



Wirescan Digital and LIRA Technology Benefits in User Cases

User Case: Wirescan Digital for subsea cables in operation



Oil & Gas, Offshore Power Cables



Total E&P (Paris, Qatar)

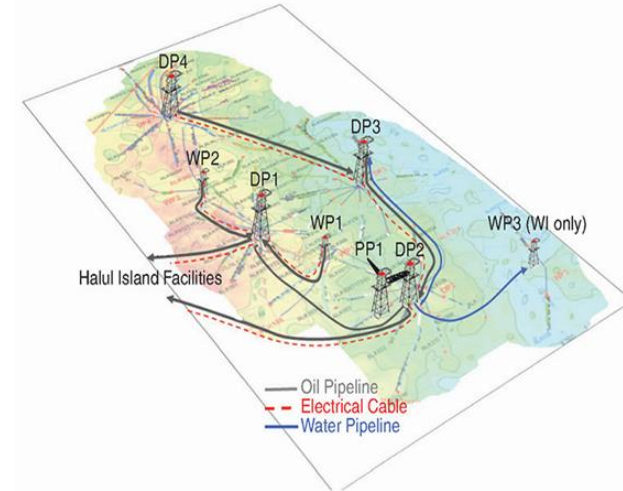


Under implementation



SCOPE

Wirescan Sensor system will be installed at a mature offshore oil field in Qatar, for critical subsea cables of different maturity. Cables will be monitored continuously in operation. All data will be analyzed automatically in Wirescan Digital. Results will be available at any time displayed online in a meta-contextual map visualization



Commercial

- Reduction of OPEX due to knowledge of actual cable health and targeted maintenance
- Elimination of cost, losses related to emergency downtime



BENEFITS



Technical

- Basis for centralized cable data from all sources (DTS, TDR, etc.)
- Increased asset reliability, availability, knowledge-based lifetime extension measures
- Digitalized asset management, integrated in company's platform



HSE

- Reduced time and number of personnel offshore
- Reduced travel and carbon footprint
- Reduction of health risks and availability of remote control

User Case: Wirescan Digital for Grid Connectors



Power Transmission, Offshore Onshore Export & Transmission cables



TenneT Offshore Gmb



In operation



SCOPE

Wirescan Digital (WD) includes the whole TenneT Offshore GmbH portfolio of grid cables linking offshore wind farms in the North Sea to the onshore extra-high voltage grid. WD includes a large historical database. Cables are tested regularly when de-energized; data analysed where analysis is done automatically with comparison, trending and aging evaluation. Results and data are available to multiple stakeholders online in a meta-contextual map visualization



Commercial

- Reduction of OPEX and CAPEX due to knowledge on actual cable health,
- Elimination of cost, losses related to emergency downtime due to early detection
- Reduction of response time & cost in case of cable failures



BENEFITS



Technical

- Basis for centralized cable data from all sources (TDR, etc.)
- Increased asset reliability, availability, targeted maintenance
- Digitalized asset management



HSE

- Reduced time and number of personnel on sites
- Reduced travel and carbon footprint
- Reduction of health risks and availability of remote control at any time

User Case: Wirescan Digital for power cables in operation



Renewables, Onshore Wind Export cables



Total EREN (Paris, Greece)



In operation



SCOPE

Wirescan Digital is established for critical export cables at Total Eren 7-year-old wind farm in Greece. Total Eren experienced unplanned downtime due to frequent cable failures caused by operational conditions. Wirescan Sensors, installed at cable terminations, collect real-time data to the cloud. Cable health analysis results are displayed in metacontextual map visualization on Portfolio/Asset/Cable/Phase level available online to Total Eren HQ and in Greece.



Commercial

- Elimination of unplanned cost/losses caused by cable failure in early life
- Increased production through increased reliability and availability of asset
- Reduction of OPEX due to targeted O&M and reduced personnel onsite



BENEFITS



Technical

- Technical asset reliability
- Digitalized asset management on Corporate/Regional levels



HSE

- Reduction of time and number of personnel on site
- Reduction of health risks and availability of remote control
- Elimination of need to inspect under COVID restrictions



User Case: LIRA Technology for Cable Assessment



Renewables, Offshore Wind Export cable – 7,7km – 220kV XLP



Cable Installation Company (Netherlands)



Fault Location & Damage Assessment



SCOPE

An incident occurred during installation which resulted in an abnormal bend in the cable. Wirescan identified and located an anomaly on one of the phases at the corresponding location of the bend. The anomaly was not detected by TDR



Commercial

- Eliminated unforeseen post installation costs and liabilities
- Estimated saving EUR 600 000



BENEFITS



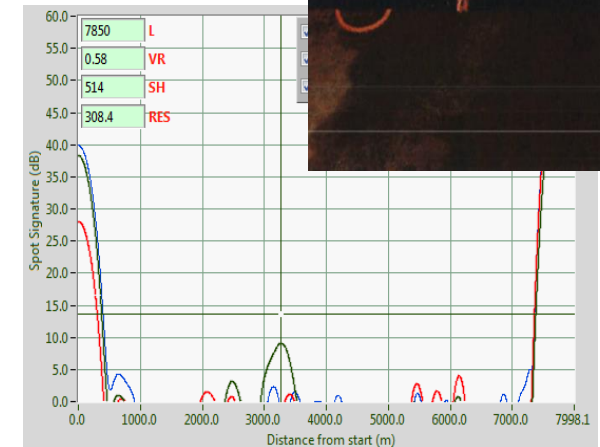
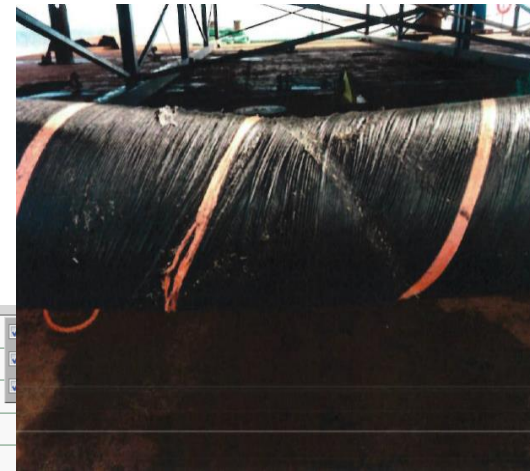
Technical

- Increased quality of installation
- Eliminated operational uncertainties and consequences



HSE

- Reduction of time and number of personnel offshore
- Reduction of health risks and availability of remote control



User Case: LIRA Technology for Cable Assessment and Fault Localization



Power Transmission, Onshore cable 750m 420kV PILCe



TSO (Norway)



Fault detection, localization and assessment of cable integrity.



SCOPE

LIRA measurement identified a cable fault of high severity. Fault location was detected with 0,1% (of cable length) accuracy. 10m of cable was replaced. After inspection, a deformation of the lead sheet was identified as cause for irregularity



Commercial

- Estimated immediate saving EUR 300 000 due to efficient emergency response.
- Elimination of cost due to loss of production due to early detection and preventive measures



BENEFITS



Technical

- Short response time and targeted replacement due to high accuracy and severity detection
- Increased technical reliability



HSE

- Reduction of time and number of personnel on site
- Reduction of health and safety risks

User Case: LIRA Technology for Cable Assessment



Power Transmission, Multiple cables 420kV PILC (paper insulated) from 1981 – 11,2 km



TSO (Norway)

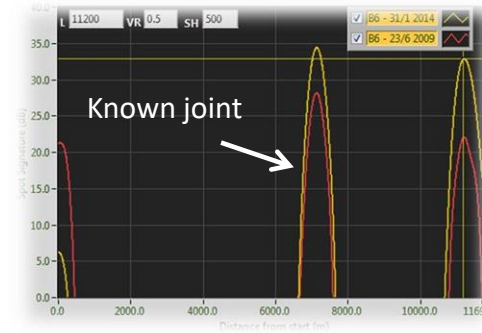
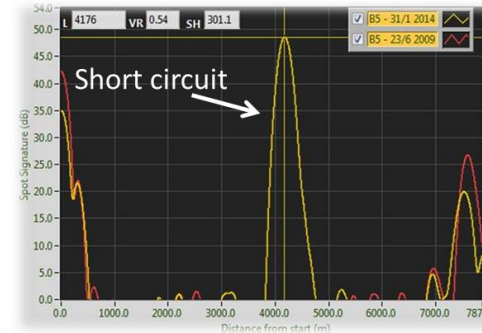


Fault detection, localization and fingerprint measurement



SCOPE

LIRA measurement detected short circuit at 4154 m from measurement point. Accuracy of localization less than 0.3% accuracy. Good fingerprints obtained from the other cables as reference for future monitoring, comparison and assessment of aging ratio.



Commercial

- Elimination of cost due to loss of production due to established regular monitoring and preventive measures



BENEFITS



Technical

- Short response time and targeted repair due to high localization accuracy
- Increased technical reliability, basis for future targeted maintenance based on cable health knowledge



HSE

- Reduction of time and number of personnel on site due to targeted maintenance
- Reduction of health and safety risks

User Case: LIRA Technology for Fault Localization



Power Transmission, Offshore cable



TSO (Sweden)



Fault detection, localization and assessment of cable integrity.



SCOPE

The cable was cut by external influence, exact cable length unknown. Wirescan established the velocity ratio (VR) with a LIRA measurement on the spare cable, and the fault was detected at 3595 m from measurement point. Further inspection showed the fault detection was with 0,01% accuracy



Commercial

- Estimated immediate saving EUR 600 000 due to efficient emergency response.
- Reduction of loss of production due to targeted repair



BENEFITS



Technical

- Short response time and targeted replacement due to high accuracy
- Increased technical reliability and knowledge on overall cable health



HSE

- Reduction of time and number of personnel on site
- Reduction of health and safety risks

User Case: LIRA Technology for Fingerprinting



Power Transmission, HVDC Interconnector – ~262 km – 200 kVDC XLPE



TSO (UK)



Fingerprinting and assessment of cable condition.



SCOPE

Reference measurements (fingerprinting) of critical interconnection DC cables. Long length link with 70 sub surface splices. Full length assessment not possible with TDR or other methods. LIRA Measurements covered whole length, measurements from both sides to increase resolution, coverage and confidence



Commercial

- Reduced uncertainties and risks in post guarantee period



BENEFITS



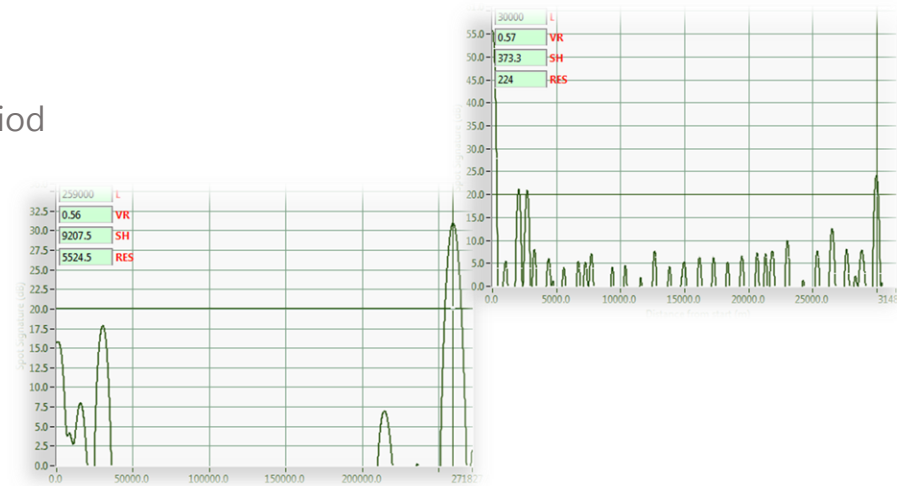
Technical

- Reference for future assessments
- Increased confidence in actual state of cable
- Decision support for further action



HSE

- Reduction of time and number of personnel on site
- Reduction of health and safety risks



User Case: LIRA Technology for Fault Localization



Renewables, Offshore cable 6.8 km – 5 kVAC XLPE



Offshore Wind Operator (Portugal)



Fault detection, localization and assessment of cable integrity.



Fault identification and location based on suspected fault in subsea joints. TDR did not give any identification of fault.. LIRA measured between phases to identify and locate the fault at 135 m in front of a subsea joint.

SCOPE



Commercial

- Estimated saving EUR 600 000.
- Reduction of loss due to targeted repair



BENEFITS



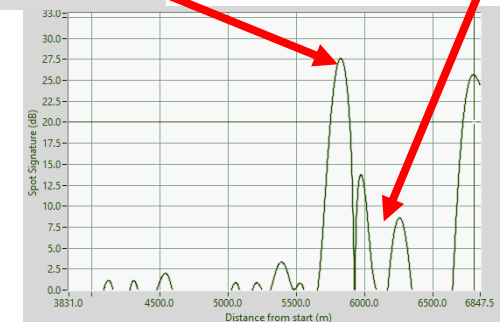
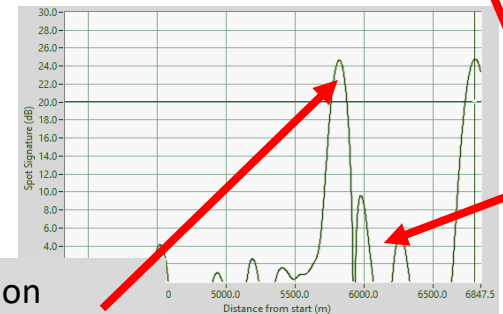
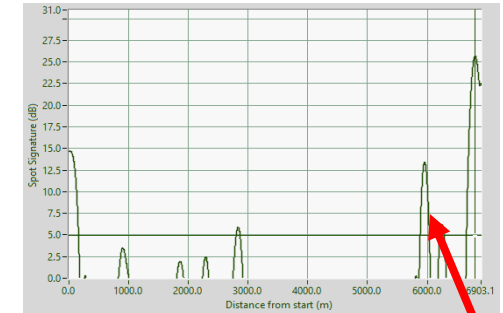
Technical

- Eliminate uncertainty on joint failure
- Accurate location of fault
- Overall knowledge on actual cable condition and points of concern



HSE

- Reduction of time and number of personnel on site
- Reduction of health and safety risks



LIRA fault location
135m before first joint
on blue phase

Joints