T & D Network Operator goes DTS + RTTR!

Australia

A leading Australian network operator wanted to gain more monitoring insight into his distribution network: to monitor the medium-voltage power cable's condition, identify hotspots and bottlenecks, and to minimize risks and costs for maintenance and in emergency situations. Overall, with a noticeable improvement in the network's efficiency, to get the most out of their assets and to take advantage of the related operational cost savings.

The result? Following installation and commissioning the operator was pleased that the new solution exceeded his expectations. In particular, the combination of spatial and temperature accuracy, mapped along the route of his installation, provided a new level of insight into his network's status.

The installation

The operator has **4 power cables (33kV)**, with a power circuit length of 20 km. The entire installation is underground. With an eye toward future growth, the operator decided on a 6-channel model of AP Sensing's *Linear Power Series*, keeping 2 channels in reserve.

Sensor cables being prepared in the substation

Key solution components: With AP Sensing's *Linear Power Series* the operator found a solution that exceeded all of his requirements:

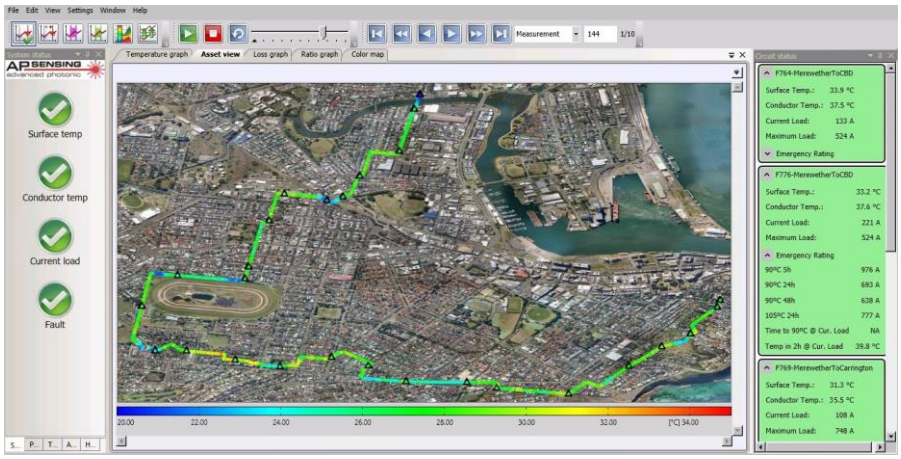
- **Real-time thermal rating (RTTR).** The DTS continuously measures the real-time temperature at the sheath or jacket of the cable. This data, combined with the cable's load, is continuously fed into an RTTR (or DCR, dynamic cable rating) engine and individually modeled per thermal section (in this case, with 11 different laying conditions). This provides both steady-state and transient thermal analysis:

- **Conductor temperature** is estimated via the measured fiber temperature, together with the current. Continuous temperature monitoring lets operators compare the current load with the maximum permissible load (ampacity). Comparing the original ampacity calculation made during the planning stage to the RTTR results, the operator is able to adjust his steady state load table by +14%. Additionally it shows him that the load could be increased by 32% if a temperature of 90° C is tolerated for 24 hours. During peak loads or emergencies, if a temperature of 105° C for 24 hours is tolerated, a 48% capacity increase can be realized.

- **When overloads need to be applied,** RTTR can predict the cable temperature at the end of the emergency period. Alternatively, it can give the maximum time the cable can be overloaded before exceeding its recommended maximum. This information is valuable for planning maintenance cases and to better control peak / emergency situations.

- **Intelligent software.** AP Sensing's **SmartVision** software suite provides **data acquisition and analysis, data management and asset visualization.** The customer can view and store the analyses, statistics, history trace generation, colored 2D temperature mapping, and much more. It is easily integrated into the operator's existing client network

- **Interface to the SCADA and load dispatch center** via DNP3. This is easily integrated into the existing network topology, with no disruptions to current protocols.



AP Sensing's SmartVision software: Alarm signaling, asset visualization, RTTR results

Gain insight along the entire installation by mapping GPS data together with the SmartVision asset viewer software. As shown above, even slight temperature changes can easily be seen when, for example, the sensor cable runs below a warm asphalt street (1) or it runs below a row of trees (2).

Conclusion

AP Sensing's DTS solution, the *Linear Power Series*, enabled the customer to increase utilization by 32%, and in peak load or emergency situations by 48%, without risk to his valuable network assets.

Fiber patch panels

AP Sensing's Linear Power Series