CIGRE Study Committee B3

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP[1]

WG N° B3.56	**Name of Convenor:** Philip König (South Africa)
Strategic Directions #[2]: 1,4	**Technical Issues #[3]:** 8
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 4,5,6	
Title of the Group: Application of 3D Technologies in Substation Engineering Works	

Scope, deliverables and proposed time schedule of the Group:

Background:

3D technologies integrated with Information Technology (IT) have been drastically improved and now support several stages of Substation Engineering Works such as insulation design, mechanical engineering for EHV/UHV and distribution equipment, surveying of existing equipment in the field, and visualized 3D installation and operational procedures etc.

Use of these technologies has also improved the quality and safety of construction work by integrating engineering, manufacturing and site work procedures.

This WG will investigate and introduce examples of current 3D applications at several stages of substation engineering works with future expected works so that it can standardize and establish common-working platforms between equipment suppliers, contractor and end-users.

Scope:

A questionnaire will be issued to investigate the practices and experiences of utilities regarding the application of 3D technologies in substation engineering works.

The results will be evaluated and experiences will be shared, especially, but not limited to:

1) Substation planning & equipment development stages such as overall project design and the application of different analysis tools (for example stress analysis, mechanism analysis, hot gas flow analysis, thermal dynamics and field analysis and finite element methods etc.).
2) Detailed design stages (use of 3D CAD)
3) Manufacturing and inspection stages (3D Assembly Manual & Quality Control)
4) Construction & installation, test & commissioning stages (3D scanner measuring, 3D construction & installation manuals, remote monitoring systems etc.).
5) Operations & maintenance stages (3D maintenance manual, operational training etc.).

Each survey respondent experience will be analysed, shared and summarized as a guideline for the application of 3D technologies. The purpose of the guideline is to assist in standardizing and establishing common platforms for the application of 3D technologies for substation engineering works from planning through operation and maintenance of the substation.

Deliverables:

☒ Technical Brochure and Executive summary in Electra : December 2021

☒ Electra report: October 2021

☒ Tutorial[5]: Early 2021

Time Schedule: start: October 2018 **Final Report**: 2021

Approval by Technical Council Chairman:

Date: 21/08/2018

Notes: [1] or Joint Working Group (JWG), [2] See attached Table 2, [3]See attached Table 1,
[4] Delete as appropriate, [5] Presentation of the work done by the WG, [6] See attached table 3

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (ref. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit