

Noise and vibration services

Noise and vibration on board ships is a growing concern to ship owners and yards due to higher comfort demands, new propulsion arrangements and application of lightweight materials. MARIN offers noise and vibration services for level assessment and trouble shooting.

Services:

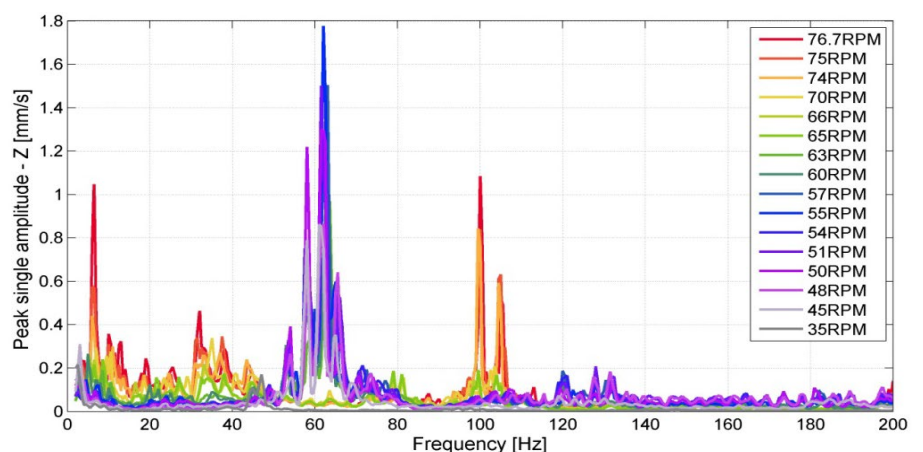
- Assessment of noise & vibration levels
- Verification of compliance with criteria
- Trouble shooting activities to find the cause of excessive noise and/or vibrations and provide measures to solve the problem



Accelerometer installed for onboard measurements

Background

MARIN offers hydrodynamic and structural services. These services range from numerical analysis and model testing to full scale measurements. The Performance at Sea department within MARIN is responsible for full scale measurements and consists of a group of hydrodynamic, structural and mechanical consultants together with experienced instrumentation engineers.



With our knowledge of physics and mechanics and our experience, we provide solutions to Noise & Vibration problems by:

- ISO noise & vibration assessment
- Evaluation of propellers (power, cavitation, pressure fluctuations)
- Determination of vibration sources
- Pressure pulse measurements
- Evaluation of shaft torsional vibrations
- Correlation of model tests, calculations and full scale measurements
- Carrying out natural & forced vibration FEM analyses



Hand-held noise & vibration analyser

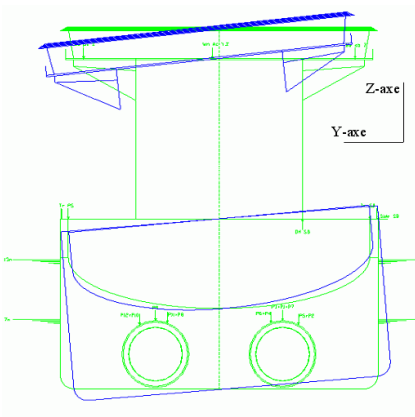
The extent of our services varies from one-day troubleshooting to extensive monitoring campaigns.

Full scale measurements

Vibrations are measured by means of accelerometers deployed over the ship structure in order to determine local and global vibration modes and frequencies. Dedicated instruments measure noise levels.

For propeller-induced vibration measurement, pressure transducers are installed in the hull plating above the propeller(s). Standardised penetrations, approved by major classification societies can be used for most ship types.

Pressure pulse measurements can be combined with propeller cavitation observations, so that interaction between aft ship, propeller and rudder can be evaluated.

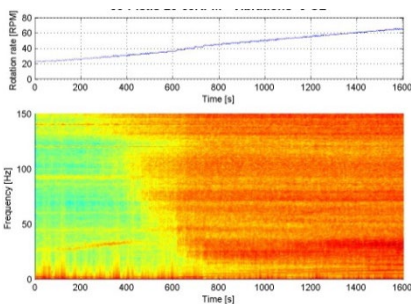


Mode shape determination

Analyses

For the evaluation of the full scale measurements detailed analyses in both time and frequency domain are conducted. Techniques such as harmonic and spectral analyses are applied.

For vibration measurements the latest ISO standards are applied and special interest is given to the identification of resonance or forced vibration effects and corresponding excitation sources. In general, the excitation sources may involve propeller and/or machinery-induced excitations.



Spectrogram of measured vibrations

To further comprehend observed phenomena, or in order to investigate cases where measurements are impractical or expensive, detailed FEM analyses can be performed. These analyses are performed to the required level of detail and take into account the correct structural effects and damping ratios.

Related products:

- Sea trial acceptance tests
- Cavitation observations
- MARIN consultancy
- FEM analysis

Consultancy

Based on the full scale measurements and analyses we provide practical advice that may involve measures to reduce excitation and/or structural modifications. We compare the measured noise and vibration levels with adequate international standards and give prognoses of these levels after our recommendations are implemented.

For more information contact MARIN:

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