
SAFE OPERATION & MAINTENANCE OF CIRCUIT BREAKERS AND SWITCHGEAR



WHO SHOULD ATTEND:

Managers, Engineers and Technicians who work with switchgear and circuit breakers and who need to update their skills and knowledge in this critical area of electrical power systems protection



THE WORKSHOP

Switchgear (and circuit breakers) are obviously critical components in electrical distribution systems and their operation significantly affects the overall operation of the system. The two day workshop will discuss application, installation, maintenance and testing issues relating to medium and high voltage switchgear and circuit breakers. There will also be a coverage of low voltage switchgear. You will receive a thorough grounding in switchgear theory and standards. You will gain a solid understanding of the issues associated with the proper application, installation and maintenance of these critical items of equipment with an overriding emphasis on safety.

This comprehensive and practical two day workshop emphasises medium voltage switchgear which represents most of the switchgear installed on electrical distribution systems. The focus here is on air blast, oil, SF6 and vacuum circuit breakers. Case studies covering the main manufacturer's equipment will illustrate the important practical principles. Other power system protection components will be discussed as well to ensure that switchgear is understood in the correct context.

WORKSHOP OBJECTIVES

Delegates will learn about the following:

- Selection of appropriate type and rating of circuit breakers and switchgear
- Fundamentals of operation of switchgear
- Switchgear components (CTs, VTs, relays, cable terminations)
- Safe operational policies including safety rules and safety documents
- Diagnostic tools and test equipment
- Safe maintenance policies including safe working in switch rooms, indoor and outdoor substations

ON-SITE TRAINING

— contact us for a proposal today

IDC Technologies unique on-site training delivery service can save your company up to 50%, or more, off the total per-head costs associated with delegates attending a public workshop. One of our qualified and experienced Instructors can discuss the content with you, then come to your venue and present a workshop designed to your own specifications!

Why not call or e-mail and ask about having components from a number of courses combined together? It's affordable, effective, convenient and much easier than you may have thought.

"Technology Training that Works" we mean it! Try us soon and see the difference. For more information, or a customized proposal to run any of our practical workshops at your own venue, contact your nearest business development manager for manager (see page 32).

THE PROGRAM

DAY ONE

SWITCHGEAR - ORIGINS & TYPES

- Single line diagrams
- Active and passive network components
- Circuit breaker utilisation
- Alternative forms of MV switchgear - ring main units, load breaking/fault making switches,
- Fuse switches
- HV fuses in combination with, and as alternative to circuit breakers
- Auto-reclosers and auto-reclose operation

APPLICATION OF SWITCHGEAR

- Principles of current interruption
- Plain break circuit breakers
- Bulk and small oil volume circuit breakers
- Turbulator (explosion pot)
- Operating mechanisms
- Transfer earth circuit breakers
- Air break and air blast switchgear
- SF6 and Vacuum
- Switchgear in association with disconnectors
- Fixed and withdrawable designs
- Switchgear standards
- Factors affecting switchgear selection

SPECIFICATION OF SWITCHGEAR

- Switchgear rating - highest system and impulse withstand voltages, load and short circuit currents
- Simple and complex protection systems
- Switchgear ancillaries, measurement CTs, VTs, relays
- Cable terminations
- Indoor and outdoor operation
- Substation and switch room layouts and design

SHORT CIRCUIT TESTING

- Symmetrical and asymmetrical breaking
- Make and break operations
- Understanding test oscillograms

CASE STUDY - SPECIFICATION FOR A 132 KV SWITCHBOARD

DAY TWO

SAFETY POLICIES

- General safety precautions and the use of personal protective equipment
- Principles of safety rules
- Principles of personnel authorisation
- Operative training for safe operation of switchgear
- Isolation in a circuit breaker context
- Safety documentation
- Operational and safety locking, caution and danger notices
- Safe working in a substation environment
- Safety interlocks
- Substation alarms
- Individual study task and presentation - safety policies in my company and how they might be improved

OPERATION OF MODERN SWITCHGEAR

- Case Studies:
 - Sprecher & Schuh
 - Schneider
 - ABB
 - Siemens

ASSET MANAGEMENT IN A SWITCHGEAR CONTEXT

- Principles of time and condition based asset management
- Asset registers
- Asset management systems

DIAGNOSTICS, TESTING & MAINTENANCE

- Switchgear inspection methodologies
- Partial discharge measurement and survey
- Timing tests
- Thermovision
- Mechanisms of deterioration
- Principles of circuit breaker maintenance
- Maintaining oil circuit breakers
- Contact maintenance and contact wipe
- Oil testing
- Maintaining vacuum circuit breakers
- Maintaining SF6 circuit breakers
- SOPs and DINs
- Switchgear defects and defect control systems

SUMMARY