COURSE OVERVIEW EE1111
Operation Optimization and Energy Efficiency

Course Title
Operation Optimization and Energy Efficiency

Course Date/Venue
Session 1: June 16-20, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: October 06-10, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
EE1111

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 Operation Optimization and Energy Efficiency. It covers the importance of energy efficiency in water and electricity sectors, international standards and benchmarks (ISO 50001) and regulatory drivers and sustainability goals; the energy flow and system boundaries, energy audit methodologies, baseline establishment and performance indicators; the energy balance and process mapping and system thinking and optimization principles; the power plant efficiency improvement techniques.

Further, the course will also discuss the energy demand in desalination processes, optimize high-pressure pump operations and apply energy recovery systems in RO and process monitoring for efficiency; the combined heat and power (CHP) and cogeneration and carryout load forecasting, demand optimization, fuel optimization and emissions reduction; the water distribution network optimization and desalinated water blending and reuse strategies; the smart grid and smart water systems, energy performance contracting (EPC), digital twins and predictive analytics.

During this interactive course, participants will learn the artificial intelligence for energy optimization, energy efficiency project identification and selection; the measurement, verification and energy monitoring; the financing mechanisms and incentives and apply developing an energy management system (EnMS) and energy efficiency in procurement and design; linking energy efficiency to carbon goals and discuss circular economy and resource efficiency, decarbonizing water and power operations and sustainability reporting metrics

Course Objectives

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

- Apply and gain an in-depth knowledge on operation optimization and energy efficiency
- Discuss the importance of energy efficiency in water and electricity sectors, international standards and benchmarks (ISO 50001) and regulatory drivers and sustainability goals
- Recognize energy flow and system boundaries, energy audit methodologies and baseline establishment and performance indicators
- Describe energy balance, process mapping, system thinking and optimization principles as well as apply power plant efficiency improvement techniques
- Discuss energy demand in desalination processes, optimize high-pressure pump operations and apply energy recovery systems in RO and process monitoring for efficiency
- Identify combined heat and power (CHP) and cogeneration and carryout load forecasting, demand optimization, fuel optimization and emissions reduction
- Define the role of SCADA and DCS in energy optimization and apply real-time monitoring and control loops, advanced analytics, data-driven decisions and optimization alarms and alerts
- Recognize energy use in water transmission systems and carryout pump system optimization, leakage detection and non-revenue water reduction
- Employ water distribution network optimization and desalinated water blending and reuse strategies
- Recognize smart grid and smart water systems, energy performance contracting (EPC), digital twins and predictive analytics
- Carryout artificial intelligence for energy optimization, energy efficiency project identification and selection as well as measurement, verification and energy monitoring
- Discuss financing mechanisms and incentives, develop energy management system (EnMS) and apply energy efficiency in procurement and design
- Link energy efficiency to carbon goals and discuss circular economy and resource efficiency, decarbonizing water, power operations and sustainability reporting metrics

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 operation optimization and energy efficiency for mechanical engineers, electrical engineers, process engineers, energy engineers, operations managers, energy managers/sustainability officers, facility managers, project managers, maintenance teams, c-suite executives (ceo, cfo, coo), environmental, health & safety (EHS) officers, procurement specialists, consultants and service providers, regulatory and compliance professionals and other trechnical 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 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 **Operation Optimization**, **Power Generation & Transmission**, **Electrical Generator & Power Transformers**, Power Systems **Protection & Relaying**, **Earthing**, **Power System Protective Relay**, **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**, **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**, **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** and **Bachelor** 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.

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.

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 Energy Efficiency Concepts*** *Definitions and Terminologies • Importance of Energy Efficiency in Water and Electricity Sectors • International Standards and Benchmarks (ISO 50001) • Regulatory Drivers and Sustainability Goals*
0930 - 0945	*Break*
0945 – 1045	***Energy Flow & System Boundaries*** *Energy Conversion and Transfer Processes • System Boundary Definition and Energy Flow Diagrams • Energy Losses and Their Classification • Practical Examples from Power & Water Sectors*
1045 - 1145	***Energy Audit Methodologies*** *Types of Energy Audits: Preliminary versus Detailed • Tools and Techniques for Auditing • Energy Audit Reporting and Analysis • Case Studies of Audit Findings in Utilities*
1145 - 1230	***Baseline Establishment & Performance Indicators*** *Establishing Baselines for Operations • Key Performance Indicators (KPIs) • Normalization Factors (e.g., Temperature, Production) • Baseline Recalculation Scenarios*
1230 – 1245	*Break*
1245 – 1330	***Energy Balance & Process Mapping*** *Sankey Diagrams for Energy Flows • Mass and Energy Balances • Identifying Inefficient Operations • Mapping Optimization Opportunities*
1330 - 1420	***System Thinking & Optimization Principles*** *Holistic View of Integrated Systems • Identifying Interdependencies • Operational versus Design Optimization • Root Cause Analysis of Inefficiencies*
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	***Power Plant Efficiency Improvement Techniques*** *Heat Rate Improvement Methods • Boiler and Turbine Efficiency Optimization • Combined Cycle Efficiency Strategies • Maintenance and Operational Best Practices*
0830 – 0930	***Desalination Process Optimization (RO & MSF)*** *Energy Demand in Desalination Processes • Optimizing High-Pressure Pump Operations • Energy Recovery Systems in RO • Process Monitoring for Efficiency*
0930 - 0945	*Break*
0945 – 1130	***Combined Heat & Power (CHP) and Cogeneration*** *Principles of Cogeneration Systems • Integration in Utility Systems • Efficiency Improvement versus Standalone Systems • Real-Life Utility Case Studies*
1130 - 1230	***Load Forecasting & Demand Optimization*** *Predictive Modeling for Power and Water Demand • Peak Shaving and Load Shifting Techniques • Integration of Storage Solutions • Real-Time Data for Load Management*
1230 - 1245	*Break*
1245 - 1330	***Fuel Optimization & Emissions Reduction*** *Fuel Selection and Blending Strategies • Operational Adjustments for Cleaner Combustion • Emission Monitoring and Reporting • Fuel-to-Energy Ratio Calculations*
1330 - 1420	***Instrumentation & Control Systems for Optimization*** *Role of SCADA and DCS in Energy Optimization • Real-Time Monitoring and Control Loops • Advanced Analytics and Data-Driven Decisions • Optimization Alarms and Alerts*
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	***Energy Use in Water Transmission Systems*** *Head Loss and Pressure Analysis • Pipe Network Optimization Techniques • Valve Control Strategies • Real-Time Flow Monitoring Systems*
0830 – 0930	***Pump System Optimization*** *Affinity Laws and Efficiency Curves • Pump Scheduling and Variable Speed Drives (VSDs) • Preventive Maintenance Impacts • Reducing Hydraulic Losses*
0930 - 0945	*Break*
0945 – 1130	***Leakage Detection & Non-Revenue Water Reduction*** *Energy Losses Due to Leakages • Smart Leak Detection Tools • Pressure Management Systems • Case Studies of Water-Energy Savings*
1130 - 1230	***Water Distribution Network Optimization*** *Hydraulic Modeling Tools (e.g., EPANET) • Pressure Zone Mapping and Management • Demand-Driven Distribution Strategies • Energy Cost Modeling in Distribution*
1230 - 1245	*Break*
1245 - 1330	***Desalinated Water Blending & Reuse Strategies*** *Water Quality and Blending Energy Impacts • Use of Treated Effluent to Reduce Energy • Energy Considerations for Advanced Water Reuse • Reuse Integration into Transmission Grids*

1330 - 1420	***Smart Grid & Smart Water Systems*** *Integration of ICT in Operations • Smart Metering and Remote Diagnostics • Data Analytics for Operational Efficiency • Cybersecurity in Smart 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 Three*

Day 4

0730 – 0830	***Energy Performance Contracting (EPC)*** *EPC Models and Frameworks • Shared Savings versus Guaranteed Savings • M&V Protocols and IPMVP • EPC Examples in Water/Power Facilities*
0830 – 0930	***Digital Twins & Predictive Analytics*** *Introduction to Digital Twins for Energy Optimization • Predictive Maintenance Applications • Simulation Tools and Scenario Analysis • Benefits and Implementation Challenges*
0930 - 0945	*Break*
0945 – 1130	***Artificial Intelligence for Energy Optimization*** *AI and ML Applications in Forecasting and Control • Neural Networks and Adaptive Control Systems • AI in Plant Fault Detection • Case Applications in Desalination/Power Plants*
1130 - 1230	***Energy Efficiency Project Identification & Selection*** *Screening and Prioritization Matrix • Cost-Benefit Analysis of Measures • Payback Period and NPV/IRR Calculations • Bundling Strategies for Impact*
1230 - 1245	*Break*
1245 - 1330	***Measurement, Verification & Energy Monitoring*** *Key Elements of M&V Plans • Data Collection Protocols • Baseline Adjustment and Deviation Analysis • Use of Energy Dashboards and KPIs*
1330 - 1420	***Financing Mechanisms & Incentives*** *Government and International Funding Options • Internal Funding Through Energy Savings • Carbon Credits and Monetization • Return-on-Investment Strategies*
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*

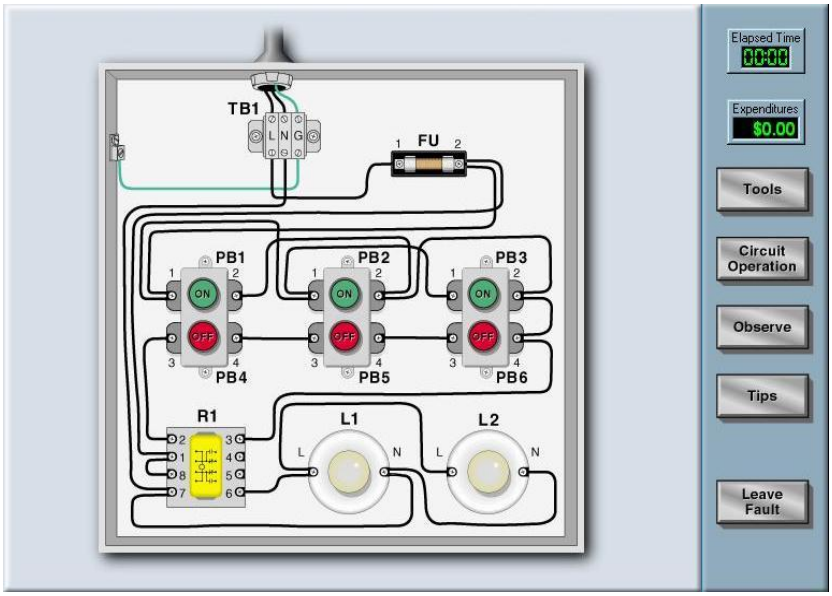
Day 5

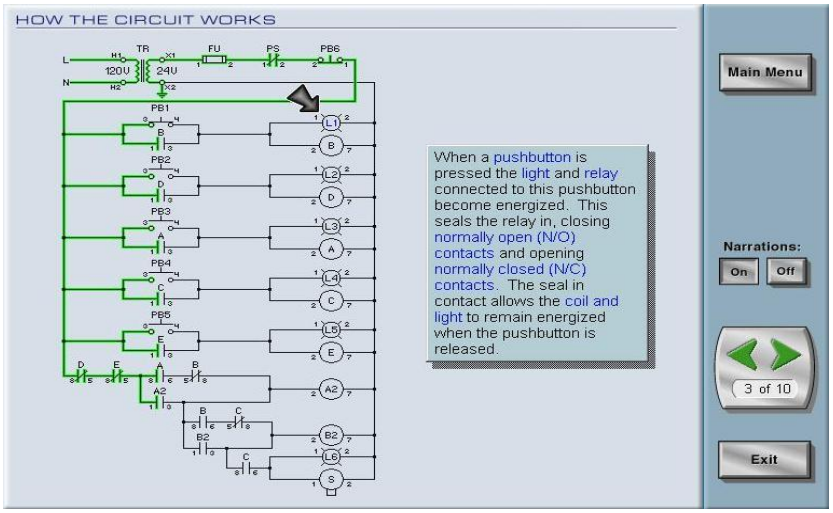
0730 – 0830	***Developing an Energy Management System (EnMS)*** *Overview of ISO 50001 Standard • EnMS Framework and PDCA Cycle • Roles and Responsibilities in Implementation • Internal Audit and Management Review*
0830 – 0930	***Energy Efficiency in Procurement & Design*** *Life Cycle Costing (LCC) in Procurement • Energy-Efficient Design Criteria • Procurement Specifications and Green Tenders • Evaluating Supplier Efficiency Performance*
0930 - 0945	*Break*
0945 – 1100	***Integration with Sustainability & Net-Zero Goals*** *Linking Energy Efficiency to Carbon Goals • Circular Economy and Resource Efficiency • Decarbonizing Water and Power Operations • Sustainability Reporting Metrics*

1100 – 1200	***Workforce Training & Operational Culture*** *Employee Awareness and Behavior Change • Incentive Schemes and Energy Teams • Operational SOPs for Energy Saving • Building Energy Champions*
1200 - 1215	*Break*
1215 – 1345	***Continuous Improvement & Innovation*** *Using Kaizen and Lean Principles • Root Cause Analysis and Feedback Loops • Benchmarking with International Best Practices • Pilot Projects and Scale-Up*
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*

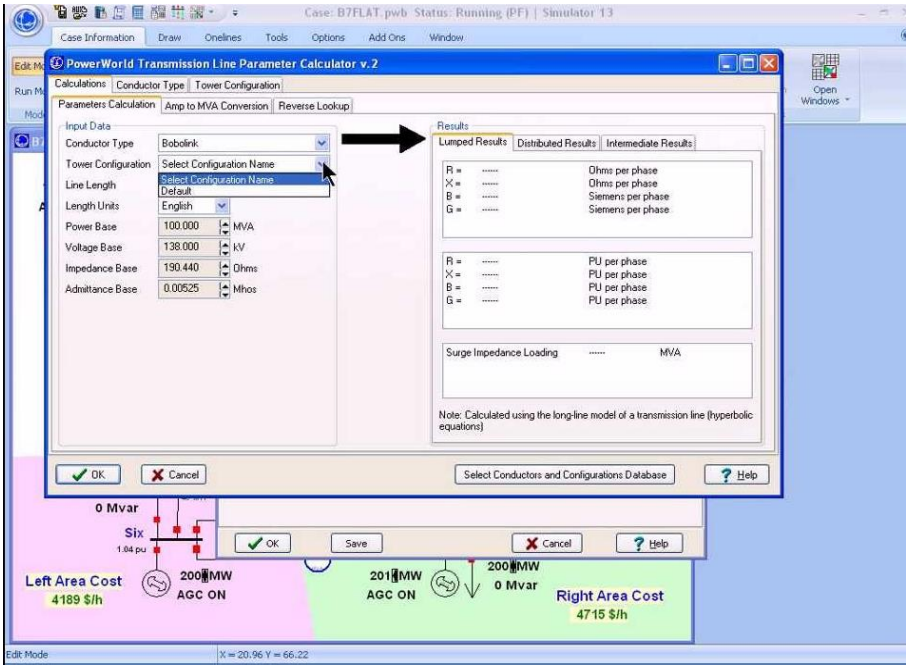
Simulator (Hands-on Practical Sessions)

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 simulators "Troubleshooting Electrical Circuits V4.1", "Power World" and "ETAP software".

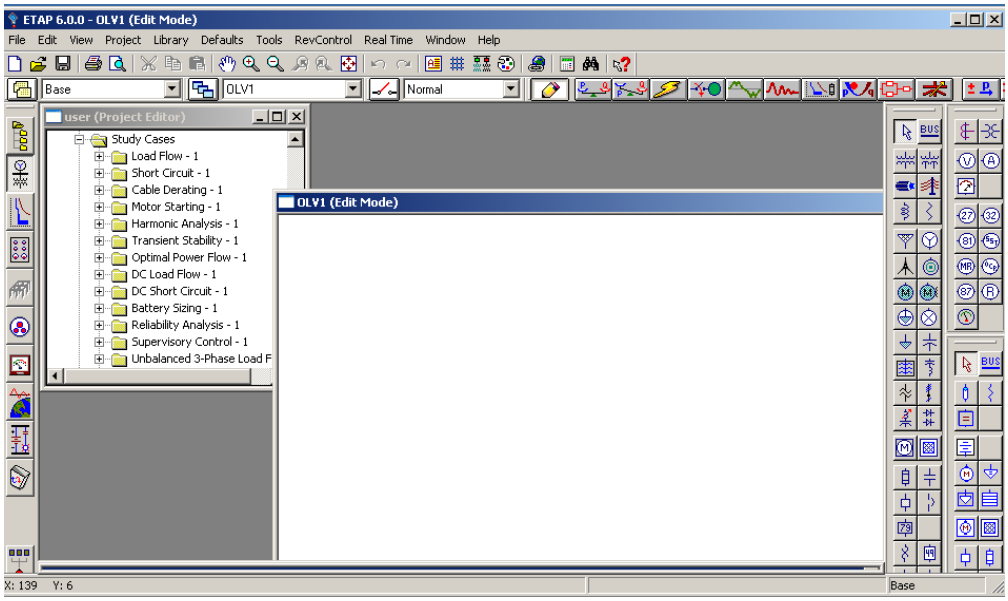




Troubleshooting Electrical Circuits V4.1 Simulator



Power World Simulator



ETAP Software Simulator

Course Coordinator

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