

PANDROL

Tram extension in the historic centre of Florence, Italy

Alstom
QTrack & Floating Slab Mat
Florence Tramway



Case study
2025

Partners in excellence

Protecting UNESCO heritage from rolling stock vibration in Florence's tramway extension

**Customer**

Alstom (track works contractor)

End Customer

The Municipality of Florence

Date

2015

Products

QTrack

Floating Slab Mats

Sector

Light Rail and Metro

Track length

23 km

Customer Challenge

The latest extension to the Florence tramway is benefiting from an innovative solution from Pandrol, which will help to reduce noise and vibration in this historic city, renowned for its impressive renaissance architecture and unique Roman heritage.

Established in the 1950s, the tram had offered both locals and visitors an effective mode of transport. However, to meet increasing demand, in 2015 Florence began a phased extension of the tramway, with stages completed in 2018 and 2025, resulting in a 7.8km extension that connects Peretola Airport to Piazza San Maro.

The Florence tramway is located just a few meters from beautiful churches, basilicas and other historical and protected buildings. With such ancient buildings in close proximity to the track, this presented a number of issues.

Firstly, there was a concern that the tramway would generate noise that could be heard in the churches nearby, disrupting worshippers and visitors to these sacred spaces. Secondly, there was a need to protect the fragile buildings from any cracks caused by ground-borne vibrations coming from the pass of trains.

In light of the above, a solution was needed to attenuate 20dBv in critical frequencies, which presented a technically demanding challenge. For that a Pandrol Floating Slab Mat solution was selected to be installed and reduce vibration levels in critical sections.

Another challenge was the presence of historical ruins below the track. As the city was first built in Roman times, beneath it lie many significant and important architectural artefacts. This dictated the excavation depths when carrying out civil works, reducing as much as possible the track structure and digging. Therefore, Pandrol QTrack® an embedded rail solution, was the best option to minimize slab thickness and civil works digging, that needs to be also integrated with urban utilities infrastructure at soil level (pipes, electricity, etc.) .

Furthermore, installation needed to be quick and efficient due to the tramway's placement in a central area so construction time needed to be kept to a minimum.

Finally, protection from stray currents was another element that needed to be considered. The tramway extension was required to protect people against electricity flow and imbalances in the electrical supply system from any leakage of currents.

Pandrol Solution

Pandrol designed a solution which involved the use of its innovative floating slab mats, in combination with QTrack®, an embedded ballastless track system.

This combination, which has been highly successful on other international tramway projects in cities such as Athens, is highly effective in minimising vibration transmission from rolling stock to surrounding structures.

Pandrol was successful in securing the contract because of its ability to supply a complete rail solution that addressed all the project's challenges.

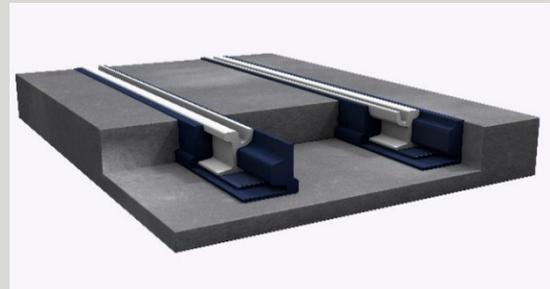


Pandrol's QTrack®, was selected for its ability to provide vertical and lateral support to the rail. This fastening system effectively minimises vibration transmission from rolling stock to surrounding structures, while also offering precise control over stray currents, enhancing electrical isolation.

QTrack®

- Noise & vibration attenuation,
- High electrical insulation,
- Designed for quick installation
- Encapsulation of switches and crossings,
- Sustainability & very low carbon footprint

[More Information](#)



The Pandrol Floating Slab Mat, a high-performance vibration attenuation system made from 90% recycled rubber, was also selected for its ease of installation, maintenance-free design and compatibility with all rail and track systems.

Floating Slab Mat

- Designed for quick and easy installation,
- Maintenance free,
- Compatible with all types of rail and track systems,
- Vibration isolation,
- Exceptional performance,
- Eco-friendly.

[More information](#)





By combining Pandrol's Floating Slab Mat with the QTrack® system, the project achieved the precise level of vibration attenuation needed at critical frequencies. This balance prevents excessive elasticity or rigidity, which could otherwise increase vibrations.

Results

Pandrol created a quieter, more stable rail system with reduced vibration impact, lower noise levels and avoided vibration affecting surrounding buildings.

Frederique Coeuille, Chief Technology Officer at Pandrol, explains, "It was really important on this project that we could provide a complete engineering solution which met all the challenges. This had to be able to protect Florence's historic architecture, whilst meeting the needs of millions of visitors and residents in a modern transport system. We were able to devise an innovative solution to both noise and vibration from the tramway, as well as stray current protection."

Frederique Coeuille adds: "Our tried and trusted infrastructure solutions are widely used across some of the world's major cities – helping them meet carbon reduction targets for a more sustainable future." Pandrol collaborated closely with Alstom, the project's main contractor, to streamline construction, minimise disruptions and ensure timely project completion, while meeting Florence's environmental goals and contributing to the city's CO2 reduction targets.

In 2025, Pandrol QTrack® and FSM systems were chosen again for a new extension of Line 3 in Florence Light Rail, which confirms the confidence the customer has in the long-term performance and reliability of Pandrol track solutions.

As a UNESCO World Heritage Site and a major tourist destination, Florence attracts approximately 15 million visitors per year.

With rail infrastructure in over 100 countries, Pandrol remains committed to defining the industry standard for rail fastening systems and aluminothermic welding. Its capabilities include manufacturing casts, track electrification, track construction, fastening installation and welding.

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