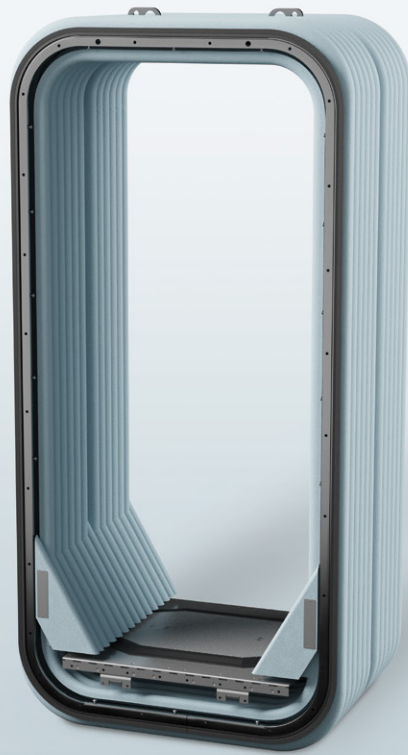




Gangway Systems & Components: **High-Speed Trains**

Robust design

- Premium materials from in-house production to ensure long service life

Safety and comfort

- Pressure-tight gangway construction guarantees maximum passenger comfort and protection at high speeds

Flexibility

- Systems are modularly constructed and can be individually customized for different car body contours

Maintenance friendly bridge systems

- Self-supporting designs, few parts subject to wear, and high general durability result in low maintenance effort

Gangway Systems & Components: High-Speed Trains

- Gangway system consists of **bellow with coupling frame**, a **bridge system** and – when desired – a **fairing system**
- Patented HÜBNER **Fairing** allows **energy savings** of up to 4%
- **Components** of the gangway can be **individually customized** and delivered separately
- All materials **meet applicable fire-safety standards** (e.g. EN 45545 HL1-HL3, NFPA 130, etc.) – other standards available upon request



Corrugated Bellows

Single corrugated bellows

- Compact design, low weight, cost-efficient solution

Double corrugated bellows

- For more demanding requirements in acoustic and thermal insulation

Attachment Systems

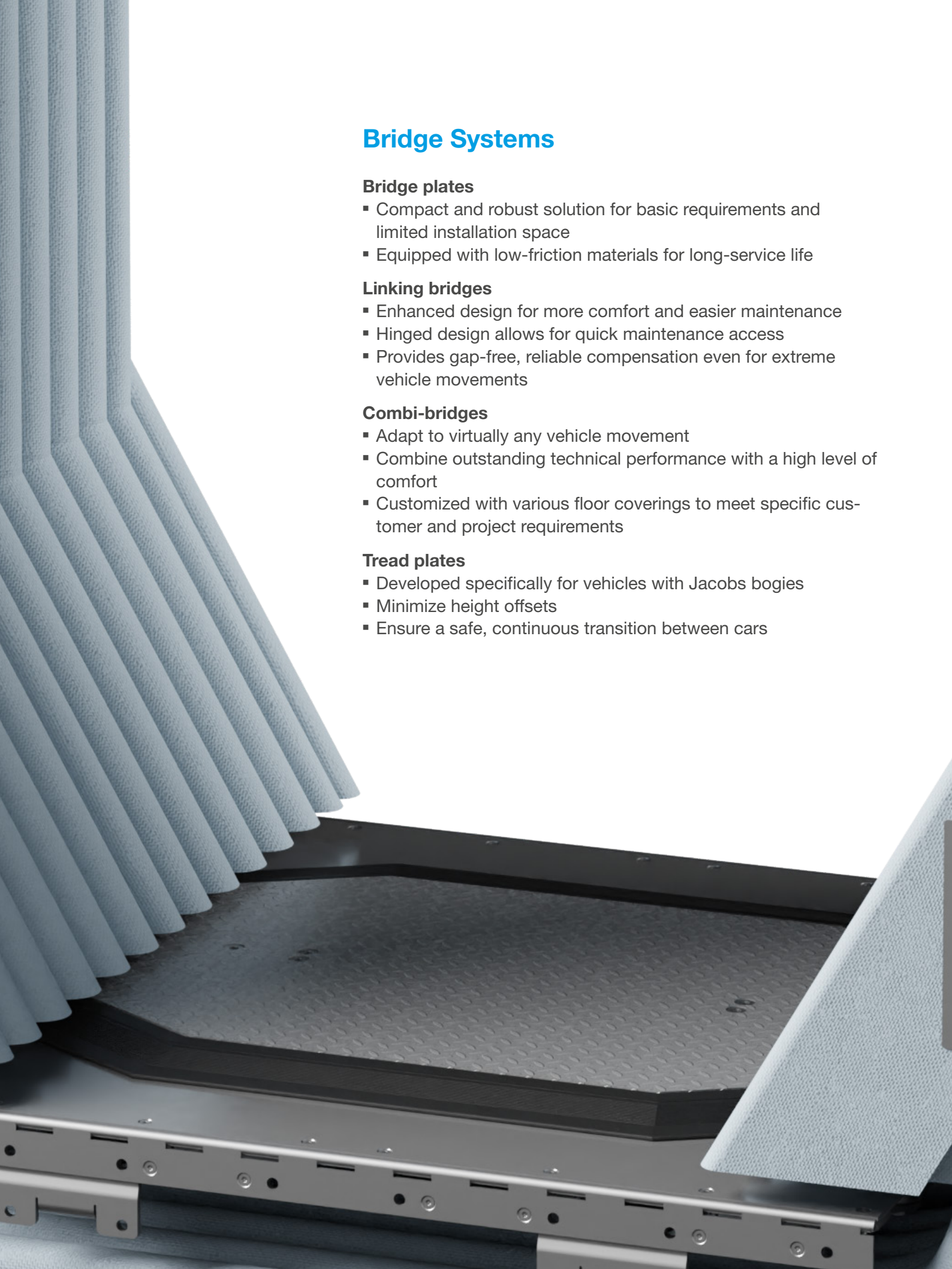
Bolted frame

- Simple, robust solution for standard applications

Coupling frame

- Fast disconnection or replacement; perfect when cars are frequently removed from a train set

Both options are pressure-tight and supplied with integrated sealing, requiring no additional sealing measures during installation



Bridge Systems

Bridge plates

- Compact and robust solution for basic requirements and limited installation space
- Equipped with low-friction materials for long-service life

Linking bridges

- Enhanced design for more comfort and easier maintenance
- Hinged design allows for quick maintenance access
- Provides gap-free, reliable compensation even for extreme vehicle movements

Combi-bridges

- Adapt to virtually any vehicle movement
- Combine outstanding technical performance with a high level of comfort
- Customized with various floor coverings to meet specific customer and project requirements

Tread plates

- Developed specifically for vehicles with Jacobs bogies
- Minimize height offsets
- Ensure a safe, continuous transition between cars

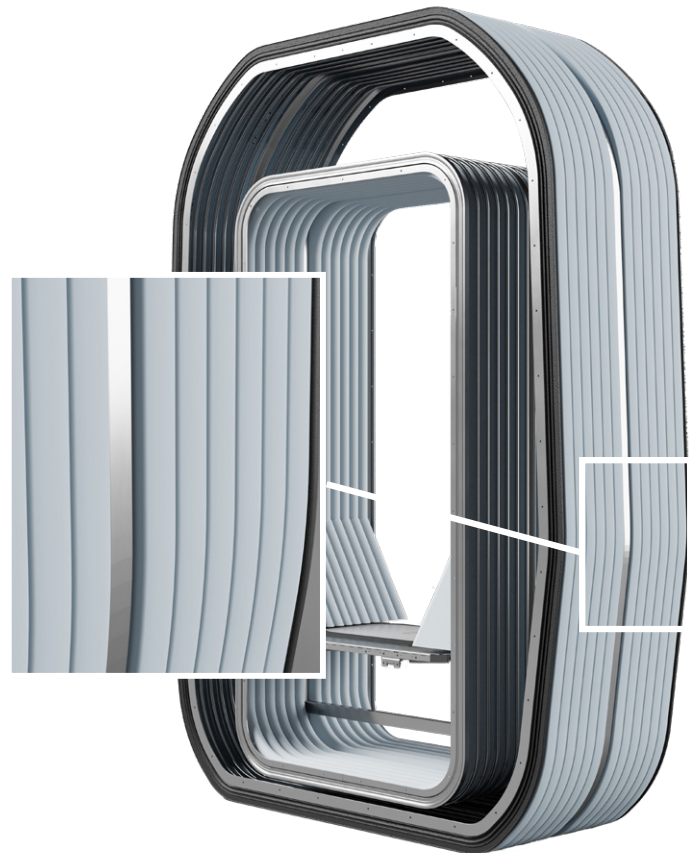
HÜBNER Fairing



- Fairings are a type of corrugated bellows providing a flush connection to the contour of the rail vehicle
- Patented rectangular configuration
- Gangways can be equipped with fairings that provide improved aerodynamics
- The resulting reduction in air resistance allows energy savings of up to 4%
- Application in all vehicle segments

Features

- Provides a smooth and virtually flat surface
- No seams visible at the corners
- Reduced space requirements
- Superior sound insulation

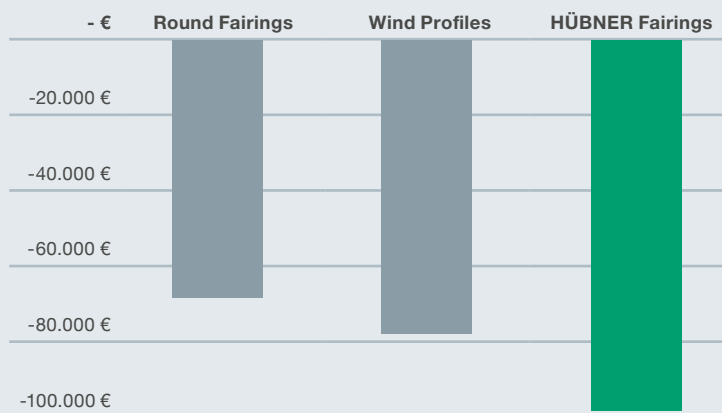


Cost-Saving Potential



Example of a 7-car very high-speed train

Cost savings of additional measures compared to no measure*



Breakdown of HÜBNER Fairing cost savings*

- 83 %** Traction effort savings
- 15 %** Thermal savings
- 2 %** Simplification of components

*data is per train and for 15 years, shown is the cost saving considering investment plus operational costs minus operational benefits, calculations are for a 7-car very high-speed EMU based on the Munich – Berlin very high-speed corridor, max. operation speed 280 km/h, Berlin climate conditions, for 15 years life-time of components, based on wind tunnel and heat loss measurements done by HÜBNER, further details and estimations for different trains and conditions are available on request

Benefits of the HÜBNER Fairing

Aerodynamic efficiency

- Reduction in air resistance allows energy savings of up to 4%

Safety

- Improved passenger safety on platform by closing the gap between train and platform

Thermal optimization

- Increase of thermal insulation reduces energy costs

Asset protection

- Protects cables & pipes between cars

Noise reduction

- Improved passenger experience due to higher noise insulation

Train body protection

- Covering of endwall against environmental influences (e.g. abrasion by sand) and unauthorized access