Prognostic Indication of Power Cable Degradation

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Abstract - The reliability and the health performance of network assets are of a great interest due to power network operators. This project investigates methods of developing a prognostic capability for evaluating the health and long term performance of ageing distribution cable circuits. From the instant of installation and operation, the insulating materials of a cable will begin to age as a result of a combination of mechanical, thermal and electrical factors. Development of simulation models can significantly improve the accuracy of prognostics, allowing the targeting of maintenance and reduction of in service failures [1]. Real-time measurements taken close to underground cables can update the simulation models giving a more accurate prognostic model.

Currently the project investigates a thermal prognostic simulation model which will predict the likely temperature impact on a cable at burial depth according to weather conditions and known loading. Anomalies of temperature measurements along the cable compared to predicted temperatures will indicate a possible degradation activity in a cable. An experimental surface trough has been set up where operation of power cables is simulated with a control system which is able to model any cable loading. The surface temperature of the cable is continuously monitored as well as the weather conditions such as solar radiation, soil moisture content, wind speed, humidity, rainfall and air-temperature.

Figure 1: Cable duct test bed for prognostic indicator assessment

[1] S Christou, J Steele-Davies, , P L Lewin and S G Swingler, ,” Condition monitoring and prognostic indicators for network reliability” *HubNet Smart Grids Symposium, Bristol, GB, 11 - 12 Sep 2012.* 1pp.