Haward Technology Middle East

COURSE OVERVIEW EE1100
Resilience Assessments for Power Systems

Course Title
Resilience Assessments for Power Systems

Course Date/Venue
Session 1: June 23-27, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: October 13-17, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
EE1100

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 Resilience Assessments for Power Systems. It covers the resilience in the context of power systems and its importance for reliability and sustainability; the components of a power system and resilience challenges in power systems; the risk management and resilience assessment; the effects of climate change on power system infrastructure and extreme weather events and their impact on operations; the adaptation strategies for mitigating climate risks and regulatory and policy implications for climate resilience; the difference between resilience versus reliability; and how reliability improvements contribute to resilience.

Further, the course will also discuss the weak points in power system design; the qualitative and quantitative vulnerability assessment, tools and techniques for vulnerability modeling, risk maps and vulnerability matrices; the critical infrastructure for power systems and dependencies between systems and infrastructure; the effects of failure in one component on overall system resilience; assessing interdependencies with water, communication and transportation systems; the cybersecurity vulnerabilities in power systems; and the impact of natural disasters and economic and operational vulnerabilities.

During this interactive course, participants will learn to upgrade physical infrastructure for resilience and redundancy and diversification; the smart grids and resilience and resilient transmission and distribution networks; the operational flexibility and emergency response, financial and risk mitigation tools and resilience modeling techniques; the scenario analysis, stress testing and optimizing resilience in power systems; the data analysis for resilience assessment, resilience assessment framework and developing action plans based on resilience assessment results; assigning responsibilities, setting performance targets and monitoring continuous improvement; and the collaboration and stakeholder engagement.

Course Objectives

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

- Apply and gain an in-depth knowledge on resilience assessments for power systems
- Discuss resilience in the context of power systems and its importance for reliability and sustainability
- Identify the components of a power system and resilience challenges in power systems and apply risk management and resilience assessment
- Recognize the effects of climate change on power system infrastructure and extreme weather events and their impact on operations
- Apply adaptation strategies for mitigating climate risks and discuss regulatory and policy implications for climate resilience
- Differentiate resilience and reliability and discuss how reliability improvements contribute to resilience
- Identify weak points in power system design and apply qualitative and quantitative vulnerability assessment, tools and techniques for vulnerability modeling, risk maps and vulnerability matrices
- Define critical infrastructure for power systems and identify dependencies between systems and infrastructure
- Discuss the effects of failure in one component on overall system resilience and assess interdependencies with water, communication and transportation systems
- Determine cybersecurity vulnerabilities in power systems, impact of natural disasters and economic and operational vulnerabilities
- Upgrade physical infrastructure for resilience and explain redundancy and diversification, smart grids and resilience and resilient transmission and distribution networks
- Apply operational flexibility and emergency response, financial and risk mitigation tools, resilience modeling techniques, scenario analysis and stress testing
- Optimize resilience in power systems, apply data analysis for resilience assessment and create a resilience assessment framework
- Develop action plans based on resilience assessment results and assign responsibilities and set performance targets
- Employ monitoring and continuous improvement as well as collaboration and stakeholder engagement

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 resilience assessments for power systems for utility and grid operators, resilience and risk management teams, executive leadership and decision-makers, planning and infrastructure teams, IT and cybersecurity professionals, emergency services and first responders (external or internal) and other technical staff.

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 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 **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries and **Water & Utilities** specializing in **Electrical Safety**, Certified **HV Electrical Safety**, **Low Voltage Electrical Safety**, **Electrical Circuits**: Series and Parallel Connection, **Electrical Faults & Protective Devices**, **Renewable Energy Integration**, **Smart Grid** & **Renewable Integration**, **Renewable Energy** Storage Systems, **Renewable Energy** Economics & Finance, 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**, **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 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	***Understanding Resilience in Power Systems*** *Definition of Resilience in the Context of Power Systems • Importance of Resilience for Reliability & Sustainability • Key Resilience Concepts: Reliability, Vulnerability, Robustness • Resilience Framework for Critical Infrastructure*
0930 - 0945	*Break*
0945 – 1045	***Components of a Power System*** *Generation, Transmission & Distribution • Key Infrastructure Components: Substations, Transformers, Lines • Communication & Control Systems • Integration of Renewable Energy Sources*
1045 - 1145	***Resilience Challenges in Power Systems*** *Impact of Natural Disasters & Climate Change • Geopolitical & Supply Chain Disruptions • Technological Vulnerabilities (Cybersecurity, Aging Infrastructure) • Human & Operational Factors*
1145 - 1230	***Risk Management & Resilience Assessment*** *Risk Assessment Methodologies for Power Systems • Identifying Critical Assets & Infrastructure • Vulnerability Analysis & Prioritization • Assessing Resilience from a Systems Perspective*
1230 – 1245	*Break*
1245 – 1330	***Climate Change & Resilience*** *Effects of Climate Change on Power System Infrastructure • Extreme Weather Events & their Impact on Operations • Adaptation Strategies for Mitigating Climate Risks • Regulatory & Policy Implications for Climate Resilience*
1330 - 1420	***Resilience versus Reliability*** *Differences Between Resilience & Reliability • How Reliability Improvements Contribute to Resilience • Balancing Resilience & Cost-Effectiveness • Case Studies of Resilience Failure versus Reliability Success*
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	***Vulnerability Assessment Methodologies*** *Identifying Weak Points in Power System Design • Qualitative versus Quantitative Vulnerability Assessment • Tools & Techniques for Vulnerability Modeling • Risk Maps & Vulnerability Matrices*
0830 – 0930	***Critical Infrastructure & Dependencies*** *Defining Critical Infrastructure for Power Systems • Identifying Dependencies Between Systems & Infrastructure • Effects of Failure in One Component on Overall System Resilience • Assessing Interdependencies with Water, Communication & Transportation Systems*

0930 - 0945	Break
0945 – 1130	***Cybersecurity Vulnerabilities in Power Systems*** *Cyber Threats & their Impact on Resilience • Key Cybersecurity Vulnerabilities in SCADA Systems • Risk Assessment Frameworks for Cybersecurity • Best Practices for Enhancing Cybersecurity Resilience*
1130 - 1230	***Impact of Natural Disasters*** *Earthquakes, Hurricanes & Floods: Effects on Power Systems • Disaster Preparedness & Recovery Plans • Case Studies of Resilience During Natural Disasters • Strategies for Improving System Resilience to Disasters*
1230 - 1245	Break
1245 - 1330	***Economic & Operational Vulnerabilities*** *Financial Risks & Impacts of System Failure • Operational Risks: Workforce Management, Skills & Training • Supply Chain Vulnerabilities & Material Shortages • Economic Resilience in Energy Systems*
1330 - 1420	***Case Study: Vulnerability Assessment in Practice*** *Real-World Case Studies of Power System Vulnerabilities • Application of Vulnerability Assessments in Power Systems • Lessons Learned from Resilience Failures • Simulation Exercises & Group Discussion*
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	***Hardening the Power Grid*** *Upgrading Physical Infrastructure for Resilience • Reinforced Power Lines, Transformers & Substations • Resilient Power Distribution Networks • Hardening Against Extreme Weather Events*
0830 – 0930	***Redundancy & Diversification*** *Redundancy in Power Generation & Transmission • Diversifying Energy Sources to Enhance Resilience • Energy Storage Systems as Resilience Tools • Microgrids & Distributed Generation Systems*
0930 - 0945	Break
0945 – 1130	***Smart Grids & Resilience*** *How Smart Grid Technology Improves Resilience • Real-Time Monitoring & Control for Rapid Response • Predictive Analytics for Proactive Resilience Management • Case Studies of Smart Grid Implementations*
1130 - 1230	***Resilient Transmission & Distribution Networks*** *Designing Flexible & Adaptive Transmission Systems • Impact of Digital Technologies on Resilience • Automated Fault Detection & Restoration • Ensuring Grid Stability During Peak Demand & Outages*
1230 - 1245	Break
1245 - 1330	***Operational Flexibility & Emergency Response*** *Building Operational Flexibility into Power Systems • Emergency Response Plans for System Failure Scenarios • Role of Operators & Staff in Resilience Strategies • Coordination with Emergency Services & Local Authorities*

1330 - 1420	***Financial & Risk Mitigation Tools*** *Risk Transfer Strategies: Insurance, Hedging & Financial Planning • Cost-Benefit Analysis of Resilience Investments • Financing Resilience Upgrades & Improvements • Government Policies & Incentives for Resilience Investments*
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

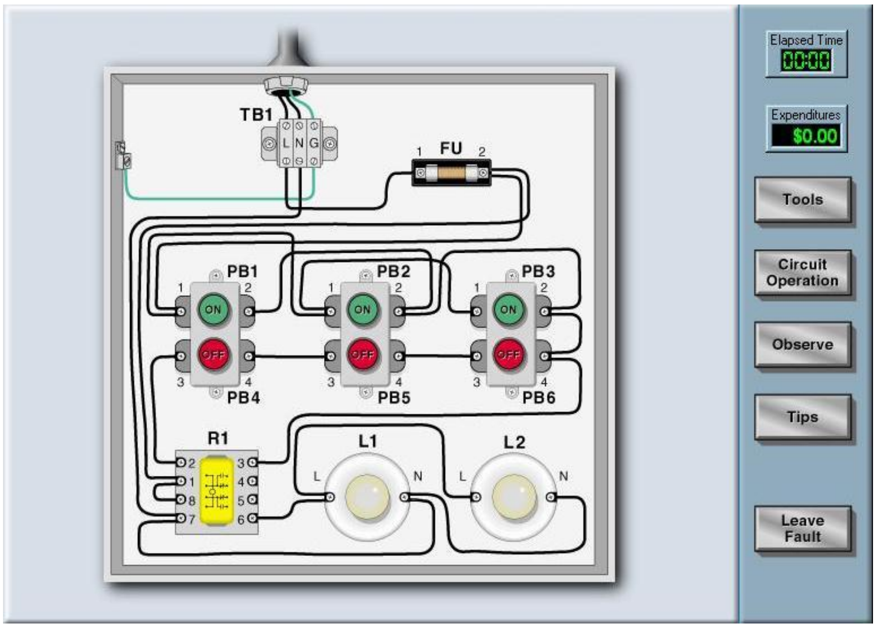
0730 – 0830	***Resilience Modeling Techniques*** *Introduction to Resilience Modeling in Power Systems • Probabilistic & Deterministic Modeling Approaches • Key Parameters & Inputs for Modeling Resilience • Tools & Software for Resilience Modeling*
0830 – 0930	***Scenario Analysis & Stress Testing*** *Creating Disaster Scenarios for Power System Resilience Testing • Stress Testing Systems for Extreme Conditions • Evaluating System Performance Under Stress • Model Validation & Verification Techniques*
0930 - 0945	*Break*
0945 – 1130	***Optimization of Resilience in Power Systems*** *Optimizing System Performance Under Normal & Stressed Conditions • Balancing Resilience with Operational Costs • Techniques for Optimizing the Response to Outages • Long-Term Planning for Resilience Optimization*
1130 - 1230	***Data Analysis for Resilience Assessment*** *Role of Big Data in Resilience Assessments • Analyzing Operational & Performance Data • Using Historical Data to Predict Vulnerabilities • Machine Learning & AI in Resilience Prediction*
1230 - 1245	*Break*
1245 - 1330	***Simulations & Real-World Application*** *Running Resilience Simulations for Power System Scenarios • Real-World Applications & Results of Simulations • Identifying Weaknesses & Proposing Improvements • Group Exercise: Creating a Resilience Model*
1330 - 1420	***Simulation Tools & Software Overview*** *Overview of Software Tools Used for Resilience Modeling • Key Features of Resilience Simulation Platforms • How to Integrate Simulation Results into Decision-Making • Training on Specific Simulation Tools Used in Resilience Assessments*
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*

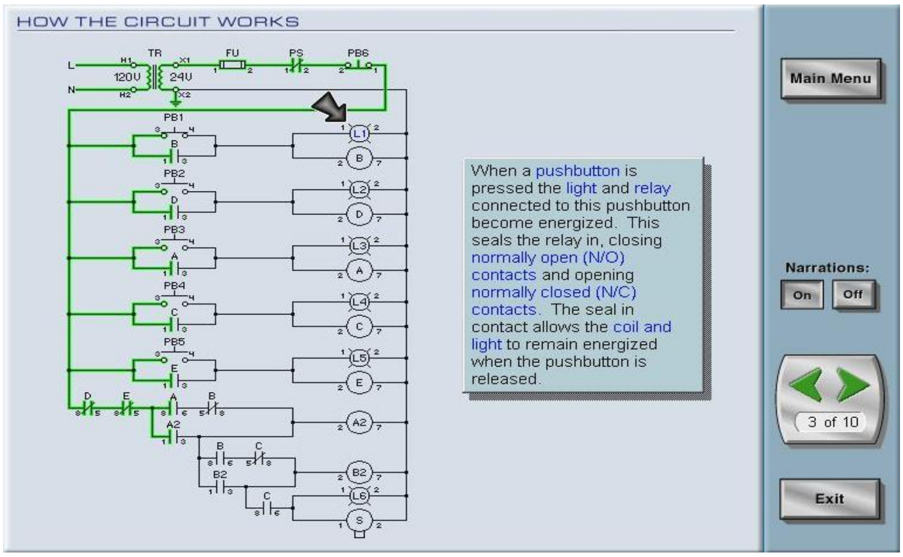
Day 5

0730 – 0830	***Creating a Resilience Assessment Framework*** *Defining Resilience Assessment Criteria & Metrics • Developing a Comprehensive Resilience Assessment Framework • Involving Stakeholders in the Assessment Process • Documentation & Reporting of Resilience Findings*
0830 – 0930	***Action Plans for System Improvements*** *Developing Action Plans Based on Resilience Assessment Results • Prioritizing Interventions & Improvements • Defining Timelines & Budget Considerations for Improvements • Assigning Responsibilities & Setting Performance Targets*
0930 - 0945	*Break*
0945 – 1100	***Monitoring & Continuous Improvement*** *Implementing Ongoing Monitoring & Assessment Systems • Key Performance Indicators (KPIs) for Resilience Management • Periodic Reviews & Updates of Resilience Plans • Continuous Improvement Through Feedback Loops & Lessons Learned*
1100 – 1200	***Collaboration & Stakeholder Engagement*** *Engaging Stakeholders in the Resilience Planning Process • Communication Strategies for Resilience Planning • Collaborating with Local Authorities, Suppliers & Contractors • Public & Regulatory Reporting of Resilience Measures*
1200 - 1215	*Break*
1215 – 1345	***Case Study: Resilience Improvement Projects*** *Review of Successful Resilience Improvement Projects • Learning from Failures & Implementing Corrective Actions • Best Practices in Resilience Improvement Initiatives • Discussion of Challenges Faced in Resilience Improvement*
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*

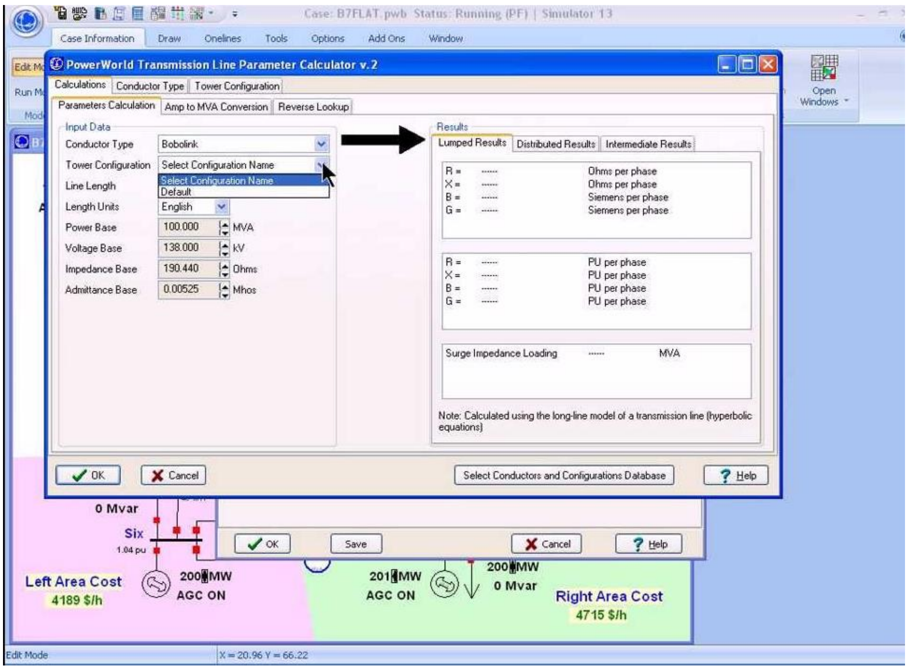
Simulator (Hands-on Practical Sessions)

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".

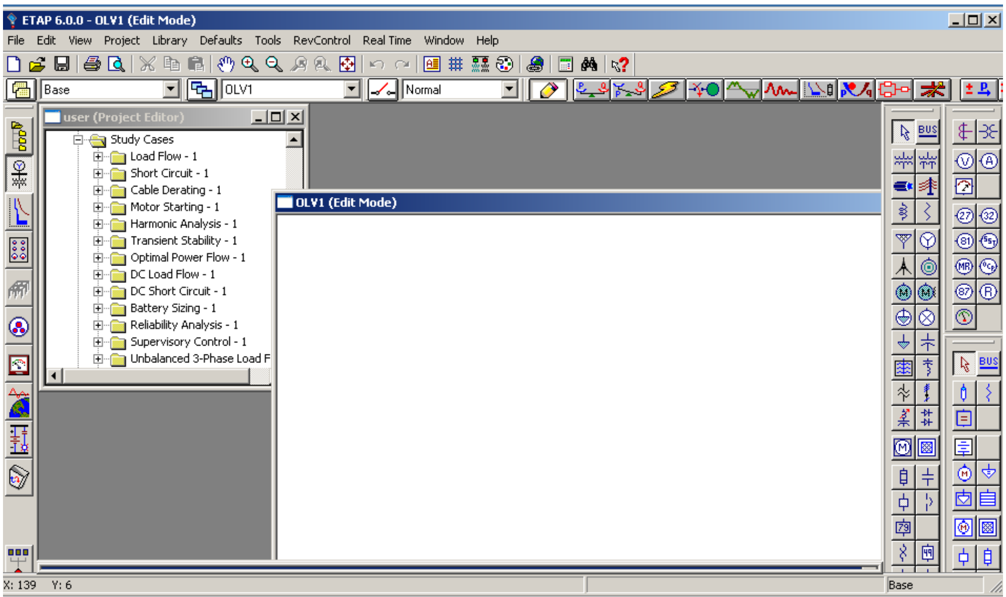




Troubleshooting Electrical Circuits V4.1 Simulator



Power World Simulator



ETAP Software Simulator

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org