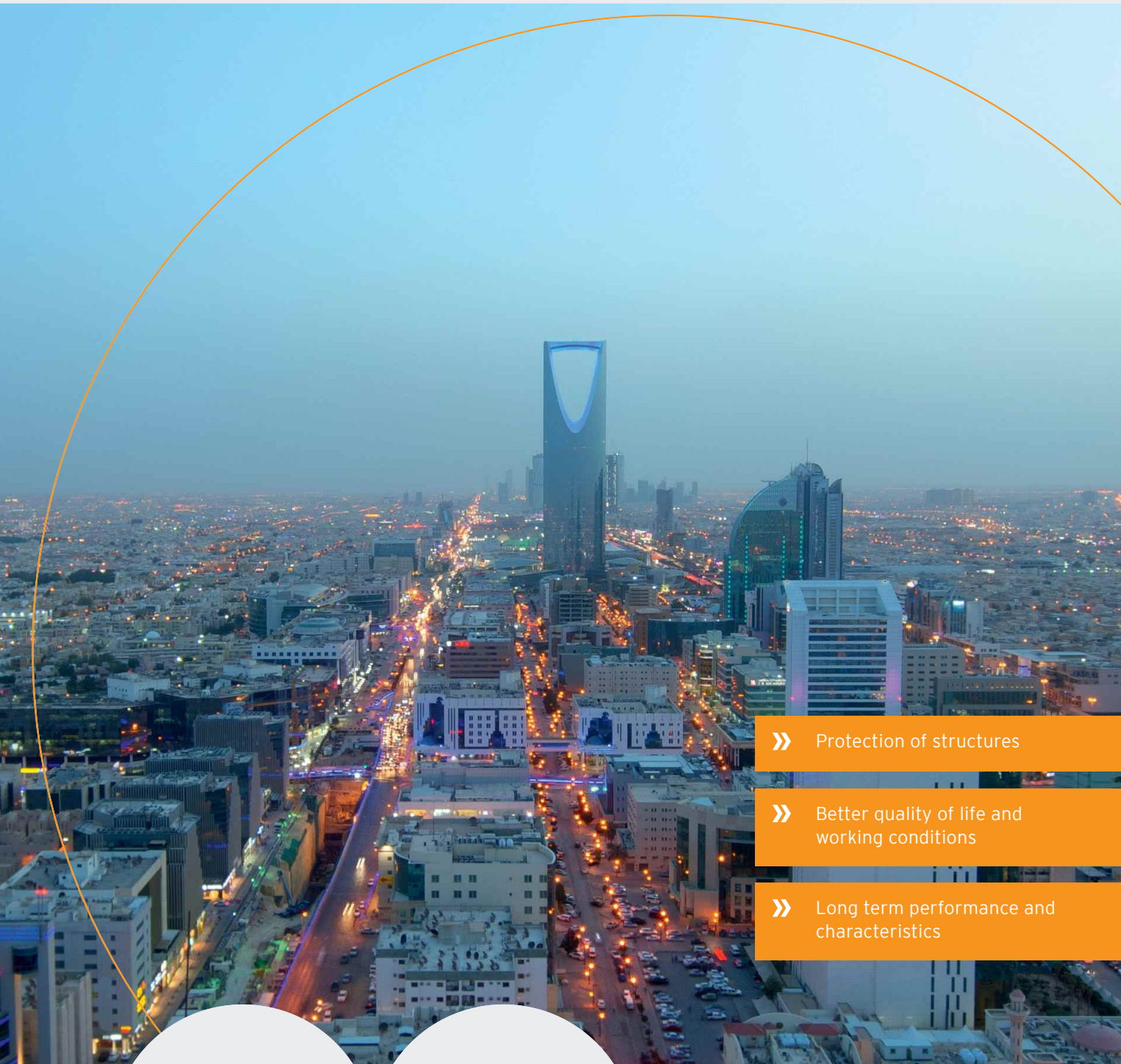


Case Study

State-of-the-art Noise Reduction for Riyadh Metro



» Protection of structures

» Better quality of life and working conditions

» Long term performance and characteristics



Highly efficient noise and vibration mitigation

Project Description

The Riyadh Metro rail network embodies the backbone of the public transportation system. The network connects public facilities with local residents and commuters as well as educational, commercial and medical institutions. It is connected to King Khalid International Airport, King Abdullah Financial District, main universities, downtown and the public transport center.

Due to previous references in the region, as well as the very good relationship to consultants and contractors, Getzner was commissioned in 2016 for its excellent products and solutions to protect people living close to railway lines against vibrations and noise.

The Riyadh Metro Project is the biggest metro project in GCC (Gulf Cooperation Council) and is executed by the Riyadh Development Authority (RDA) in Saudi Arabia. The project involves the construction of a metro rail network across various locations in Riyadh. The metro has six main routes covering a total length of approximately 177 km with 85 stations in total, including underground, ground level and elevated stations. More than 73 km of the metro in the capital is underground, which is about 40 percent of the total length.

Twice as much urban traffic expected by 2030

The metro project is part of Riyadh's Public Transport Project (RPTP) plan that was approved by the Council of Ministers in 2012. The project is also known as 'King Abdulaziz Public Transportation Project'. The current daily traffic demand is 7.4 million traffic trips, whereof almost 90 percent is met by private automobiles. The daily demand is expected to exceed 12 million traffic trips by the year 2030. This huge increase in traffic linked with high dependence on cars

has led to severe traffic congestion, especially during peak hours.

A sophisticated public transportation system

In order to meet the growing challenge of rapid urban growth, a sustainable public transportation system was carried out as a cornerstone with the aim of reducing automobile dependence and significantly improving the service level of the transportation system. To guarantee the high standard and availability as well as longer service life for the six metro lines, Getzner

Advantages

- Highly effective protection against vibrations and structure-borne noise
- Cost-optimised solutions achieved by selecting project-specific materials
- Improved quality of life and working conditions for residents
- Minimisation of loads on the rail seat
- Smoothing of rail deflection
- Quick and simple installation
- Increased safety and travelling comfort





Tunnel ready for installation



Baseplate pads for VAE turnouts

provides appropriate products and solutions to minimise downtime, to reduce maintenance costs and to increase lifetime. Furthermore, these measures effectively reduce vibrations and noise in urban areas that are caused by metro traffic and protect track structures and rail vehicles enabling smooth metro operation.

The Getzner solution

Elastic components against disruptive vibrations

For the Riyadh Metro Project 5 dB insertion loss was to be achieved in the first section. In the other section, a natural frequency of 8.4 Hz was desired. Getzner tailored a dedicated solution for the different Riyadh Metro track lines varying between full surface and strip bearing isolation for the viaduct, at-grade, tunnel sections, as well as 12 elevated stations (Stations Mezzanine).

Better quality of life and working conditions

Two types of mass-spring systems were implemented due to the different requirements at each section. The first system consisted of full surface single type of vibration mitigation material with side mats. The second solution considered a

strip bearing system including shear keys isolation and filler material serving as lost formwork.

Mass-spring systems are used in applications with extremely stringent requirements for protection against vibration and structure-borne noise. These demanding vibration and acoustic isolation requirements are successfully met by Getzner solutions.

Baseplate pads for elasticity in the track

Turnouts are critical components of any railway track. The Riyadh metro lines were equipped with heat-treated premium rails, turnout and signaling technology. To reduce the high levels of wear on the turnouts and the other superstructure components, Getzner baseplate pads for over 320 turnouts were installed in different sections of the six metro lines. Elastic baseplate pads maintain the load-distribution qualities of the rail and reduce vibrations caused by irregularities in the wheels and track. By properly distributing the stiffness of the baseplate, it is also possible to adjust the level of rail deflection caused by the rolling stock.

Floor bearing in coaches to increase the comfort of the journey

For this project, Getzner has developed special solutions for the mounting of floating floor bearings

and components in order to increase travelling comfort and reduce life cycle costs of train carriages.

Impressive use of material

The total quantities for all applications are approximately 95,000 m² mass-spring systems and 21,000 baseplate pads.

Getzner offered specialized service and support for this project, such as technical, commercial and design support, material supply, installation supervision on site and installation training. Furthermore, many special tests were performed to prove stated characteristics of the material. A Factory Acceptance Test (FAT) was performed under supervision of the customer for every delivery.

The main advantages of the Getzner solutions are the proven long-term performance in all environmental conditions and bespoke system design according to project requirements.



Tunnel Line 3

Facts and figures

Track length:	35 kilometers of mass-spring systems
Operator:	Riyadh Development Authority (RDA)
Material used:	95,000m ² mass-spring systems and 21,000 base plate pads
Opening:	2021
Daily traffic demand:	7.4 million traffic trips

Getzner Werkstoffe GmbH

Foundation:	1969 (as a subsidiary of Getzner, Mutter & Cie)
Chief Executive Officer:	Ing. Jürgen Rainalter
Employees:	490 (360 in Bürs)
2017 turnover:	EUR 100.3 million
Business areas:	Railway, construction, industry
Headquarters:	Bürs (AT)
Locations:	Berlin (DE), Munich (DE), Stuttgart (DE), Lyon (FR), Amman (JO), Tokyo (JP), Pune (IN), Beijing (CN), Kunshan (CN), Charlotte (US), Decatur (US)
Ratio of exports:	93 %

Photo credits: Getzner Werkstoffe