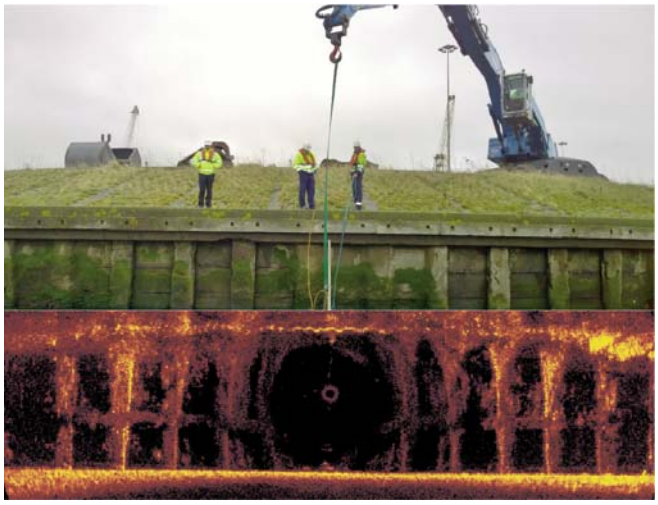
MOOG

Survey
Case Study

Inshore Surveys
Port and Dock

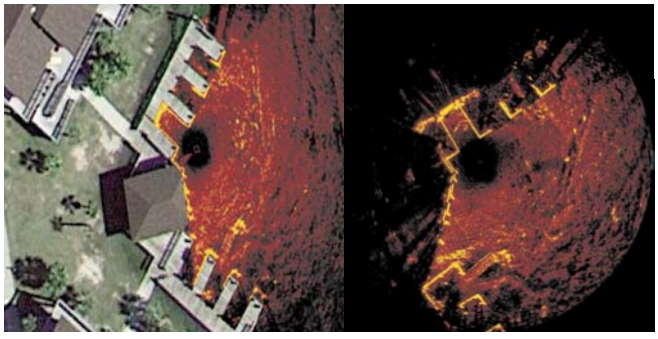


A cross-section sonar image of the Port of Workington perimeter wall where the challenge of a curved port wall can be clearly seen.

Location Background

The **Port of Workington is** the largest port in Cumbria, England, UK, serving the region's industrial needs handling 600,000 tonnes of cargo per year and co-ordinating around 300 ship movements annually.

The **Cypremort State Park, Louisiana** is a public recreation area located on Vermilion Bay, Louisiana, USA. The park contains a half-mile stretch of man-made beach which includes a 100-foot (30m) fishing pier, where crabbing, water skiing, windsurfing and sailing are common activities.



The image to the left, is a 360 degree scan which has been tiled and mapped using the *Tritech Image Tiler Programme.

The image to the right is a 360 degree image taken by Tritech's SeaKing Hammerhead imaging sonar.

Images captured at Cypremort Point State Park, Louisiana, USA.

Imaging Sonars - Inshore Surveys

Tritech's range of imaging sonars achieve high-quality underwater images which can rapidly assist with inshore waterway surveys.

The **SeaKing Hammerhead** mechanical scanning imaging sonar is a versatile sonar and has dual-frequency settings to support operating range requirements. An ultra-narrow horizontal beam angle provides 360 degree scanning of the target area, in either vertical or horizontal deployment.

The **StarFish 990F**, is part of the compact and lightweight range of StarFish Seabed Imaging Systems optimised for high-resolution imagery.

Both sonar options utilise Compressed High Intensity Radar Pulse (CHIRP) and digital-signal processing (DSP) techniques for greatly improved range resolution.

The Need for Sonar Inshore Surveys

A port or harbour master may suspect damage of a port, harbour or dock wall and rapid sonar inspection may reduce costly and potentially dangerous operations involving a diver. In this instance, a sonar survey of the area will provide rapid feedback to enable decisions to be made on remedial action. Similar sonar surveys may also aid dredging works, salvage of engineering works or data gathered can be used to map the target waterways by overlaying onto a geo-referenced bitmap*.

Both Tritech's SeaKing Hammerhead and StarFish 990F can record and playback data gathered, which can in turn assist surveyors by providing data for future analysis.

The Challenge of Inshore Surveys

Operators tasked with a port, harbour or dock survey have difficult working environments, such as murky water with little to no visibility. They often work in tight conditions, where the operating area may be difficult to manoeuvre in due to its construction or local debris. Both the Port of Workington and the Cypremort Point State Park initially utilised the complete functions of Tritech's Hammerhead sonar to assist their respective port and harbour inspection.

Tritech

How it Works

The Port of Workington

The Port Manager was interested in surveying a curved section of the outer port wall in order to examine for suspected damage. The SeaKing Hammerhead was fixed in a horizontal orientation to a custom-build mount, which was made especially by The Port of Workington's engineers. The sonar was then lowered into the water by a crane and held in position in order to capture the images. For this application, the sonar imagery was captured using the 935 kHz frequency which offers high definition images up to a range of 40m radius.

The SeaKing Hammerhead is a dual-frequency system and therefore for larger surveys, the sonar can be switched to the 675 kHz frequency to provide long-range detection at 100m radius.

In post-processing, the operators were able to overlay the data onto a photograph of the port wall to give a more representative picture of the curved wall area (see over).

Comparing the Data

In order to compare the data gathered from the vertical scans as captured by the SeaKing Hammerhead, a StarFish 990F was also deployed. The side scan was fixed to the starboard side of a vessel via a pole mount arrangement, in a similar method to the SeaKing Hammerhead where it was deployed horizontally, perpendicular to the river bed in order to scan the wall.

Jeremy Lihou , the Port of Workington comments:

"We were very impressed with the imagery taken from Tritech's SeaKing Hammerhead and StarFish 990F and it proved invaluable to us locating the hazards in the curved wall."

Cypremort Point State Park

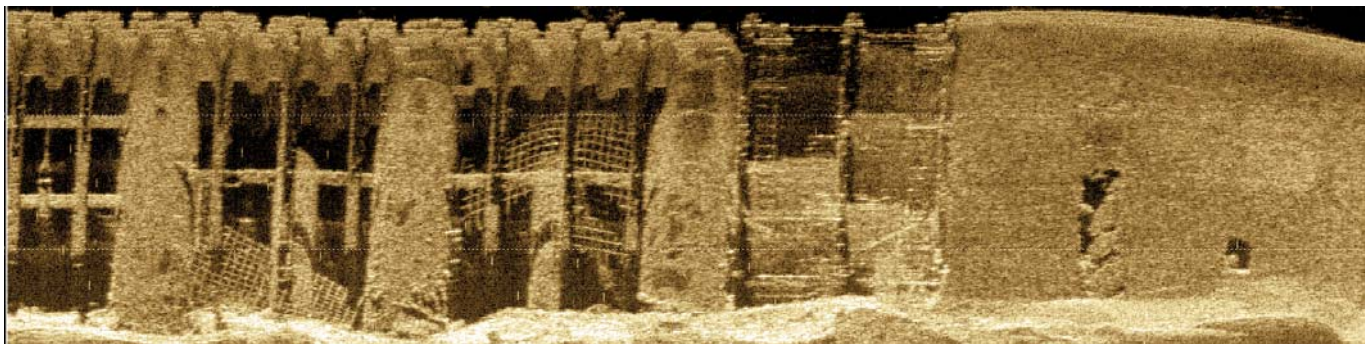
At this inshore survey, the operator was looking to achieve an accurate map of the area, to survey for debris.

Once data sets were gathered, Tritech's Image Tiler Programme was used to build an accurate map of the area in post processing; where each 360 degree sweep (collected by moving the tripod to different locations), is 'stitched' together to create a mosaic.

Measuring Success

The SeaKing Hammerhead images at the Port of Workington were taken at 975 kHz frequency to enable higher definition at short-range, whereas the Cypremort imagery was taken a 675 kHz frequency; to enable rapid large area scans to be taken in order to post process in the Image Tiler Programme.

Whereas the data gathered at Cypremort Point State Park provided the operator with a rapid survey of the area, the data gathered at the Port of Workington focussed on a suspected problem area in the port wall. With clear, representative data sets, as verified by both the SeaKing Hammerhead and StarFish 990F imagery, the Port of Workington harbour master was able to accurately review the damage to put a plan of action in place.



The above image as taken with Tritech's StarFish 990F, which clearly defines thick concrete pillars, the undulating river bed and damaged section of walls, ladders and patches of damaged metal mesh.

April 2015 - all content correct at time of publish.

Contact:

Tritech International Ltd
Peregrine Road, Westhill Business Park
Aberdeenshire, AB32 6JL.
United Kingdom
Tel: +44 (0)1224 744111
Fax: +44 (0)1224 741771
Email: sales@tritech.co.uk