

# MÜLLER-BBM



## Buildings Environment Technology

# Müller-BBM

## Interdisciplinary expertise and know-how

With more than 400 highly qualified employees Müller-BBM is one of the leading engineering companies at home and abroad for consulting, testing and planning services in the areas of construction, environment and technology.



Müller-BBM's focus is on sustainable personal and environmental protection against unwanted influences. These include noise, vibration, heat, cold, humidity, air pollutants, odours, light or electromagnetic fields. We quantify, evaluate and influence these factors with comprehensive solutions from a single source – for industry, trade and transport as well as for cultural or administrative structures. Our clients

benefit from holistic, custom concepts and versatile synergies of our specialists in the construction, environment and technology sectors.

We enhance the quality of rooms and buildings and improve the comfort and convenience in them. We optimize production processes, procedures and the sound quality of rooms, equipment and products. We put together measures to reduce emissions and protect against immissions – for high quality, greater safety and the protection of our environment.



Müller-BBM operates as an independent company with all the relevant qualifications, notifications, accreditations and certifications. Our clients appreciate the objective and neutral expertise reflected, in particular, in the test reports and expert advice of our engineers, architects and scientists. Acoustic measurements and chemical analyses are carried out in our own test facilities. Very well equipped lecture halls and seminar rooms are provided for training and seminars.

Müller-BBM stands for a wide range of expertise and integrated service, for flat hierarchies, open communication and efficient structures. For specialist and generalist teams that are flexible, client-oriented and have a sense of responsibility.

Since being founded in 1962, our company has combined field-tested know-how with visionary approaches and a very high demand for quality. We are future-oriented and interdisciplinary across all departments and sections. Our clients receive comprehensive individual concepts for each task.

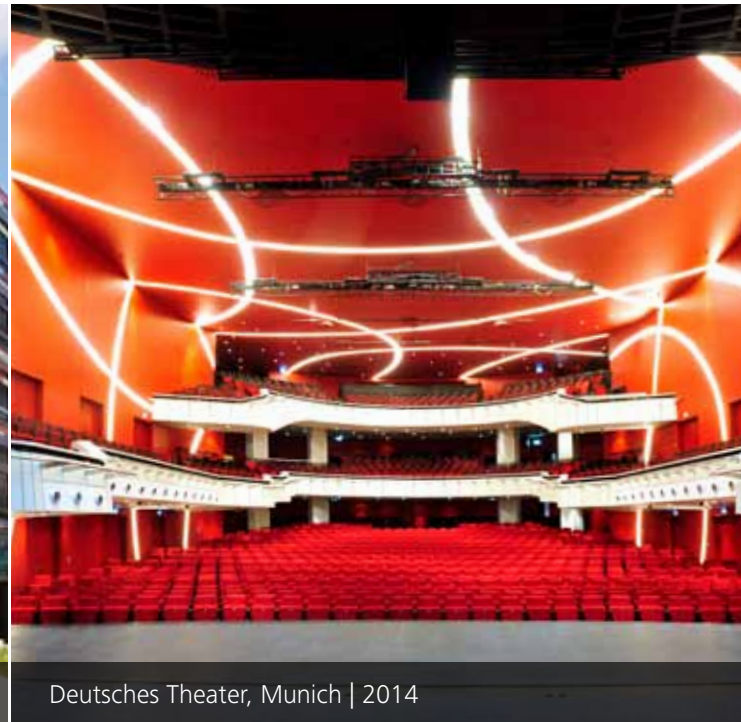


# Buildings

We improve the acoustics, the functionality and sustainability of your rooms and buildings with an unwavering eye on the ecological and economic aspects as well as the current standards and guidelines. Whether an architect, developer, investor, public or private client, you benefit from individual consultation, networked performance profiles and integrated solutions that are holistic, targeted and future-oriented. From feasibility studies to detailed design, from supervision of construction right up to commissioning, we focus on the safety, quality and success of your project, always in accordance with your time-line, and without losing sight of the architectural concept.



Authority for Urban Development and Environment, Hamburg | 2013



Deutsches Theater, Munich | 2014

## Room acoustics

Good sound, speech intelligibility or noise attenuation: The acoustic design of a room has countless facets. We define the acoustic qualities and requirements on the geometry and materials of each individual room in accordance with its requirements. This can be point-by-point consultation or overall planning for room acoustics, whether it is for a classroom or a concert hall, for a new construction or a renovation.

## Building acoustics and sound insulation

We assess proposed constructions and develop superstructures and connection details relevant to building acoustics. We carry out measurements directly on site and examine the airborne and impact sound insulation, the effects of external noise and noise from technical installations. We ensure that all requirements on sound insulation invariably correspond to building regulations.

## Structural dynamics

Modern construction methods allow leaner structures to be used. However, this increases the sensitivity to dynamic excitation. We advise you during the planning phase about acceptable structures and measures suitable for the protection of persons and buildings.

## Media and communications technology

We develop designs for communication technologies, providing support through our consulting and engineering team when it comes to the implementation of audiovisual systems and building the requisite infrastructure. We focus on the production and broadcast studio facilities for radio and television, theatre, cultural and museum buildings, media and presentation technique, conferences and corporate communications.

## Building physics

We design high-quality thermal building envelopes in accordance with state-of-the-art building physics. We examine heat and moisture transport processes



Tour Total, Berlin | 2012



Tianjin Grand Theater, China | 2012

using multi-dimensional and transient simulations to minimize heat loss and to prevent moisture damage.

### **Energy efficiency**

Whether the concern is the passive house, the KfW Efficiency House or the ever more stringent legal requirements of the German Energy Saving Ordinance (EnEV): We prepare your energy-efficient building planning from the design phase through to work supervision.

### **Building climate control**

We ensure that your building achieves high thermal comfort at minimum expense with regard to energy and technology. The focus is on passive measures, the use of the building's thermal masses and the use of natu-

ral resources such as sunlight, natural ventilation, and solar or geothermal power. We simulate climate and energy concepts using advanced simulation tools. You save on investment and operating costs.

### **Sustainability**

As a member of the German Sustainable Building Council (DGNB), we also provide consulting services concerning ecology, economy, functionality, technology and processes. Our focus is on the entire life cycle of a property, its performance assessment and long-term follow-on costs. Our auditors advise you in the certification procedure for the DGNB seal.

### **Fire protection**

Effective fire protection concepts and measures are a fundamental prerequisite for the planning and approval of construction projects. Our fire protection experts develop and produce all documents required throughout the life cycle of a property. We also develop complex special solutions for individual cases, keeping in mind maximum personal safety within the buildings.



# Environment

We support industry, commerce, the public and private sectors with an extensive portfolio of environmental services that enable us to identify, assess and minimize disruptive factors in the environment due to air pollution, odours and noise right up to electromagnetic fields. We measure and assess emissions and immissions. On this basis, we plan appropriate protective measures. We act as a link between trade and industry, local authorities and the legal requirements for environmental protection.



## **Emission and immission measurements**

As a notified body and accredited testing laboratory defined by § 29 b of the German Federal Pollution Control Act (BImSchG), we measure and assess emissions and immissions from traffic, industry, business, sport and leisure. This includes air pollution, odours, sound and vibration as well as electromagnetic fields and light.

## **Transport and environment**

We measure and assess noise and air pollutants at existing and planned transportation facilities and routes with regard to road, rail and air transport. This applies to both smaller individual plants as well as large urban structures. To this end, we elaborate the adequate protective measures.

## **Operating permit and urban development planning**

We support you in planning approval processes or regional planning procedures, in urban development planning and in licensing procedures. Our teams advise and help you draw up your application documents and answer expert assessment questions with advice for air pollutants, noise, vibration, light and electromagnetic compatibility with the environment. We carry out environmental and FFH compatibility assessments and help you draw up landscape conservation plans, species protection assessments, Strategic Environmental Assessments (SEA) and issues concerning water legislation.

## **Risk assessments and occupational safety**

We advise and assist you in identifying and assessing risks from noise and vibration as well as building and indoor pollutants at workplaces. As a notified body we measure and assess exposure to hazardous substances. We carry out complete occupational exposure assessments, develop control plans and advise you in the selection of appropriate protective measures.

## **Plant safety**

Our experts, as defined in § 29 a of the German Federal Pollution Control Act (BImSchG), answer your questions concerning safety issues. We provide expert reports on fire and explosion protection, assess hazardous substances and residual materials and provide consultation on



industrial safety regulations. Approved experts for protection of water draw up concepts as part of authorization procedures and provide expert opinion in cases of damage. In addition, we carry out commissioning, decommissioning and requalification.

### **Climate protection**

Our environmental auditors assist you in environmental and energy management. We also advise you on questions of vulnerability assessment and material requirements in establishing and implementing an energy management system: from the analysis right up to the internal audit. Worldwide, we help operators utilize the flexible mechanisms of the Kyoto Protocol to monitor emissions of components with great potential for damaging the climate.

### **Management systems**

Responsible management requires corporate structures that are legally compliant. We are at your disposal for the professional analysis, design, implementation and integration of management systems concerning the environment, energy, quality and safety, right up to monitoring legal requirements. If necessary, we provide you with experienced coordinators and external company officers.

### **Chemical analysis**

We analyze your samples from the fields of environment, materials and industrial products – customized and purposeful – in our own laboratories with accredited methods for elemental analysis, heavy metals, halogens and anions. Our analysis spectrum also includes organic compounds of high,

medium and low volatility, nitrosamines, dioxins and POPs (persistent organic pollutants).

### **Contaminated building materials**

Hazardous substances that may be present in buildings and affect the users are pollutants such as volatile organic compounds (VOCs), formaldehyde, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), wood preservatives, asbestos, artificial mineral fibres and mould. We inspect buildings for these pollutants.



# Technology

We reduce the sound and vibration of machines, vehicles, aeroplanes, ships and plants. We optimize equipment and systems in terms of acoustics and vibrations with a focus on independent advice and measurement. For industry, commerce and the public sector, we provide expert opinions, test products and carry out technical audits in our own laboratories, with software and hardware systems developed by us.



## Vehicle acoustics

We furnish vehicles with the sound specific to their product and brand – from the sound of a sports car or motorcycle to the noise of trains in motion. To develop new acoustic solutions to meet your individual needs, we use sophisticated measurement techniques.

## Railway engineering

We put together many different components so that the different acoustic requirements on the complex railway system can be met. We advise manufacturers and operators of rail vehicles and tracks in all aspects of acoustics, acoustics management and vibration protection. For the analysis of rail and wheel roughness, we have developed and market our own measuring instruments.

## Ship and offshore acoustics

Diesel engines, drive systems, pumps, compressors and hydraulic systems with pipelines: when it comes to ships or offshore platforms the variety of sound and vibration sources in confined spaces gives rise to particular acoustic challenges. We advise shipyards, shipping companies, design offices and suppliers on acoustic solutions for ships of all sizes as well as for offshore work.

## Machine acoustics

The low-noise design and qualified identification of noise emission from machines and machine components constitute both a requirement and simultaneously an important quality hallmark. We support you in selecting the quietest possible individual components and in the targeted application of sound-attenuation measures.

## Psychoacoustics and sound design

We visualize listening impressions. Our experts determine the acceptability of sounds using objective measurements. Our sound design does not end in the recording studio, but includes the development of specific modifications and the acoustic validation of your product.

## Vibration protection

Our vibration-protection specialists are called in when dynamic loads such as traffic loads, engine loads, wind or earthquakes affect people, machinery and equipment. We analyze and predict vibrations and shock, define appropriate safety objectives and develop measures to protect your equipment.





### **Industrial acoustics**

We develop, optimize and coordinate measures for successfully protecting the environment from the effects of sound and vibration emitted by all sizes of industrial plants. You benefit from the long-standing experience of our team who are familiar with the operations and technical processes in your type of system, for example, in the automotive industry, power plants or in the petrochemical industry. You may also benefit from our experience and know-how when establishing a legally compliant corporate organization.

### **Electromagnetic compatibility with the environment**

Electromagnetic fields can affect the operation of highly sensitive instruments and equipment, or even turn into a health hazard. We develop individual concepts and solutions for reducing electromagnetic immissions. We also deal with technical implementation with, for example, our active magnetic field compensation system.

### **Lighting technology**

Our lighting design helps you to recognize and solve any conflicts of use caused by light pollution between, for example, residential areas and industrial sites or sports facilities already at an early planning stage. We carry out measurements and advise you. In addition, we also assess whether workplace lighting is in line with current standards.

### **Comparative product testing**

We test and evaluate the performance characteristics of devices and systems for audio, video, IT, telecommunications, mobile communications and image-processing using approved methods, objective test procedures and subjective panel tests.

### **Mobile communication**

Mobile telephony is essential in our day and age. This results in high demands on stable wireless networks and their infrastructure. We offer services for mobile phones and terminals, in addition to coverage measurements for mobile phone networks.

# Test equipment Products

We have been successful in acoustic consulting and measurement for five decades. This success is significantly based on our in-house test facilities and our measuring systems.



## Test facilities

Acoustic measurements and chemical analyses are carried out in Müller-BBM Group's own state-of-the-art test facilities: from the noise output of a machine, through to airborne and impact sound insulation of structural components, the insertion loss of a silencer right up to the sound absorption of building materials and elements of office fittings. The focus of our range of chemical analysis services lies in determining air pollutants.

So, we offer all necessary measurement methods for noise, vibration and air pollution control.

One section of our test laboratory for noise and vibration is a calibration laboratory for acceleration and acoustic measurements for the calibration of your measuring equipment. Our laboratories are accredited according to ISO/IEC 17025. Müller-BBM is listed in the register of VMPA, the German Association of Material Testing Institutes, for sound insulation testing.

## Products

More than five decades of know-how gathered from successful consulting and acoustic measurement have also gone into the development of our measurement systems, which can be purchased. The product range includes systems for magnetic field compensation or structure-borne sound monitoring as well as roughness measurement systems for rails and rail vehicles through to measuring instruments for room acoustics and building acoustics. All our products are user-friendly and practical.



# Attestations of expertise

## Seminars and specialist conferences

Our expertise in the fields of buildings, environment and technology is communicated to you regularly in conferences and seminars, in project-related and specialist workshops or in customized seminars.



### Attestations of expertise

The testing and calibration laboratories of Müller-BBM GmbH are accredited according to ISO/IEC 17025 (general requirements for the expertise of testing and calibration laboratories) by DAkkS, the national accreditation body of the Federal Republic of Germany. The management system also meets the requirements of BS OHSAS 18001 (Occupational Health and Safety – Management Systems – Requirements). Notes on the scope of accreditation, the international validity and the certificates can be found on our website at <http://www.muellerbbm.com/quality/>.

### Seminars and specialist conferences

Use the various options available to you that our well-equipped lecture halls provide at our sites in Planegg near Munich and Berlin. Find out more about our extensive offering of user training programmes and hands-on continued training classes. These include seminars and workshops on topics such as „Noise control in industry“, „Immission protection in practice“, „Technical acoustics“, „Vehicle acoustics“ or „Experimental modal analysis“.

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## Buildings

Building acoustics  
Room acoustics  
Media and communications technology  
Thermal building physics  
Building climatology  
Sustainability  
Fire protection  
Structural dynamics  
Building pollutants

## Environment

Noise control  
Air pollution control  
Vibration control  
Light and electromagnetic fields  
Environmental compatibility  
Plant safety  
Legally compliant business organization  
Risk assessment  
Chemical analysis

## Technology

Automotive acoustics  
Ship acoustics  
Rail technology  
Industry plant acoustics  
Machine acoustics and machine dynamics  
Psychoacoustics  
Mobile communication  
Product testing

## Headquarters

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## Comprehensive solutions from a single source

### Consulting · Planning · Measuring Expert Opinion · Research

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 and is now one of the world's leading engineering firms. More than 400 highly qualified employees form an interdisciplinary team of architects, scientists and engineers in the most diverse specialist fields. The company currently has twelve offices in Germany as well as branch offices in Austria and Switzerland.

#### Notifications

Müller-BBM is notified as an expert authority in accordance with § 29 b of the German Federal Pollution Control Act (BImSchG). The notification comprises

- determining emissions and immissions of air pollutants, noise and vibration,
- verifying the correct installation and function in addition to the calibration of continuous emission measurement systems (CEMS),
- checking combustion conditions.

As a test laboratory, Müller-BBM is authorized to render the services of an independent third-party provider for assessing and examining performance reliability in accordance with EU regulation no. 305/2011 (Construction Products Regulation).

#### Accreditations

Our testing and calibration laboratories are accredited according to ISO/IEC 17025:

- Test laboratory for sound and vibration, electromagnetic fields and light
- Test laboratory for immission protection, measurements of hazardous substances and chemical analysis
- Acoustic test laboratory for materials, components and equipment
- Calibration laboratory for acceleration and acoustical parameters.

Müller-BBM has a significant number of employees with competency certificates that were awarded to them on an individual basis. They include publicly appointed and sworn experts, state-recognised experts and otherwise appointed and notified experts. The competency certificates are closely associated with the specific areas of expertise, therefore, their details can be found on the web pages of the specific areas of expertise.

Notes on the scope of accreditation, the international validity and certificates can be found on our website at <http://www.muellerbbm.com/quality/>.