



Arabian Institute For Training

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# Power System Blackouts , Preventive Measures

## INTRODUCTION

- Major blackouts are caused by not investing into your infrastructure, failing to carry out enough planning, lack of contingency planning and not analyzing your power system voltage requirements and operational conditions correctly. With any transmission and distribution system, reliability of the system is fundamental to preventing power outages and to ensure that regional and national assets are protected. The result of not planning and preventing power outages can have dramatic effects such risk to life through essential services such as supplies to Hospitals, Businesses not being able to function correctly, loss of revenue, unacceptable power quality and telecommunication transmission problems. This training course has been designed to ensure that you understand these issues and furthermore, can plan ahead to mitigate the risks to your power infrastructure.

### This training course will highlight:

- Power quality and risks with instability
  - In-rush/cold rush effects
  - Voltage control and regulation
  - Blackout/power outage prevention
  - Power system reliability
  - How Blackouts occur
  - Voltage and frequency concerns
  - Load shedding
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## OBJECTIVES

- Elaborate on the causes Power Blackouts
- Analyze case studies of previous incidents and learn from them
- Discuss 'Transients' and their effect on power grids
- Elaborate on 'inrush' concerns and effects
- Consider the correct applications of 'Voltage stability'
- Critically analyze Reactive power
- Discuss in detail Power Blackout preventative measures
- Discuss power grid protection systems
- Consider power restoration planning and techniques
- Analyze the use of 'SMART' technology

At the end of this training course, you will learn to:

- List methods used to improve power quality
- Discuss analysis concepts when investigating potential power quality and interruption issues
- Analyze power quality
- Risk assess Power outages
- Understand how power outages can start and cascade
- Apply procedures to ensure power continuity
- Consider a variety of planning techniques for Power Blackouts
- Consider the use of SMART technology

## ORGANISATIONAL IMPACT

- The impact from sending your work force onto this training course are wide and far reaching. Candidates will gain a variety of practical and theoretical knowledge which complies with current practice and legislation. The knowledge gained by candidates can be applied back in their work roles and can be used to ensure the following;
- Designers, Engineers, Technicians and Responsible Persons can gain knowledge of current practices when looking to ensure reliable power supplies.
- Designers, Engineers, Technicians and Responsible Persons can obtain knowledge to understand how Blackouts occur and how to mitigate against such occurrences
- Key personnel can prepare contingency plans for power quality issues and potential power outages
- Apply knowledge gained to limit negative impacts on customers when dealing with power outages

## PERSONAL IMPACT

- Candidates will be able to learn new practices to ensure power quality and reliability
  - Candidates will be able to refresh their knowledge
  - Candidates will be able to fully appreciate and understand power quality issues such as Blackouts and poor-quality power
  - Candidates will be able to apply methods discussed and demonstrated, to ensure a reliable power supply on your power infrastructure
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## WHO SHOULD ATTEND?

This training course is suitable to a wide range of professionals but will greatly benefit:

- Electrical Construction Engineer
- Designers
- Maintenance Supervisor Electrical
- Electrical Power Technician
- Commissioning Supervisor
- Electrically Supervisor
- Managers with power infrastructure responsibility
- Senior Managers power infrastructure responsibility

## Course Outline

### Blackouts, Instability and Inrush

- Introductions
- Introduction to Power System Blackouts
- Blackout concerns
- Causes of Blackout
- Instability and transient issues
- Inrush/Cold inrush concerns
- Voltage control and stability
- Inductive loads and reactive power issues

### Power Analysis, Blackout Preventative Measures and Voltage Stability

- Recap on
- Power system analysis
- Blackout preventative measures
- Blackout prevention - analysis of standards and compliance
- VAR Compensation
- Voltage stability

### Power Restoration, Asset Concerns and Power Restoration Analysis

- Recap on
  - Power restoration
  - Analysis of restoration techniques
  - Power system protection issues – Protection relays
  - Transformer issues – cold load
  - issues with power restoration
  - Different approaches to power system restoration
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## Power Restoration Techniques, Local Disturbances and Ongoing Blackout Training

- Recap on
- Modern techniques in power restoration
- System requirements
- Decisions for restoration after a local power disturbance
- Training techniques to prepare for Blackouts
- Evaluating lessons learnt from Blackout simulations, modelling and training

## Power Restoration Techniques, Local Disturbances and Ongoing Blackout Training

- Recap on
  - Restoration of power policies
  - Planning for power outages in large urban and urban locations
  - Deployment of power Blackout planning
  - Computers, automation and DCS control of power systems
  - Local, specific and generic power system restoration techniques
  - Support tools and interactive controls
  - End of course Assessment – submitted electronically by delegates
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