Scour Protection, Monitoring & Prevention

The presence of scour (erosion of the seabed surface) around marine structures including offshore wind farm turbines is a common occurrence. Scour prevention measures are often deployed when wind turbines are installed in order to minimise the risk of future problems associated with scour.

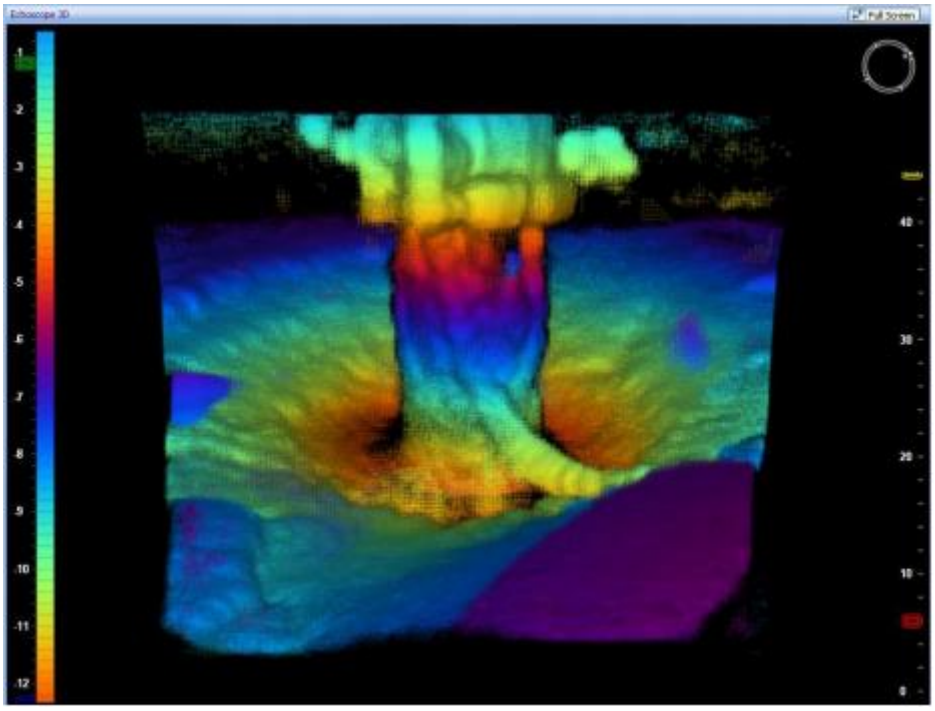

Figure 1: Scour erosion around an offshore wind turbine base captured real-time using an Echoscope®

The Echoscope® with its unique 3D sonar imaging capability is an ideal system to observe and measure the extent of the scour and also to assist in the deployment of protection and remedial works. There is a variety of different techniques that can be employed to protect wind turbines from the effects of scour.

A novel technique recently employed on a large offshore UK Wind Farm is to deploy Kyowa filter bags containing limestone aggregate in a radial matrix pattern using pole-mounted Echoscope as the 3D imaging sonar.

These 4 and 8 –tonne capacity filter bags provide coverage, flexibility, stability and ensure that aggregate does not spread and damage the turbine base and any associated cabling.

The Echoscope can be used to observe the deployment of the filter bags in real-time and give the user complete confidence in the operation. The time to lay a filter bag and the danger to life is greatly reduced using this method when compared to using divers to monitor deployment.

Additionally, a pre-lay 3D model of the filter bag target locations can be imported into our proprietary CodaOctopus® Underwater Survey Explorer (USE) software application and the user can over-lay the real-time 3D sonar image on to the model to ensure that the bags are deployed in exactly the correct position. An as-laid survey can be easily generated from the USE software for delivery to the end client.

A more traditional technique to protect from scour is to use rock dumping around the turbine base. However, this process needs to be carefully monitored in order to avoid damage to the turbine and any associated cabling. The Echoscope can provide unparalleled real-time 3D visualisation of the rock dumping operation ensuring that the aggregate is targeted, confined and safely deployed.

At the Sherringham Shoal Offshore Windfarm, Statoil and their contractor Van Oord have installed monopiles for 80 turbines. The installation involved the very precise placement of rocks around the side of the J-tube, where the cable enters the monopile, to form a cushion layer. This is achieved by dumping rock down a specially designed fallpipe, and it is vital that the operator is able to understand exactly where each of the elements is relative to each other. The Echoscope was used to visualise the scene before, during and after the rock dumping, avoiding the need to slow down the operation to check progress with a conventional multibeam site survey.

Ton Hardonk, the Van Oord Surveyor on the project, said "*The Echoscope was an enormous help during the precise rock dumping phase*." Vernon Bridges, the Statoil Vessel Representative, noted, "*I have been very impressed with the Echoscope equipment, and it certainly greatly helped our contractor Van Oord place the rock more accurately than would have otherwise been possible. I am sure that this new technology will become more commonly used once people see the benefits it can bring to a project*."

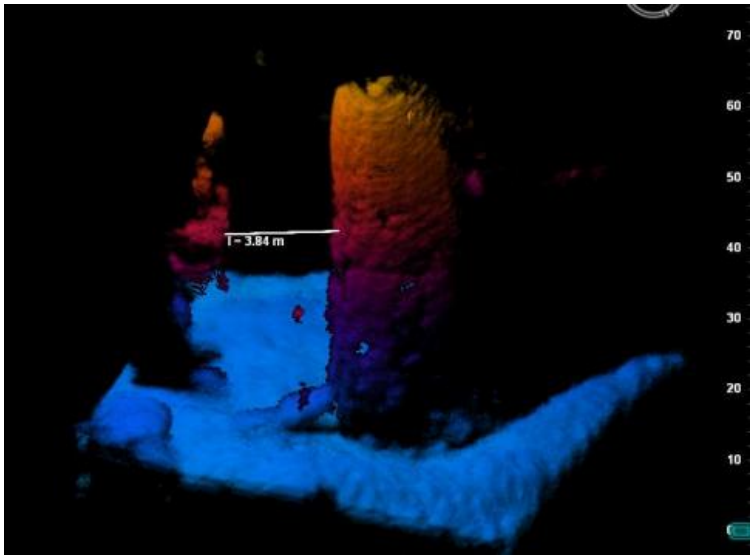

Figure 2: Live Echoscope image showing rock dumping on the left very close to the monopile on the right. The operator can ensure that the deposition is happening in precisely the right location.

Coda Octopus
Sound Underwater Intelligence

For further information on Scour Prevention, Monitoring, and Protection or other related applications, please contact our sales department at sales@codaoctopus.com.