Engineering the Future:

Designing a Specific Transmission Module for Portugal's Railways

CRITICALSOFTWARE.COM

1998 - Foundation

We started with the most demanding environment

NASA JPL was our first client looking for capabilities in software for fault injection, detection and recovery of spacecraft

About Critical Software

Employees

1400+
Critical Software

4500+
Critical Group

Customer Satisfaction

9.1/10
average score
(last 5 years)

Offices

Portugal
Coimbra
Lisbon
Porto
Viseu

United Kingdom
Southampton

Germany
Munich

USA
Boston
San José

Our Markets & Clients

Aviation

GE Aviation AIRBUS Esterline

Defence

LEONARDO BAE SYSTEMS Marinha

Medical Devices

Medtronic Dräger skan

Automotive

Critical TechWorks BMW Continental

Space

NASA ThalesAlenia Space esa

Energy

Data Communications Company SAUTER MeteRSit

Finance

vodafone SIBS cognitivo

Government

GOVERNO DE PORTUGAL

Some of our railway clients

Certified Footprint

Technical Domains

- Systems engineering
- Embedded software development
- Systems & Software Validation
- RAMS & certification support
- Cybersecurity
- Digitalisation & AI

Certifications & Standards

- ISO 9001
- CMMI Level 5
- ISO 27001
- IEC 63452 workgroup
- ISO 62443

CENELEC EXPERIENCE

- EN 50126
- EN 50128
- EN 50129
- TS 50701
- EN 50159-1/2
- EN 50716

Designing a Specific Transmission Module for Portugal's Railways

ATP Context in Portugal

CONVEL is based on EBICAB 700 tailored to Portuguese railway needs

Rolling stock in Portugal is equipped with CONVEL onboard units

Legacy CONVEL onboard units no longer available due to obsolescence

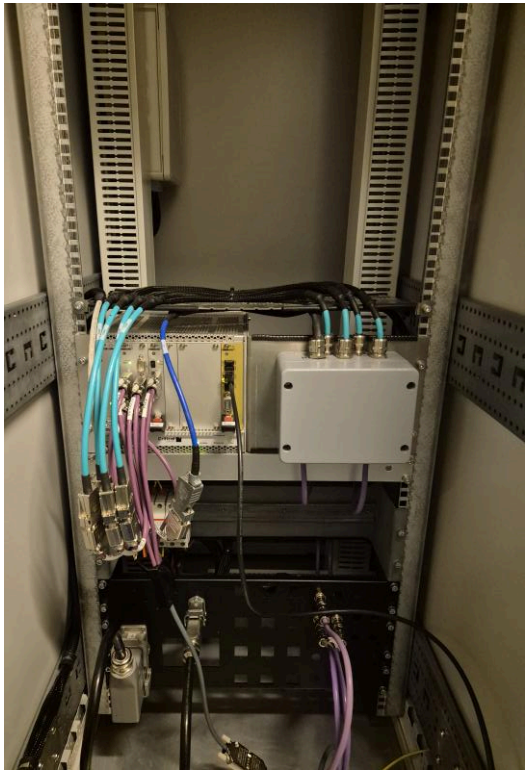
Multiple ongoing projects deploying ETCS Level 2 on wayside

A transition from CONVEL to ETCS is considered as a high-priority action for the country ▸ CONVEL STM

CONVEL STM

“An STM is responsible for the train movement supervision, according to the received national trackside information” (Subset-035)

- Implements train supervision equivalent to rules of the Class B system
  → Assessed by Designated Body (DeBo)
- Interoperability constituent implementing applicable TSI requirements
  → Assessed by Notified Body (NoBo)
- Safety-critical system with safety integrity level 4 (SIL4)
  → Assessed by Independent Safety Assessor (ISA)

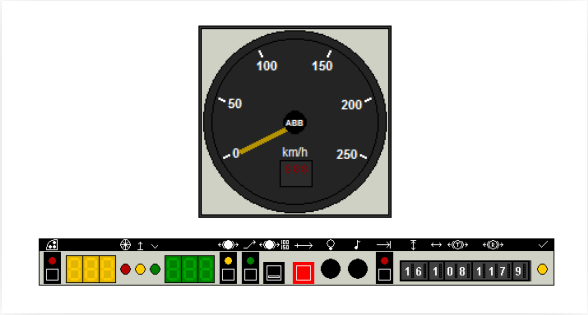


Challenges

Lack of documentation and knowledge about legacy CONVEL system

Development from scratch of the first STM solution for Portugal

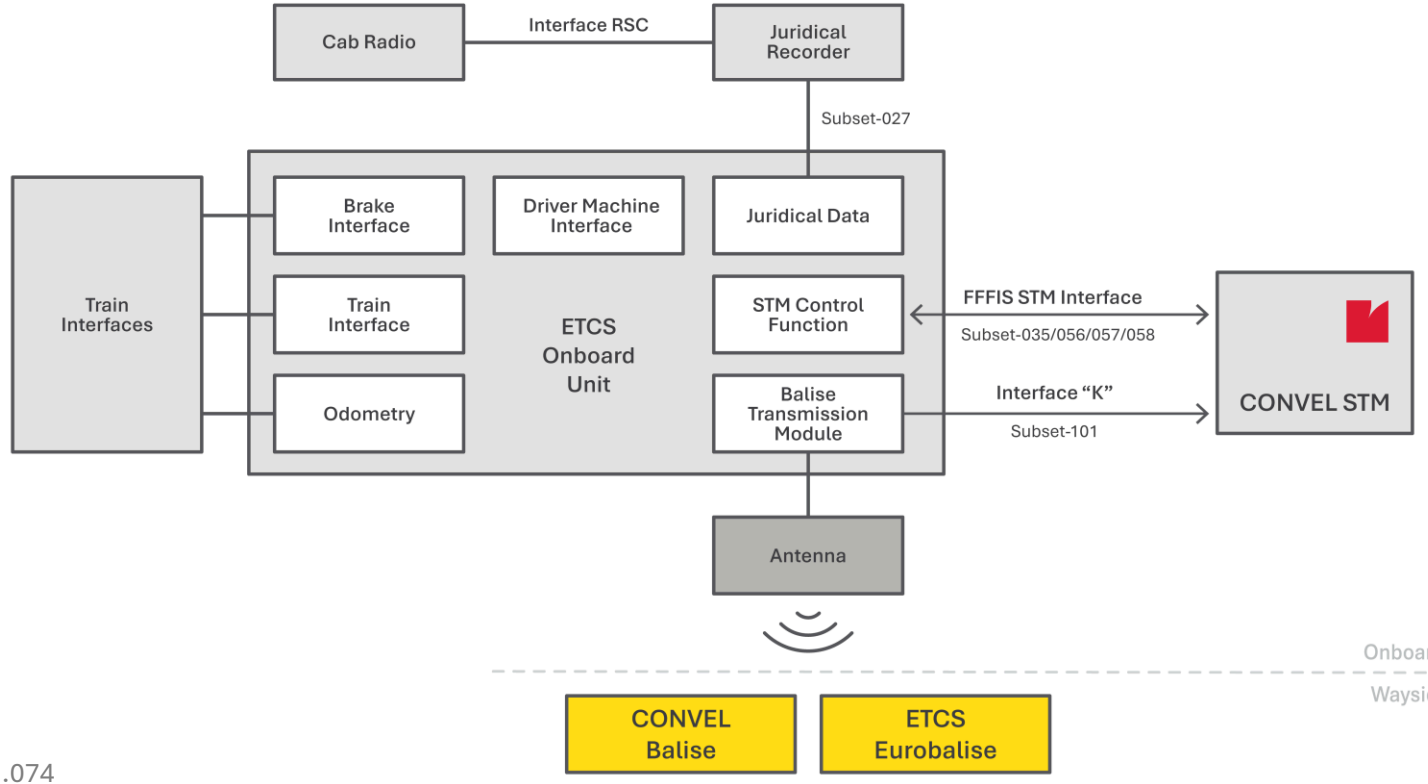
Definition of technical rules with National Authorities for safe operation of the ETCS + CONVEL STM solution



CONVEL

ETCS + CONVEL STM

System Architecture



Based on reference architecture defined in National Rule GR.IT.SIN.074

Benefits

Seamless transition from legacy CONVEL system to ETCS

Improvement of user experience for the drivers via ETCS DMI

Solves one of the technical barriers for entry of rolling stock in Portugal

Enables interoperability of the Portuguese railways and connection with Europe

Advantages of Critical Software's STM solution

Simplicity of integration by having no direct vehicle interfaces

External STM supporting integration with multiple ETCS providers

Ready for the market in Q2 2026

Stakeholders

HW & SW Partners

Customers/Operators

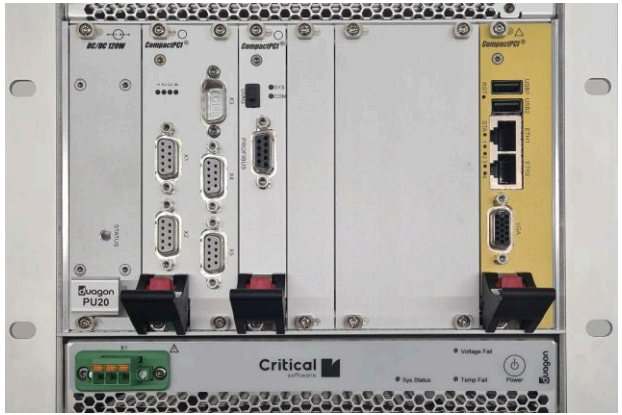
Certification Partner

ETCS Onboard Partner

Infrastructure Manager

National Safety Authority

ETCS + STM Solution Deployment



Deployment in more than 80 vehicles!

SIEMENS LE4700

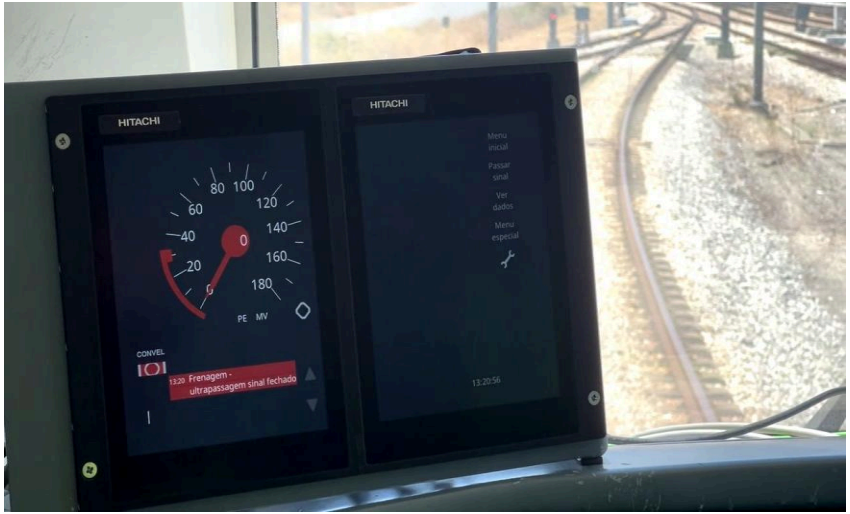
STADLER FLIRT

STADLER E6000

First vehicle equipped with ETCS + STM solution in Portugal!


4716
MEDWAY

CONVEL STM information on ETCS DMI



Thank you!

Visit us at our Booth I211

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