

€ TRAINING

Modern Electrical Power System



7 - 11 November 2021
Cairo (Egypt)
Conrad Cairo by Hilton



Modern Electrical Power System

REF: L12332 DATE: 7 - 11 November 2021 Venue: Cairo (Egypt) - Conrad Cairo by Hilton Fee: 3000 Euro

Introduction:

The course starts by reviewing current practices to establish a sound understanding of the underlying principles of power system transmission, distribution, operation, and control. Next are considered the developments that are taking place as a result of new forms of generation, load interconnection, fault level limitation, and numerous advances in system innovation. The manner in which the new technologies are implemented is related to geographical location, sites requiring additional power, government strategy, and technical motivation for change. Not all power systems will advance at the same rate, but all will take advantage of the benefits of technology to a greater or lesser extent, thus improving the overall electrical efficiency.

The course aims to make candidates aware of improvements that technological advances make possible and to consider implementing these on their system, whether it be a utility, a large end-user, or an industrial islanded system. Asset management, DSM, nonlinear loads, harmonics, and online diagnostics of plant are also considered, as are ways of improving the utilization and efficiency of system plants.

Course Objectives:

At the end of this course, the participants will be able to:

- Understand the operation and power flow characteristics of small-large networks and how the network can be arranged to deliver more real power over the transmission system to the load centers
- Explore the form and use of a range of FACTS devices to improve system operation
- Understand the fault level limiting devices
- Learn about the New CT and VT optical transducers and protection relaying system using microprocessor configured relays
- Deal with non-linear loads and the problem of Harmonics, at the PCC point of common coupling
- Learn about Protection systems for thermal monitoring of cable networks
- Explore alternative forms of generation and embedded generation. Carbon emission limiting, etc.
- Learn about diagnostic monitoring of plant and in particular GIS substations
- Learn about the high-speed fault limiters and real-time stability monitors

Targeted Audience:

- Designers
- Engineers
- Technicians
- Professionals involved with the planning, operation, and maintenance of small to large scale power networks, from around 11kV, upwards
- Professionals from the Distribution Companies
- Power Utilities, Engineering Professionals in the Electricity Supply Industry and Petrochemical Companies who have to deal with aspects of generation, transmission, and distribution

Course Outlines:

Unit 1: Introduction to Modern Electrical Power Systems:

- Overview of typical systems covering generation, transmission, and distribution
- Determination of flow of real and reactive power
- Determination and control of fault level
- Control of reactive power and voltage
- Control of active power and system frequency
- The requirements for reactive compensation voltage profiles
- Quality of supply

Unit 2: Current Operational Problems:

- Coping with rising demand for power transmission and distribution
- The costs associated with increasing fault level
- Catering for increasing load on the existing system ratings of plant
- Monitoring of plant conditioning. temperature
- A review of analytical methods and demonstration of software for optimizing system operation
- Increasing problems of heavily loaded systems, stability, voltage dips

Unit 3: Introduction to System Operation:

- Active Power and Frequency Control - automated
- Voltage Control and Reactive Power Requirements automated
- Generation, including combined cycle and small embedded generators
- Transmission voltage levels - line and cable design, power loading and de-rating for temperature effects

Unit 4: Emerging Technologies:

- Energy and the Environment - solar power, geothermal power, etc. CO₂ and its impact on the world
- Demand Side Management remote load control minimizing demand optimizing transmission coping with dips and swells
- Optical Current Transducers for Protection
- High Voltage Applications - Surge protection, current limiters network switching, etc

Unit 5: Advances in Control and Monitoring:

- Power Electronics Applied to Power Systems
- Flexibility in AC Systems
- Series Controlled Capacitors
- Changing maintenance schedules, remote surveillance of plant and the introduction of unmanned substations
- Data logging

Unit 6: Making the System Work Harder:

- Power Dynamics Management the low-frequency oscillation
- Advanced protection and Control Techniques
- Fault Current Limiter
- Diagnostics partial discharge techniques
- Optical cable temperature monitoring

Unit 7: System Protection:

- Digital and Micro Processor Protection
- Electrical Insulation
- Condition Monitoring of Plant