



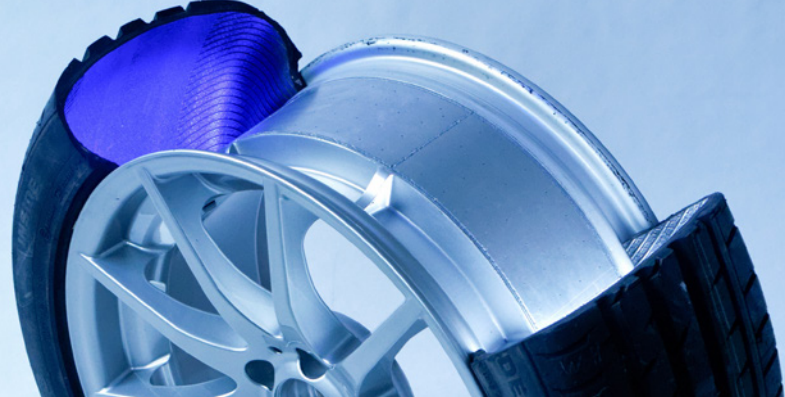
**Fraunhofer**  
IBP

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



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

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#### 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

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#### Further test facilities

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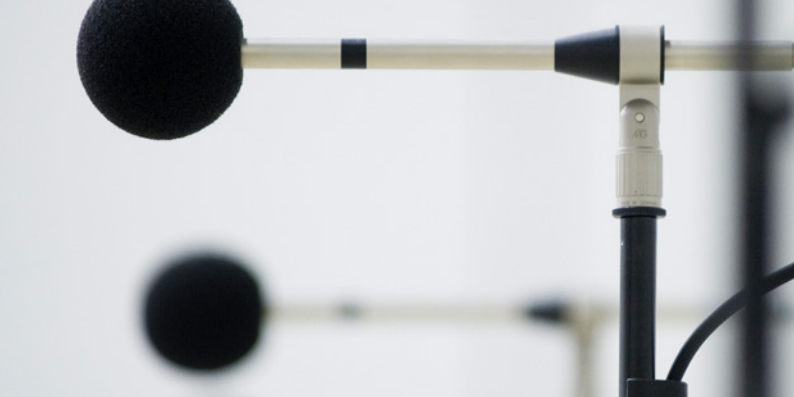
- Test facility for windows
- Test facility for facades (reverberation room/semi-anechoic room)
- Test facilities for sound insulation (vertical and horizontal)
- Reverberation room: V = 392 m³
- Anechoic room: V = 1090 m³
- Semi-anechoic rooms
- Test facility for simulated rain shower according to  
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

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#### Specific measuring methods

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- 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

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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

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