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DECISION SYSTEMS
INTERNATIONAL
Atlanta, GA, USA

Challenges to Emergency Operation under Stress

May 03 - 07, 2009 - Millennium Hotel, Sharjah, U.A.E

Presented by:



Dr. Atif Debs

DSI - President

Five Days Program for:

- Hands-On Recovery from the Emergency State
- Hands-On Recovery for Partial or Total System Collapse



+971 4 3622021

+971 4 3678636

info@apex-dubai.com

www.apex-dubai.com

Program Introduction

The course provides medium-level and advanced training to system operators and training managers on the handling of major system emergencies.

The **first day** starts by bringing the participants up-to-date on the latest standards by NERC/USA on system emergencies with a focus on recovering from the “emergency state.” This is followed by a basic lecture on security assessment and enhancement, both in the current state-of-the-art in industry and new advances that are coming in the next few years. The day concludes with a short lecture on the EPRI Operator Training Simulator (OTS), followed by exercises aimed at demonstrating how to use the OTS to discover basic power system phenomena and the functioning of some control devices.

The **second day** is dedicated to two major areas: generation control and recovery from major emergencies. The participants will be required to carry out the needed exercises and to be prepared to answer basic questions at the end of the day.

Days 3, 4 and 5 are dedicated to the area of system restoration with a focus on restoration planning, frequency and voltage response during restoration, islanding, both planned and unplanned, and estimating restoration duration.

Four basic exercise are required using these principles with the goal of having each restoration team complete the exercises together with a full report on activities with estimates of restoration durations. By the end of this course all the participants would have learned how to apply this knowledge in their own systems.

We look forward to welcoming you to

‘ Emergency Operation under Stress’

In May, 2009.

Intended Audience

The course is intended for dispatch and control center operators, managers and trainers. University faculty and students can benefit greatly from this course as it applies classroom principles effectively.

The approach is hands-on with simulator exercises using DSI-provided software the Operator Training Simulator

Program Goals

This program is intended to immerse the participants in practical exercises dealing with the complex phenomena of emergency control and system restoration.

Upon the completion of the program, each participants would have learned the following:

1. How to work with OTS tools that are similar to SCADA/EMS tools to identify emergencies and the security level of the system,
2. How to solve emergency control problems for line overloads and voltage collapse within the time frames and rules of the NERC standards
3. How to plan and execute a restoration plan and to estimate its duration,
4. How to report and defend on what was accomplished.

About DSI

DSI is a certified provider of continuing education hours by the **North American Electric Reliability Council (NERC)**.

DSI also is a value-added developer and implementer of several software packages for **Operator Training, Electricity Market Simulation and Short-Term Load Forecasting.**

www.dsipower.com

COURSE OUTLINES

DAY ONE

- **The Emergency State of the Power System**
Definition of the Emergency State. Corrective control. Emergency control. NERC standards. . [Presentation]
- **Online Security Assessment and Enhancement:-**
Security state diagram. Classification of security problems into static, dynamic and voltage stability issues. Enhancement measures. Probabilistic issues. [Presentation]
- **Introduction to the EPRI Operator Training Simulator:-**
Types of training simulators used in industry. Uses in training, studies and projects. EPRI Generic OTS and its basic functions. Hands on introduction to basic OTS operation [Presentation and exercises]
- **Using the OTS to Learn Power System Principles-**
Work with scenarios on surge impedance loading, Ferranti effect, voltage control using tap changers, line flow control by means of generation rescheduling [Presentation and exercises]

DAY TWO

- **Generation Control Principles:-**
Primary and secondary control. Response of units to disturbances and control signals. Automatic Generation Control. Generation response to frequency deviations [Presentation and exercises]
- **Automatic Generation Control:-**
Unit control modes. Constant frequency control. Constant net interchange control. Tie line bias control. Measuring control area bias. [Exercise]
- **Emergency Control for Transmission Overload:-**
Detection of security level of the system. Corrective control following a transmission overload. [Exercise]
- **Emergency Control for Pending Voltage Collapse:-**
Detection of impending voltage collapse. Emergency control measures [Exercise]
- **Review and Answers to Questions**



DAY THREE

- **NERC Standards on System Restoration :**
Review of applicable NERC standards and how they can be applied to various power systems [Presentation]
- **System Restoration Planning:**
Principles of system restoration. Top-down vs bottom-up approach. Restoration stages. Planning team. Plan testing and verification. [Exercise]
- **System Separation and Islanding:**
System separation disturbance. Identification of system islands. [Exercise]
- **Frequency and Voltage Response During Restoration:**
Basic rules on frequency response. Basic rules on voltage response. Creation of a stable island for restoration. Problems and pitfalls during restoration. [Lecture and Exercise]

DAY FOUR

- **Estimating the Duration of System Restoration:**
Building time charts. Priority list. Running time estimation scenario [Exercise]
- **Automated Islanding as a Defense Measure:**
Building balancing groups for potential islanding. Using islanding as a defense measure. [Exercise]
- **Restoration from Partial Collapse:**
Identification of extent of collapse. Stabilizing energized islands. Building the transmission backbone. Load restoration. [Exercise]
- **Discussion and Response to Questions:**

Day FIVE

- **Review of Lessons Learned:**
- **Black Start from a Complete Collapse—Plan Development:**
Developing basic plan and timing charts. Developing recording system for restoration. Open discussion and review [Exercise]
- **Black Start from a Complete Collapse—Implementation:**
Implementation of the plan developed in previous session. Recording of progress and deviation from the plan. Reporting. [Exercise]
- **Review, Feedback and Discussion:**
Team presentations of restoration report. [Exercise]

Use of Laptops

Participants are required to bring their own laptops as part of this hands-on course. The required specifications for the laptops are:

- PC's with minimum of 512 MB RAM
- Windows XP Professional operating system
- 300 MB of DISC memory needed for the OTS

SPEAKER & PROGRAM DEVELOPER

Dr. Atif Debs

*Power Systems Expert,
Researcher, Business Leader*

Dr. Debs earned his B.S., M.S. and Ph. D. Degrees at MIT, Cambridge, Massachusetts, USA. His illustrious career involved an early involvement in industry (Systems Control, Inc., California) whereby he developed advanced control center applications software, and then a 22 year academic appointment at Georgia Institute of Technology, Atlanta, Georgia whereby he introduced and developed its renowned Electric Power Program at the graduate and undergraduate levels.

During his academic tenure, he was seconded for a 3 year appointment as Director, Engineering Division at the Kuwait Institute for Scientific Research, whereby he led major programs in electric power, solar energy and energy conservation.

Since 1994, he has been working full-time as President, Decision Systems International. In recent years he has been heavily involved in developing power system simulation software for training, forecasting, operations and planning with a focus on the emerging electricity markets.

Course Fee:

The amount of 3500 USD will be charged for the course. Send (3) delegates and get a 10% discount on the third participant.

Payment Method:

All payments should be in favor of Apex FZ-LLC. Account details are as follows:

**HSBC Bank Middle East limited,
Jebel Ali Branch, Dubai, UAE
A/C: 035 - 626472 - 100**

Cancellation Policy

If you are unable to attend the course you may send a substitute delegate.

Cancellation should be made **20 days** prior to the course conduction. Failure to cancel within **10 days** will be required to pay the course fee in full amount.

About APEX

- Apex is a training, consultancy and development provider base in Knowledge Village Dubai, UAE
- Apex core services focus mainly in Power & Utilities, Oil and Gas, Petrochemical Industries within the Gulf region.
- Apex courses and training programs are based in 2 major disciplines; Technical and Management
- For more information on APEX go to Website :

www.apex-dubai.com

REGISTRATION FORM

Name (MR./MS): _____
Position : _____
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Department : _____
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Address : _____
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Telephone No : _____
Fax No. : _____

CONTACT DETAILS



APEX FZ-LLC
Block 18, Knowledge Village
Dubai, UAE, P.O. Box. 502221

Course Coordinator:

Ahmed Al-Gohary

Mobile : +971 50 1728446 (UAE)

: +966 50 1003553 (KSA)

E-mail : tc@apex-dubai.com

Website : www.apex-dubai.com