



Needs Tailored Interoperable Railway Infrastructure

Tailored track technology for different lines

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Context of the research

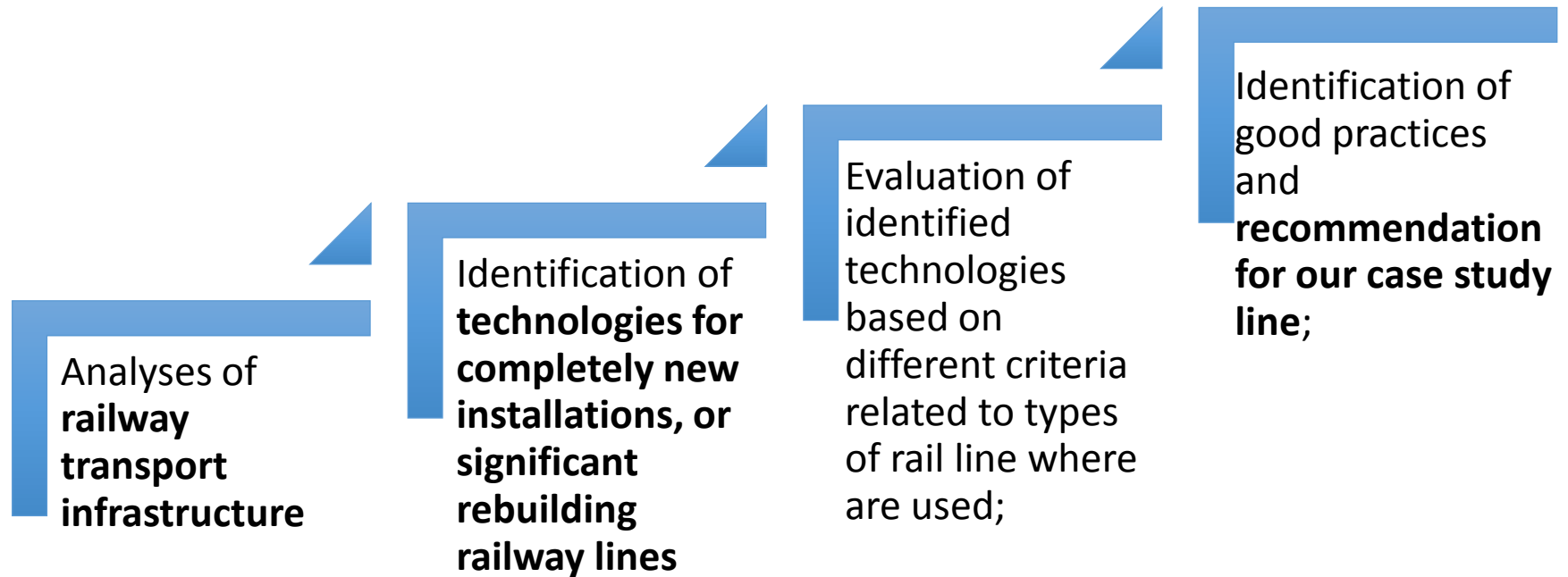
- The study was carried out along the WP2 of the project NeTIRail
- This WP focuses on the cost drivers of track infrastructure maintenance.
- This WP deals with track technology, switches and crossings, corrugation, lubrication and transition zones.

Scope and content of the research

- The goal of this task was to identify best technology on best practices for:
 - installing,
 - operating
 - and maintaining lines
- The study categories of test line in Netirail INFRA are:
 - busy passenger,
 - low density rural/secondary line
 - and a freight dominated route



Steps of the research



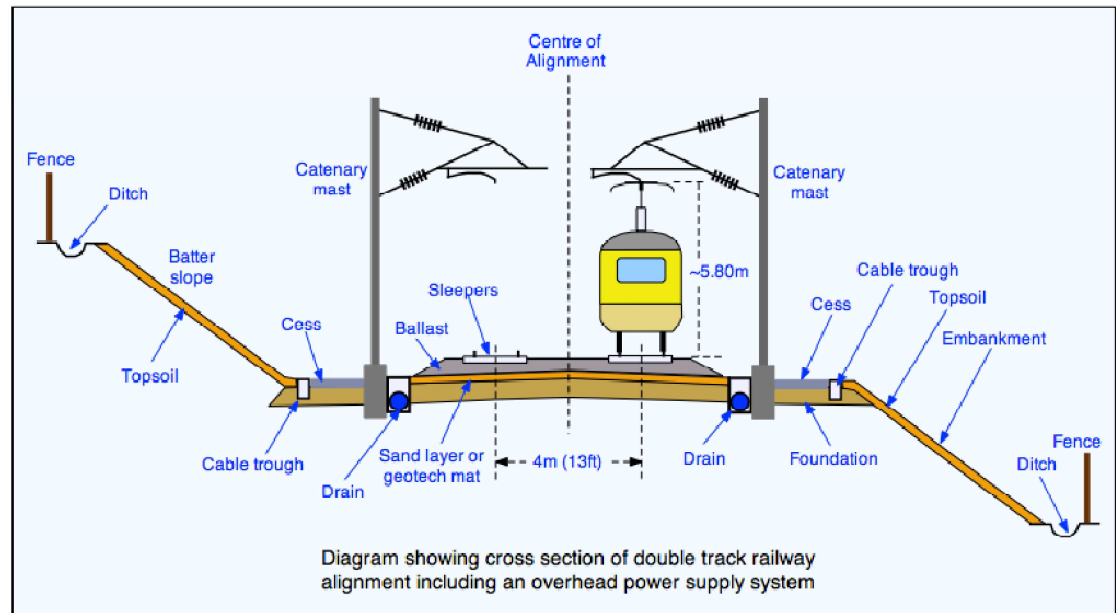
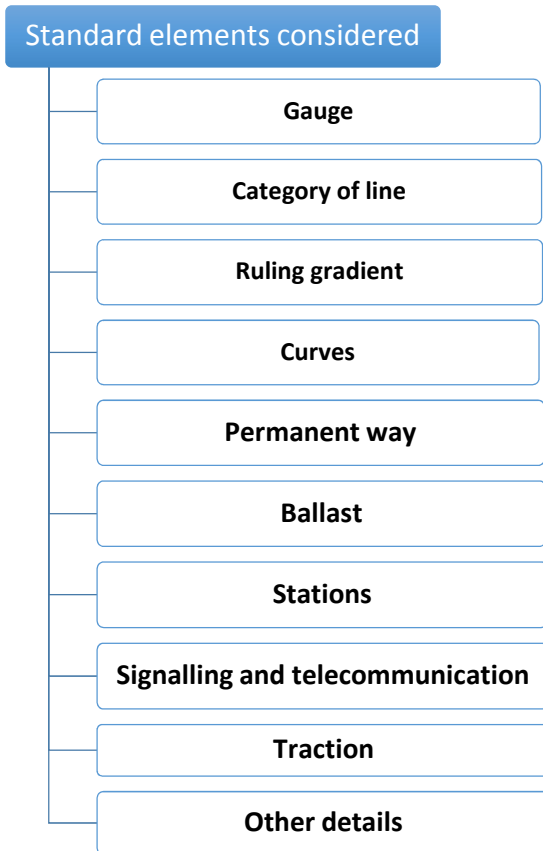
Technologies for completely new installations, or significant rebuilding railway line



- For completely new installations, or significant rebuilding, a wider range of technologies is within scope, **including rail grade selection, crossing types, sleeper spacing, ballast and sub-structure, for which best practice for different line types are documented**
- Necessity to construct new railway line arises from following considerations:
 - a. Regions with low grade of economic and social development.
 - b. Trade Centres need to be connected.
 - c. Political and strategic reasons.
 - d. Routes between two important points may be longer than required.

Technologies for completely new installations, or significant rebuilding railway line (2)

- Standard elements should be considered for new construction:



Source: <http://www.railway-technical.com/infrastructure.png>

Technologies for completely new installations, or significant rebuilding railway line (3)

Special attention to the following issues

Subgrade (formation)

Alignment of a railway line

Lines with high gradients

Sleepers for rails act as support

Rails - most important element of the track

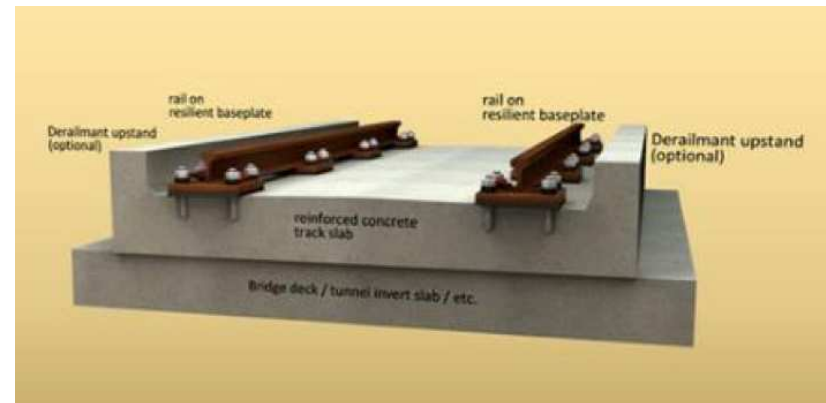
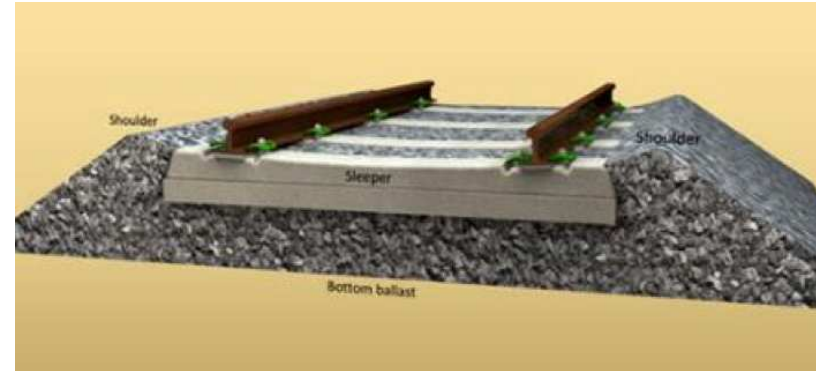
Degradation mechanisms:

- Loss of Rail Profile
- Rolling Contact Fatigue
- Rail Breakage

S&C (Switch and Crossings)

Technology of welded rails

- LWR (long welded rail)
- CWR (continuous welded rails)





Railways Modernization - Trends and Strategies

- Main objectives when railways are modernized: allowing heavier trains to run safely and economically at faster speeds; improving productivity; providing better customer service to rail users.
- Modern strategies for railways are focused on:
 - Track and infrastructure modernization for high speed trains.
 - Railway modernization adopting strategies focused for designing of dedicated freight routes which means for almost exclusively carrying freight traffic at higher speeds and increased axle loads.



Railways Modernization - Trends and Strategies (2)

A railway track could be modernizing by incorporating the following features in the track:

- Mechanized maintenance as modernization
- Upgrading ballast to a hard stone composition
- Use of heavier rail sections and the use of wear -resistant rails
- Adopting rail grade quality to R350HT and beyond.
- Curved switches of 1 in 16 and 1 in 20 type for smoother arrival at yards.
- Pre stressed concrete sleepers (PSC) and elastic fastenings.
- Introduction of electric traction in order to haul heavier loads at faster speeds.



Railways Modernization - Trends and Strategies (3)

A railway track could be modernizing by incorporating the following features in the track:

- Switch and crossings improvements.
- Upgrading ballast to a hard stone composition.
- Use concrete sleepers or even pre-stressed concrete sleepers on the entire route, including points and crossings.
- Track monitoring *using automatic inspection cars with portable accelerometer*
- Introduction of *modern signalling and interlocking systems*
- Setting up of a management information system for monitoring and moving freight traffic
- Computerization of the train ticket reservation system.
- Use of computers and other modern management techniques to design and maintain railway assets

Tailored solutions for improving new designs and upgrading existing conventional lines (1)



- Using the information gained from the study cases analysed in the project, NeTIRail provides tailored solutions for improving new designs and upgrading existing conventional lines.
 - A. For the situation of a busy passenger lines
 - B. Freight category dominated route
 - C. Low density rural/ secondary lines

Tailored solutions for improving new designs and upgrading existing conventional lines (2)



- **For the situation of a busy passenger, the line infrastructure modernization** is necessary to serve in good conditions the social demands.
- Strategies for introducing high-speed trains for passengers:
 - **Upgrading of existing railway lines.**
 - **Designing and construction of dedicated high-speed corridors.**

Tailored solutions for improving new designs and upgrading existing conventional lines (3)



- **Freight category dominated route** - Most important improvement for better utilisation of freight category dominated route is to increase the axle loads on the routes, with immediate result to increase railway capacity.
- **Improvements recommendations for designing Dedicated Freight Line (DFL) for:**
 - Track line structure
 - Bridges and viaducts
 - Tunnels
 - Signalling and telecommunications
 - Regional economic aspects

Tailored solutions for improving new designs and upgrading existing conventional lines (4)



- **Low density rural/ secondary lines represent a different situation.**

- Increasing traffic density is mainly dependent on external factors.
- Modernisation of line involves costs that may not be recovered. In this way, increasing efficiency could be possible through decreasing the maintenance cost; with this strategy, the line section will become more economic.
- Any improvement proposed for the others categories will lead to decreasing maintenance expenses but the investment cost should be assessed to determine if it is economically acceptable, or the deployment of other low cost technologies should be substituted.



Thank you!