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SPOTLIGHT ON DENMARK
LEADING THE WAY

NEW WIND TURBINE TECHNOLOGY
LATEST INNOVATIONS

HORNSEA ONE
THE STORY SO FAR

LIFETIME OF OPPORTUNITY
INDUSTRY OPENINGS

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Mascot International

UXO DETECTION DEVELOPMENT: DEVISING SAFE AND EFFECTIVE SOLUTIONS

Unexploded ordnance (UXO) is widely found in both the North Sea and Baltic Sea as a result of past conflicts, particularly the First and Second World Wars

Between 1848 and 1946 approximately 150,000 mines and millions of aerial bombs were dropped into the Baltic Sea alone. There is also a high concentration of mine lines in the Gulf of Finland. The steel casing on these munitions remains largely intact at deeper water depths because the mines were not only constructed to endure high water pressure, but the Baltic Sea's low salinity and oxygen levels also create conditions for slower corrosion.

CLEARING THE WATERS

After WWII, the nations surrounding the Baltic Sea conducted mine-hunting campaigns to clear the waters from the UXO threat and much of it has been removed or destroyed. After the dissolution of the Soviet Union in the 1990s however there was a general arms reduction and mine hunting capacities in the Baltic Sea were significantly reduced. The remaining mines that were considered to be problematic were located mostly near Estonia, Latvia and Lithuania.

But in 2003 the attitude toward UXO shifted. During efforts to salvage a Swedish reconnaissance airplane lost in the central Baltic during the Cold War era, four German mine lines from 1916 were encountered. When the Swedish Navy inspected the mines they were found to be in excellent condition – even after 87 years on the seafloor. With this renewed awareness of the potential threat on the Baltic seafloor, mine-hunting capacity increased once again.

CONTINUED THREAT

UXO continues to pose a threat to any seabed activity in the Baltic Sea, whether it is building windfarms, laying cable or installing pipelines. The biggest construction campaign in the Baltic Sea by far has been the laying of the Nord Stream Pipeline stretching from Russia all the way to Germany at a length of approximately 1,220km. Prior to the laying of the twin pipeline, Nord Stream performed a meticulous UXO survey together with MMT. To safely install the pipelines, security corridors were defined to a width of 15m along the routes, with some extended areas, resulting in over 10,000km of UXO survey work between 2007 and 2010.

At the time, the existing systems for UXO detection were limited in coverage. In order for Nord Stream to safely cover the security corridors, innovative ideas were needed. Together MMT, Nord Stream and Innovatum improved the Smartsearch™ system to consist of a 6.5m wide frame pushed by a Remotely Operated Vehicle (ROV), resulting in the coverage of a 7.5m corridor per survey line. The system at this stage had a typical noise level of ±10 – 15 nT/ft, with local noise between 20 and 25 nT/ft. At a maximum altitude of 1.0 – 1.2m, any anomaly above 30 nT/ft was considered to be potential UXO that could pose a threat to the campaign. During the survey 432 UXO items and 696 UXO-related items were detected. All of the UXO that posed any threat to the installation was successfully cleared and the pipelines were later safely installed.

"MMT surveyed the complete route (except Russian waters) for the Nord Stream pipelines in the Baltic Sea for the first two pipes. The experience gained through this has been used in many projects since," says MMT Founder Ola Oskarsson.

PROGRESS

Almost 10 years later in 2016, the boundaries for state of art UXO surveys were once again pushed forward. Nord Stream 2, a project to build two more pipelines in the Baltic, subcontracted MMT to perform UXO surveys of the pipeline corridor. A completely new system was developed by MMT, increasing the frame width to 8.5m and utilising 24 three-axial magnetometers to form a gradiometer used to survey a wider corridor.

Image 1 (below): Blue line shows data from GMA-1000 model T compared to another well-known system. With a high sample rate and very low noise levels the detection capacity is very high. The zone of detection is spherical and the swath sampled by the sensor in a single pass is affected by the altitude of the sensor above the seabed.

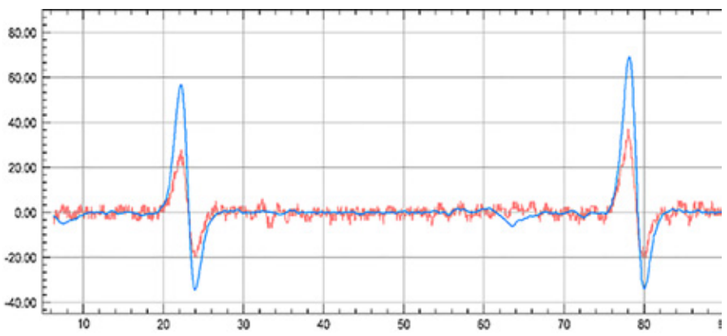

Image 2 (left): The new GMA1000 Model T system fitted to a work-class ROV. With this new system the noise levels are generally below 2-3 nT/ft, enabling an increased detection threshold at higher survey altitudes. The sampling rate of 100 Hz allows high speed surveys while still detecting smaller potential UXO targets.

The possibility to survey at higher altitudes gives the opportunity to survey more quickly while maintaining safety. MMT has used the GMA-1000 sensors on WROVs in over 10,000 survey kilometres in the Baltic Sea and Black Sea.

CONTINUED INNOVATION

The innovation continues at pace with MMT Sweden, together with Reach Subsea, developing the world's fastest ROV, the Surveyor Interceptor survey ROV, equipped with state-of-the-art sensors to deliver survey operations at higher speeds and with industry leading data resolution. Combining different types of surveys in one go is the future, leading to more effective campaigns and lower cost. One of the goals is to perform wide UXO surveys at higher speed. SIT trials are conducted Q1 2018.

MMT strives to continuously develop tailored systems to survey wider corridors at higher speeds. They provide their customers with better solutions and a safer installation at a reasonable cost.

MMT Sweden

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