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Partners in excellence

PANDROL RAIL FASTENING SOLUTIONS FOR URBAN TRACKS: ACOUSTIC COMFORT AND ENVIRONMENTAL CARE

GET STARTED

Hello and Welcome

RAILWAY FORUM NAPOLI 2025

Slab Track Forum

6-7 November, Napoli, Italy

2nd International Scientific and Technical Conference
Modern Technologies in Planning, Construction, and Maintenance of Slab Track Systems – 2025

rubenripoll@pandrol.com

Technical Manager -Pandrol Ibérica

Bonded plates Global Product Manager

- *Advanced degree in Industrial engineering (mechanical spec.) from the Polytechnic University of Catalonia.*
- *Master in Operations Management and Innovation Strategy from ESADE business school.*

17 years exp. on slab track

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Delachaux group /

A family-owned company created in 1902, the Delachaux Group is a **global player** in **mission-critical engineered solutions**

DELACHAUX

About us…

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CONDUCTIX wampfler

DCX CHROME
GROUPE DELACHAUX

Fastening | welding | Electrification | Equipment & Control

1700 employees at more than 40 sites

At the heart of over 400 railways in over 100 countries

100 years experience in the railways

40 years experience in the railways infrastructure control

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Aluminothermic Welding

Rail Fastenings Systems

Fastening Installation Equipment

Rail and Sleeper Handling

Sustainable Resilient Systems

Rail Welding Equipment

Signalling Equipment

Track Measurement and Analysis

Track Safety Equipment

Track Transportation Equipment

1700 employees globally at the heart of more than 400 railways in over 100 countries.

VALUE PROPOSAL

$$\text{VALUE} = \frac{\text{NEED} + \text{DIFF.}}{\text{PRICE}} \text{ +- SERVICE - DAMAGE (PPP)}$$

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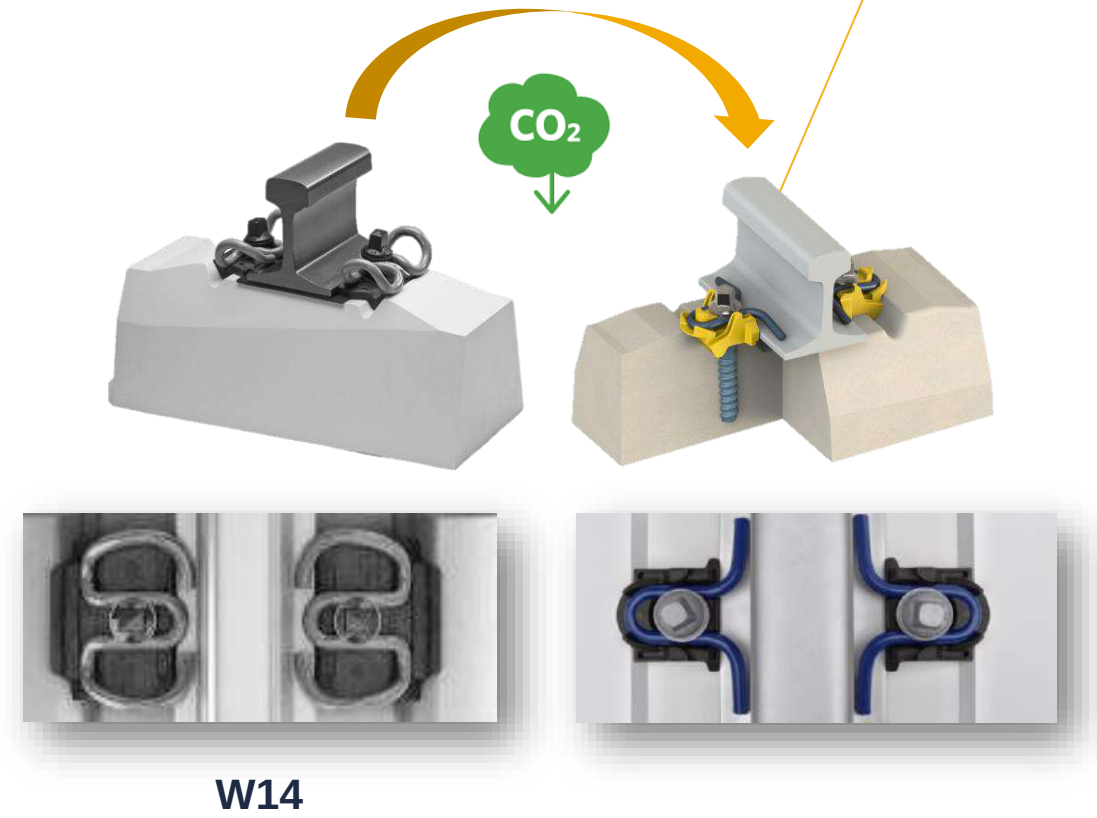
SD CLIP

ECODESIGN

1.5-tons of raw material reduction per km of track

Component	Weight
SKL-14 Tension Clamp SD-1311 Clip	30%
SD-46 Insulator	25%

25% CO_2 eq. reduction



W14

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Pandrol SD Autodrive

Autodrive: Automated Screw-on Technology

- SD systems can be delivered with an advanced configuration that facilitates the automatic movement of the clip from the parked position to the in-service position during the screwing process.
- It is recommended to use Pandrol Autodrive installation equipment to ensure optimal functionality.

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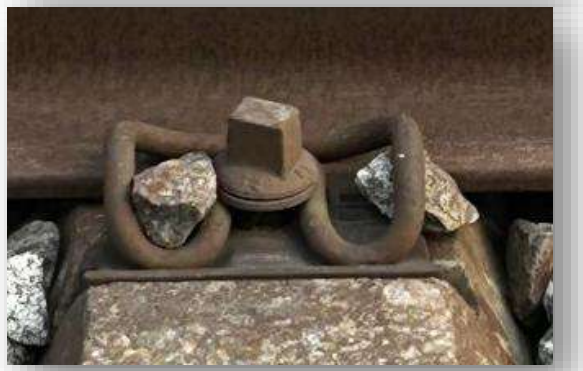
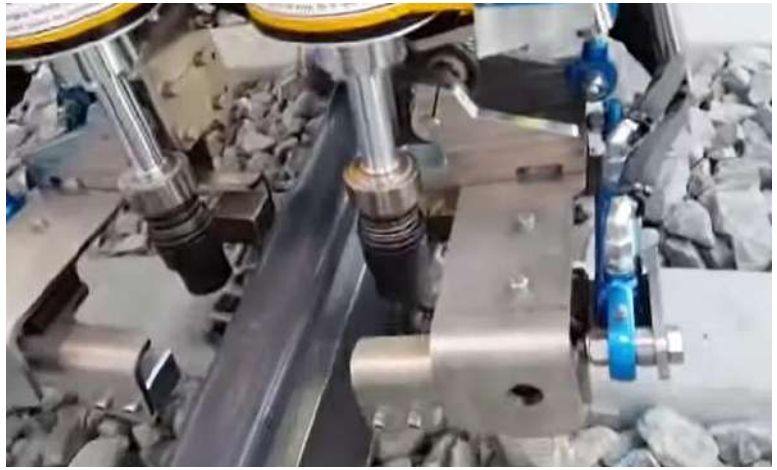
SD Clip Guidance on Maintenance operations

On SD Fastenings, Clip guidance avoids dealignment or rotation during installation and maintenance operations.



SD Clip Guidance on Installation / Track construction

SD systems improve installation ratios thanks to their capacity to be pushed on when they are preassembled on the sleeper at 40 N.m.



SKL-14 Insalled with Robel SKL Clipping Machine

SD Preassembled up to 40 N.m

SD Clips can be also pushed with Fastclip equipment when they are preassembled up to 40 N.m

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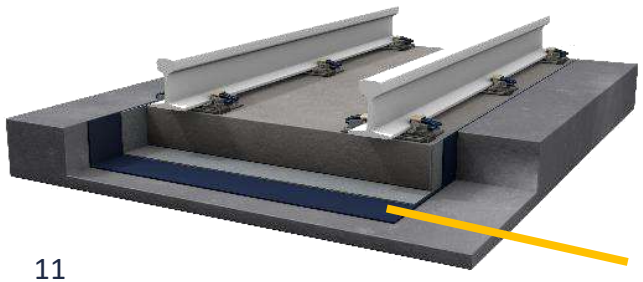
FASTENING RAIL SYSTEMS. BONDED PLATE

SD CLIP (SAFE DRIVEN)

BONDED PLATE
RUBBER-STEEL



ELASTIC MAT

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BONDED PLATES

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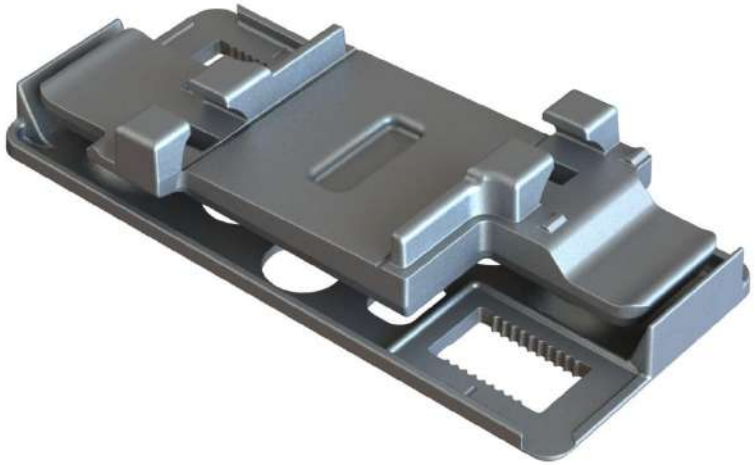
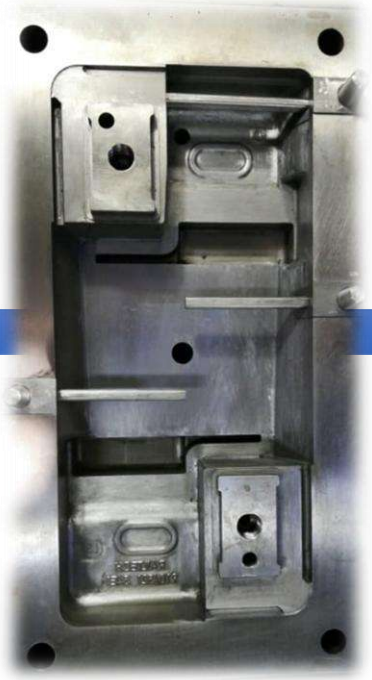
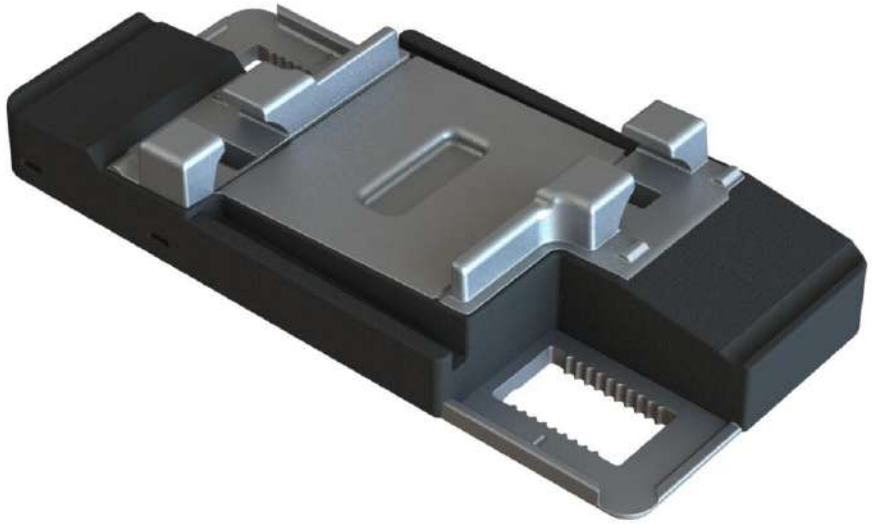
VULCANIZATION PROCESS







MOULDING + VULCANIZATION

LIFE TIME >30years

TEST AFTER 8/14/20 YEARS IN SERVICE

Metro de Madrid

- Stiffness recheck
- +3/6M cycles inclined RLT
- Electrical insolation
- Internal inspection

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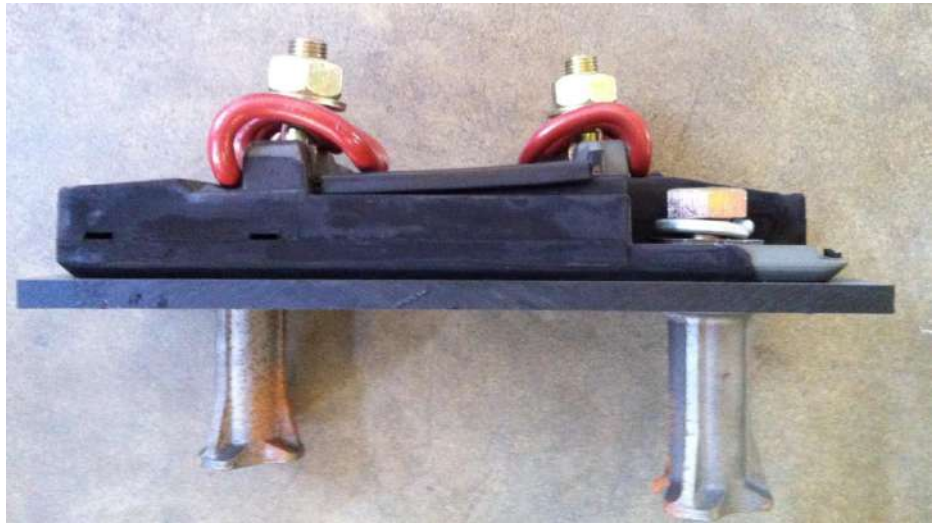
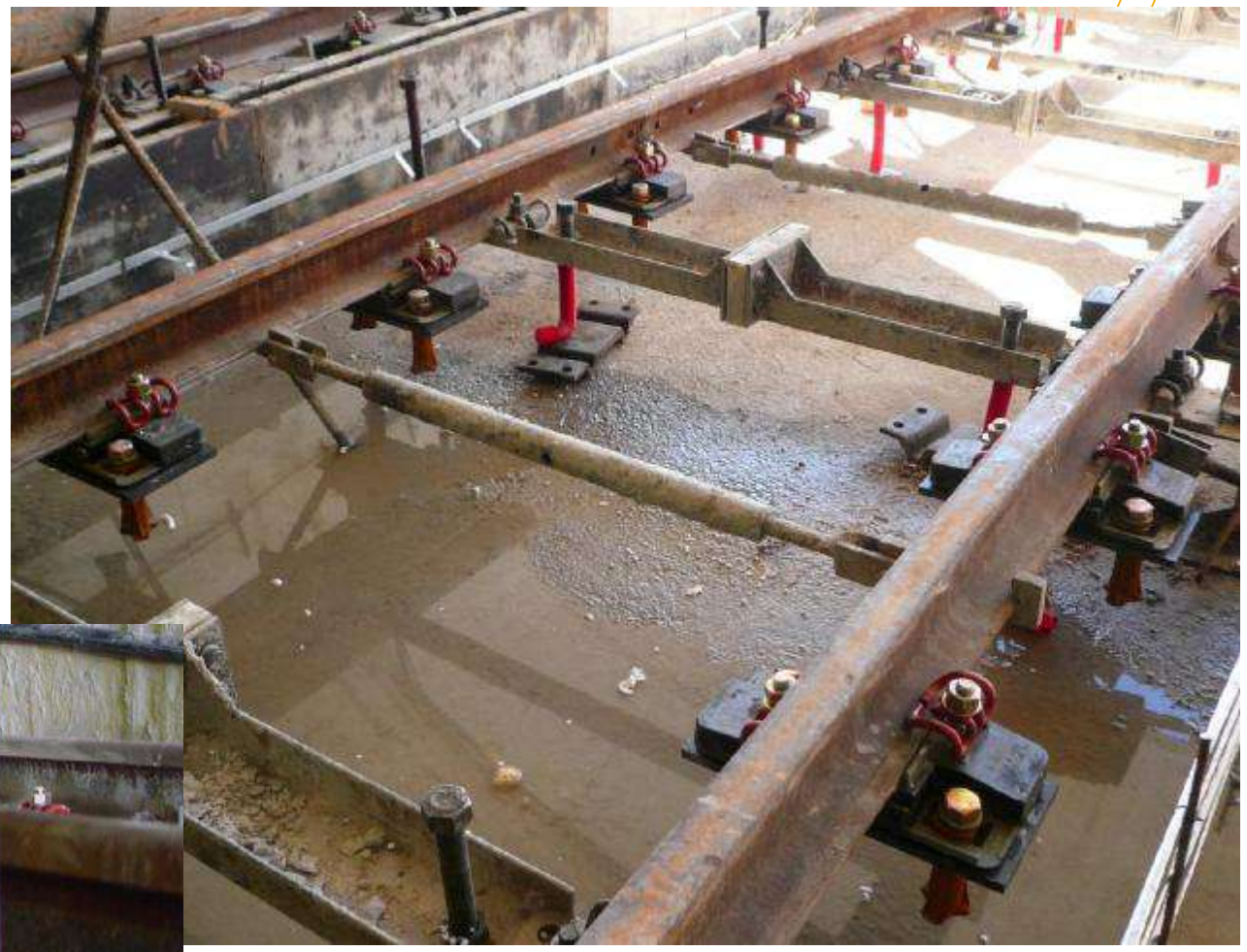
EASY TO INSTALL



PREASSEMBLED



SAFE CAST IRON INSERT

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VALUE PROPOSAL

01 Low stiffness range

02 Acoustic-vibration response

03 *Corrugation prevention*

04 *Easy to install*

05 *Compact*

06 *Guard rail version*

07 Turnouts

08 *Transitions*

09 *Durability*

10 *Corrosion protection*

11 *Electr. Isolation*

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SIN SERVICIO
M-8114
Metro
Metro de Madrid


TMB
Transports
Metropolitans
de Barcelona


FGC
Ferrocarrils
de la Generalitat
de Catalunya

adif

euskal trenbide sarea

metrovalencia

metro SEVILLA

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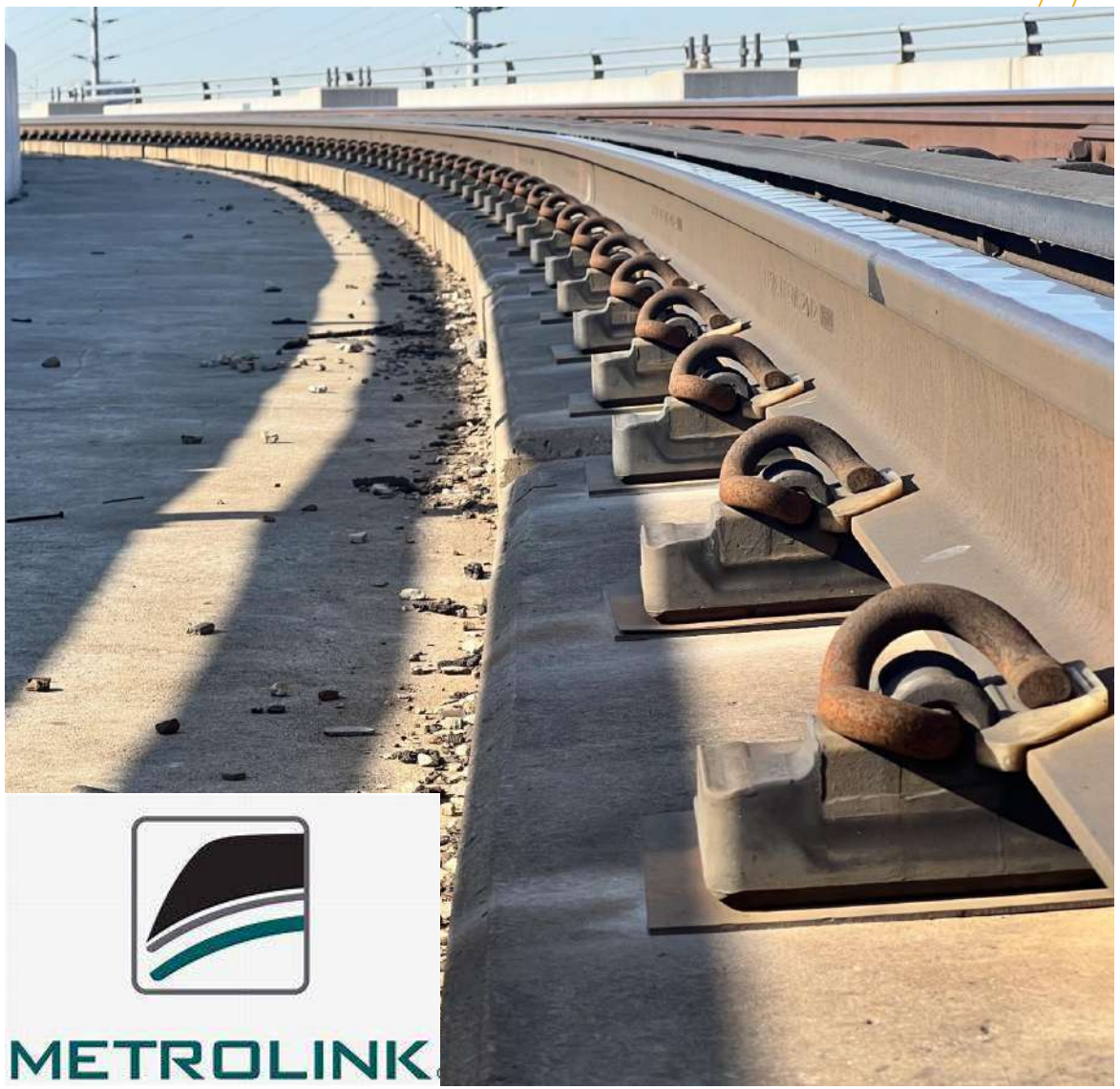
QUITO
METRO



METROLINK

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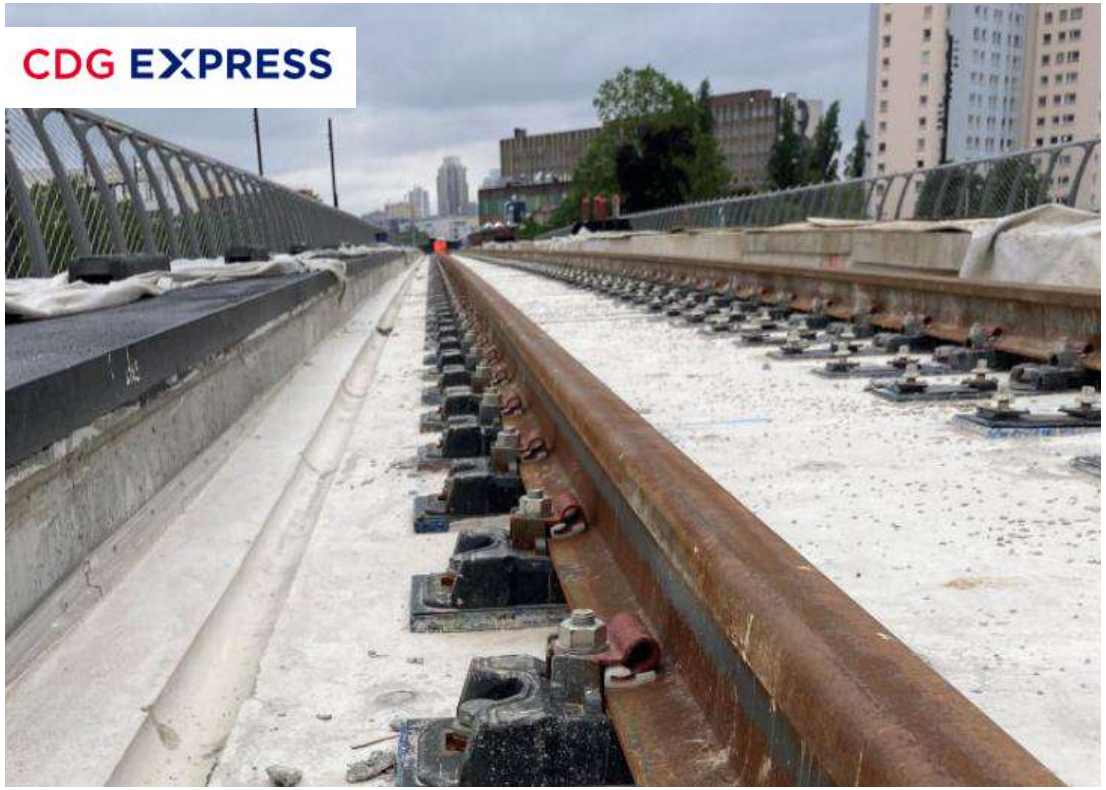
rapidKL


metro
Taipei



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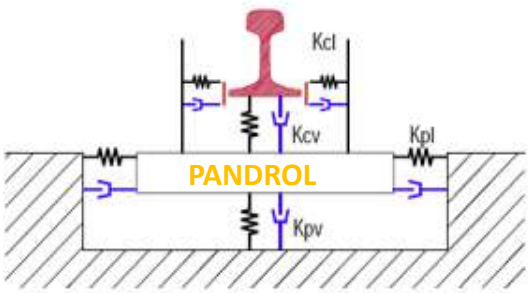
➢ STIFFNESS RANGE



k40

[kN/mm]

k25

k17

k10

K7

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k25

k17

k10

k7

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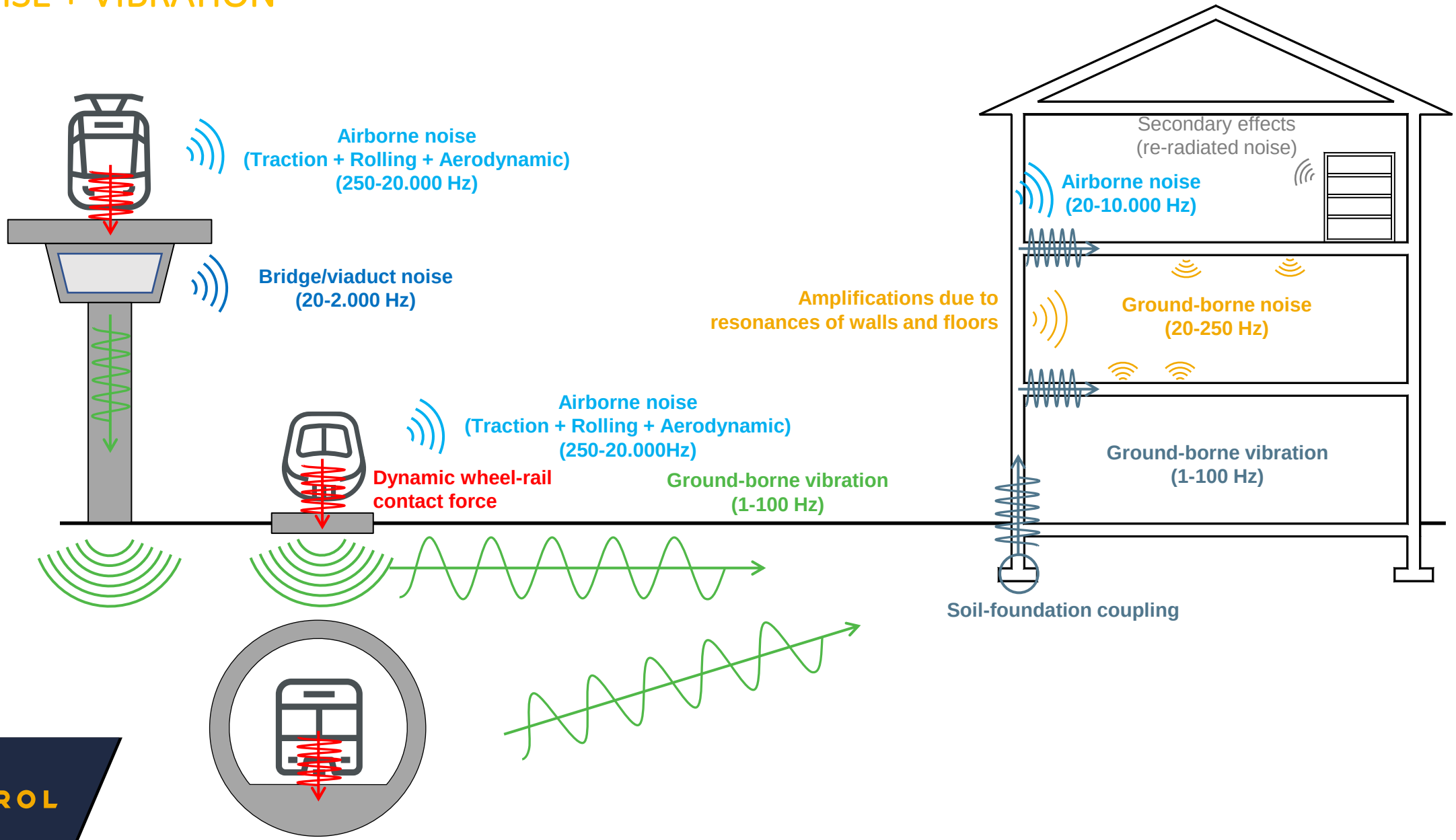
NOISE + VIBRATION



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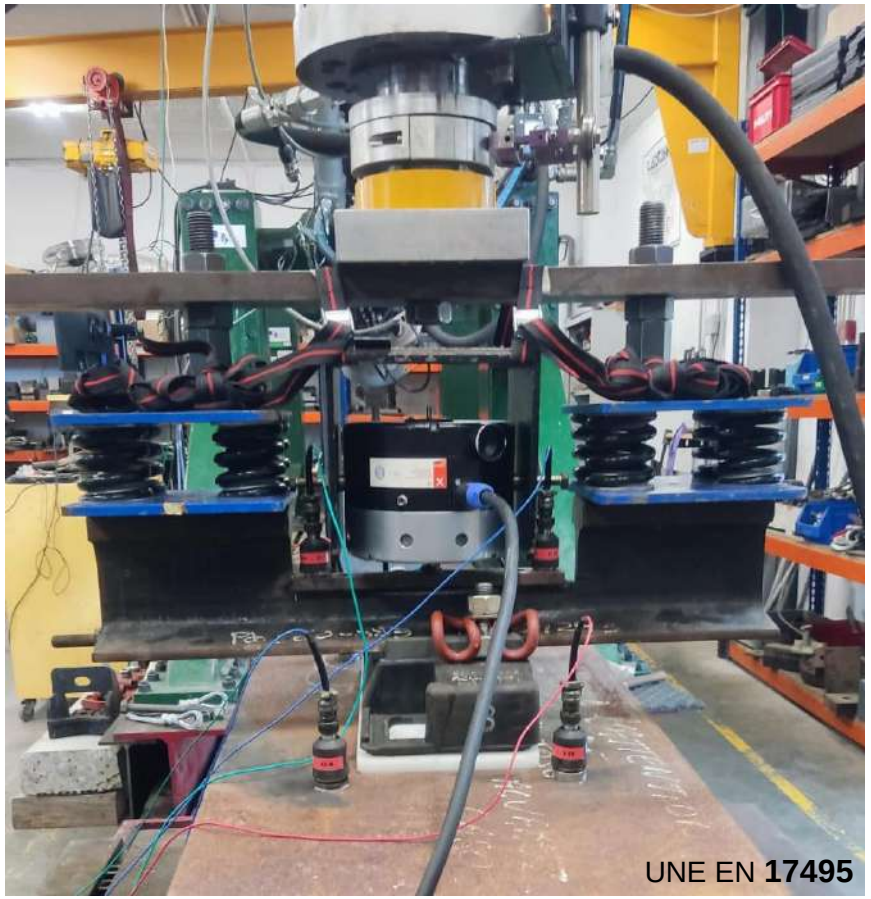
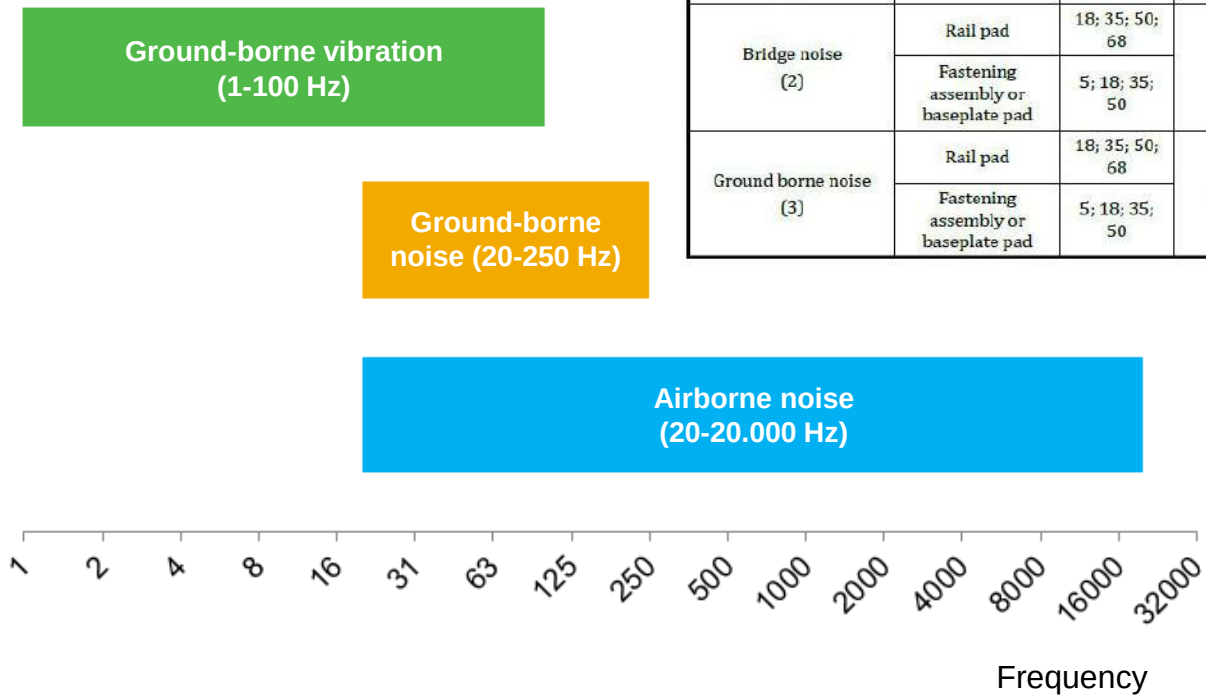
NOISE + VIBRATION



Case	Component	Preload values kN	Minimum frequency range (one-third octave bands) Hz	Preferred frequency range (one-third octave bands) Hz
Rolling noise / train interior rolling noise (1)	Rail pad	18	80 - 400	50 – 1 250
	Fastening assembly or baseplate pad	5		
Bridge noise (2)	Rail pad	18; 35; 50; 68	80 - 400	25 – 2 000
	Fastening assembly or baseplate pad	5; 18; 35; 50		
Ground borne noise (3)	Rail pad	18; 35; 50; 68	50 - 200	10 - 400
	Fastening assembly or baseplate pad	5; 18; 35; 50		



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01

Low stiffness range

02

Acoustic-vibration response

03

Corrugation prevention

THERE ARE MULTIPLE FACTORS THAT INFLUENCE WAVE WEAR

At the level of the track superstructure, it is confirmed that increase the elasticity of the track, especially **at the transverse level, helps to delay wave wear.**

It is important to not exceeding the maximum dynamic over-width safety limits and understand that not always this formula Works as there are many factors that influence on this kind of defect.

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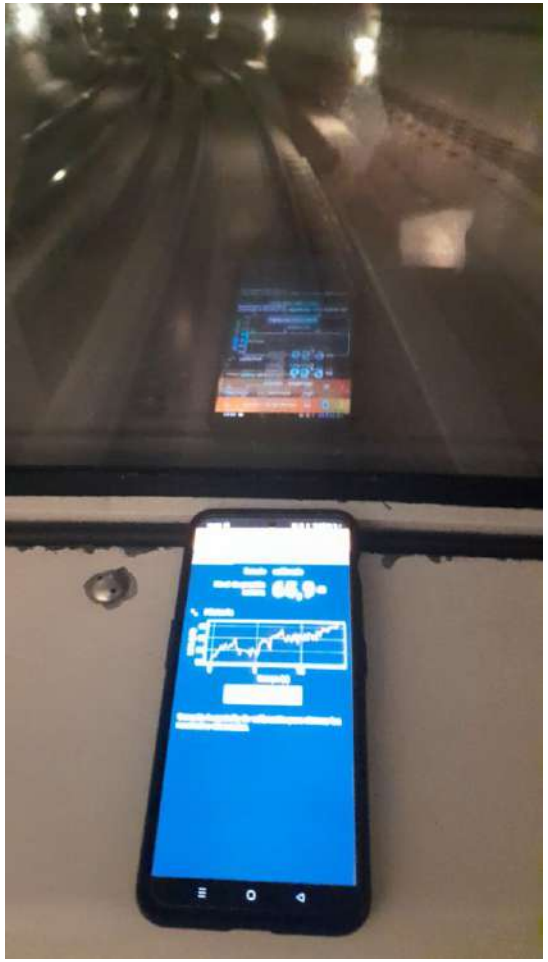
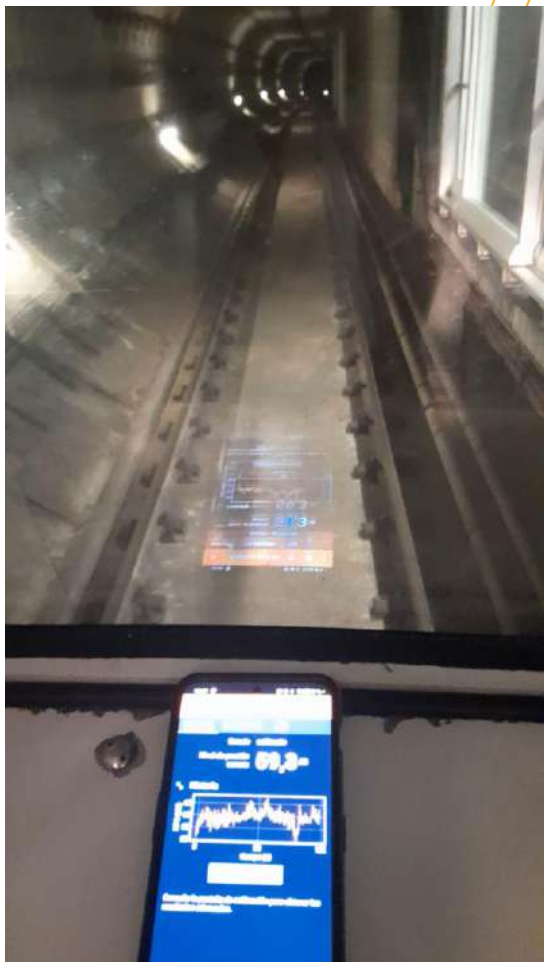
ROLLING NOISE EFFECT OF LATERAL STIFFNESS



ZONE A LOW SYSTEM FST



ZONE B: BONDED PLATES

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euskal trenbide sarea

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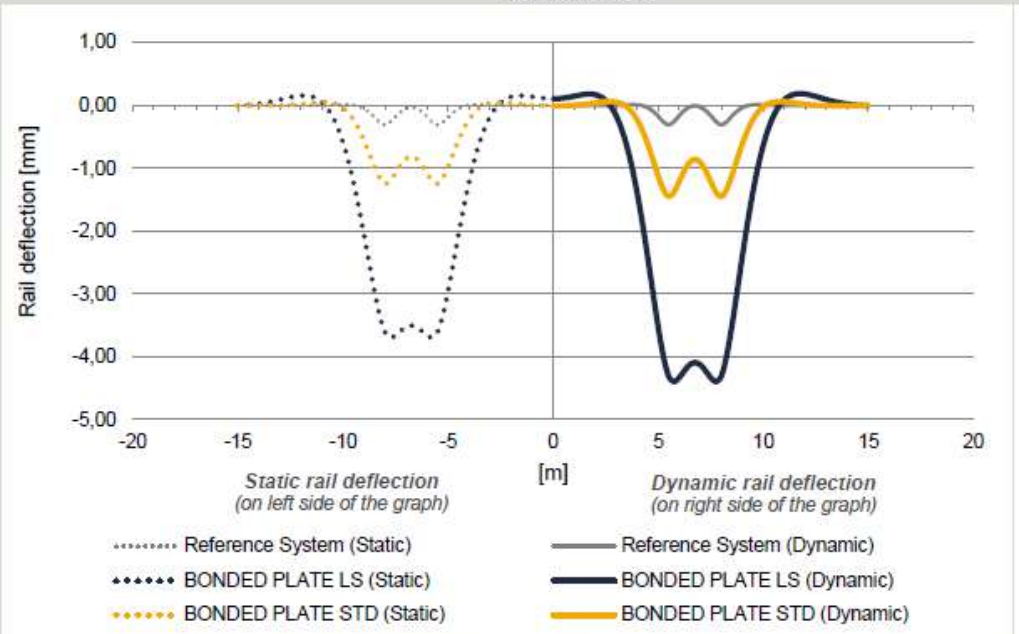
Track Elastic Model

General Project information

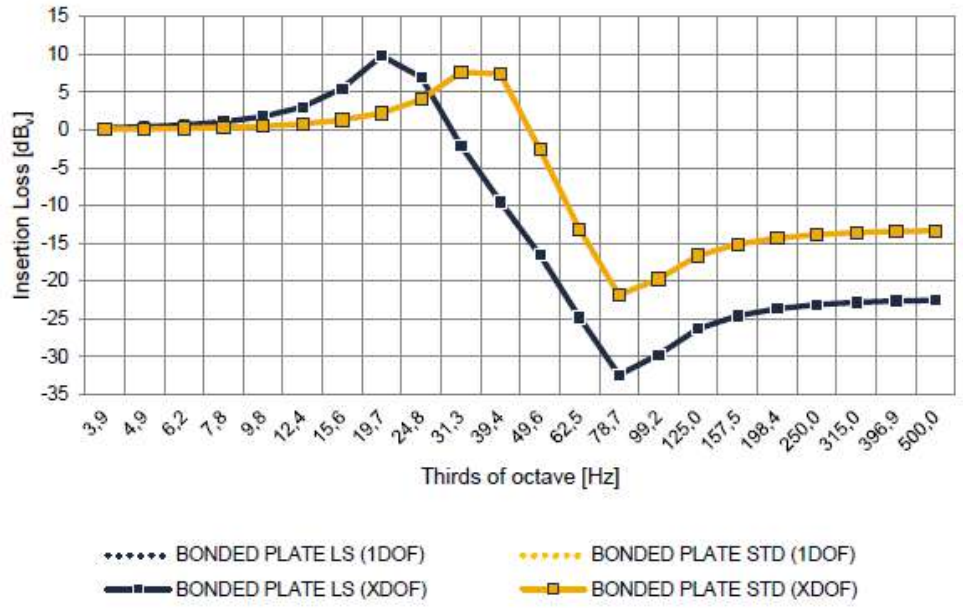
Project Number		Country		Project Name		Customer	Customer
Author		Date		Calculation Case	Calculation Case	Program Version	5.2.2

Outputs

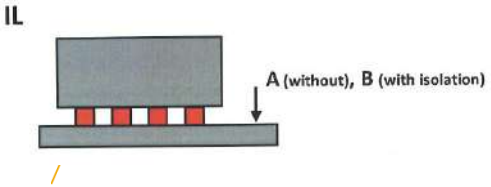
Rail deflection

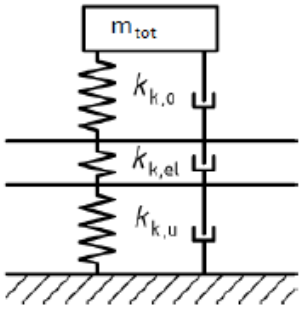


Insertion Loss



Eisenmann parameters for dynamic deflection calculations			
Standard deviation, t	3,0	3,0	3,0
Track condition, φ	10 %	10 %	10 %
Dyn. Amplication Factor	1,34	1,34	1,34
Equivalent track stiffness *(track deflection by one single axle)*			
Static	520,89 kN/mm	43,37 kN/mm	128,63 kN/mm
Total deflection at rail head			
Static	0,31 mm	3,69 mm	1,24 mm
Dynamic	0,31 mm	4,39 mm	1,45 mm
Results vibration		1DOF XDOF	1DOF XDOF





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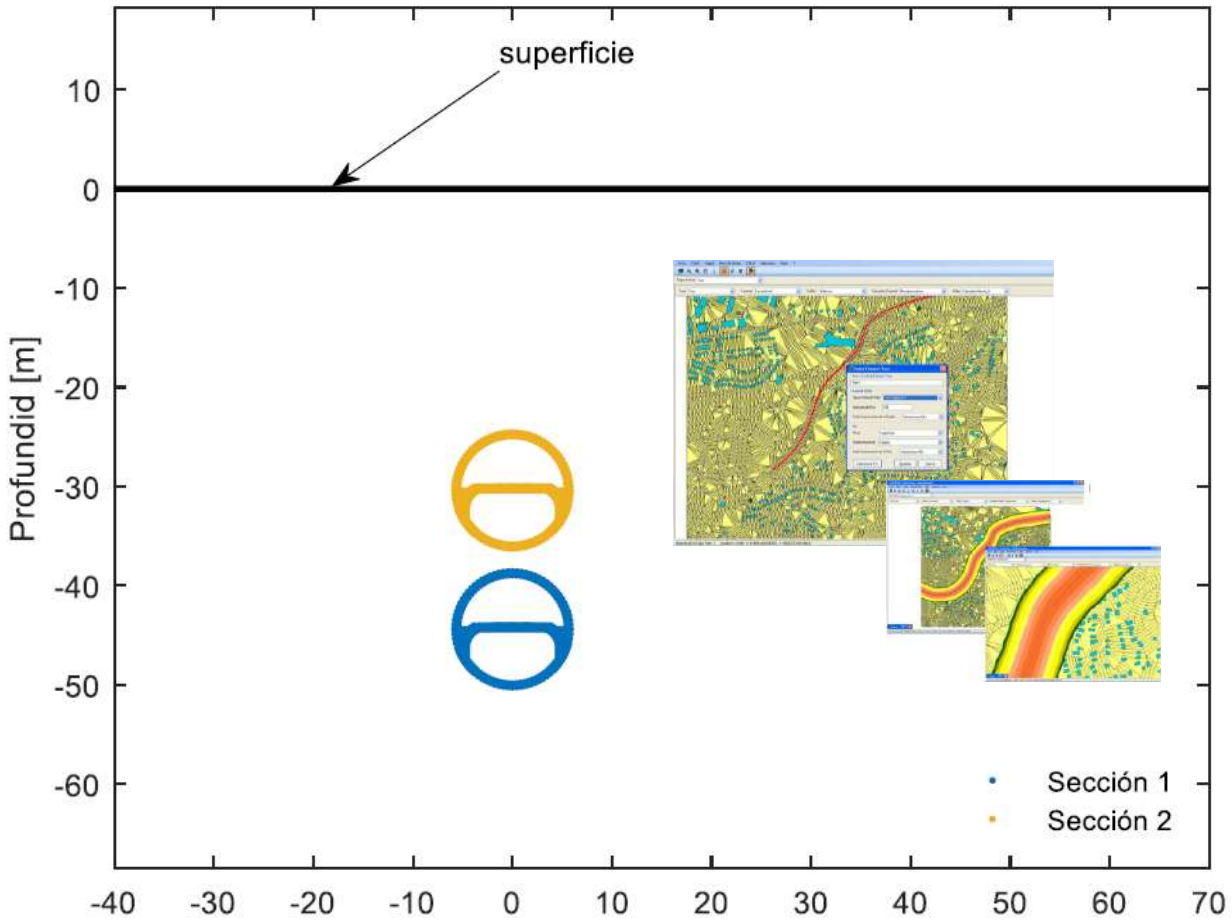
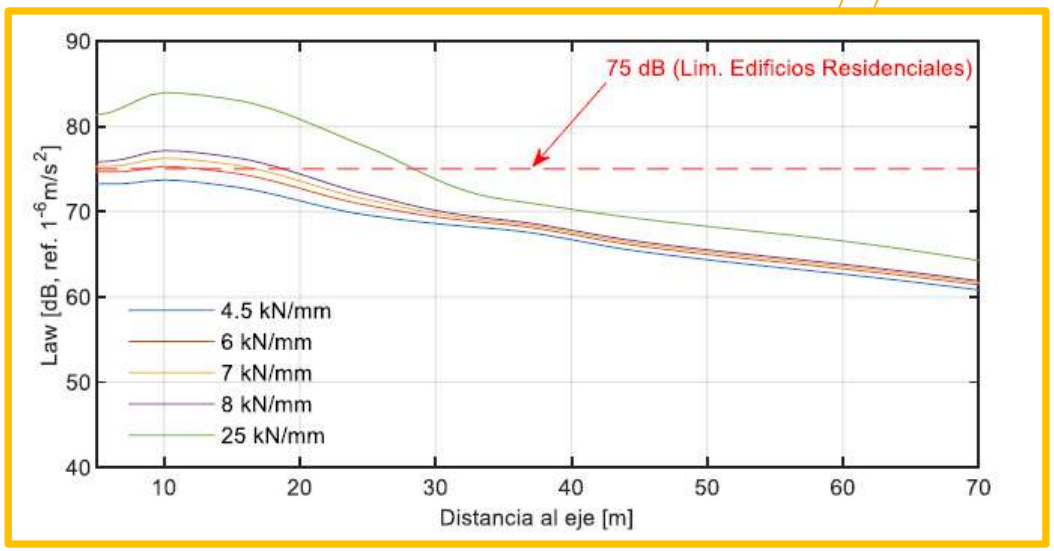
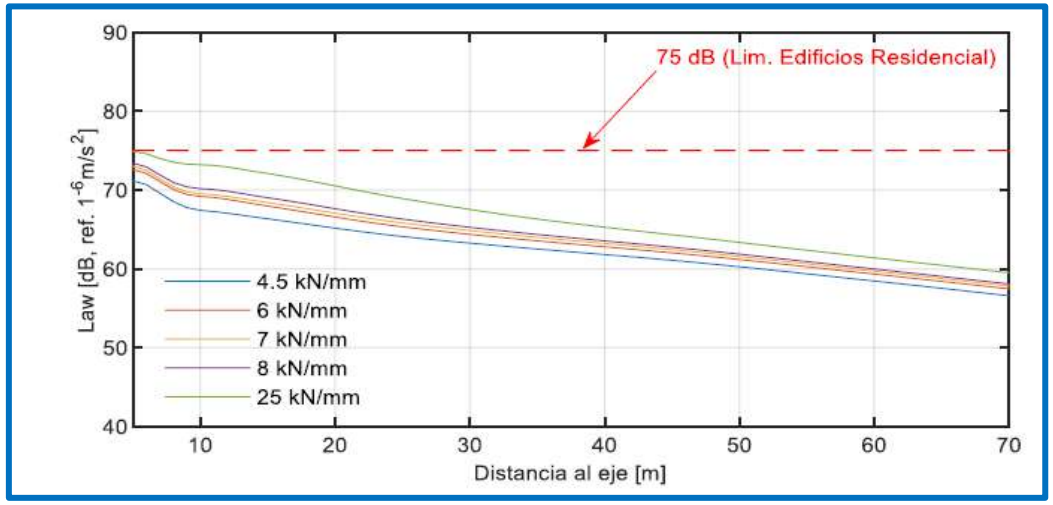
Rail Track Vibration Mitigation

Limit cases

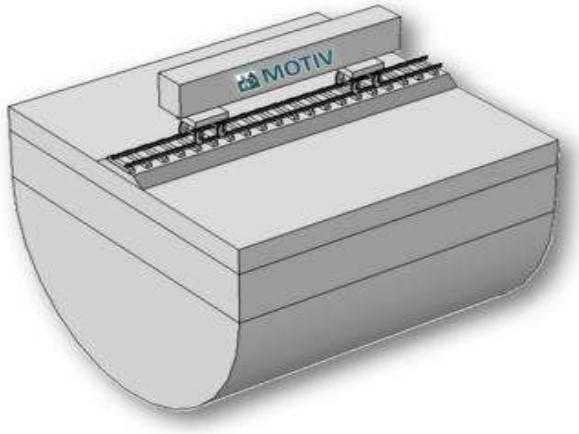


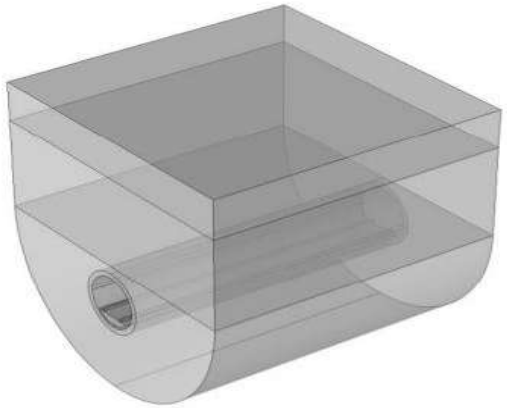




Rail Track Vibration Mitigation

PANDROL MOTIV (Modelling Of Train Induced Vibration)





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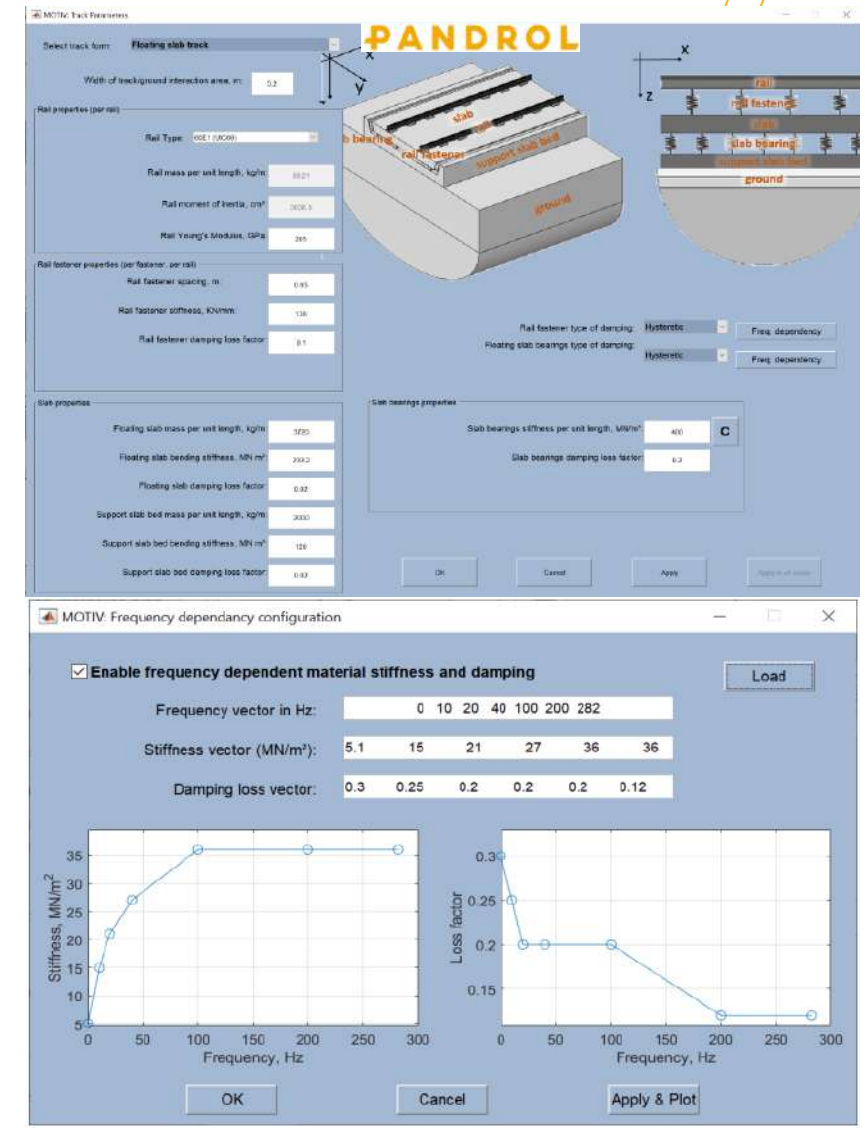
University of Southampton



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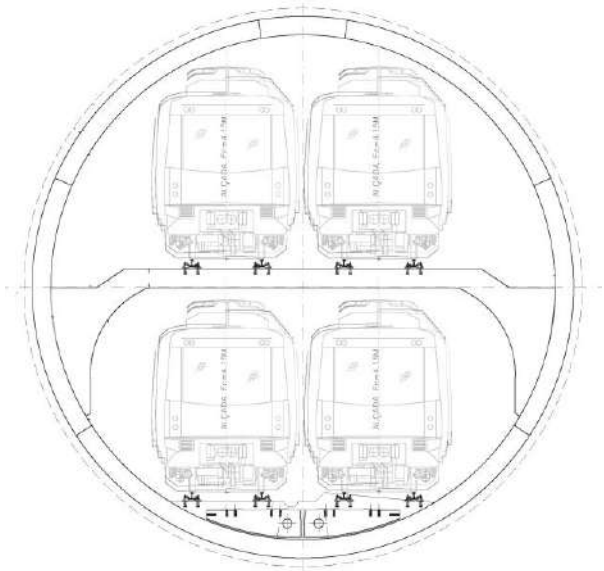
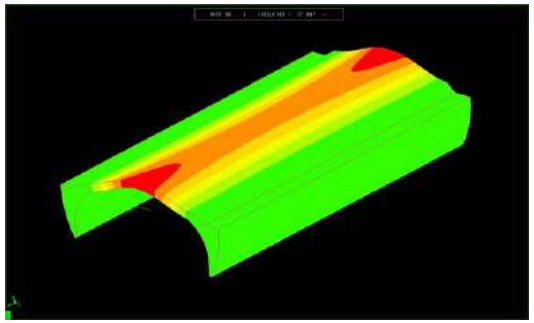
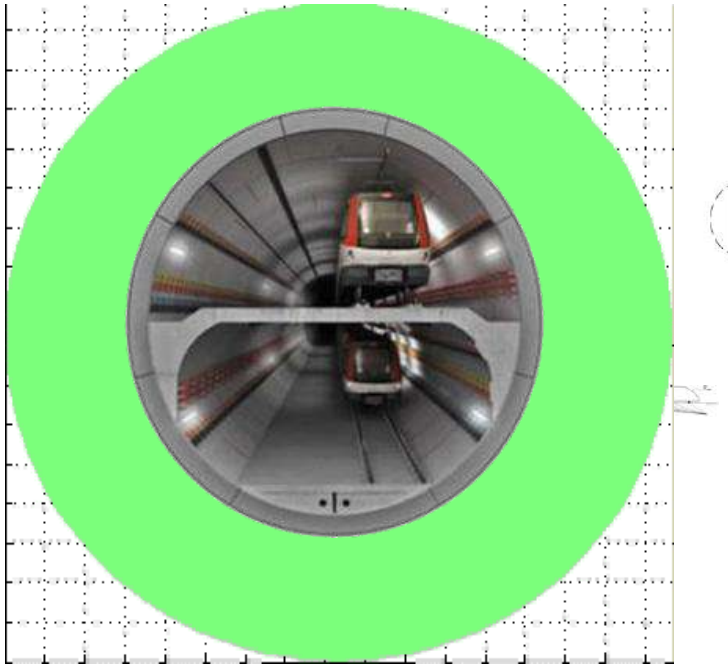
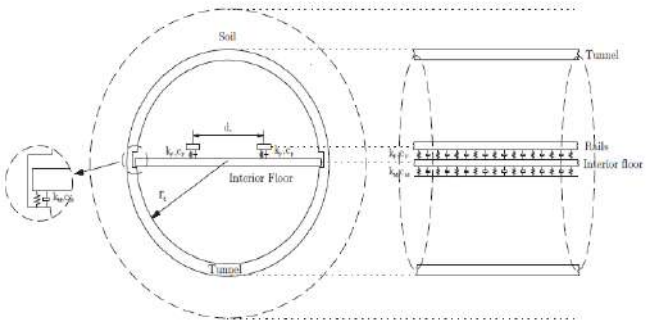
OPTIMAL STIFFNESS. RESULTS



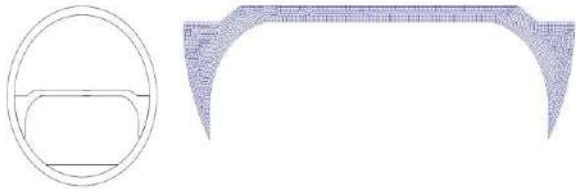


Control of vibration induced by railway traffic in the upper floor.

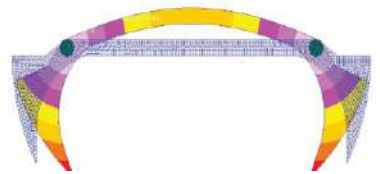




Transversal eigenfrequencies of the plate found using a FEM model.



Shape of the first eigenmode



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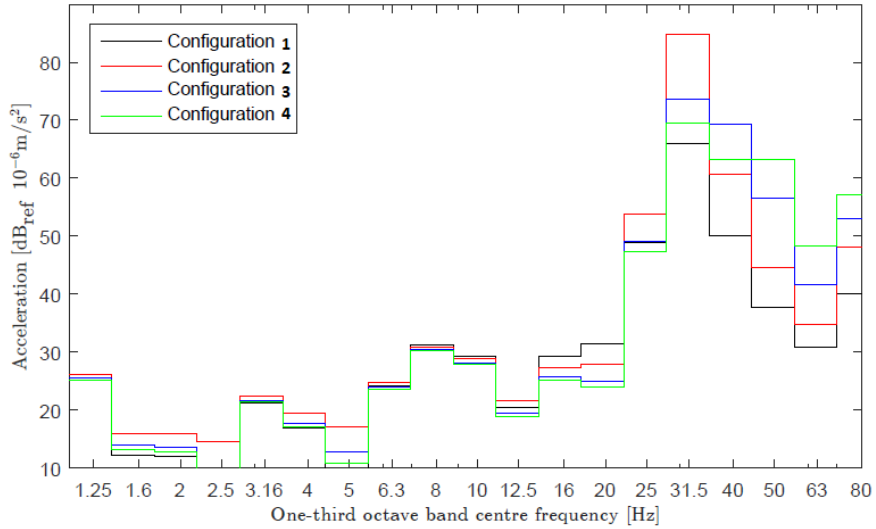
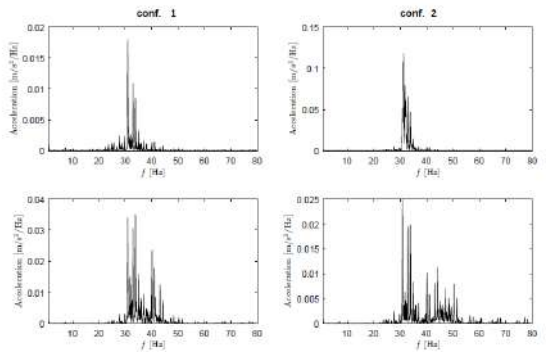
OPTIMAL STIFFNESS. RESULTS

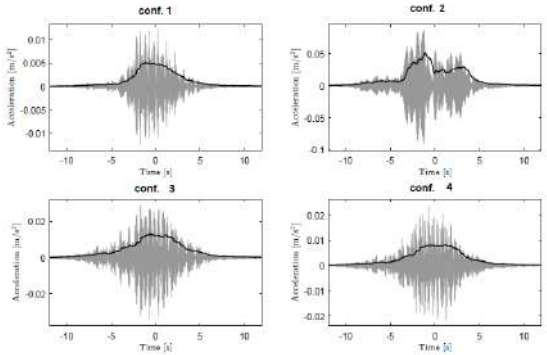
Pondered ISO-2631-2 one-third octave band spectrums



Response in frequency

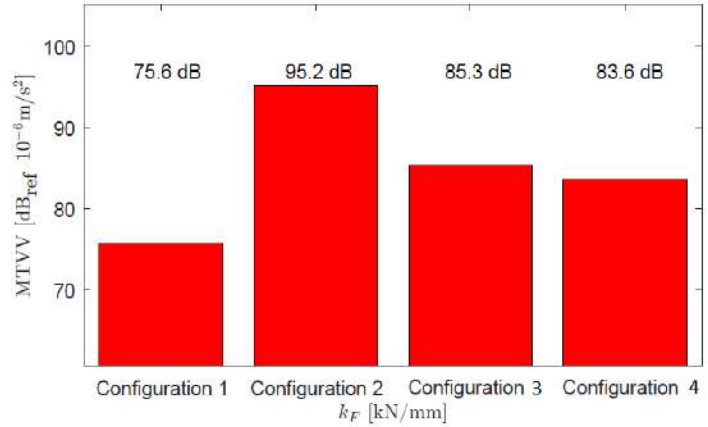


Response in time



The Maximum Transient Vibration Value is obtained for a set of points (ISO-2631-1)

$$\mathrm{MTVV} = \max\left[\sqrt{a_X^2 + a_\theta^2 + a_R^2}\right]$$



K4,5 K10 K17 K25

Kd:(KN/mm)

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THANK YOU

ruben.ripoll@pandrol.com