SPANISH EXPERIENCE IN CREATION AND ADAPTATION OF RAIL STANDARDS

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- National standards
- International standards
- Interoperability
- Local design criteria

The situation at the beginning of the process

–Mid of eighties
–Conventional mixed traffic
–90 mph maximum speed

The current situation

–1200 miles of high speed lines
–Eight HS lines connecting major destinations
–185 mph, maximum operational speed

The railway system

- Physical subsystems
  - Infrastructure
  - Rolling stock
  - Energy
  - Traffic control
  - ...
- Functional subsystems
  - Operation
  - Maintenance
  - ...

Civil works, the track support

- Main components
  - Earthworks
  - Structures
  - Tunnels
  - Other components

⟶ The largest life cycle among subsystems

Track, the trains support

- Main components
  - Rails
  - Fastenings
  - Sleepers and ballast / slab track
  - Other components (switches & crossings...)

⟶ Life cycle depends on traffic and weather conditions

Main differences between infrastructure and other subsists

–Civil works life cycle: 100 years, at leas

–Components are interacting with environment

–Land use needs

⟶

Safety as main goal

The process to update standards

–Definition of infrastructure and track functionality for operational high speed

–Definition of main infrastructure parameters (for design and construction purposes)

Main infrastructure parameters

- General
  - Life cycle
  - Cant diagram maximum gradient
  - Maximum cant ratio
  - Maximum cant deficiency ratio
  - Maximum non compensated acceleration ratio
  - Maximum acceptable vertical acceleration
  - ...
- Plan view
  - Radius
  - Maximum cant value
  - Cant gradient
  - Transition curves, spirals
  - Transition curves length
  - Minimum tangents and radius length
  - ...

- Long profile
  - Vertical transitions geometry
  - Vertical transitions curve radius
  - Minimum vertical transition length
  - Minimum constant gradient length
  - Maximum slopes
  - ...
- Cross section parameters
  - Center track distance
  - Ballast layer geometry
  - Right of way width
  - Clearances
  - ...

Standards to be adapted

–Alignment geometry
–Earth works
–Subgrade
–Structures, bridges, viaducts
–Tunnels, underground works
–Track components
–Switches & crossings
–Stations
...

Sources / references

–Spanish available standards
–UIC leaflets
•General line features
•Track building and maintenance
•Building
•Structures
...
–ORE/ERRI documents
–Other countries experiences
•France
•Japan
•Germany
•Italy

European standardization process

–Parallely, European inniciative in order to harmonize safety levels
–European "interoperabilty" policy. (European norms)
–Safety, se urubú, reliability criteria

CEN → normes
Technical Specifications for Interoperabilty (TSI)
Local → (ADIF) design criteria

Summary

–At that time Spanish norms had to be adapted considering other national experiences. (Additional features according to different track gauge)

–European process of standardization, consistent with the interoperability policy. (CEN norms, TSI)

–Currently, the Spanish Public Works Ministry is defining the requirements to certify the interoperability of a line

–The railway infrastructure manager, ADIF, establishes their own design criteria