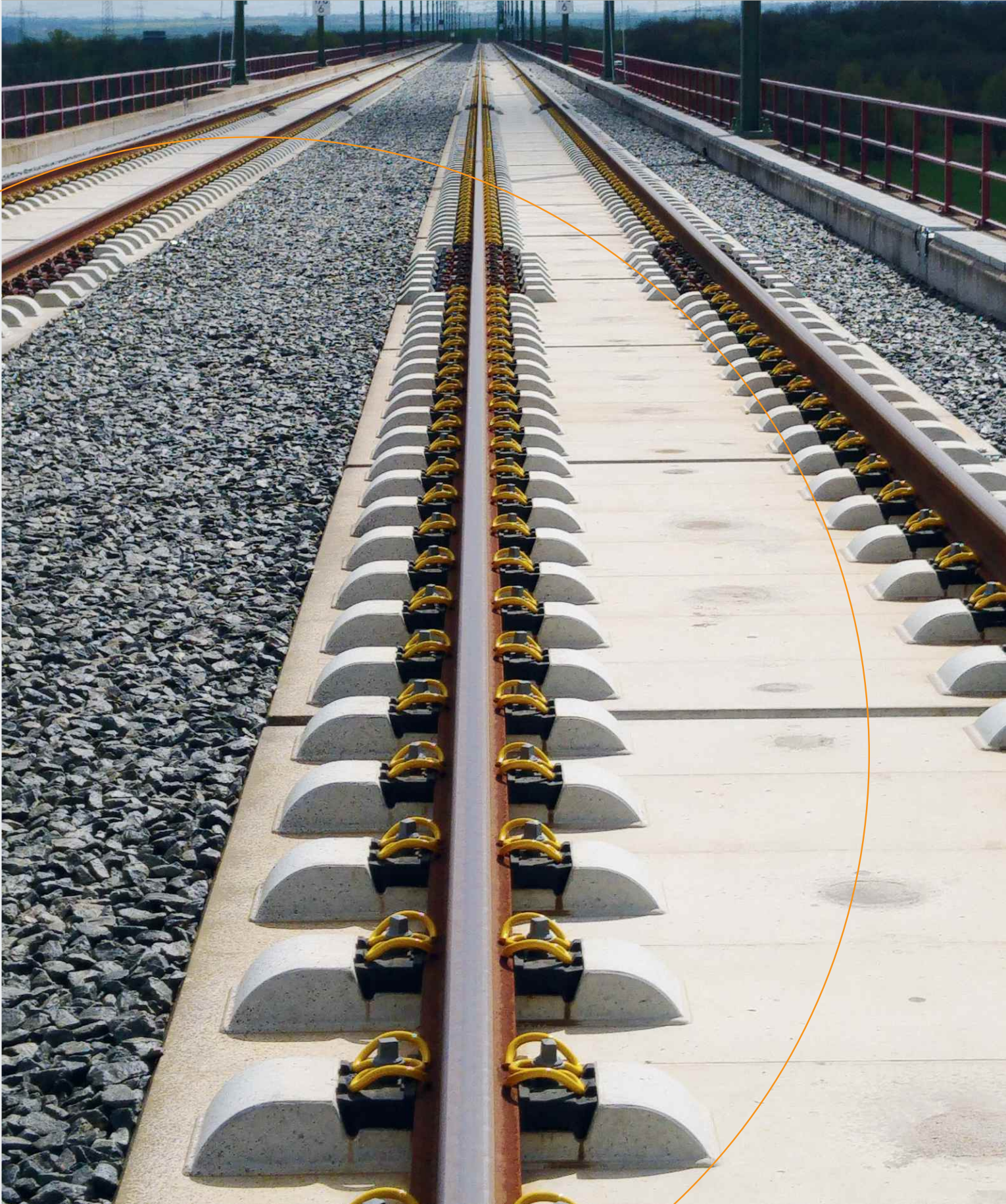
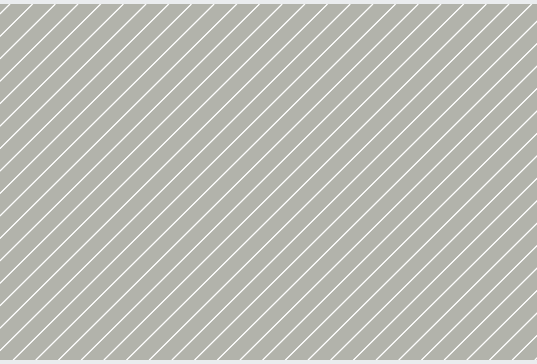


Elasticity in Slab Track with **Baseplate Pads**



1 | Optimisation of Slab Track





High-speed rail fastening system during assembly

Baseplate pad in urban railway network

Less maintenance.
Less noise.

Getzner baseplate pads provide the elasticity that a slab track superstructure requires. The advantages include lower life cycle costs for network operators and less noise in the surroundings of railway lines.

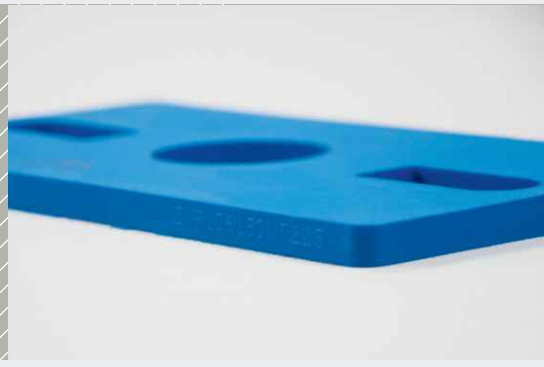
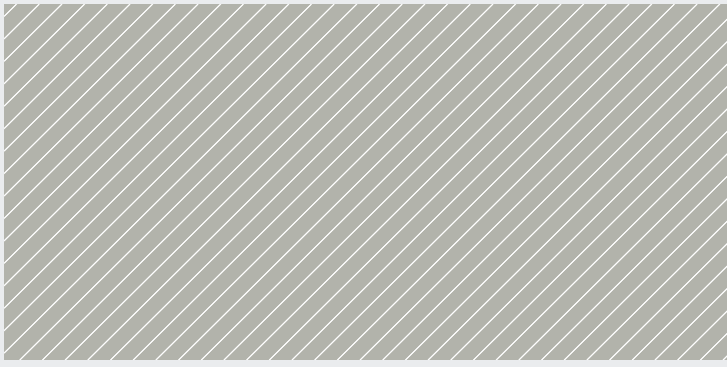
Slab track is used all over the world for railways, tramway lines and subway systems. The lack of elasticity, which in the case of ballasted track is provided by the ballast itself, means that the superstructure components are subjected to high levels of loading. In addition, the noise levels caused by

passing trains are considerably higher than with a ballasted track. Vibrations and structure-borne noise are transmitted into neighbouring buildings, adversely affecting living and working conditions.



Slab track with bridge transition zone in the DB network

Getzner Sylodyn® baseplate pads add elasticity to the slab track.



Baseplate pad ZWP 104/150 NT 22.5

Lower dynamic forces

Fastening systems elastically supported with Sylodyn® baseplate pads significantly increase the elasticity of the slab track superstructure. The rails are decoupled from the subsoil and the high dynamic forces exerted on the rail, fastening system and slab are greatly reduced.

Everyone benefits from the higher levels of elasticity

For network operators, there is less damage to the superstructure components. Installing baseplate pads significantly reduces the life cycle costs of a line and extends its service life. Surveys demonstrate that railway lines generate less structure-borne noise, resulting in better protection for residents and vibration-sensitive buildings and systems. Passenger comfort increases as well, as the amount of vibration in the rail vehicle is also minimised.



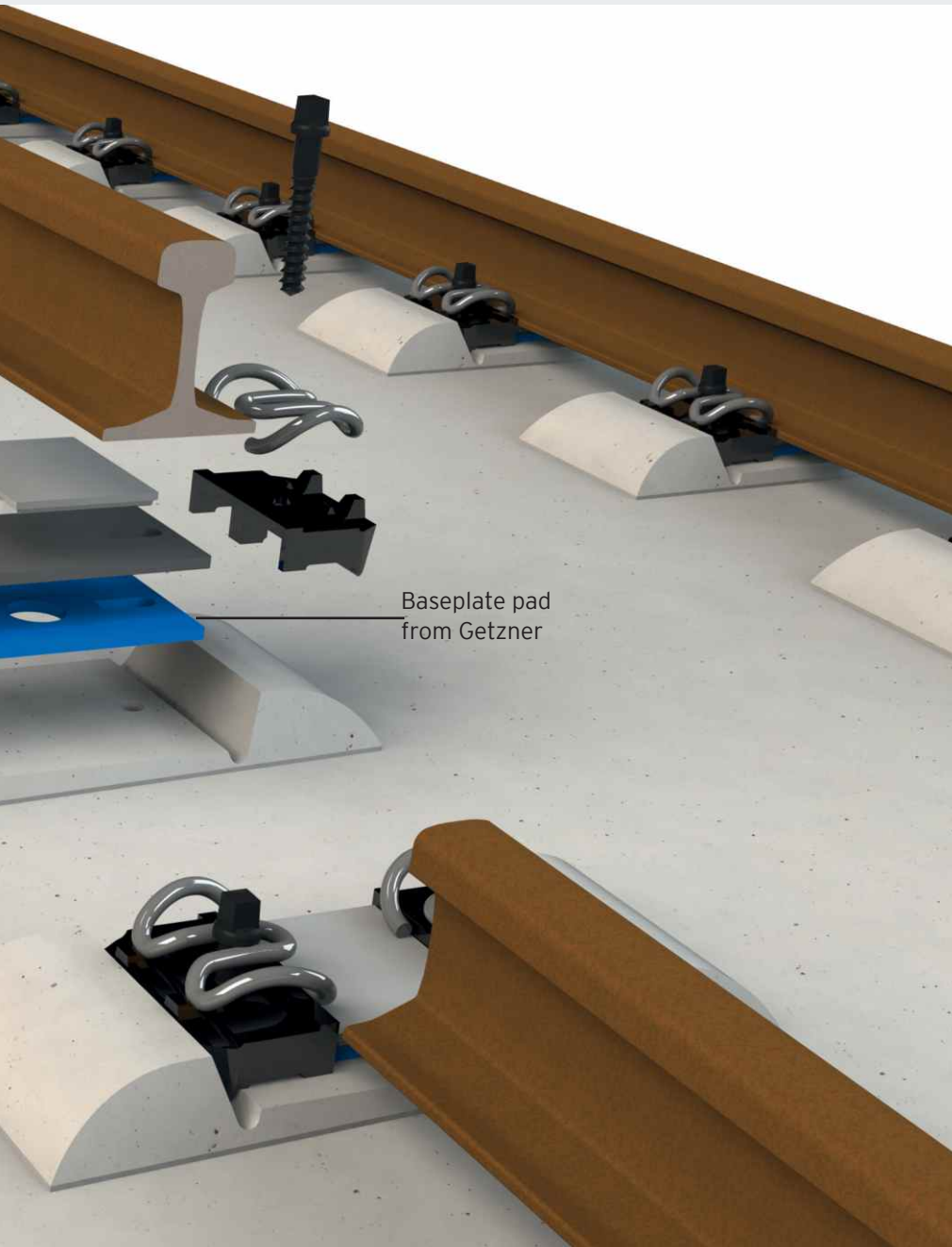
Slab track with elastically supported fastening systems for high-speed network



Syloodyn® HS (High Strength) baseplate pad for maximum loading



Baseplate pad for special applications



Baseplate pad from Getzner

Advantages

- Defined elasticity in the slab track
- Lower dynamic forces
- Improved load distribution
- Less maintenance required
- Reduced life cycle costs
- Less emission of structure-borne noise
- Protects vibration-sensitive buildings
- Less vibration in rail vehicles

2 | System Solutions for all Applications



Elastically supported fastening system in high-speed turnout, South Korea

Perfectly tailored.
Extremely durable.

Getzner produces customised solutions. What type of baseplate pad to use is determined by the characteristics and requirements of the line in question.

Whether for urban railway networks or high-speed lines, Getzner baseplate pads provide higher levels of elasticity for every type of application. What type of baseplate pad to use depends on a number of factors: on the one hand, the material specification is dictated by the dynamic requirements, while on the other the stiffness and geometry of the baseplate pad are determined by the properties of the fastening system.

Design of baseplate pad determined by:

- Dynamic requirements
- Stiffness specification
- Permitted deflection
- Baseplate geometry
- Design of fastening system

Special solutions

Maintenance-intensive parts of the railway network, such as turnouts, bridges and transition zones, require a great deal of attention, as they play a major role in determining the profitability of a line. As the loading of superstructure components in these areas is well above average, the amount of maintenance they require is much higher than in “normal” track sections.

Getzner provides special solutions for these critical areas. The most suitable

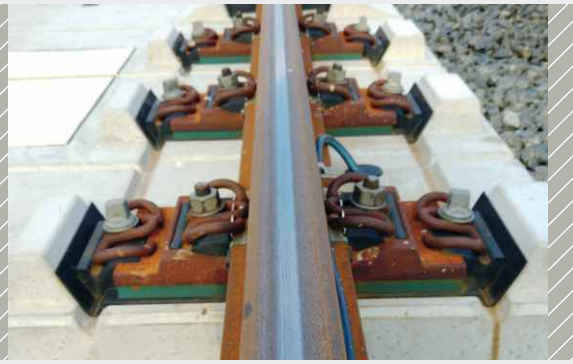
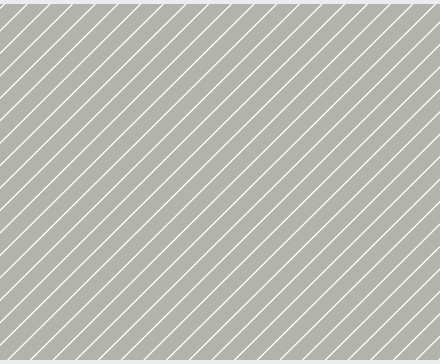
baseplate pad is determined using sophisticated forecasting models. The result: asymmetrical loading and stiffness fluctuations are reduced and less maintenance is required.

Quick installation

Baseplate pads can be installed quickly and easily directly under the baseplate. The instructions provided by the manufacturer of the respective fastening system must be considered (e.g. preload forces).



Customised solutions to satisfy the most stringent requirements



Baseplate pads on a bridge transition zone in the DB network

Elastically supported urban railway turnout

Sylodyn® – the high-tech material

Sylodyn® is a polyurethane material and has been used with great success for baseplate pads all over the world for more than 20 years. The advanced Sylodyn® HS (High Strength) version is designed specifically for applications where extreme loads are encountered – for example heavy haul.

Properties

- High mechanical load capacity
- Excellent dynamic to static stiffness ratio
- Defined level of elasticity
- Homogeneous material (volume-compressible)
- Outstanding long-term behaviour
- Stiffnesses and geometries for every application

Advantages

- Improved track bed stability
- Protects track superstructure (optimal load distribution)
- Effective vibration protection
- Constant performance under high loads and environmental impacts
- Reduced life cycle costs (less maintenance required)
- Permits flexible fastening system design



Installation of baseplate pads in the NYC Transit subway system – in use for 20 years

3 | Advanced Manufacturing Technologies



Punching

Individual solutions.
Unlimited opportunities.

The wide range of manufacturing methods used for the production of baseplate pads offers immense versatility.

Getzner develops tailor-made solutions for every customer. The choices available in the production of baseplate pads are equally wide-ranging – be they special formulations, geometries or material combinations. Semi-finished goods are cast continuously or in moulds. They are then tailored and labelled.

Tailoring

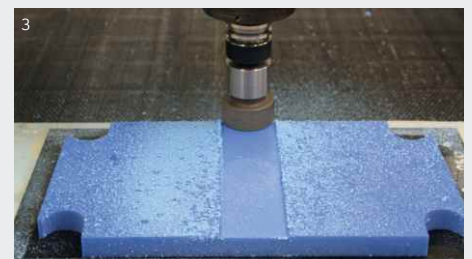
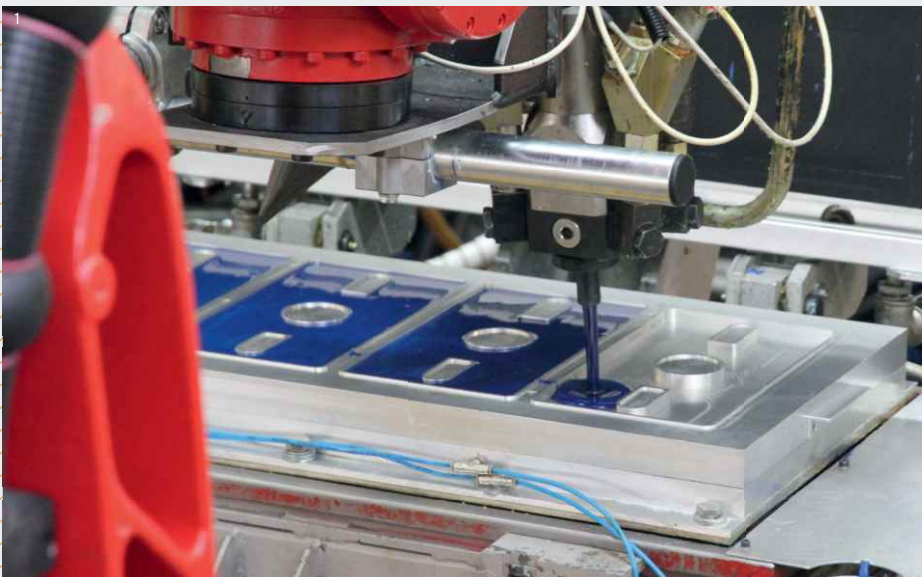
- Punching
- Water jet cutting
- Skiving
- Milling
- Bonding

Labelling

- Inkjet
- Screen print
- Laser
- In the mould



Water jet cutting



1 + 2 Cast moulding 3 Milling

4 | Tested and Approved



Extensive system tests

Impressing quality.

Before they leave the factory, Getzner baseplate pads are tested, in-house and externally, in accordance with the relevant standards and delivery conditions. Beyond that Getzner possesses national approvals for certain types.

Baseplate pads are subject to a continuous strict quality testing, even during the production process. This involves thoroughly testing them for their suitability in rail fastening systems not just on the in-house test rig, also in many cases by independent

external bodies as well, such as the Technical University of Munich (Chair and Institute of Road, Railway and Airfield Construction).

Standards & supply agreements

Getzner baseplate pads are normally tested according to the relevant national or European standards (e.g. EN 13146 & EN 13481) or supply agreements (e.g. DBS 918 235). Alternative testing parameters can, if requested by the customer, be included in the product specification.

Approvals

Many Getzner baseplate pads – such as the ZWP 104 NT – have been approved by the German Federal Railway Authority and Deutsche Bahn, as well as from various other national bodies.



Baseplate pads are subject to intensive testing on the in-house test rig

Getzner as a solutions provider

- System testing on the in-house large-scale test rig
- Forecast calculations based on finite element method
- Customised solutions
- Compatible with a wide range of fastening systems
- Versatile application options
- On-site support

5 | References



Slab track construction in China

Proven solutions around the world.

Getzner baseplate pads have been in use all over the world for decades and are well established.

High-Speed Line Wuhan-Guangzhou, China

The 1,000 km Wuhan-Guangzhou section is part of China's high-speed network. The slab track, which is designed to handle speeds of up to 350 km/h, came into service in 2009.

The Sylodyn® ZWP 104 NT 22.5 baseplate pads, which have now been in use for more than 6 years, were recently subject to a series of random tests. The results speak for themselves: the baseplate pads have not suffered any damage and the stiffness figures remain within the tolerance range associated with brand new products. The dynamic to static ratio of 1.13 is outstanding.

Getzner has to date supplied more than 30 million baseplate pads for the Chinese high-speed network.



Jubilee Line Extension, London Underground, Great Britain

Getzner baseplate pads were installed during the extension of the London Underground Jubilee Line in 1996. The aim was to protect the buildings in the surroundings from noise and vibration.

Having lain in track for 20 years, London Underground decided to remove some baseplate pads in different sections to check their material properties. A series of extensive tests

revealed that the pads are retaining their full functionality. Their thickness remains within the tolerances laid down in 1996 and the dynamic to static stiffness ratio of 1.5 is very good.

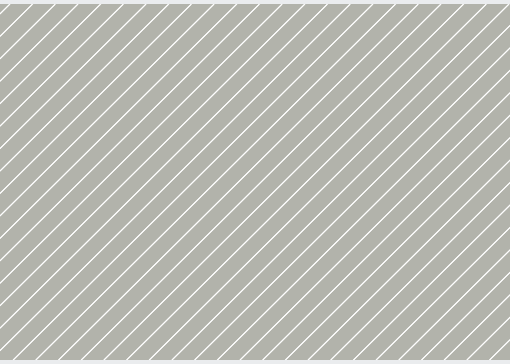
The test results give us confidence that the baseplate pads will retain their effectiveness for decades to come.

Wuhan-Guangzhou (CN)

- High-speed line with speeds up to 350 km/h
- Installed 2009
- In use for 6 years: values the same as brand new baseplate pads
- More than 30 million baseplate pads in use in China (approx. 4,500 km double-track)

Jubilee Line (GB)

- Urban railway
- Installed 1996
- 565 million metric tons by 2016
- More than 200 million passengers a year
- After 20 years' service: dynamic to static ratio 1.5



ZWP 104 baseplate pad in China after 6 years



Removing of baseplate pads at London Underground network



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- Tramway line, Munich (DE)
- Tramway line, Augsburg (DE)
- Underground, Nuremberg (DE)
- Underground, Frankfurt (DE)
- Metro Budapest (HU)
- Metro Prague (CZ)
- Metro Milan (IT)
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- Metro Hyderabad (IN)
- Metro Bangalore (IN)
- Metro Kochi (IN)
- SMRT Singapore (SG)
- Hong Kong Airport Express Link (CN)
- Metro Seoul (KR)
- Gimpo Urban Rail (KR)

For more references, visit:
<https://www.getzner.com/en/references>

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