



RAMBOLL

Offshore and Nearshore Cable Tracking

Ramboll performs a variety of different marine geophysical services. Within cable tracking Ramboll provides a comprehensive suite of unique and tailored solutions.

Introduction

Over the last decade Ramboll have performed numerous cable tracking investigations, with a special focus on performing power cable burial surveys. Offshore, these surveys are normally carried out using a ROV (Remote Operated Vehicle), mounted with the cable tracking equipment. The ROV can either be flying over or driving on the seabed. For the nearshore investigations, the cable tracking equipment are usually mounted directly onto the survey vessel.

Cable tracking investigations are for example relevant during offshore windfarm construction, where cable installation and maintenance is of key importance. Both export and infield cables require a certain burial depth. Cable burial is performed by trenching or jetting the cable into the seafloor. And the cable tracking is subsequently performed to

confirm that the required burial has been achieved.

Method

The cable tracking is usually a part of a larger geophysical investigation. The investigations can be comprised of multiple marine geophysical techniques that can be used to identify everything from subsurface stratigraphy (sub-bottom profiling), ferrous objects on the seabed (magnetometer), seabed conditions (side-scan sonar) and performing bathymetric surveys (single-beam and multibeam).

Cable tracking is part of a family of electromagnetic (EM) methods, that utilizes conductive coils that interacts with metallic objects that makes it possible to locate buried items such as cable, pipelines and unexploded ordinance (UXO). Most cable tracking systems provides continuously updated measurements of the horizontal

and vertical offsets from a reference point to the cable. The cable tracking system is a very simple system to set up as it does not require any pre-survey calibration. Only a basic function and verification test are performed prior to the surveys. The cable tracking itself can be performed on both an active or passive cable. On an active cable the tracking is performed on the signal the cable generates. On a

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SELECTED CABLE TRACKING REFERENCES

EnergiNet

Kontek cable between Germany and Denmark
Cable Tracking, 2011-2012

NKT

Baltic1 offshore windfarm
Cable tracking, 2013

StattNet SF

SK1-4 HVDC cables at Bulbjerg, Denmark
Cable tracking, 2015

Boskalis

GodeWind HVDC cable
Cable and Pipe tracking, 2014-2015

JD Contractor

Horns Rev3 offshore windfarm
Cable tracking, 2016-2017

EnergiNet

Lillebælt, Denmark
Cable and Pipe tracking, 2013-2014 and 2017

passive cable a tone with a specific frequency is applied to the cable, which is then tracked.

Cable tracking measurements can then be combined with bathymetric data to obtain an estimated depth of burial or identify any exposures and free-spans. It is important to note that the measured cable position is reference to the current bathymetry, which means that any future bathymetric surveys can be applied directly to produce up-to-date results of the burial depths. Updating burial depth at regular intervals is especially relevant in areas where significant movements of sediments occur. This is done to assess the long-term movement and to plan counter-measures.

Data Acquisition

A standard investigation comprises of a cable tracking and multibeam system. And

offshore it may be supplemented with video recordings that can be used to inspect the exposed cable for any risk of damages.

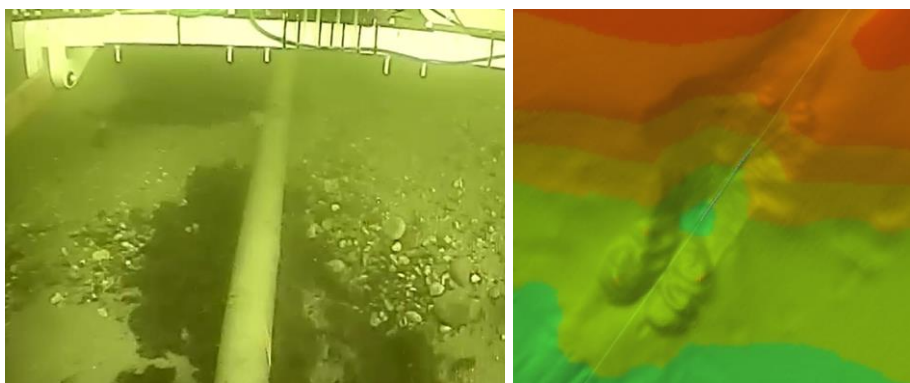
The offshore setup requires a relative large and complex setup using a large survey vessel as platform and a ROV, mounted with cable tracking system. Depending on the setup these surveys can start from about 5-10 meters water depth and out.

The nearshore setup requires only a very simple setup using a small survey vessel. And since the nearshore setup acquires data using a vessel mounted tracking system (and therefore an underwater positioning system is not necessary), the horizontal uncertainty is significantly smaller than for data acquired offshore. These surveys can start almost onshore at about 1m water depth and out to about 7-10m

water depth. The limitation to this setup depends on the range of the tracking system. The nearshore setup is of course also a very cost-effective setup.

Data Processing

Ramboll uses state-of-art software solution for data acquisition and data processing. With the possibility of integrating bathymetric, video and cable tracker data, which provides a detailed and complete data overview throughout the workflow. All of the visualization, processing and analysis is performed in a 3D environment that allows for extensive possibilities. Within the software there are automatic data cleaning and filtering tools letting the software do most of the work quickly and efficiently. This allows for near real-time processing, that translates into a cost-effective workflow.



LEFT

Video recording during a cable tracking survey, where the cable is exposed.

RIGHT

Image of bathymetric data together with the processed cable position.