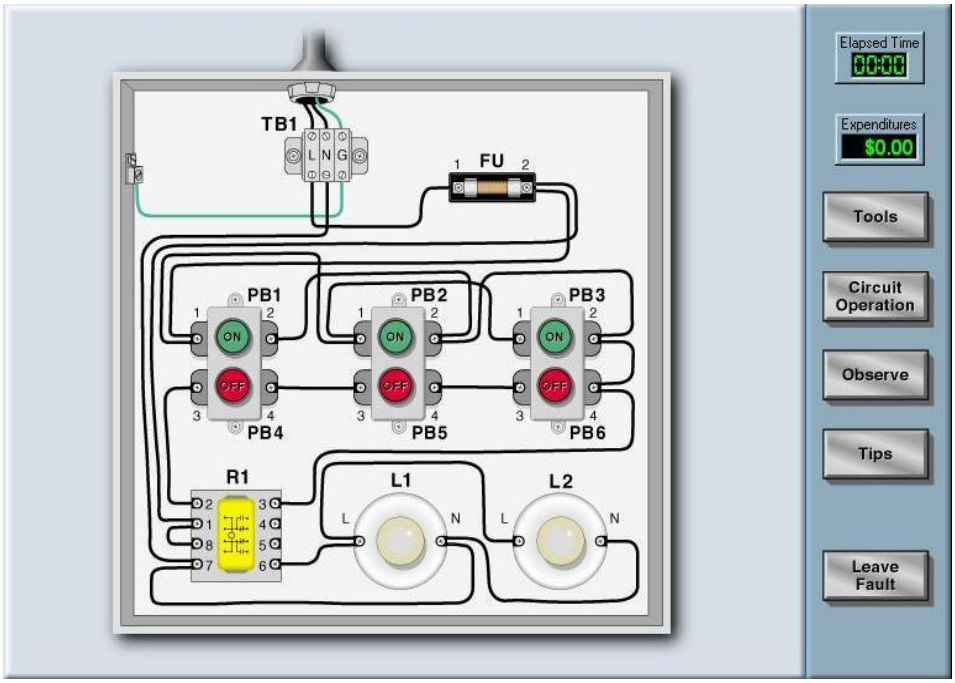
Day 5

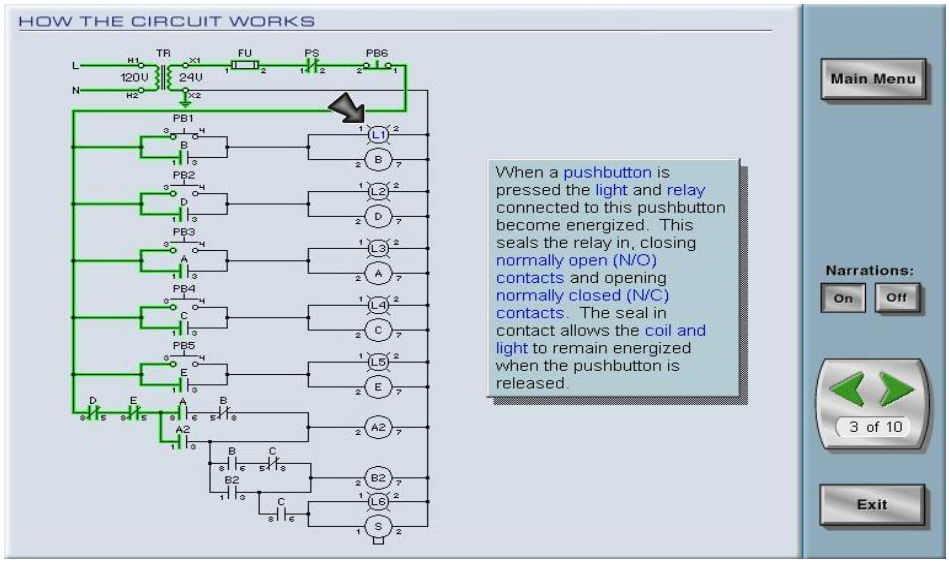
0730 – 0930	***Workplace Electrical Standards*** *IEC/NEC/IEEE Compliance Introduction • Local Authority Regulations • Inspection Reporting Requirements • Importance of Code-Compliant Installations*
0930 – 0945	*Break*
0945 – 1100	***Hands-On Troubleshooting with Fault Simulators*** *Practical Faults on Simulated Panels • Step-By-Step Fault Diagnosis • Safe Isolation & Repair Procedures • Real-Time Feedback on Performance*
1100 - 1230	***PLC Interface & Control Panel Checks (Basic Intro)*** *Introduction to PLC Hardware • I/O Troubleshooting • Basic Ladder Logic Interpretation • Panel Wiring Integrity Checks*
1230 – 1245	*Break*

1245 – 1345	***Group-Based Case Study & Problem Solving*** *Industrial Electrical Failure Scenario • Root Cause Analysis in Teams • Solution Planning & Presentation • Lessons Learned & Peer Review*
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*

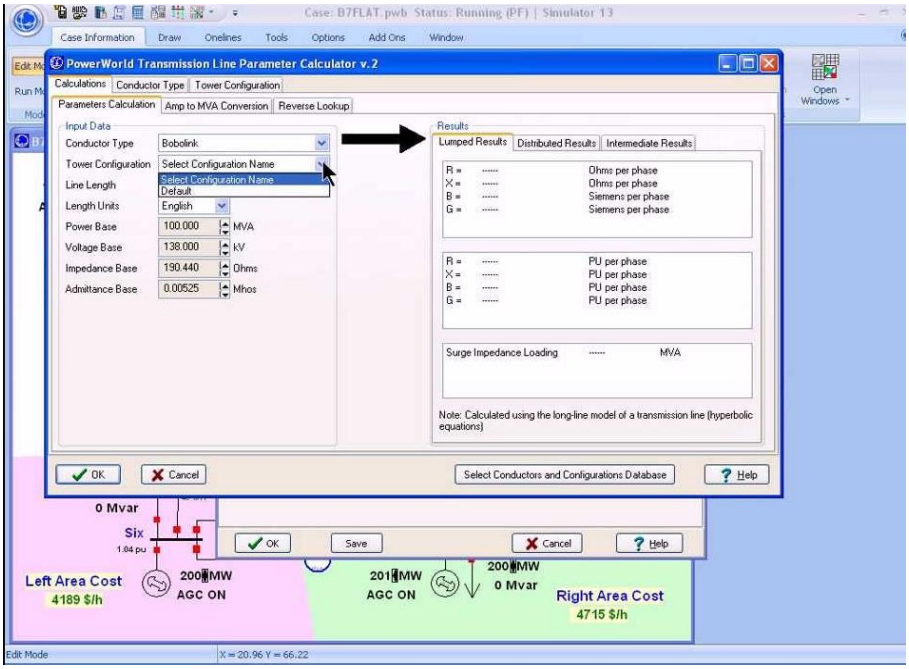
Simulator (Hands-on Practical Sessions)

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".

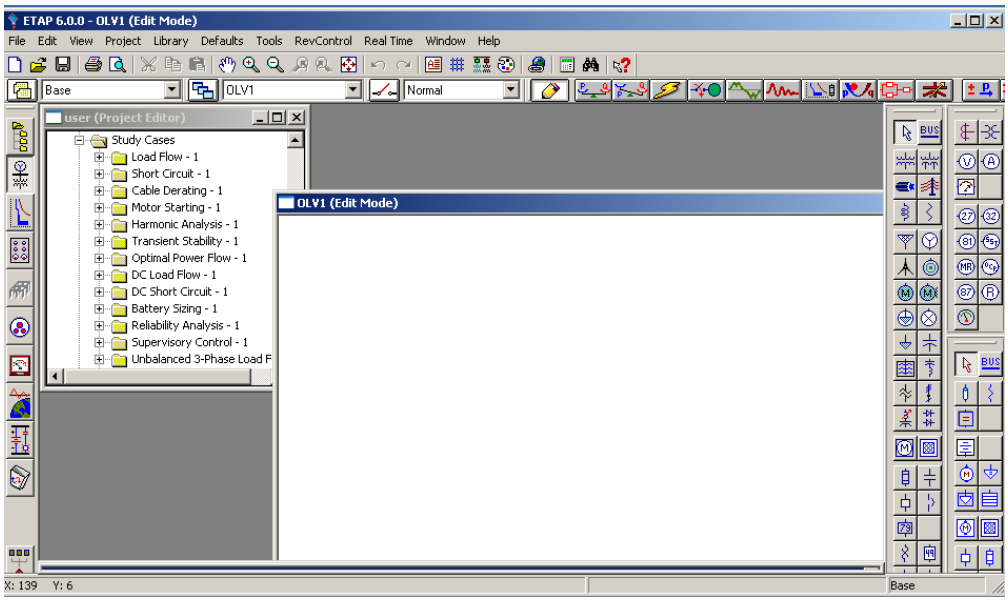




Simutech Troubleshooting Electrical Circuits V4.1



Power World Simulator



ETAP Software Simulator

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