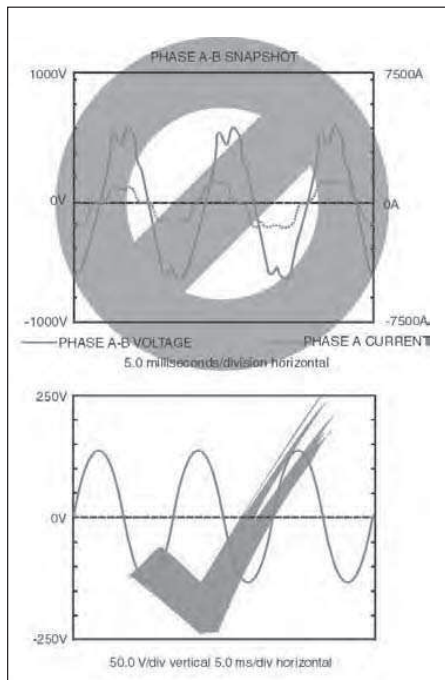

POWER SYSTEM HARMONICS, EARTHING AND POWER QUALITY

- PROBLEMS AND SOLUTIONS



YOU WILL LEARN HOW TO:

- Develop a sound working knowledge of power quality problems and solutions
- Do a step-by-step site analysis on various aspects of power quality such as power interruptions, voltages variations, harmonics, surges and electrical noise
- Deal with power interruptions
- Gain practical knowledge on surge and transient protection
- Design electrical and electronic systems correctly by applying knowledge of harmonics and earthing principles
- Troubleshoot electrical and electronic systems for power quality and harmonic problems
- Isolate and rectify power quality, harmonic problems and electrical noise
- Network with your peers on solving these problems

WHO SHOULD ATTEND:

This course is designed for personnel who want to understand the issues related to power quality in plants. Those who will benefit the most from this workshop include the following:

- Electrical designers and engineers
- Electrical maintenance engineers
- Personnel from EPC (Engineering, Procurement and Construction) companies
- Project engineers
- Consulting engineers
- Plant maintenance personnel
- Electrical and electronics technicians

The Workshop

The practical quality and harmonics – problems and solutions course is a comprehensive, highly practical and interactive two-day course dealing with the various types of power quality problems that have a wide ranging effect on the power systems equipments and apparatus in any plant.

You will have an opportunity to learn and discuss the fundamentals of power quality problems such as surges and voltage sags. Other problems having wide ranging effects on power system equipments such as voltage swells, voltage fluctuations, supply interruptions, frequency variations, harmonics and noise shall also be discussed in details. Issues related to control of the occurrence of these problems by appropriate system design and mitigation of the effects of these by adoption of appropriate protective measures and by the addition of power conditioning equipment shall be discussed.

Also, aspects related to designing of the systems, proper installation practices analysis of the probable reasons and corrective measures will be discussed in detail. Practical examples from actual projects will be used extensively to illustrate the principles and drive home the point.

The material is covered by means of an interactive lecturing style, with plenty of practical examples and realistic case studies derived from real work performed in this area.

The Outline

The workshop commences with a review of the fundamentals of power quality issues and the need to improve and maintain the quality of power in any installation. The ways to deal with power interruptions and voltage variations are explained in details. Surge and transient protection is then reviewed with practical steps outlined to minimise or even eliminate this problem. Hereafter the workshop focuses on what harmonics in power systems are and how to minimise them. The common problem of noise is reviewed and some misconceptions in this area are discussed.

The second day moves onto conducting a site analysis with a step-by-step set of instructions on harmonic site analysis procedures. A practical discussion on power conditioning is also discussed and the two days are rounded off with realistic case studies covering a wide variety of industries ranging from manufacturing and process control to telecommunications. You will also be provided with a high quality course manual that IDC is known for. This course manual will be useful for many years after the course.

The Program

POWER QUALITY OVERVIEW

- What is power quality?
- Power quality indicators
- Need for improving power quality

DEALING WITH POWER INTERRUPTION

- Failures and power interruptions
- Redundancy and automation
- Types of UPS systems
- UPS configuration for computer application

VOLTAGE VARIATIONS

- Reasons for voltage variations
- Sags and swells
- Handling voltage fluctuations
- Control measures for mitigation
- Recommended system changes

SURGE AND TRANSIENT PROTECTION

- Basics of lightning phenomena
- Power system faults and switching surges
- Mitigation techniques and case study review

VOLTAGE ASYMMETRY

- Reasons and analysis of voltage asymmetry
- Effects of asymmetry
- Permissible limits of asymmetry
- Dealing with asymmetrical loads

HARMONICS IN POWER SYSTEMS

- Principles of harmonic analysis
- Problems due to harmonics
- Limits of harmonic presence
- Analysis of harmonic components
- Control of harmonics

ELECTRICAL NOISE AND MITIGATION

- How are sensitive circuits affected by noise?
- Time and frequency domain representation of noise
- Categories and sources of noise
- Importance of grounding in noise control
- Zero signal reference grid and signal transport ground plane

SYSTEM INSTALLATION GUIDES

- Commercial power, power interruptions and issues of location
- Evaluation of power conditioning options
- Noise suppression sensitive loads by proper grounding
- Checking for redundancy requirement
- Signal/data cabling susceptibility
- Radio Frequency Interference (RFI) protection
- Static electricity related problems
- Surge and lightning protection
- Documentation
- Planned maintenance

CONDUCTING SITE ANALYSIS AND SURVEY

- Overview of sources of power quality problems
- Site survey procedures
- Solutions generated

SUMMARY, OPEN FORUM AND CLOSING