

Ship and offshore acoustics



CONSULTING · PLANNING · MEASUREMENTS · EXPERT REPORTS · RESEARCH

Key activities

The acoustic conditions on a ship are exceedingly complex: Powerful noise and vibration emitters are found on board, including diesel engines, cooling compressors, pumps and actuator systems. The typical ship structure with its ducts and channel systems provides ideal propagation conditions for noise and vibration. Acoustic optimisation measures improve the usability of a ship, and sustainably enhance its value in the eyes of its owners and passengers.

Activities of Müller-BBM – consultancy, calculations, measurements – are requested and ordered by industry (shipyards, manufacturers), owners, authorities or/and the Navy. Close cooperation over more than 40 years with all parties involved has established a solid confidence in the qualification and engagement of the Müller-BBM company.

About Müller-BBM

Müller-BBM GmbH is a subsidiary of Müller-BBM Holding AG, with headquarters in Planegg near Munich. Since 1962 Müller-BBM has been advising clients nationally and internationally, it is now one of the world's leading engineering firms in all fields of acoustics, building physics and environmental protection. More than 400 highly qualified employees form an interdisciplinary team of architects, scientists and engineers. Customer proximity is guaranteed by our twelve offices in Germany as well as by our branch offices in Austria, Switzerland and Russia.

In Germany Müller-BBM is one of the leading accredited testing laboratories according to § 29b BImSchG for air pollution and odour control, noise and vibration control and more. Furthermore, Müller-BBM is an accredited testing laboratory for light and electromagnetic environmental radiation. Decades of experience in testing and inspection enrich our consulting services and are therefore also beneficial for our customers with respect to licencing procedures.

Feasibility studies and predictions

Based on airborne and structure-borne sound levels for different types of noise sources:

- Noise levels on board (for cabins, rooms and open areas)
- Underwater noise: source level, target level, self-noise
- Vibration levels
- Calculations considering sound transmission, sound insulation (measures), and sound radiation

Noise control plan

- Development of specifications
- Assessment of acoustic measures

Acoustic quality control

- Design guidelines
- Preparation of acoustical specifications of machinery and material properties (for subcontractors)
- Test specifications and test procedures for FAT, HAT, SAT
- Visual inspections and measurements

Structural dynamics (experimental and numerical investigations)

- Modal analysis
- Operational deflection shape analysis
- Investigations on sound transfer characteristics (e. g. transfer path analysis, impedance measurements)

Numeric simulation tools

FEM, BEM, SEA



Troubleshooting

Investigations and improvements, if specifications are not fulfilled

Test facilities and test procedures

Material properties (laboratory tests)

- Dynamic stiffness of decoupling elements (springs, compensators etc.)
- Bending wave damping
- Sound insulation and sound absorption

Building and room acoustics, anechoic room, reverberation room

Acoustic properties of machinery or components under specific conditions

Measurements

FAT (Factory acceptance tests)

- Airborne and structure-borne sound measurements, according to or related with standards
- Assessment of test results

HT (Harbour tests)

- Multi-channel measurements
- Quality control of acoustic decoupling of machinery
- Structural-dynamic investigations on foundations, ship structure, determination of transfer properties (e. g. impedance, flanking paths like pipelines)
- Pre-tests for SAT: underwater noise next to the hull, airborne noise, structure-borne noise

SAT (Sea acceptance tests)

- Measurements of airborne sound, structure-borne sound, waterborne sound
- Vibration measurements
- Field measurements of radiated underwater noise and transient noise

Standardization

Müller-BBM is represented in all relevant bodies in the field of underwater noise

Lectures and training in ship acoustics and measurements

Seminars and workshops, symposia, conferences, lectures

Products

Signature monitoring system

Acoustic on-board measurement network

Research & Development

Prediction and monitoring of radiated sound for vessels

Sound propagation and noise mitigation for offshore construction works

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