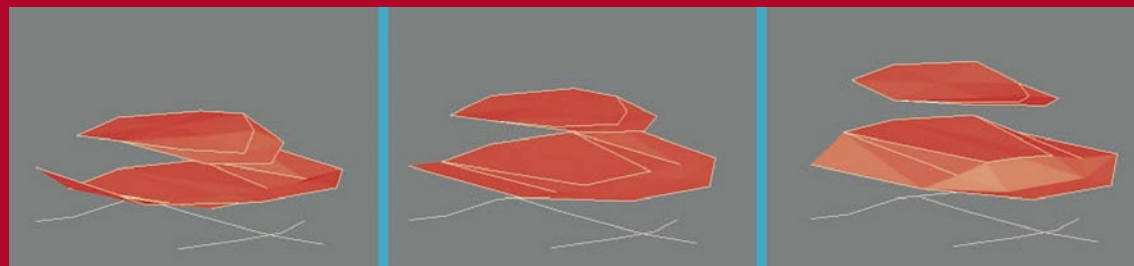


Cost-effective and fast troubleshooting of vibration problems



Vibration of two superstructure decks.

MARIN continuously masters its capabilities to assist designers and operators in securing acceptable noise and vibration levels on board their ship and offshore structures.

Mirek Kaminski
M.Kaminski@marin.nl

For cargo ships for instance, MARIN helps avoid vibration damage and helps assure that vessels comply with regulations concerning allowable vibration and noise levels in crew spaces. For passenger ships and yachts, MARIN's countermeasures focus on passenger comfort is the main goal when it comes to naval vessels.

However, application of noise and vibration countermeasures often compete with other design objectives and therefore, avoidance and even minimisation of the excitation is often very difficult to achieve. Consequently, designers and operators are sometimes confronted with unacceptable noise and vibration levels during sea trials. In some cases, operators observe unacceptable noise and vibration levels in the first months of operation when ship conditions differ from those during the sea trial.

In these cases MARIN's troubleshooting services can still secure acceptable noise and vibration levels.

In principle, there are three remedial actions possible (listed below in order of their effectiveness).

- Reduction of excitation (flow optimisation around the hull, propeller modification and form optimisation of hull appendages and openings)
- Reduction of transmission (application of elastic mountings, floating floors and/or insulation)
- Reduction of response (structural reinforcement, damping by consumption of vibration energy, passive balancing by application of mass-spring systems tuned to vibrate in counter-phase and active balancing by arrangement of devices producing dynamic counter-phase forces).

However, before the remedial actions can be advised and verified, several troubleshooting activities are required including an evaluation of the contract requirements, on-site measurements – determination of Operational Deflection Shapes (ODS) with their frequencies and damping factors, identification of response mechanisms and of excitation sources.

MARIN has recently renewed its hardware and software tools to carry out and analyse on board vibration measurements. An effective and thorough analysis is guaranteed by the application of a wireless and distributed measuring system, and by eliminating the use of forced excitation. Thus providing a good advice to solve sound and vibration problems.