Vysus Group

Whitepaper

Assessing submarine power cable installations

Cable route development and the laying, burial and protection of submarine power cables represent complex offshore operational activities undertaken in challenging environments.

During the preparation, installation and operational phases, significant volumes of systems performance data are generated.

Optimally assessing this performance data can help cable developers, cable insurers, installation contractors and operators to assess risk, support maintenance planning and inform future projects.

Overview

Across the globe, submarine cables increasingly power our modern world, transporting electric current across oceans and seas. The number of submarine cable installation projects is rapidly increasing, mirroring the demand from offshore wind farms, electrification of existing facilities and energy trading through international and inter-regional interconnector cables.

Power cables are laid and trenched into the seabed by specialist marine contractors. Considerable engineering expertise is combined with purpose-built vessels mobilised to survey and prepare the seabed and then install the cable using cutting edge lay-and-trench systems optimised for the water depths, subsea environment and seabed soil conditions.

As the sector matures and the number of cables in operation rises, experience gained is focussing industry attention on cable handling, installation performance and protection maintenance together with fault identification and location and cable repair.

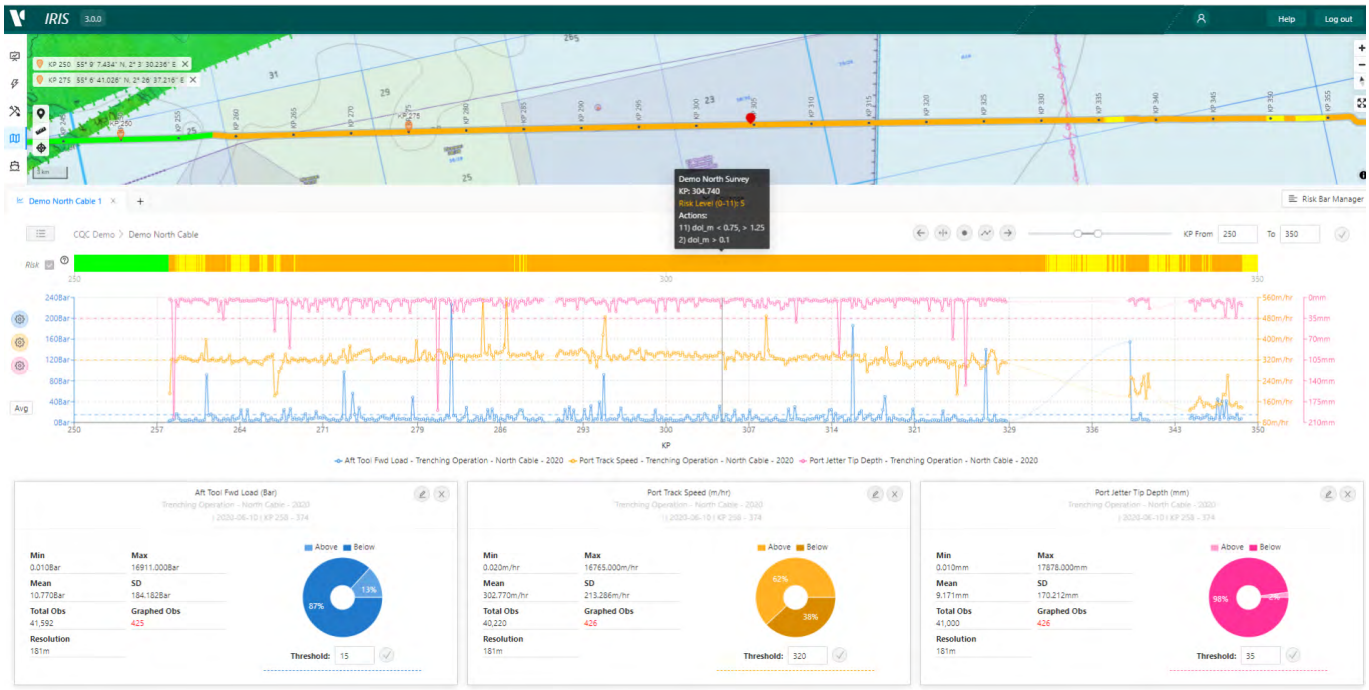
Physical cable fault or damage repairs are typically significantly expensive to undertake, incorporating the repair cost itself, cable transmission downtime and the impact on future insurance premiums.

The quality of the complete cable installation is of fundamental importance when considering operations and maintenance budgets and planning, future investment and operational insurance premiums.

Cable faults and insurance cover

Insurance companies specialising in this sector are increasingly appreciating the magnitude, and frequency, of submarine cable faults and repairs. The cable operational insurance sector is currently described as ‘hardening’, resulting in a less competitive market and increasing premiums. There are some industry concerns of maintaining access to suitable future cover.

An insurance company will determine an insurance premium profile for a newly installed cable. This is operational insurance, differentiated from installation insurance and marine warranty cover. Premiums may be calculated based on the average or maximum number of faults experienced on similar cables. They may not necessarily reflect the experience and capability of the installation contractor, the quality of the installation execution itself or assessed ongoing risks post-installation which may change over time.



IRIS CableQC - Data Integration and Visualisation

An arising cable fault will often manifest itself within the cable operational period, once the construction and commissioning are completed and the installation vessels have long since demobilised from the project.

It can then take significant time for loss adjusters to gather the necessary information and data to assess the validity of the claim and to consider if there is a counter claim on the construction insurance or installation warranty.

Introducing Cable Installation Assurance

There are clear advantages to cable developers, operators and their insurers to have ready access to all types of installation, survey and inspection data and information that is acquired across the life of the cable to date.

This allows for an assurance-based assessment of the status of the as-installed cable, assigning risk at granular intervals along its entire length.

Using quantitative and qualitative inputs from raw and processed installation data, combined with cable engineering and installation data expertise, installation assurance can confirm cables or cable sections that have been proficiently installed to specification and expectation, whilst highlighting sections that might carry higher risk due to installation related issues or post-installation seabed or anthropogenic changes.

This assessment produces a close coupling of risk and insurance premium profiled along the entire length of the cable, benefiting developers and operators who can demonstrate reduced risk of arising faults, related to high quality levels of installation performance.

The risk profile can thereafter be regularly updated as new data and information becomes available. This allows stakeholders to have a detailed and clear understanding of the current risk profile along the cable route, facilitating survey and intervention works and maintaining fit for purpose insurance premium alignment.

Which installation data are available?

A submarine cable installation report typically consists of operational and technical volumes, as-built charts, as-built data listings and supporting geospatial (GIS) data. These deliverables are provided at project completion, reflecting the final as-installed cable position, burial depth and protection status. Accompanying vessel daily reports (DPRs) and field memos describe the offshore activities and any operational issues or incidents that may have occurred.

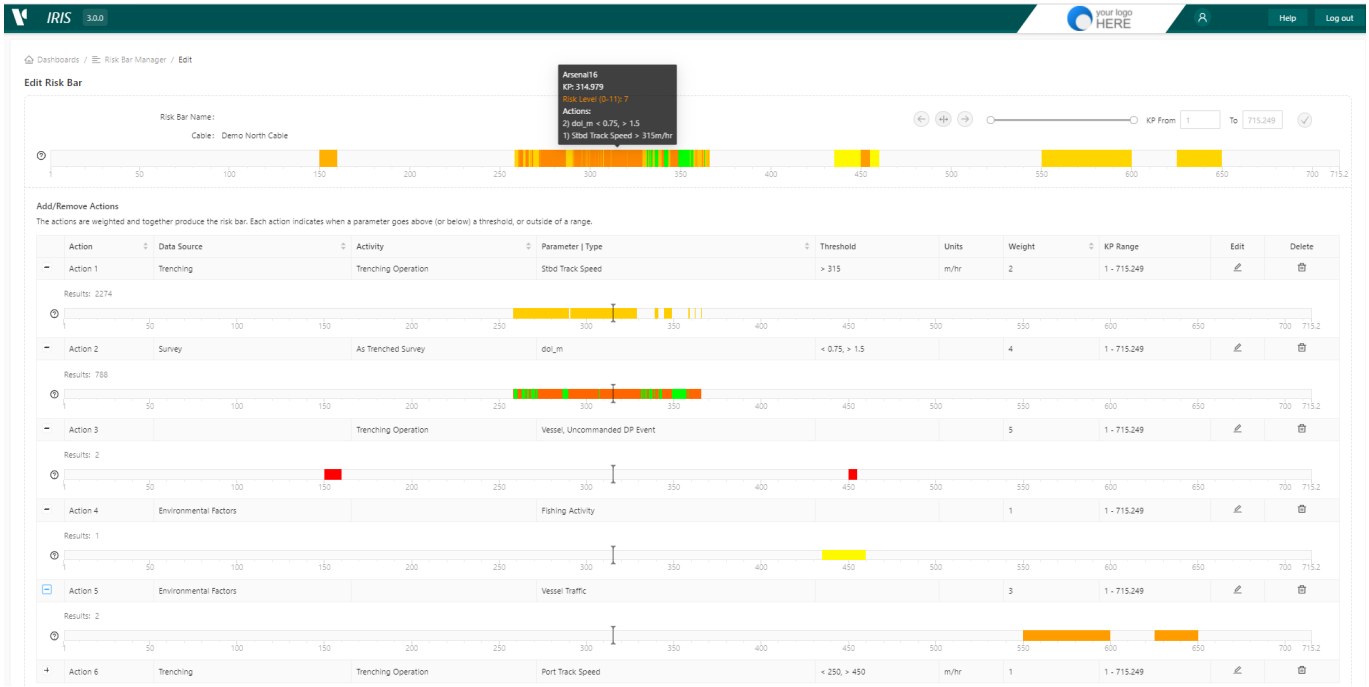
These reports alone may not suffice to allow the cable operator to interpret potential physical impact on a cable section that may have been applied during installation.

Real-time data sources are available from sensors onboard the installation vessels, lay and trench systems which can be used to highlight operational situations or issues that may inform areas of concern. The data may also indicate issues in real or near real-time enabling early identification and mitigations to be put in place.

Cable carousel, lay and trenching systems are computer aided, producing a large range and volume of raw sensor and parameter data that describe second-by-second operational performance.

Data types include loads, tensions, depths, orientations, motions, temperatures, voltages and pressures. Fibreoptic systems, bundled within the cable, also contribute data indicating excessive stress or strain. Heave, pitch and roll sensors provide valuable data describing the vessel motion at the cable departure point.

This data may be specified by the cable developer for inclusion within project deliverables. It may also be streamed in real-time to an independent logging system onboard the vessel and/or ashore via satellite. A real-time software application can then be used to consume the data helping to highlight arising performance situations as the offshore project continues.



IRIS CableQC - Cable Risk Assessment

Assured Independent Risk Assessment

An independent cable installation specialist can then review all raw data alongside as-built survey listings and soils data taken directly from the burial assessment study (BAS). All data is assessed against both time and kilometre point (KP) to represent the operational record of the cable lay and trench and other supporting installation activities. Daily progress reports (DPRs) and field reports provided by the Offshore Client Representatives (OCR) and the Marine Warranty Surveyors (MWS) are combined to further support the assessment.

Using this approach, it is possible to provide consistent independent assessments of as-installed cables, clearly identifying where the integrity of a cable section may be of concern. Cable sections may be stressed or damaged which may result in faults manifesting over time and subsequently requiring repair. Similarly, there may be areas of the route where protection measure data indicates limitations and requires planned monitoring and possible maintenance.

CableQC

Vysus Group has developed software called **CableQC** to manage the data collection, visualisation and risk assessment for submarine cable installation projects.

CableQC is the latest module to be incorporated within the industry leading IRIS project and data management and mapping web application. IRIS has been widely used in the offshore energy sector since 2013, monitoring the progress and status of offshore survey, construction and inspection projects.

CableQC builds upon a foundation of over seven years' IRIS experience of streaming real-time data from offshore vessels and lay and trenching assets. Clients include some of the world's leading cable installation and trenching contractors, developers and operators working on array cables, export cables, interconnectors and umbilical projects.

CableQC defines all key phases, operations and activities of a submarine cable project from initial survey through installation to operations and maintenance. Raw and processed data, results and reports are collected at every stage providing a unique and valuable central datastore for the life of the project. Data is securely held within the cloud, and efficiently accessed and visualised by client-approved users and stakeholders.

All data types with a Kilometre Point (KP) or time reference can be plotted on intuitive graphs interactively linked to a web map presenting any KP location on the individual cable or wider cable network.

A user-defined set of risk criteria are assessed for the cable and risk profiles generated using tests of the raw and processed data, together with more nuanced inputs, allowing both regular reporting and deep dive risk reviews.

As new data becomes available, from subsequent surveys or changes in environment, the risk profile may be re-assessed and updated. Over time, the trends in risk along the length of the cable can be stacked and tracked, assisting with allocating operations and maintenance budgets, early scheduling of works and preparedness for cable failures at higher potential locations.

CableQC may be used under license by cable developers, operators and installers to optimise their knowledge of the live status and performance of their cable installations.

The **CableQC** data provision requirement for this level of insight can be specified within an EPC scope of work, technical specification and contract documents.

Working alongside expert cable engineering partners, Vysus Group uses the software as an integral part of its Submarine Cable Installation Assurance Service.

Informing future installation projects

Cable installation data are typically looked at within the context of a single project; deliverables are delivered, project wash-ups and lessons learnt exercises completed. However, once a project is completed, it can be difficult to reliably recall or reactivate previous data and information to inform and guide future similar projects.

CableQC users will quickly accrue a significant and valuable database of cable installation data on their projects, within a single web portal. This becomes a live repository of readily accessible knowledge and information, minimising the potential for expensive lessons to be learnt more than once.

By incorporating multi-project data within the same database structure and accessed through a single software portal, CableQC provides the possibility to analyse the performance of installation vessels, lay and trenching systems across multiple projects, subsea environments, weather conditions and soils types.

Cable developers, operators (and their insurers) and installation contractors can then gain additional knowledge regarding expected performance of proposed vessels and associated installation assets for the next installation project, asset maintenance activity or cable repair. Quantitative experience and lessons learnt from this platform will help shape a realistic assessment of schedule, cost and expectation for variations.

Why CableQC?

Cable developers

- Establish and grow a valuable database of cable installation performance across your projects;
- Enhance company knowledge and fine tune schedules, budgets and project risk on future projects;
- Achieve close visibility to the progress and status of the installation project;
- Monitor in real-time, identify arising issues early;
- Knowledgably assess contractor variation claims;
- Demonstrate to insurers the quality of the installation and achieve a fit for purpose premium profile.

Cable operators

- Seamlessly inherit the data from the development stage, retaining all of the knowledge gained during the cable installation;
- Regularly assess and update risk following subsequent works;
- Share data with stakeholders and contractors;
- Maintain optimal insurance profiles.

Cable installation contractors

- Establish and grow a valuable database of cable installation performance across your projects;
- Analyses systems and project performance across multiple projects;
- Present capabilities and systems performance;
- Align with cable developer technical requirements;
- Support variation requests;
- Monitor project progress in real-time, identify arising issues early.

Why Vysus Group

Vysus Group Survey & GeoEngineering provides marine geoscience consultancy and project management services across the offshore energy and cable sectors.

Our submarine cable project services include route feasibility and design, survey project management and burial and protection studies. Working with our expert cable engineering and installation partners, we offer Cable Installation Assurance incorporating technical support, project management, offshore client representation and owners engineer functions.

We provide innovative web mapping and data delivery services using IRIS, together with independent quality assessment of cable installations using the **CableQC** module.

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Get in touch

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