

Acoustic testing on ship gearboxes

imc measurement technology in the maritime industry

Application Note



Quiet and powerful on the high seas

What do the barge "Große Freiheit", the steamboat "Geo.Gleistein" and the tanker "TMS Georg Burmester" all have in common? They all use REINTJES brand gearboxes.



DLG series gearbox: for use in work boats
© Photo copyright: REINTJES GmbH

The REINTJES company started in 1879 with the creation of a mechanical workshop in the city of *Emmerich am Rhein* and today has grown to be a renowned global player. One of REINTJES areas of specialization is in the production of marine gearboxes. Their application areas include work boats (250 to 30,000 kW), fast vessels (350 to 5,000 kW) and ferry boats (600 to 13,200 kW). While some of their smaller gearboxes are built from lightweight materials and can fit into a truck, their larger gearboxes are the size of a truck.

High quality standards require testing

The demands placed on a modern marine gearbox are high: naturally, transferring the motor power to the drive shaft is the main task. However, integrating auxiliary drives for different units, such as pumps and generators, as well as braking and locking propellers and shafts are also key requirements. Both in the research and development departments, as well as with quality assurance, extensive tests

and measurements are carried out to ensure the highest quality of their marine gearboxes.

Gearbox acoustic testing

The marine gearboxes must not only be capable of handling powerful loads, but they must also be able to operate quietly as to not affect the crew and underwater wildlife with loud noise emissions. Therefore, REINTJES subjects their gearboxes to acoustic emission testing. Acoustic noise refers to mechanical oscillations that have frequencies in the audible range, i.e., approximately 16 Hz - 16 kHz. There is a distinction of sound propagation in fluids and solids, namely air-borne, water-borne and structure-borne sound. The ear only picks up sound events as air-borne sound. Water-borne and structure-borne sounds are only audible when they are converted into their final phases of propagation: air-borne sound.

Mobile test and measurement

For mobile testing of air-borne and structure-borne sounds and vibrations, REINTJES inquired about a compact measurement device that could provide simple and universal operations. Furthermore, they needed accompanying software that would enable employees to quickly and easily perform spectral analyses with a harmonic cursor.

To measure their noise and acceleration signals, REINTJES decided on a measurement system from imc Meßsysteme GmbH:

the imc C-SERIES.



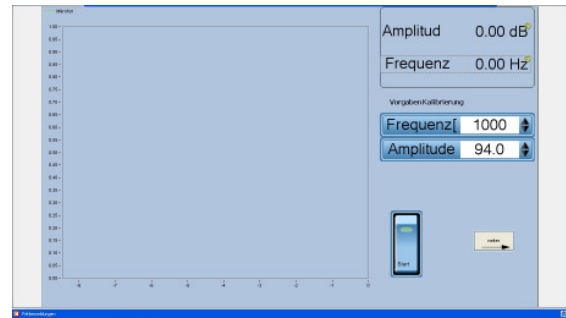
imc-C-SERIES

Benefits of the imc C-SERIES:

- Compact, rugged design, ideal for mobile applications
- Integrated real-time signal analysis and intelligent data reduction
- Powerful trigger machine
- PC-independent
- Flexible data storage options
- Excellent price/performance ratio

Step by step through the test process

Making this solution especially productive, imc hardware is used in conjunction with imc software applications. The imc STUDIO software leads the user step by step through the entire measurement process: from the calibration of the sensors, input of test object data and carrying out the test procedure, all the way to automated data storage. Except for entering the product data, no additional settings from the user are required.



Calibration

The system allows for both the detection of the rpm and noise levels, as well as calculating order lines, FFT or applying digital filters.

In the imc Curve Window, the tester can perform a spectral analysis of harmonic waves with a harmonic cursor. Starting from a fundamental frequency, the cursor marks periodic integer multiples. Thus, disturbances or resonances are directly revealed, facilitating to identify the root cause.

To evaluate all of the test results and to assess them according to internal and external standards, imc FAMOS signal analysis software is ideal. Using this software, current measurements can be subsequently analyzed, including comparisons with internal data files and other external references.



Analysis

Additional information:

imc Test & Measurement GmbH

Voltastr. 5
13355 Berlin, Germany

Telephone: +49 (0)30-46 7090-0
Fax: +49 (0)30-46 31 576
E-mail: hotline@imc-tm.de
Internet: <http://www.imc-tm.com>

imc Test & Measurement GmbH is a manufacturer and solution provider of productive test and measurement systems. imc implements metrological solutions for research, development, service and production. imc has particular expertise in the design and production of turnkey electric motor test benches. Precisely outfitted sensor and telemetry systems complement our customer applications.

Our customers from the fields of automotive engineering, mechanical engineering, railway, aerospace and energy use imc measurement devices, software solutions and test stands to validate prototypes, optimize products, monitor processes and gain insights from measurement data. As a solution

provider, imc offers their customers an attractive and comprehensive range of services. These include project consulting, contracted measurements, data evaluation, specialist deployment, customer-specific software development and system integration. imc consistently pursues its claim of providing services for “productive testing”.

If you would like to find out more specific information about imc products or services in your particular location, or if you are interested in becoming an imc distributor yourself, please go to our website where you will find both a world-wide distributor list and more details about becoming an imc distributor yourself:

<http://www.imc-tm.com/our-partners/>



Terms of use:

This document is copyrighted. All rights are reserved. Without permission, the document may not be edited, modified or altered in any way. Publishing and reproducing this document is expressly permitted. If published, we ask that the name of the company and a link to the homepage www.imc-tm.com are included. Despite careful preparation of the content, this document may contain errors. Should you notice any incorrect information, we kindly ask that you please inform us at marketing@imc-tm.de. Liability for the accuracy of the information is excluded.