



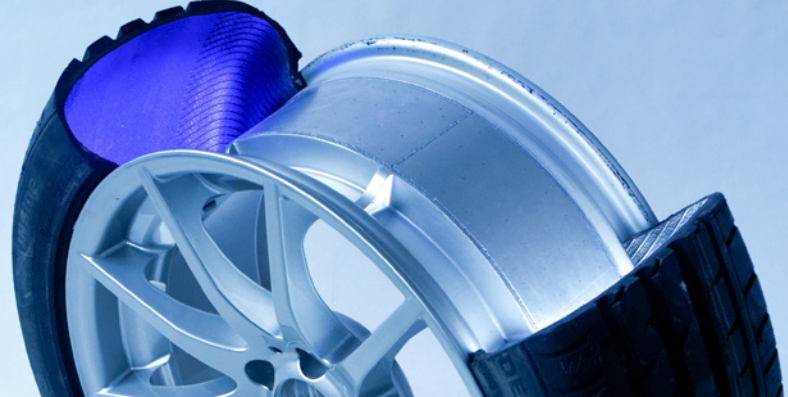
Fraunhofer

IBP

**FRAUNHOFER INSTITUTE FOR
BUILDING PHYSICS IBP**

VEHICLE ACOUSTICS OVERVIEW OF SERVICES AND COMPETENCES





The Fraunhofer IBP has a modern and well-equipped test center for vehicle acoustics and offers a wide range of research and development services for customers from the automotive industry. On the four-wheel drive chassis dynamometer in our semi-anechoic acoustic measuring hall we carry out various investigations on interior and exterior vehicle acoustics, for example simulated pass-by measurements.

OUR RANGE OF SERVICES

- Noise reduction and acoustic optimization of prototype and series-production vehicles
- Tire-road, power train, components
- NVH benchmarking (Noise Vibration Harshness)
- Simulated pass-by according to DIN ISO 362-3
- Improvement of communication and safety
- Sound design and psycho-acoustics
- Electromobility

COOPERATIONS

- Public research projects
- Research and development for the industry
- Measurements according to customer specifications



Four-wheel drive chassis dynamometer with semi-anechoic acoustic measuring hall for simulated pass-by measurements

Semi-anechoic measurement hall

- Lower cut-off frequency 40 Hz,
hall dimensions (W × H × L) 18.9 m × 6 m × 25 m

Simulated pass-by

- PAK measuring system with 2 × 30 microphones

Removable pallets

- Closed exterior noise pallet
- Open interior noise pallet with space for pit lift

Vehicle fixation

- Hook fixation by chains and restraining bars
- Wheel hub fixation

Delivery zone

- Prototype-compatible indoor loading bay for high confidentiality
- Gate to the test bench 3.4 m × 3.4 m

Four-wheel drive chassis dynamometer

- Four individually driven rollers
- Roller diameter: 1.90 m (75")
- Force per roller: 7500 N
- Electrical power: 4 × 300 kW
- Test speed: 0–320 km/h
- Precise synchronization of rollers:
deviation max. 0.05 km/h, per axle max. ±1 mm
- Roller width: 550 mm
- Wheel track: 1100 mm
- Vehicle cooling: 20 km/h–100 km/h, speed-controlled,
min. 7000 m³/h, max. 42,000 m³/h,
incident flow height max. 800 mm
- For vehicles up to 4 t total mass with maximum axle load of
2 t and with 2200–4000 mm wheel base

Varying roller surface coverings

- Safety walk
- Rough-textured asphalt simulation
- Impact bars: 20, 15 and 7.5 mm

Equipment and evaluation

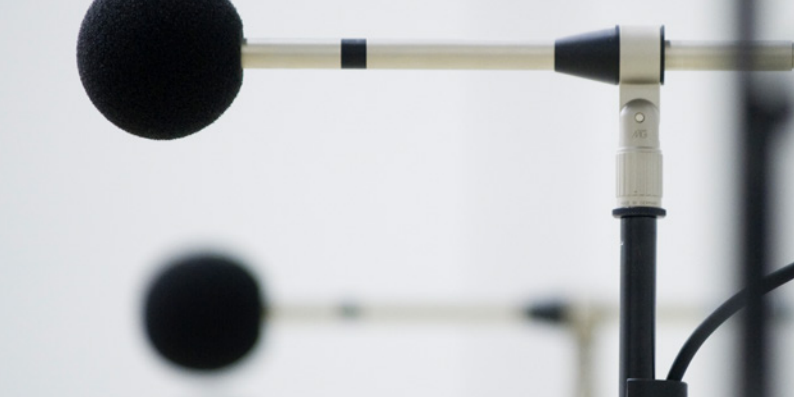
- Two separate and lockable evaluation and equipment
rooms with lifting platform

Further test facilities

- Test facility for windows
- Test facility for facades (reverberation room/semi-anechoic room)
- Test facilities for sound insulation (vertical and horizontal)
- Reverberation room: V = 392 m³
- Anechoic room: V = 1090 m³
- Semi-anechoic rooms
- Test facility for simulated rain shower according to
DIN EN ISO 140-18
- Acoustic wind tunnel: volume flow 35 m³/s,
variable test opening 0.5 m², incident flow up to 200 km/h

Specific measuring methods

- PAK measuring system for simulated pass-by
- HEAD measuring system
- SQ-Lab/Artemis
- Binaural artificial head measurement technique and analysis
- Laser scanning vibrometer
- Acoustic near-field holography (microphone array for acoustic
near-field holography and beamforming)
- Airborne and structure-borne sound intensity
- Measuring systems for material parameters:
sound absorption at normal sound incidence (impedance tube),
flow resistance, dynamic stiffness, modal analysis



Contact

Fraunhofer Institute for Building Physics IBP
Nobelstrasse 12
70569 Stuttgart, Germany

Contact persons

Dr. Jens Rohlfing
Noise Control and Vehicle Acoustics
Phone +49 711 970-3306
jens.rohlfing@ibp.fraunhofer.de

Michael Krämer
Noise Control and Vehicle Acoustics
Phone +49 711 970-3355
michael.kraemer@ibp.fraunhofer.de

www.ibp.fraunhofer.de/acoustics

The Fraunhofer IBP is a member of the Fraunhofer Traffic and Transportation Alliance, which develops technical and conceptual traffic and transportation solutions for public and industrial clients and transfers them into practical applications.

Photo acknowledgments

© Fraunhofer Institute for Building Physics IBP