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Slab track as a response to the modern demand for a sustainable rail system



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Introduction

- Design and construction of ballastless track => usually related to high-speed railway
- Questions of the type of ballastless track
- Selection of the most appropriate structure





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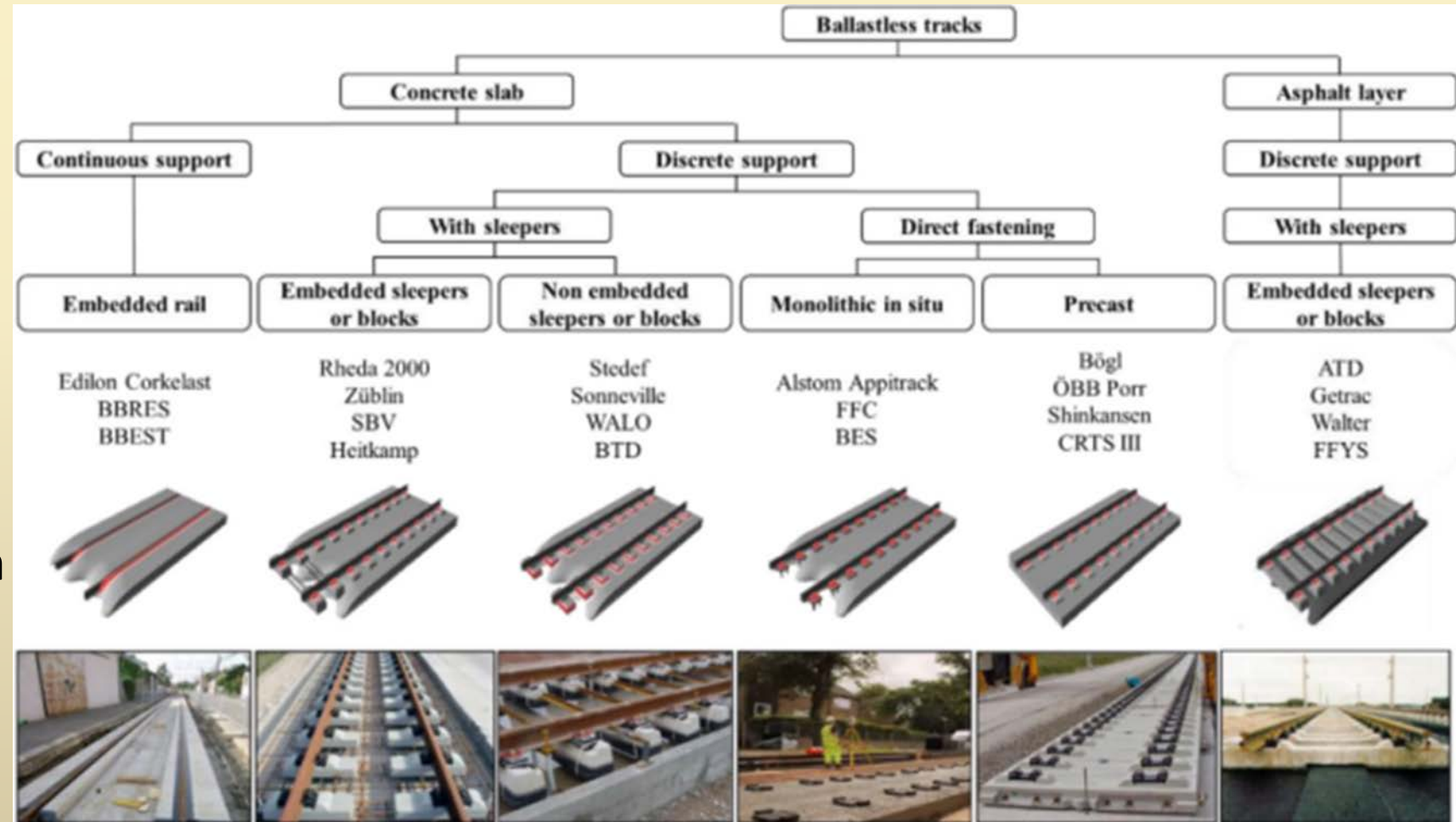


Introduction

Ballastless track

Advantages:

- Greater stability
- Less maintenance
- Extended service life
- Sustainable rail system





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Slab track classification

The choice of slab track type depends on several factors and the most significant are:

- type of rail vehicle and its loading,
- speed of motion of rail vehicle,
- geological conditions of the terrain for the route construction purposes,
- requirements defined by noise and vibration protection measures.



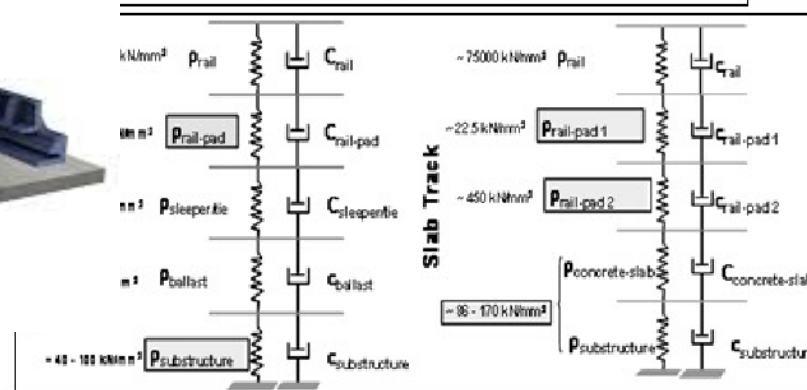
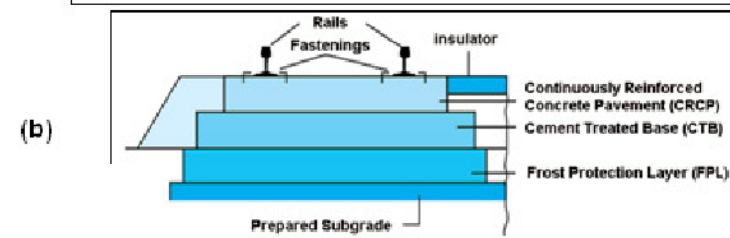
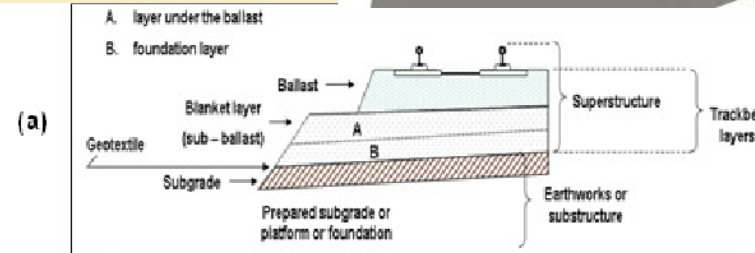
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Slab track classification

Slab track classification according to:

1. method of fastening the rails to the foundation
2. system stiffness
3. materials (specific for FST systems)





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Slab track performance

- *Stiffness and track slab module*
- *Alignment Tolerances*
- *Thermal Forces and Rail Neutral Temperature*
- *Rail Fastening*
- *Rail Welding Technology for Slab Track*
- *Application on bridges, tunnels and short-span structures*
- *Drainage of concrete slab track, with emphasis on depots and stations with track groups*



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Advantages and disadvantages of concrete slab tracks

Advantages	Disadvantages
Less routine maintenance: No ballast compaction; inspection intervals are extended to six months, reducing whole-life costs on high-traffic lines.	Higher initial investment: Typically, 20–30% higher cost than ballasted track.
Improved stability: Greater lateral resistance and torsional stiffness enable operation at speeds of 350 km/h without flying.	Limited post-build adjustability: Geometry corrections require plate sanding or jacking.
Reduced structural depth: Advantageous in tunnels or on bridge structures with a narrow passage space.	Noise and Vibration: A stiffer track emits more peak noise; pads under the rails and acoustic barriers may be required.
Environmental benefits: The amount of dust is reduced, dust and noise during maintenance is reduced.	Complex drainage and integration of services: Requires early coordination of signaling, cable routes and drainage channels in the construction phase.



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Current experiences in the Republic of Serbia

Tunnel Cortanovci

High speed

railway line Belgrade – Subotica





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Current experiences in the Republic of Serbia



Beograd Centar railway station



Novi Beograd railway station

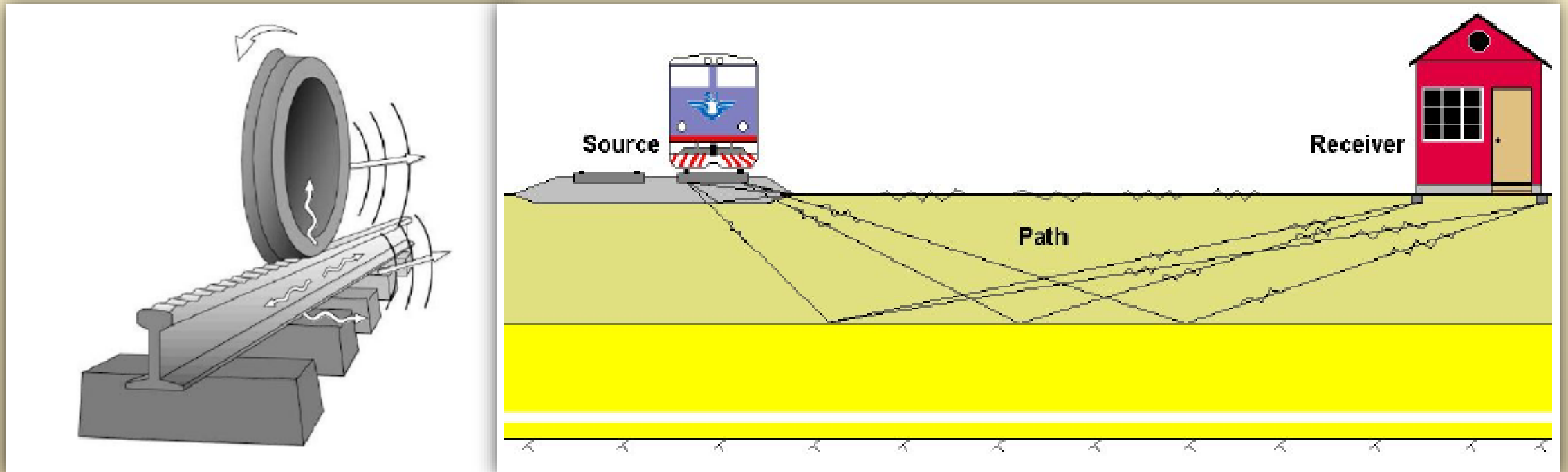


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Protection from noise and vibration

Motion of railway vehicles generates noise and vibrations





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Protection from noise and vibration

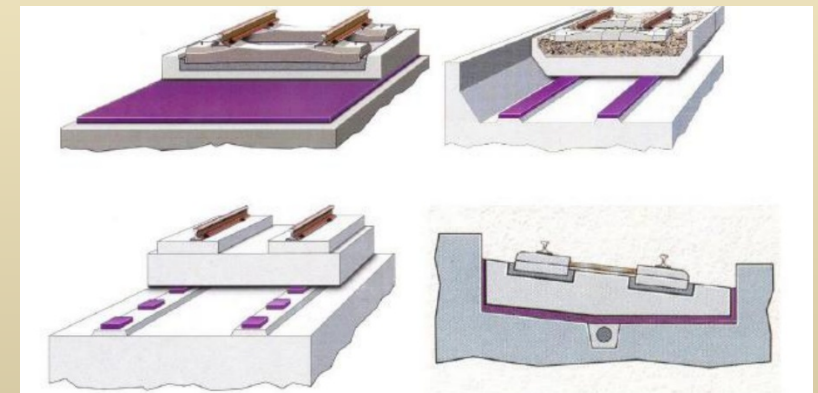
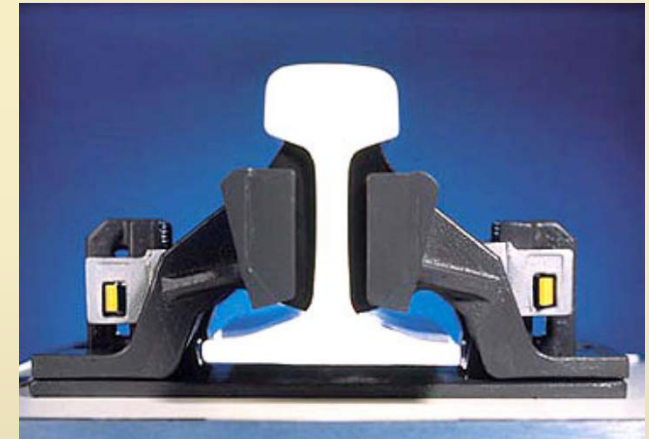
Protection from **noise**

- Interventions at the source (elastic connections)
- Interventions at the path (acoustic barriers)

Protection from **vibrations**

- Interventions at the source (the most effective):
 - elastic fastening of rails
 - elastomeric layer below RC slab (spring-mass)

Noise and vibrations are always connected





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Final considerations

- The technical solution - slab track, is increasingly in use
- However, there are still many open elements
- Obtained experiences should be shared in the design and construction
- New technologies and materials, and above all new requirements, are an open door to development and increasing application of ballastless track



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Thank you for your attention !

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