

Mag-03RC and DAS1 used in Magnetic Signature Measurements

Objectives

Measure the magnetic signature (i.e. induced and permanent magnetisation components) of a vessel prior to and after its magnetic treatment (degaussing).

Instrumentation

- Mag-03RC submersible three-axis range magnetometer.
- DAS1 data acquisition system.

Background

Degaussing is the process of removing magnetisation from an object. This is most commonly achieved by passing an AC current, with decaying amplitude, through sets of coils around the item of interest. This generates an AC magnetic field which will degauss the vessel.

To optimise the degaussing process, the magnetic signature is determined beforehand, so that the appropriate current may be applied to specific areas. When the degaussing process is complete, a second set of signature measurements takes place to check the efficacy of the degaussing process.

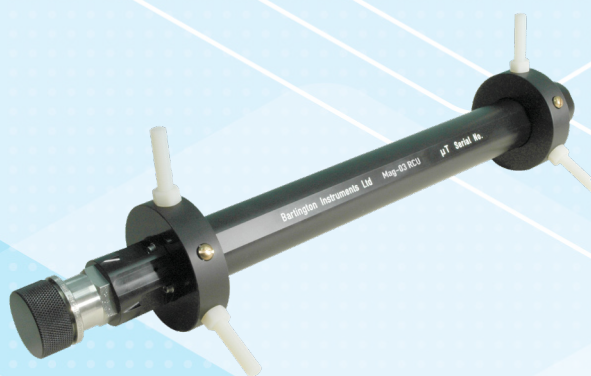
Method

The Mag-03RC and DAS1 have been designed to work in maritime magnetic signature ranges. A signature range consists of an array of Mag-03RC sensors, connected to a DAS1, and installed in a linear or cross array on the sea floor at a known

depth. A range is normally installed near a naval base or dockyard, typically with between 10 and 30 sensors. Long cables are required to achieve the measurement depth and magnetic hygiene of the range site. The Mag-03RC is built specifically for operation over long cables.

As well as containing magnetic field sensors, ranges are often multi-influence, and may also contain acoustic, electrical and pressure sensors.

Permanent magnetic signature ranges allow accurate reading of a vessel's magnetic signature, but only in the area where the range is located. The value of the Earth's magnetic field varies throughout the world. As a vessel travels around the world, the induced component of the signature will change in accordance with the local magnetic field. Portable signature ranges may be used to compensate for this. The DAS1 and the rest of the data acquisition function can be contained within a shipping container that is placed on shore, with the Mag-03RCs and other sensors weighted down and installed on the sea bed by boat.



The Mag-03RC contains an in-built test unit that can apply a known field to each axis to test functionality. It can therefore remain installed for long periods and be tested in situ.

The numbers and arrangements of sensors used may vary, depending on the complexity of the model that is to be produced. The more sensors that are used, the more data points will be collected and the more complex the computer model will be. The Mag-03RC may also be mounted at different depths in order to assess vertical variations of a vessel's magnetic signature.

