CIGRE Study Committee B2

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

WG N° B2.67	**Name of Convenor:** Nathan Spencer (Australia) **E-mail address:** nathan@uriengineering.com
Strategic Directions #[2]: 2, 3, & 4	**Technical Issues #[3]:** 8, 9, & 10
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 1, 5, & 6	
Title of the Group: Assessment and Testing of Wood and Alternative Material Type Poles	

Scope, deliverables and proposed time schedule of the Group:

Background:

Up to 1997, wooden poles in Europe and the UK in particular, could last up to 90 years with regular (5-10 year interval) inspection from 30 year life onwards. However, in the past 20 years the following issues have been found to exist with wood poles:

1. Poles are conductive with linesman frequently getting electric shocks. The type of treatment can also have a bearing on the extent of pole conductivity which may cause potential fatal electric shock
2. Poles are weakened through degradation and cannot be guaranteed to function correctly in a line according to their loading requirements, or where the loading is revised, to the present design standards.
3. Pole quality is deteriorating with some poles even exhibiting rot at time of delivery, as the existing treatment types, e.g. creosote, do not necessarily penetrate the pole sapwood during treatment. Other pole treatment types do not necessarily provide for more than about 10-15 years of service.
4. Poles may prove dangerous to climb. Poles have failed with linesmen on the pole resulting in injury and now many linesmen are refusing to climb poles. With pole top rot, the safety requirement of a fall-arrest system cannot be used in such cases to effectively protect linesman. In most of Northern Europe, access by hiab or bucket truck is not possible for 80% of poles and so pole climbing is still required.
5. Strong objection to the use of preservatives, including creosote, to protect wood poles for infestation and rot. Regulations in Europe indicate that approved use of creosote will stop in 2018. The alternative of altering the chemical composition of creosote makes it less effective as it does not sufficiently penetrate into the pole, and is ineffective on Douglas Fir.
6. External brackets and fittings have been used to “strengthen” degraded poles, but the performance of such methods is not widely understood.

Internationally there are a significant number of “unassisted” pole failures per annum that need to be considered.

The full extent of pole failures is not known for probably commercial reasons, but even if only available in generic terms, this information would be very valuable to analyse. An associated issue is the definition of an “unassisted” pole failure. This needs to be expanded to ensure that failures from extreme climatic events are not included, or are at least qualified to allow filtering. What is needed is a consistent and unambiguous framework for the capturing of pole defects and failures.

The type of foundation, direct embedded in natural soil or with some strengthening, as well as whether the pole is guyed, will also have an influence on the lifetime and potential failure mechanisms of a pole.

It is also noted that in some situations, that a pole’s loading has increased during its service life due to the addition of transformers, telecom cables, antennas etc., that can impact the remaining lifetime of a pole.

With reference to the types of inspection and assessment, the available options vary between utility and country, with some methods based on historical approaches that may not utilise new technologies that are now available.

Some methods are totally non-invasive providing preliminary but “quick” results, while other methods are invasive to various extents that may negatively affect the pole capacity, especially with compound testing.

Scope:

1. To determine the present status of wood pole experience and extent of failures in utilities worldwide. This is to identify whether the points mentioned in the background are common to all utilities or are only regional issues, and to supplement the list of potential issues with other predominant issues that utilities have to deal with. This shall also reference the type of failure and whether related to the pole and/or foundation, guying, as well any loading changes over the service life of the pole.
2. To identify different types of timbers that are being used as powerline wood pole and to determine if there is any relation between timber types and the pole operational failure (pole top fire) or maintenance failure (electrocution/ crossarm damage).
3. To identify and qualify the range of available methods for testing and inspecting wood poles at time of delivery and subsequently in the field, especially with regard to pole top rot, to help utilities to ensure their reliable performance and maintenance personnel safety. Limitations, if any, of a suitable test method due to the foundation type or pole configuration shall also be noted. There may be sufficient information to allow some limited risk assessment guidelines to be developed.
4. To identify and discuss the various methods used to strengthen or reinforce degraded poles, including their impact on the foundation arrangement.
5. To provide guidance on alternate preservatives/treatments and compare their potential environmental impacts.
6. To provide guidance on the type of alternate pole materials, e.g. steel, concrete, composite, that are available and the available experience of their use. This will include describing relevant testing procedures for consideration for these pole types, for their purchase and maintenance. This WG excludes any coverage of Fibre Reinforced Polymer (FRP) Composite poles which are specifically covered under WGB2.61. However, coordination with the activities of WGB2.61 is encouraged to cross reference the findings, and to ensure there is no overlap in scope.

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial[5]

Time Schedule: start: May 2017 **Final Report:** August 2020

Approval by Technical Committee Chairman: M. Waldron

Date: 24/04/2017

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

Update:
Nov 28, 2018: Change Convener

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