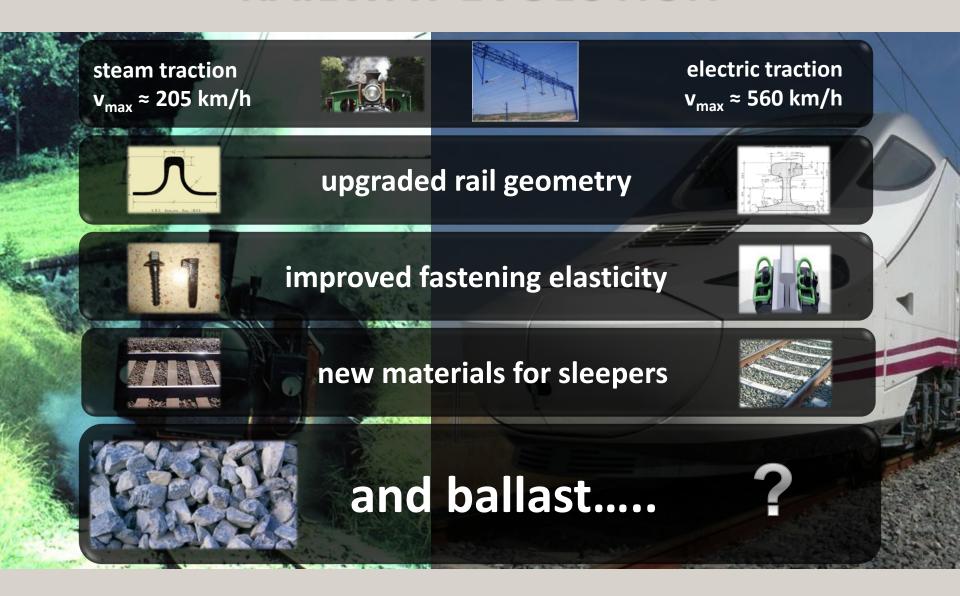


neoballast in safety

exclusive marketing rights for DACH & BeNeLux area hold by HYPERION

RAILWAY EVOLUTION

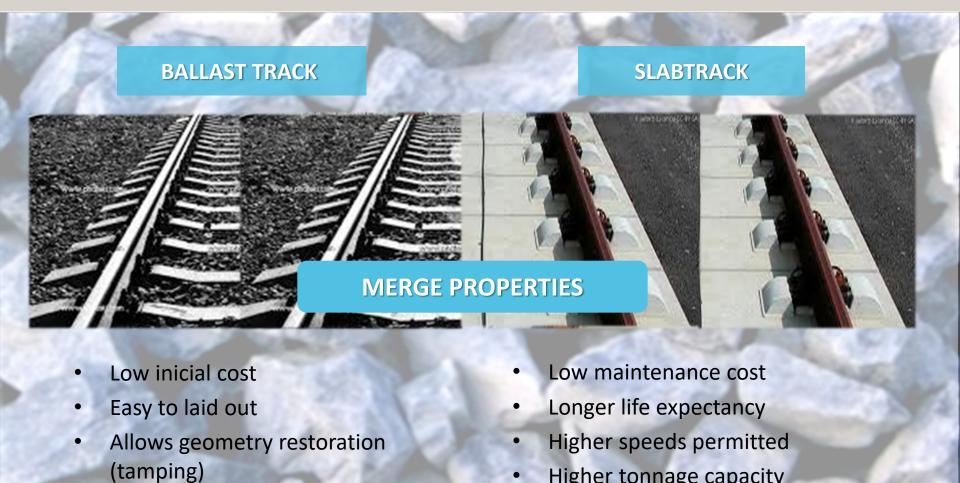




BALLAST. STATE OF THE ART



KICK-OFF IDEA

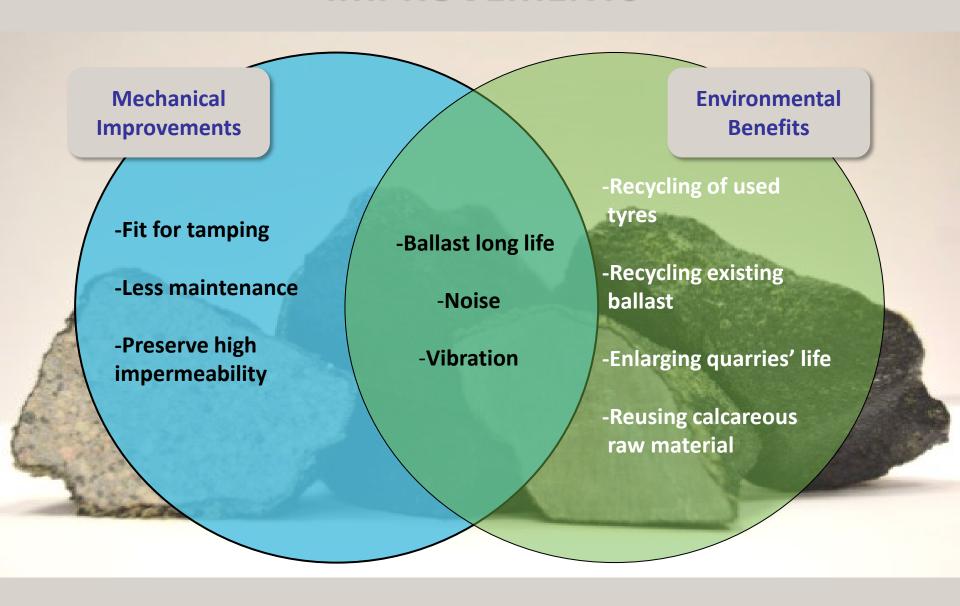


Higher tonnage capacity

neoballast

High permeability

IMPROVEMENTS



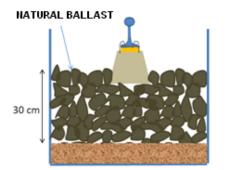


LAB TESTS

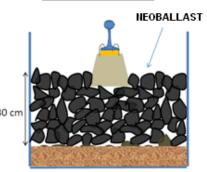
REAL-SCALE SIMULATOR



ADIF SECTION

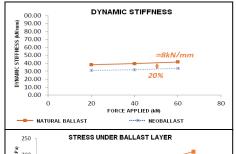


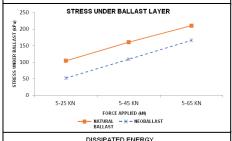
NEOBALLAST SECTION

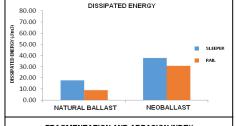


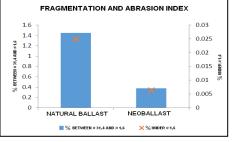












20 % GLOBAL

STIFFNESS

REDUCTION

25% STRESS
REDUCTION UNDER
BALLAST LAYER

54% MORE ENERGY
DISSIPATED

70% LESS
DEGRADATION



TEST IN ADIF



TEST IN ADIF

Located between Maçanet-Massanes and Sils stations

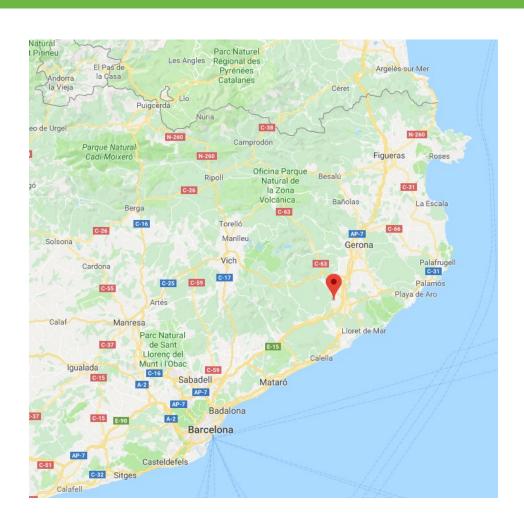
Municipality of Sils (province of Girona, Spain)

75km from Barcelona

ADIF's 270 Line from Barcelona to Cerbère (France)

Conventional line with mixed traffic (passengers and freight)



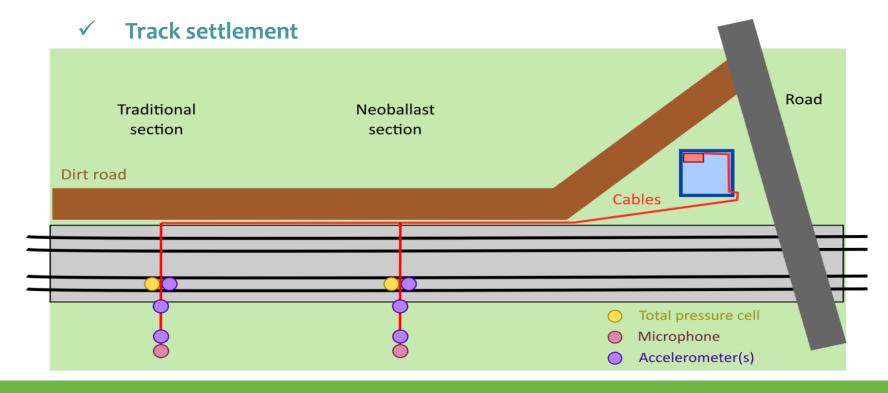




TEST IN ADIF

Comparative analysis of Neoballast vs Ballast in terms of:

- ✓ Vibrations
- ✓ Track degradation / stress under ballast layer





TEST IN METRO BARCELONA



TEST IN METRO BARCELONA

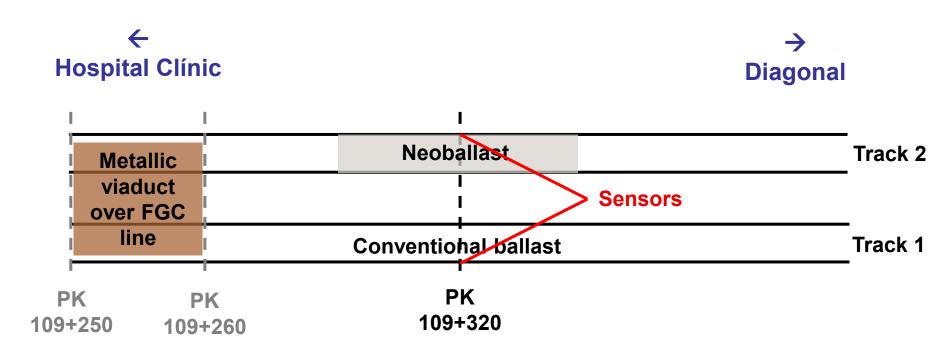




TEST IN METRO BARCELONA

Comparative analysis of Neoballast vs Ballast in terms of:

- √ Vibrations
- ✓ Track settlement





FIELD TEST RESULTS

Test in ADIF

- ✓ Overall contribution of Neoballast to the reduction of vibrations by 6 dB and increasing with time. Higher attenuation at higher speeds.
- ✓ Trend in track stress shows a degradation of conventional ballast while Neoballast performance is constant.
- ✓ Neoballast settlement higher at the beginning, then converging faster
- ✓ Irrelevant noise attenuation

Test in Metro Barcelona

- ✓ Overall contribution of Neoballast to the reduction of vibrations on the tunnel walls by 3.5 – 5 dB
- ✓ Constant vibration levels on the street above the Neoballast section, while the vibration levels on the conventional ballast section have increased over time by 3 dB.
- √ Very limited settlement



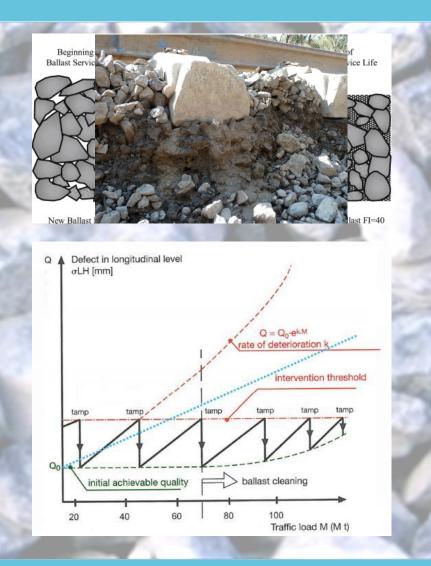
APPLICATIONS. Maintenance Reduction

TAMPING REDUCTION

- Coating provides higher abrasion resistance
 - Coating provides better stress distribution
- Less fines production and track settlement

neoballast LEADS TO REDUCTION OF MAINTENANCE ACTIVITIES

neoballast extends ballast LIFESPAN





APPLICATIONS. Low Quality Aggregates

Muestra D: Balasto Calcáreo Húmedo





Muestra E: Neoballast Calcáreo





CALCAREOUS AGGREGATTES

LOS ANGELES TEST

- Coating avoids water aggression
- High abrasion resistance (less fines)
 - Coating distributes stress

WITH **neoballast** LQ AGREGATTES COULD BE USED

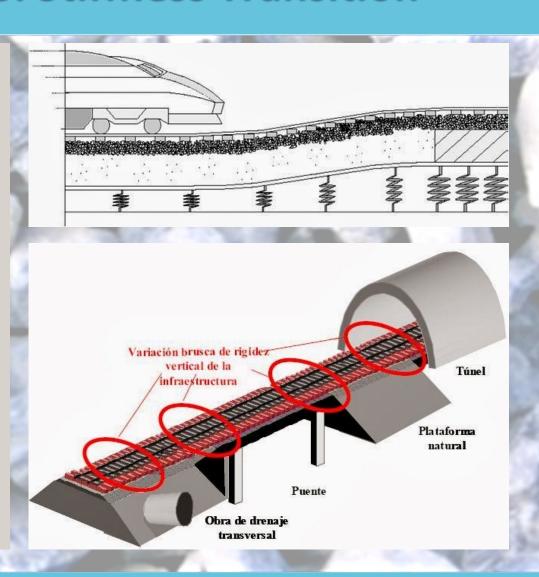


APPLICATIONS. Stiffness Transition

CONTROLED STIFFNESS

- Railway infrastructure goes through different stiffness conditions (e.g. transition areas in tunnels & bridges)
 - High stiffness changes accelerate infrastructure deterioration

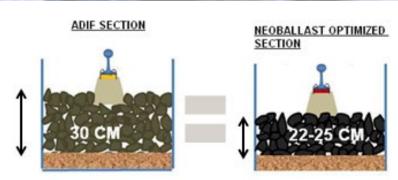
neoballast[®] CAN ATTENUATE/IMPROVE STIFFNESS TRANSITION AREAS





APPLICATIONS. Tunnels





TUNNEL GAUGE

- Plenty of tunnels with reduced gauges
- Modern vehicles have bigger gabarit
- Infrastructure is part of the solution

neoballast LAYER THICKNESS REDUCTION AVOIDS TUNNEL ENLARGEMENT

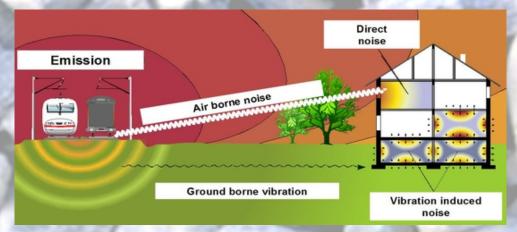


APPLICATIONS. Noise & Vibrations

NOISE & VIBRATIONS

- N&V issues are key in urban areas
 - N&V thresholds become more restrictive

neoballast As one of the solutions to reduce/mitigate n&v









exclusive marketing rights for the patented neoballast in DACH & BeNeLux area by HYPERION

With neoballast, HYPERION is now in position to offer several, application-specific ballast technologies to improve properties to increase lifespan of ballast tracks and decrease intervention level and ground borne vibration by smart coating; application-oriented and project-specific.

- neoballast® wraps the individual ballast stone.
- FLEXDUR, the plug& play composite mat, optimises the lowest packing layer in a ballast track, especially for transition zones.
- DURFLEX® the on-site foamed ballast superstructure, treats the entire load transfer area below the sleeper.

All of them are part of DURSYS®- BRAILIANT innovative products & solutions for railway infrastructures capable of increasing the service life of railway tracks, extending tamping intervals and minimizing the nuisance caused by vibrations.



THANK YOU FOR YOUR ATTENTION



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