

Gemini SeaTec System

Marine Object Tracking & Target Detection - Offshore Renewables



The Gemini SeaTec System utilises the Gemini Multibeam Imaging Sonar, shown above in titanium.

How the Gemini SeaTec System Works

The Gemini SeaTec System uses Trittech's industry-standard Gemini hardware, combined with Gemini SeaTec Software to provide intuitive object detection and target tracking capabilities.

The Gemini SeaTec Software, developed from Trittech's standalone Gemini Software, has been specifically designed to detect objects and classify these targets based on the probability of them being a specific, predetermined target type.

Marine Object Tracking & Target Detection

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

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

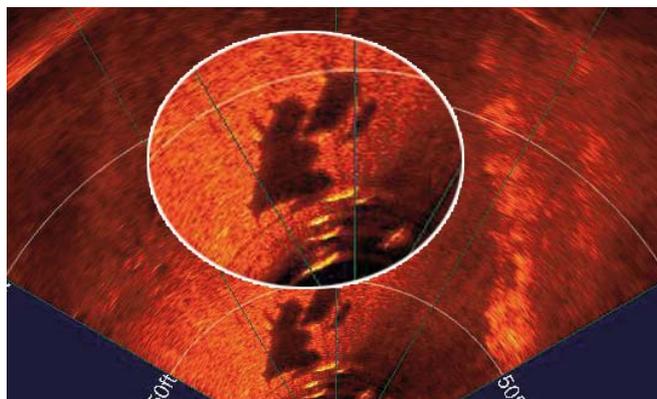


In this example, an area of waterway was being observed in order to identify the presence of marine life in the area, look out for these targets; a stingray and a school of dolphins.

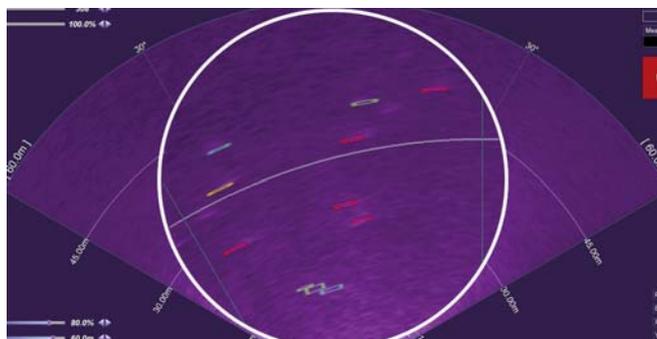
Tritech Proven Technology

Tritech is a high-technology business dedicated to providing the most reliable imaging and ancillary equipment for use in underwater applications.

Tritech has developed its Gemini real-time multibeam imaging sonar for marine object tracking and target detection.



Gemini sonar image identifying a school of dolphins (above) and a real-life image (below).



Gemini SeaTec Software showing visible moving targets as red alerts, denoting the probability of targets being marine mammals.

Case Study - Marine Object Tracking

The Need for Mammal Detection

Strangford Lough is an environmentally sensitive area and therefore MCT monitor the turbine's operational period 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 where objects are detected and classified as follows:

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 (seals, dolphins and porpoises) could be validated using visual observations. Size, shape and swimming behaviour are used to determine the likelihood that a moving target is a marine mammal.

- a. Size:** filter out marine life such as fish.
- b. Shape:** a mammal in water will have a particular sonar pattern due to the shape of its body and the location of the lungs.
- 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; thus having a high probability of being a marine mammal.

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 and more stable measurements. This identifies the target as having a high probability of being self-propelled rather than drifting with the tide.

Customer Background

Marine Current Turbines (MCT) Ltd (now a Siemens Business) are 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.

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 that equates to a 30m exclusion zone directly in front of the turbines. Precautionary shutdowns can be performed in such situations.

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.

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 Trittech on a number of tidal energy projects."

All specifications are subject to change in line with Trittech's policy of continual product development.

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