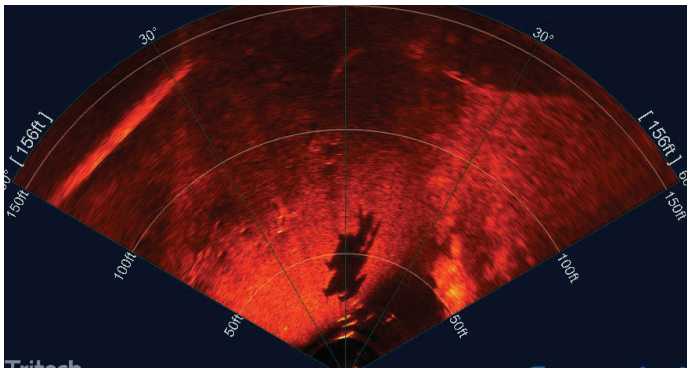
Gemini SeaTec System

Marine Object Tracking and Target Detection

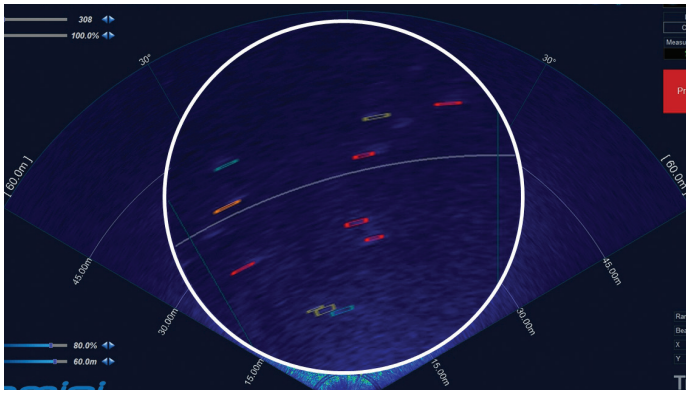
Sonar Imaging Technology

The Gemini SeaTec System is a tried and tested solution for object detection and target tracking. The system comprises of Tritech's industry-standard Gemini sonar hardware, together with Gemini SeaTec software. The algorithms of this specialised software have the capability of detecting objects and classifying them based on the probability of them being a specific predetermined target type.

The system has proven its effectiveness in applications that include: mammal detection around tidal turbines; monitoring of seal life behaviour; fish detection and fish counting.



▲ *Gemini sonar image identifying a school of dolphins*



▼ *Gemini SeaTec Software showing viable moving targets as red alert*

Application

The Gemini SeaTec System is ideal for the offshore renewables industry, where close range interactions between marine life, particularly around subsea structures, can be monitored to meet regulatory requirements.

Real time monitoring of marine environments can provide operators with an early warning signal so that immediate corrective action can be taken. Additionally, the log and target data collected can be reviewed for analysis of marine mammal behaviour, and can be used to inform future environmental impact assessments.

Benefits

- Detect, classify and identify with one system
- Fast, real-time data logging
- Data for environmental impact assessments
- Proven technology in the renewables industry
- Supports Tritech's Gemini product line

Features

- Algorithms programmed to user requirements
- Simple 'traffic light' classification of targets
- Close and long range target detection

Applications

- Renewables
- Offshore Installations
- Environmental analysis

Marine Mammal Detection

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Case Study | Application

Strangford Lough is an environmentally sensitive area and therefore the turbine's operational period is monitored continuously, to protect wildlife in the surrounding area. The Gemini SeaTec System was installed on SeaGen to trial its capabilities as a marine mammal behavioural monitoring system.

Customer Background

Marine Current Turbines (MCT) Ltd (now a Siemens Business) is a tidal energy company involved in the development of large-scale tidal current power generation technology.

The Sea Mammal Research Unit (SMRU) Ltd has world class expertise in marine mammal science with the proven ability to deliver innovative, robust and environmentally sound solutions for clients active in the marine environment. This is underpinned by the cutting edge academic research undertaken at the University of St Andrews.

MCT's SeaGen is a large commercial, tidal energy converter and is located in Northern Ireland's Strangford Lough.

Client feedback

Dr Carol Sparling, SMRU Ltd, comments on the Gemini SeaTec's performance:

"The Gemini SeaTec system provides us with the capability to detect and track marine mammals around renewable energy devices in a way that has not been previously possible and we are excited about working with Tritech on a number of tidal energy projects."

Object detection and classification

1 Identification

At operating distances of approx 40 metres, it is a significant challenge for any system to identify and classify the probability of the presence of a marine mammal. Therefore, the target detection and classification algorithms provided by the Gemini SeaTec Software were developed using trials where marine mammals could be validated using visual observations and the following factors:

a. Size: filter out marine life such as fish.

b. Shape: a mammal will have a particular sonar pattern due to its shape.

c. Behaviour: objects in the water that are moving with the tide can be filtered out to leave targets that appear to have their own source of propulsion.

2 Simple Traffic Light Classification of Targets

a. Possible: Targets with size and shape consistent with a marine mammal.

b. Potential: Possible (above) targets are reclassified when their path is identified to be inconsistent with an object drifting with the tide.

c. Probable: A potential target is upgraded when it has a longer path with consistent measurements. This identifies the target as having a high probability of being self-propelled.

3 Precautionary Shutdowns

A visual proximity alarm can be used to alert an operator of a valid target in the structure's vicinity. In Strangford Lough, the SeaGen system currently has a 6 second shutdown time, which equates to a 30m exclusion zone.

4 Detecting Movement

Reports describing Probable targets' movements and their paths through the water can be generated and cross-referenced with log files.

5 Excludes False Positives

Using this scheme, the software can also eliminate a large number of false targets: for example marine debris that moves with the tide, and fish which are both too small and are identified as moving in groups.

Marketed by:

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