Newsletter

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Conductor Condition Monitoring

ENA members have almost 800,000 circuit kilometres of overhead conductor in service, valued at several billion dollars. These critical assets are ageing with some already reaching 70 years. Current conductor condition monitoring practices are mainly visual inspections and conductor replacement is usually driven by the frequency of conductor failures. Reliable and cost effective methods to assess the likelihood of a conductor failure have not yet been developed.

This project investigates how to effectively monitor and assess the condition of overhead conductor for an improved asset management of conductors in Australian distribution networks. The objectives are:

- Review of conductor failure modes, degradation mechanisms, and parameters, which are primarily responsible in influencing conductor degradation; and current Australian industry practices to test, operate, inspect, and asset manage overhead distribution conductors.
- Define the criteria for quantifying conductor condition and its end-of-life, and subsequently determine the probability of conductor failure and estimate its remaining useful life.
- Identify the core areas of research and development for improving condition assessment of conductors in Australian DNSPs' networks.
- Survey state-of-the-art conductor condition monitoring techniques (e.g. smart sensor and other advanced overseas tested and validated techniques) that could be used to monitor distribution conductor condition without having to de-energise the distribution network. Assess the practicality and economics of applying these techniques and evaluate their suitability for Australia.

During the period of Milestone 1 (from June 20th to December 20th 2018), the project team reviewed conductor population in Australian Distribution Network Service Providers (DNSPs) circuits including the types, failure modes and geographical locales of conductors. The project team also performed a comprehensive study to understand the conductor degradation mechanism and parameters that affect each type of degradation mechanism. Then, the project team identified the core areas of research and development for an improved condition assessment of conductors in Australian DNSPs' circuits. The Milestone 1 report was submitted to ENA on December 20, 2018.

Since the completion of Milestone 1, the project team has conducted a feasibility study on the application of health index methods to improve the condition assessment of bare overhead conductors in Australian distribution networks. The project team did a comprehensive review on two representative health index methods. Moreover, the project team developed a model, which was based on the dataset of conductor failure due to corrosion. The model can estimate the critical age, at which ACSR conductors in

different geographical zones can fail due to corrosion. Furthermore, the project team completed a prototype of a software tool to estimate the remaining life of overhead conductors. The tool used a set of indices to determine the conductors' age de-rating factors, which includes conductor operating conditions, geographical locations, frequencies of fault occurrence, the number of mid span joints and the repair history.

The major challenge of the project is the data quality and availability issue. Obtaining the accurate and detailed information on conductor failure data is challenging.

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