Study Committee B3

2009 ACTIVITY REPORT FOR STUDY COMMITTEE B3 (SUBSTATIONS)

Highlights

The highlight was the 46th SC B3 Annual Meeting in Cape Town /South Africa on August 17-21, 2009. The meeting has been organised together with the annual meetings of SC A2 and SC A3 in combination with the 6th South Africa Regional CIGRE Conference and Colloquium under the headline "Addressing the challenges for reliable, efficient and sustainable supply of electricity – now and in the future". The conference was completed by tutorials given by SC A2, A3 and B3. The whole event was a great success attracting more than 450 participants mainly from the region but also from many other countries in the world. The South African CIGRE members did a great job organizing this event and offering an excellent opportunity to share experience and expertise.

The B3 Tutorial topics where:

- EHV tubular busbar design
- Conversion of existing double busbar breaker to breaker-and-a-half.

New working Bodies

TORs for following new working bodies have been approved by Technical Committee

- WG B3.23 Guidelines for uprating and upgrading of substations (January)
- WG B3.26 Guidelines for the design and construction of AC offshore substations for wind farms (February)
- WG B3.25 SF_6 analysis for AIS, GIS and MTS condition assessment (July)

These Working Groups has started there activity.

TOR for a Joint B1/B3 Working Group has been proposed JWG B1/B3.33 Common dry type interfaces for GIS connections above 52 kV (dry type/ Plug in Male and Female options) for Extruded AC cables. This WG is on approval process on behalf of SC B1.

Status of SC reference model implementation

SC B3 comprises three Advisory Groups: a Strategic Advisory Group, a Customer Advisory Group and a Tutorial Advisory Group to support the Chairman, make recommendations and motivate decisions.

The organisation scheme is based on four Advisory Areas animated by an Area Advisor:

- Substation Concepts and Developments,
- Gas Insulated Substations,
- Air Insulated Substations,
- Substation Management.

The Area Advisors assist the Chairman:

- to coordinate the present activities of the working groups within their Advisory Area,
- to propose future technical activities of the SC.

The Area Advisors are members of the Strategic Advisory Group.

All the SC B3 working groups have Terms of Reference fulfilling the requirements of the study committee reference model.

Update of SC B3 2005-2014 Strategic Plan
The 2005-2014 Strategic Plan has been revised by Strategic Advisory Group. After intensive discussions the Strategic Plan could be shortened and the main Technical Directions could be reduced and the organisation simplified. This document is on approval process.

Main technical directions currently being pursued by the SC
The main technical directions pursued by the SC in 2009 were:

T1. *New substation concepts:* Development of new concepts including novel bus arrangements, mixed technology solutions, applications and functions including specification of corresponding design/layout criteria for substations constituting integral parts of totally optimised networks

T2. *Environmental issues:* Identification of development and trends regarding physical, institutional and business environment, assessment of effects on substation requirements. Guidelines for minimising environmental impact during equipment life, LCA-concepts, recycling, developing risk assessment techniques and environmental management plans.

T3. *Maintenance:* Monitoring in-service experience including digital and sophisticated measuring equipment and GIS, condition assessment, aspects of maintenance outsourcing, actual short- and long-term needs, opportunities for cost reduction, spare parts.

T4. *Life cycle management:* Increased utilisation (life extension, upgrading, dynamic loading), renovation concepts, investment strategies, principles for combining existing and new equipment, taking into account specific demands from network-reliability and customer demand side points of view.

T5. *Substation management issues:* Organisational aspects including human resource and training needs, in-service support, software management including quality control and maintenance. Asset management including financial and technical aspects.

T6. *Strategies:* Analysis of trends and development of strategies for the target groups covering socio-environmental and business aspects, strategic long term research.

T7. *Evolution of secundary electrical equipment in power stations.*

T8. *Guides for users* covering specification, installation, commissioning, operation, maintenance, life-cycle calculations, management of substations with their subsystems.

This technical directions will evolve in compliance to updated 2005-2014 Strategic Plan.

SC B3 working groups and task forces – Progress of work

AA1. Concepts and Developments

WG B3.01 "Substation concepts"
WG B3.01-TF03: Compacting substation through the insulation reduction.
TF03 is finalizing its work TF03 with following prepared deliverables

- Tutorial in Tokyo Sept. 2005
- Electra paper + brochure to be issued beginning 2010.

WG B3.01-TF04: The impact of new functionalities on substation design.

- Brochure n°380 published June 2009

12 areas are covered in the brochure:

- Mixed technology solutions (Hybrid AIS/GIS)
- Compact AIS switchgear
- Non conventional instrument transformers
- Reactive compensation
- Windfarms
- Active Power Flow control
- Custom Power technology
- Fault current limiters
- HVDC
- Protection
- GIL/superconductors
- Monitoring & diagnostics

The activity of WG B3.01 is now considered finished. The WG is now disbanded

WG B3.11 "Combining innovation with standardisation"

The Brochure n°389 has been issued August 2009.

The activity of the WG is finished. The WG is now disbanded.

WG B3.12 "Obtaining value from substation condition monitoring"

The WG has produced an ELECTRA article that has been proposed for publication in October 2009.

In parallel the Technical Brochure has been 80% completed and should be issued end of 2010.

The web-tool developed by the WG for its own purposes is in operation and has proved to be an excellent tool.

WG B3.13 "Reducing replacement time of HV equipment"

The work of CIGRE B3.13 has been structured in a two-side analysis between current practices and trends to reduce replacement time for equipment:

- Engineering concepts
- Equipment concepts
- Working methods.

The group has prepared an Electra report and is finalizing the first draft of the relevant Technical Brochure (December 2009)

JWG B3/C1/C2.14 "Circuit configuration optimisation"

The group has tried without success since its beginning to get members from C2 and C1.

However the work is in progress. Deliverables, an ELECTRA Article and a Technical Brochure, are scheduled end of 2010:

The group aims to develop a guideline to support the process of circuit optimization and also to provide a tutorial in existing arrangements taking into account:

- Security, Availability, Accessibility, Maintainability

- Different technologies AIS, GIS, MTS

WG B3.26 "Guidelines for the design and construction of AC offshore substations for wind farms"
The work is in Progress. Deliverables, an ELECTRA Article and a Technical Brochure, are scheduled respectively mid and end of 2010:

AA2. Gas Insulated Substations

WG B3.17 "Residual life concepts applied to HV GIS"
The WG is finalizing the 13 rd draft of its Technical Brochure "Residual Life Concepts Applied to HV GIS". The document should be issued end of 2010, following an ELECTRA report.

In parallel WG B3.17 issued the Technical Brochure "GIS the state of the art in 2008". No of brochure: 318 and an ELECTRA summary in June 2009.

WG B3.18 "SF_6 tightness guide"
The Final Draft of the "SF6 Tightness Guide" is scheduled for the end of the year 2009. It should be issued as a Technical Brochure in spring 2010 together with an ELECTRA report.

A presentation has been given during A2/A3/B3 Regional Conference in Cape Town.

WG B3.20 "Mixed technologies switchgear MTS"
The WG issued the Brochure "Evaluation of different switchgear technologies (AIS, MTS, GIS) for rated voltages of 52 kV and above", Brochure N°390

The WG has then close its activity and has been disbanded.

WG B3.22 "Technical requirements for substations exceeding 800kV"
The CIGRE brochure no 362 "Technical Requirements for Substation Equipment Exceeding 800kV" has been published in December 2009 following an ELECTRA report.

A very important work has been done. It has been possible by a good coordination with WG A3.22**.**

WG B3.22 has finished its activities and has been disbanded.

WG B3.25 "SF_6 analysis for AIS/GIS and MTS condition assessment"
The kick-off meeting took place in July 2009 in Dublin/Ireland.

AA3. Air Insulated Substations

WG B3.21 "Turnkey substations"
The work is in good progress on the following scope:

- Development of Guidelines for turnkey AIS, MTS and GIS substation projects involving construction, of new substations, refurbishment and/or replacement of existing ones, focusing on increased availability and optimum LCC and project schedule,
- Contractor qualification/certification requirements,

- Review of experience with turnkey projects for substations, documenting do's and don'ts in case studies.

Full-size Electra paper and a Technical Brochure will be published on August 2010.

WG B3.23 "Guidelines for uprating and upgrading of substations"
The kick-off meeting held on april 2009. The WG proposed definitions of uprating and upgrading. A questionnaire on practical projects has been distributed to all SC B3 members as well as WG members.
The final publications (Electra and Technical Brochure) are expected in 2012

AA4. Substation Management
WG B3.06 "Substation management"

TF04 (Replacement Philosophy for Substation Equipment) has revised the draft brochure for a second time to improve its quality under the title 'Integrated Process for Substation Equipment'. The main text has been almost finalized, while the number of annexes increased to 11 examples from utilities' practices. The Technical Brochure is scheduled to be issued in 2010.

TF05 (Practical Application of asset management information strategies) finalized their analysis of the questionnaire about data and asset management tools (intelligence gap). An Electra paper has been drafted entitled ' IT strategies for asset management-Survey results'. It is aimed to be issued in Spring 2010.
The results will then be integrated in the former TF03 concept-brochure 'General principles for asset management information strategy'. A full report will be processed to be issued in ELECTRA before the 2010 Session.
The technical Brohure is expected to be released end of 2010.

The earlier disbanded TF01 produced an unfinished paper on maintenance organisation and outsourcing. The work dates back to 2005 and is being updated. A Technical Brochure should be issued under the title "Aspects for outsourcing of utility services"..

AA5. Secondary Systems

WG B3.10 "Primary/Secondary system interface modelling for total asset performance"
The working group focusses on interfaces with primary equipments and considers the proper balance between factory and field testing.
The working group takes into account in his activity the process bus as defined in IEC 61850.
The following primary equipments are being considered:

- Switchgear & Instrument transformers (A3)
- Transformers (A2)
- Static VAR & series compensators
- Mechanical switched capacitors with damping network
- GIS/GIL related interface signals
- Power cable systems
- Essential auxiliary equipment .

The Technical Brochure is on last editorial steps. It should be issued mid 2010.

The Working Group will be then disbanded together with AA5. Later other studies, if any, on this topic will be taken on within AA4.

SC website
To exchange or provide information the CIGRE webpage is one of the main tools. Many documents are put on the SC webpage to enable the members to have access to all relevant information. This web page has been continuously updated. Many Working Groups use protected web page areas too for the exchange of information and as data bank for their work. However further improvements are necessary to use this webpage as an active working tool.

Study Committee Meetings
The 46th meeting held on August 21st 2009 in Cape Town, South Africa.
The 47th meeting of the Study Committee is scheduled on August 26th, 2008 in Paris.

Regional Meetings and Symposia
As mentioned earlier a colloquium and a tutorial held in Cape Town, South Africa, together with the SC B3 annual meeting.

Relations with other organisations
The secretary of IEC SC17C “High Voltage Switchgear and Control Gear Assemblies”, being a member of SC B3 Strategic Advisory Group, provides a strong relationship between those two counterpart groups of CIGRE and IEC.

There is a close link to IEEE in the field of substation standards since the American National Member of SC B3 and also one of the SC B3 SAG members have got key positions concerning IEEE standards.

There is no official liaison with CIRED today, but it is intended to strengthen the link with CIRED at each level of the SC. All SC members have been asked to establish liaisons with CIRED people into their own country.

Claude Counan
Franz Besold

31-03-2010.

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