While more than seven decades have now passed since the end of WWII, the remnants still remain in the North Sea today. It is common practice for Unexploded Ordnance (UXO) to be found during offshore projects, with potential to pose a threat to offshore work and vessels, particularly when laying pipelines and cables in the seabed. PES wanted to find out more about this new improved technology, which will save time and therefore money. Plus it will also be safer for the operators, in what can be a dangerous occupation.

Clearance campaigns commenced after the war, which ended 73 years ago, but thousands of unexploded ordnances are still present.

As the number of offshore marine projects continues to increase, demand for an efficient, cost-effective and risk-based approach for the mitigation of UXO is a priority for offshore teams. Survey work is an essential first step in UXO clearance, with survey specialists providing the tools to locate, identify and manage potential UXO.

Now in its ninth decade and with more than 50 years’ subsea-specific experience, N-Sea offers a wide range of assurance and maintenance services to the oil and gas, renewable, and civil contracting industries, having truly evolved into a leading integrated subsea infrastructure services provider.

With bases in the Netherlands, Aberdeen, Dubai, Mumbai and Norwich, N-Sea employs 150 personnel. Its Aberdeen base was formed in 2014, to firmly establish the
company’s presence in the Northern and Central North Sea and encompasses both office facilities at Aberdeen Harbour, and a workshop/product development facility based at Dyce.

This knowledge and wealth of experience has been utilised in the development of MagSense, which has been used in numerous projects since it was first launched. Through its creation and introduction, a vertical gradiometer array, specifically designed for highly accurate UXO campaigns within the oil and gas and renewables sectors, N-Sea has opened up new possibilities for the industry.

Developed in-house by N-Sea in collaboration with EIVA, the system has been designed to collect and record high resolution data in magnetically noisy subsea environments and hostile conditions, delivering unprecedented accuracy, greater efficiency and enhanced safety in the detection of UXO. It features manoeuvrability and flexibility, customised to reflect modern-day imperatives in offshore construction, and adapt to individual client needs.

UXO management is defined as three distinct activities: geographical survey specifically aimed at searching for magnetic contacts; visual identification of any contacts found to determine if they are UXOs or debris, boulders etc; and removal of any debris and disposal of any UXOs found.

N-Sea holds an impressive track record of unexploded ordnance campaigns, with proven experience in the investigation and mapping of potential targets using state-of-the-art survey methods, ROVs and divers. The company has also identified the requirement for this expertise within the offshore renewables market, and has undertaken numerous UXO projects in the sector, including clearance work on several UK and mainland European windfarms.

Hailed as the next generation of UXO detection equipment, MagSense is specially designed for wide seabed survey, covering a larger area than other survey systems. With highly accurate UXO target detection and accurate modelling, it is also suitable for use in all environments. Uniquely, this allows for the collection of high quality, high density gradiometer data in shallow tidal areas.

Used in conjunction with an EIVA 3D Scanfish, the MagSense frame can be towed through the water in ways previously not possible, ensuring even the most uneven and difficult terrain is tracked accurately and consistently.

Additional sensors enable a better control of the unit, and the 3D steering of the frame drastically decreases the amount of infill to be budgeted for, reducing the time required to provide accurate survey results. In addition, MagSense’s specially-designed launch-and-recovery system keeps manual handling to a minimum, thus significantly reducing risk to personnel.

The pioneering system was first adopted during the installation of offshore windfarms in the German Bight. Desk studies had appointed the work sites as high-risk areas for UXO; as a consequence, installation could only commence after clearance work had been carried out at the sites.

In order to carry out successful and efficient UXO clearance, suspected targets had to be identified, even if these targets were buried. The difficulties of this are well documented. By using vertical gradiometry, MagSense can better discriminate between non-UXO and potential UXO, thus mitigating unnecessary target investigation. The result? Less digging, less operations time required and, ultimately, less cost.

A specific challenge emerged during the work scopes; the expected targets were extremely small in size and weight, in addition to being buried in the seabed. Add to this an already challenging North Sea environment (i.e. strong currents, rapidly changing seabed and poor subsea visibility), and the need for a high-tech survey solution was evident.

MagSense was used to not only perform with greater accuracy than its competitors, but with optimum efficiency. The technology allowed vessels to operate at a higher survey speed, resulting in each project being successfully completed with
‘This is an exciting project to work on, particularly with the use of our MagSense frame, which has made a huge difference throughout the work scope. It was able to enhance the efficiency and safety of the detection process, delivering benefits to our client.’

Total offshore operations reduced by 50%, when compared with previous projects. The work scope was invaluable, proving that in the field, it produces more efficient, more accurate UXO survey results, in a range of highly inaccessible environments.

Most recently, the system proved vital during work carried out on behalf of National Grid and Energinet, as N-Sea delivered a UXO clearance campaign for the Viking Link Project, which consists of a proposed 473-mile long electricity interconnector between Bicker Fen near Boston and the substation Revising in southern Jutland, Denmark.

Mobilising the MagSense systems on the Noordhoek Pathfinder, the initial scope has involved conducting a seismic sonar, multi-beam and gradiometer survey along the Viking Link route. The second phase, involving the identification and on-site detonation of any UXOs found in the area is scheduled for 2019.

Chief Commercial Officer Gary Thirkettle said: ‘We were delighted to be involved in the high-profile Viking Link project, which is testament to our significant track record for UXO campaigns and proven experience in the investigation and mapping of potential targets.

‘This is an exciting project to work on, particularly with the use of our MagSense frame, which has made a huge difference throughout the work scope. It was able to enhance the efficiency and safety of the detection process, delivering benefits to our client.’

MagSense includes a unique launch and recovery system (LARS), which mitigates the HSE implications of swinging loads and reduces the requirement for manual operation of the LARS from a safe area on deck.

The LARS system succinctly illustrates N-Sea’s commitment to ‘safe, sound and swift’ operations, and it is critical that this element of MagSense can perform even in extreme maritime conditions. It is currently under development, with the aim of ensuring it can operate in ever-higher sea conditions, thus improving efficiency without compromise on safety.

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