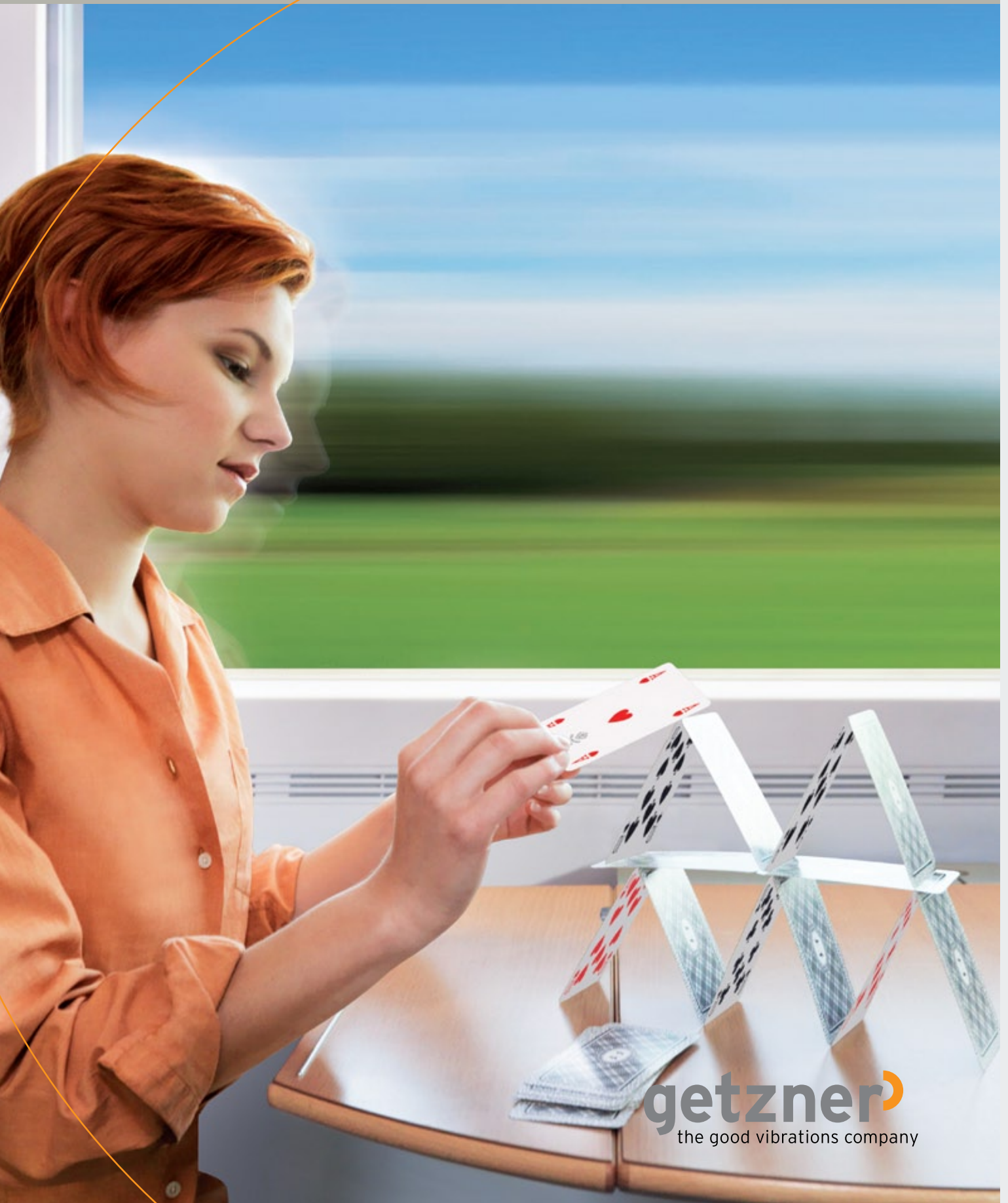
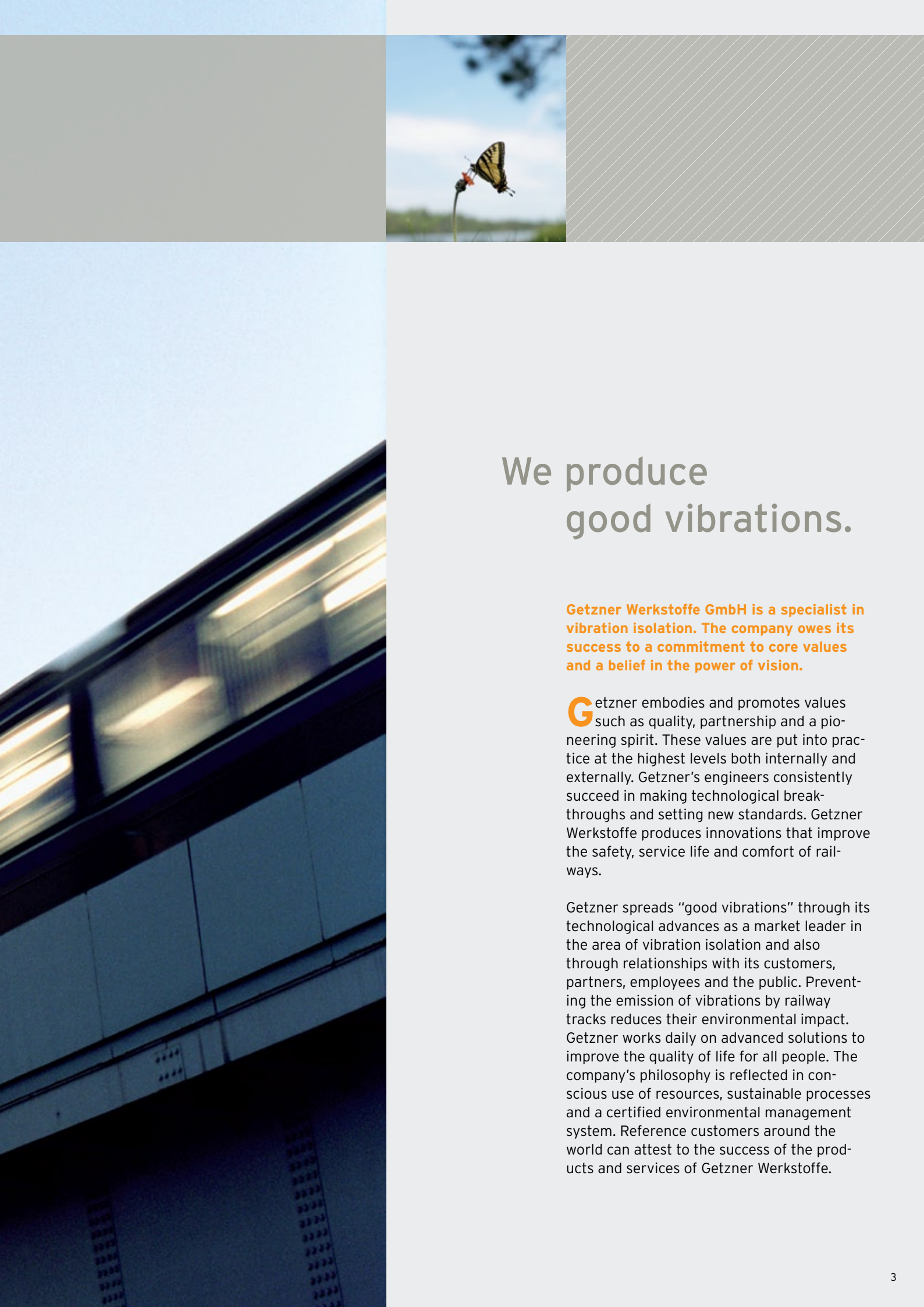


Elasticity for **Railway Superstructures**



1 | Values and Visions



We produce good vibrations.

Getzner Werkstoffe GmbH is a specialist in vibration isolation. The company owes its success to a commitment to core values and a belief in the power of vision.

Getzner embodies and promotes values such as quality, partnership and a pioneering spirit. These values are put into practice at the highest levels both internally and externally. Getzner's engineers consistently succeed in making technological breakthroughs and setting new standards. Getzner Werkstoffe produces innovations that improve the safety, service life and comfort of railways.

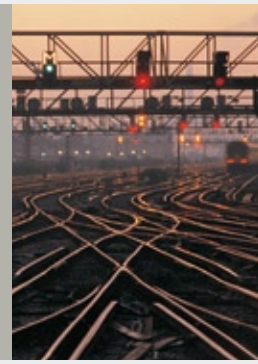
Getzner spreads "good vibrations" through its technological advances as a market leader in the area of vibration isolation and also through relationships with its customers, partners, employees and the public. Preventing the emission of vibrations by railway tracks reduces their environmental impact. Getzner works daily on advanced solutions to improve the quality of life for all people. The company's philosophy is reflected in conscious use of resources, sustainable processes and a certified environmental management system. Reference customers around the world can attest to the success of the products and services of Getzner Werkstoffe.

2 | Products to Meet the Highest Demands

Effectively
isolating
vibrations

Throughout the world, railways help improve connections between people and facilitate trade. As the diversity and density of rail traffic grows, so do the requirements with regard to availability, comfort and environmental friendliness.





One of the main problems in rail transportation is posed by the vibrations that are transmitted into the environment from the track superstructure, which we perceive as vibrations or structure-borne noise. Another main problem is the maintenance expenses that arise from material wear

due to insufficiently elastic tracks. Highly elastic products and systems for vibration isolation significantly reduce wear-related expenses for superstructure components and vehicles. For over 40 years, Getzner has developed technically advanced solutions for vibration isolation.

The product brands Sylomer® and Sylodyn® represent the standard for elasticity in railway superstructures. The polyurethane materials developed by Getzner are critical components in the industry for elastic superstructures. They perfectly satisfy the full range of requirements in railway applications, from local traffic to the transport of heavy goods.

The experts at Getzner Werkstoffe work together with customers to create individual and economical solutions based on the most recent technical advancements. The sleeper boot systems, rail fastenings and refurbishment recommendations for existing track sections are only a few examples of the trend-setting work in railway superstructures.



3 | Services



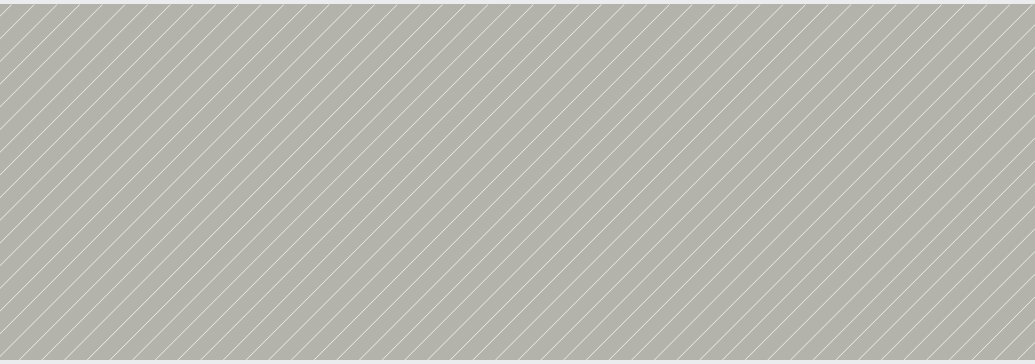
Getzner is much more than a manufacturer of first-class vibration isolation components. Customers benefit from the technical knowledge amassed in forty years of development and project work through the specialized services Getzner offers. The resulting system solutions are cost-efficient and utilize elastic materials that offer added comfort and noise protection.

From the very start, Getzner's experts play an integral role in the system development process and the definition of technical conditions for construction projects. Their expertise and know-how make them key development partners on every project. Computer simulations, material tests, measurements of effectiveness and technical advice on the implementation of the right solution have made Getzner one of the world's leading specialists and solution developers.

Our services include:

- Solution development
- Detailed solutions
- Calculations and simulations
- Effectiveness forecasts
- Technical vibration, mechanical and acoustic measurements
- Material testing and measurement at our own large-scale testing facility
- Project assistance
- Installation work
- Installation consulting and acceptance inspection
- Verification of effectiveness





Getzner engineering

The company offers comprehensive engineering services for all projects. Customers appreciate Getzner as a competent partner thanks to the company's many years of experience working on vibration issues. The consulting services also benefit from a large team of technicians and experienced project managers as well as specialized, state-of-the-art testing equipment.



4 | Components and Solutions

The whole is more than the sum of its parts.

Competence and variety

Getzner's international success in the isolation of vibrations in the rail industry rests on three pillars:

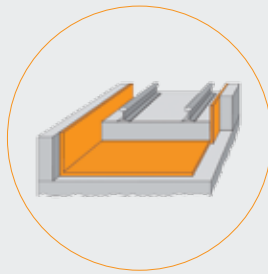
- First-class materials
- Comprehensive know-how
- Specialized supplemental services

These factors yield solutions where the result is more than the sum of its parts.

Getzner offers components and solutions for:

- Supports for mass-spring systems
- Sub-ballast mats
- Insertion pads for sleeper boots
- Sleeper pads
- Baseplate pads
- Rail pads
- Continuous rail support
- Embedded rails
- Rail groove fillers

Components and Solutions



Supports for mass-spring systems

Supports for mass-spring systems from Getzner provide particularly effective protection against noise and vibrations to people living near a railway line. Efficient vibration isolation therefore also has a positive influence on the value of real estate that is exposed to such vibrations.

Getzner offers three options for supporting mass-spring systems: point-like, linear and full-surface support. Which of these types should be used depends on economic as well as technical considerations. The lowest natural frequency achieved to date in the numerous mass-spring systems realized in local and long-distance railway lines is 5 Hz.

Mass-spring systems with supports from Getzner Werkstoffe are used in more than 40 cities, on high-speed lines (Cologne-Frankfurt) and on various standard-gauge railway lines around the world.



Point-like support



Linear support



Full-surface support

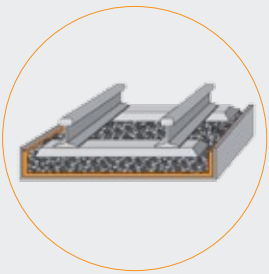
Mass-spring system for tram lines

The "light mass-spring system" is a variant of full-surface support that is primarily used for tram lines. In this system, base and side wall mats completely decouple the track bed from its surrounding environment with regard to vibrations.

This simple method is made very effective and economical by Getzner mats and has already proven itself in many cities around the world.



Supports for mass-spring systems



Sub-ballast mats

A high level of track elasticity is achieved through installation of Getzner sub-ballast mats. The reasons for installing these mats range from reducing secondary air-borne noise or providing vibration protection to preserving the ballast.

The respective technical vibration requirements must be carefully considered in selecting the appropriate mat type. The high effectiveness of Getzner mats is based on the adapted dynamic stiffness. They also stand out in terms of quality and economy. They are easy to work with, can be installed quickly and can be driven over by heavy construction vehicles. Getzner mats have also proven themselves well in retrofitting projects through a special installation process.

The economic and technical performance of Getzner sub-ballast mats can be seen around the world in the more than **5 million m²** that have been installed so far in:

- High-speed lines
- Standard-gauge lines
- Urban rail systems

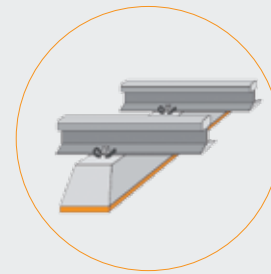


Insertion plates for sleeper boots

Slab track systems must have sufficient elasticity in order to activate the load-distributing effect of the rails. A wide range of options exist for the arrangement of elastic components.

One advantage offered by an elastically supported sleeper block is reduced emission of air-borne sound because the vibration must travel through the additional support mass. A larger elastic support surface also results in lower edge pressure.

A two-stage elasticity additionally reduces the pressures in the insertion pads and saves wear on the rail fastenings. With the ability to manufacture insertion pads of any desired stiffness, Getzner can meet the widest possible range of requirements. The most frequent applications for this system are found in various types of tunnel sections.



Sleeper pads

Sleeper pads provide vibration protection, preserve the ballast under the tracks and lengthen the service life of the track. They are used on high-speed tracks, on tracks with high axle loads and on existing tracks during refurbishment.

Sleeper pads are already installed at the sleeper factory using an optimized joining system. This means that no additional work is necessary at the construction site. Installation takes place quickly regardless of the weather and with minimal line interruptions.

Padded sleepers have proven themselves well, particularly for special track construction methods, such as for switches, crossings, transition areas and expansion compensation, and have become the technical standard in many countries.



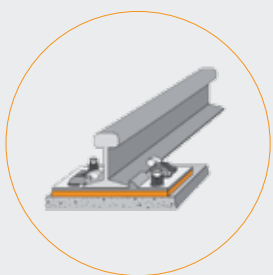
Sub-ballast mats



Rail pads



Baseplate pads

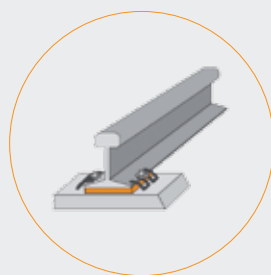


Baseplate pads

Modern railway lines are increasingly built as slab track systems. Highly elastic Getzner baseplate pads provide elasticity for such tracks. They are installed between the grooved baseplate and the concrete support slab.

Elastic baseplate pads preserve the load-distributing function of the rails and reduce vibrations due to wheel and track irregularities. The rail head deflection during train passage can be reduced by adapting the stiffness distribution of the baseplate pad.

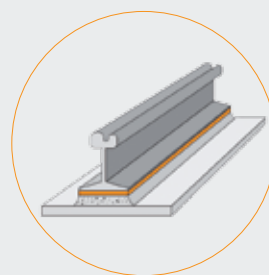
Getzner Werkstoffe has successfully met the specific requirements of projects around the world in more than 50 cities as well as on various high-speed lines.



Rail pads

Elastic rail pads are placed directly under the rail base. They have a defined stiffness and increase the elasticity of the ballasted track.

The improved load distribution yields greater passenger comfort and less wear on the superstructure. The increased elasticity has a positive effect on the wearing of superstructure components and rolling stock. Getzner Werkstoffe offers a full range of rail pad designs in any stiffness - from standard-gauge railways to tram lines.



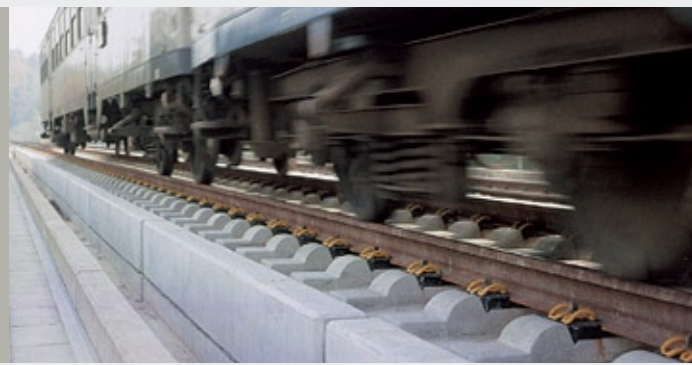
Continuous rail support

A continuous elastic rail base support that compensates for installation-related height differences while still remaining economical can be realized using the "continuous rail support" solution developed by Getzner.

The stiffness and deflection of the rails are precisely defined in advance, and appropriate selection of a material ensures that these targets are met.



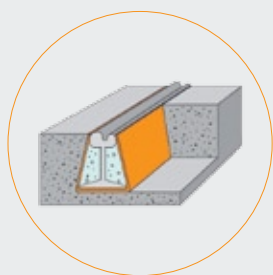
Embedded rails



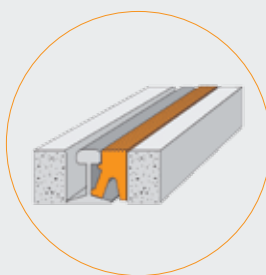
Insertion plates for sleeper shoes



Sleeper pads



Embedded rails



Rail groove fillers

Acoustic decoupling of the rails from the substructure was the starting point for the development of Getzner's "embedded rails" system for local rail transport.

The system consists of two cavity filling elements and one rail base support with a defined, homogenous elasticity. The special design of the cavity filling element ensures an outstanding connection with the surrounding concrete.

These three useful components are fastened to the rail profile with a precise fit. The stiffness of the parts is adapted to the specific needs of local rail transport companies.

Typical applications for rail groove fillers include rail profiles and tracks laid in urban areas that cross roads and other individual transportation routes. The filler profiles can be used to close up the grooves required for the rail wheel, thereby eliminating one hazard for vehicles crossing the tracks.

Additional applications include railroad crossings and connecting tracks on factory grounds. Getzner supplies rail groove fillers for all typical rail profiles.



5 | International References



Oresund Bridge between Copenhagen and Malmö

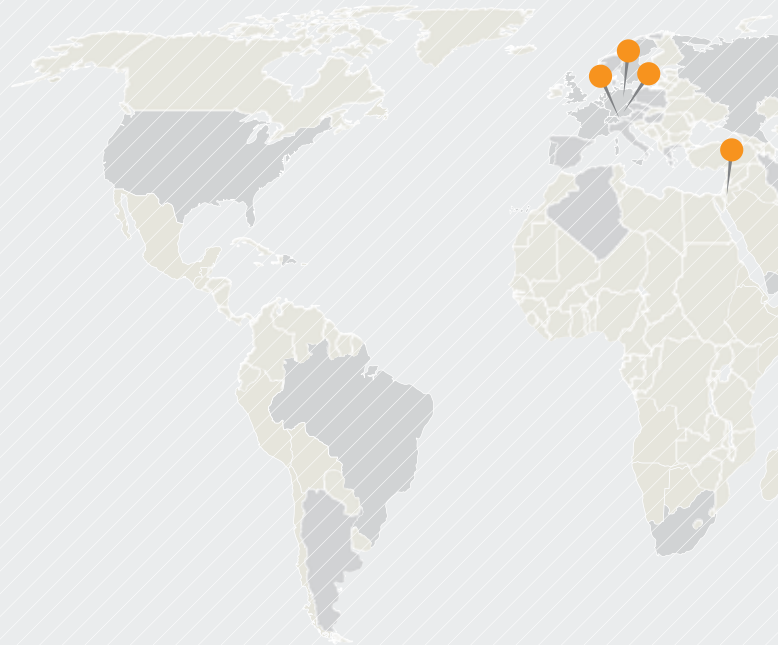
Getzner solutions can be found around the world - as can Getzner experts. With our five branch offices, we have a local presence in important geographic regions. We service practically all of the relevant markets in the world with our numerous sales partners.

Branches in:

- Bürs, Austria
- Berlin, Germany
- Grünwald near Munich, Germany
- Amman, Jordan
- Tokyo, Japan

Sales partners in:

- | | | |
|------------------|---------------|----------------|
| - Argentina | - Hungary | - Saudi Arabia |
| - Australia | - India | - Singapore |
| - Belgium | - Iraq | - Slovenia |
| - Brazil | - Italy | - South Korea |
| - China | - Japan | - Spain |
| - Czech Republic | - Jordan | - Sweden |
| - Denmark | - Lebanon | - Switzerland |
| - Egypt | - Netherlands | - Syria |
| - Finland | - Norway | - Taiwan |
| - France | - Palestine | - Turkey |
| - Great Britain | - Portugal | - USA |
| - Greece | - Romania | |





London Underground



Barcelona tram system



Potsdamer Platz Berlin

Projects realized by Getzner speak for themselves. Here is a sampling of our reference list in the railway sector:



Standard-gauge railway

Select customers:

- ÖBB, Austria
- DB AG, Germany
- SBB, Switzerland
- SNCF, France
- RENFE, Spain
- FS, Italy
- Banverket, Sweden
- Jernbaneverket, Norway
- Banedanmark, Denmark
- SNCB, Belgium
- Pro Rail, Netherlands
- CP, Portugal
- CD, Czech Republic
- Network Rail, Great Britain
- Chinese National Railways, China
- THRSC, Taiwan
- KNR, South Korea
- Union Pacific Railroad, USA

Select projects:

- West rail line Bregenz-Vienna, Austria
- HGV Hannover-Würzburg, Germany
- HGV Cologne-Frankfurt, Germany
- Madrid-Barcelona, Spain
- HSL Zuid, Netherlands
- Taipei-Kaohsiung, Taiwan
- Seoul-Busan, Korea
- NEAT: Lötschberg Tunnel, Zimmerberg Tunnel, Switzerland
- HSL Rome-Naples, Italy
- Oresund Link, Denmark, Sweden
- Cronulla Line, Australia
- Wuhan-Guangzhou, China
- Channel Tunnel Rail Link, England, France
- Helsingborg Tunnel, Sweden
- Falkenberg Tunnel, Sweden
- Tiergarten Tunnel, Berlin North-South, Germany
- Gautrain, South Africa

Tram lines

- Alicante
- Augsburg
- Barcelona
- Berlin
- Bern
- Bordeaux
- Dresden
- Esfahan
- Essen
- Florence
- Geneva
- Graz
- Grenoble
- Gothenburg
- Le Mans
- Linz
- Lyon
- Madrid
- Marseille
- Milan
- Munich
- Nantes
- Nice
- Nottingham
- Nuremberg
- Paris - St. Denis
- Rome
- Rouen
- Seville
- Shiraz
- Strasbourg
- Stuttgart
- Tenerife
- Valencia
- Vienna
- Zurich

Underground lines

- Amsterdam
- Athens
- Bangkok
- Berlin
- Bochum
- Budapest
- Buenos Aires
- Dortmund
- Hamburg
- Hong Kong
- Krakow
- London
- Los Angeles
- Milan
- Munich
- New Delhi
- New York
- Nuremberg
- Osaka
- Prague
- Sao Paulo
- Seoul
- Singapore
- Tokyo
- Vienna

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