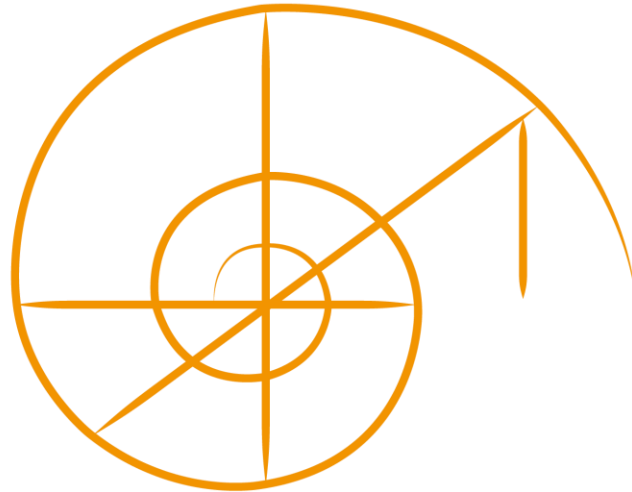




MADE IN
FRANCE



CLEARSY

SYSTEMS ENGINEERING

CLEARSY PRODUCTS AND SERVICES

SAFETY SYSTEMS
SAFETY SOFTWARE

CLEARSY OFFER
RAILWAY PRODUCTS AND SERVICES

CONTACT@CLEARSY.COM

COMPANY PROFILE

- French SME created in 2001
- Independent from any customer and privately owned
- About 140 employees (mainly engineers & PhDs)
- Located in France (Paris, Aix-en-Provence, Lyon, Strasbourg)
- ISO certified (9001:2015)
- In-depth knowledge of railway standards and rules
- In-depth knowledge of signalling systems, CBTC, interlocking, rolling stock rules and standards
- In-depth knowledge of ERTMS/ETCS standards
- Sectors: Railways (predominantly), Defence, Energy/Nuclear, Micro-electronics
- Development of a portfolio of safety critical products for Railways
www.fersil-railway.com
- Acquisition of ERSA (European Rail Software Applications) in July 2018

CORE SKILLS

- Creation and maintenance of the software development toolkit: Atelier B, used by major signalling companies and technical universities worldwide; this toolkit is used to produce mathematically proven safety critical software and/or systems
- Definition and delivery of certified safety systems and software according to CENELEC SIL2 to SIL4
- Usage of formal methods (B method) to develop such systems and/or software applications
- High level of expertise in ERTMS/ETCS (through the acquisition of ERSA in 2018)

EXPERTISE AND SERVICES

- Software and systems mathematically proven (B method)
- Safety critical data validation tools and services
- Safety cases using IEC 61508 and CENELEC EN 50126,128,129 standards
- Safety critical system and software architecture design and development
- Safety PLC program development
- Safety critical electronic hardware design and development
- Safe train track transmission by induction loop
- Safety critical software and hardware commissioning
- Expertise to meet exceptional or unusual safety requirements
- Provision of specialists in safety critical developments
- Provision of CBTC and ERTMS/ETCS specialists (advice, requirements, validation, training, etc...)
- Ability to manage a complete project, from design to deployment and commissioning and level 1 maintenance management
- Management of production, multi-site manufacturing (subcontracting)

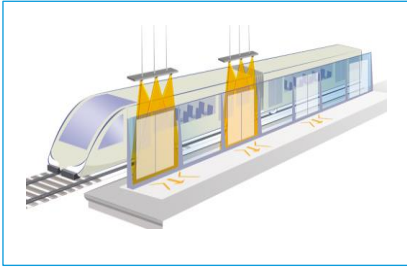
MAIN CUSTOMERS

The customers are mainly end users, railway or subway operators, industrial companies, integration companies, installation companies.

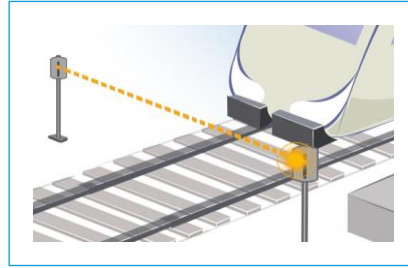


EXAMPLES OF SAFETY CRITICAL SYSTEMS AND PRODUCTS

The following products have been designed and produced by CLEARSY.
About 20 products are certified according to CENELEC standards.



> DETECTION OF A PERSON IN A GAP



> TRAIN DETECTION



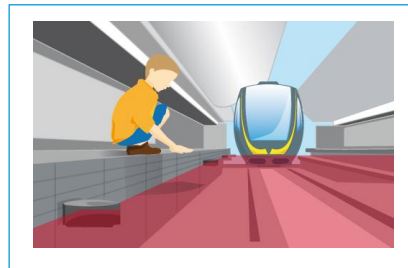
> PLATFORM SCREEN DOORS CONTROL



> SIL4 RELAYS



> CONTROLLER AND I/O NETWORK



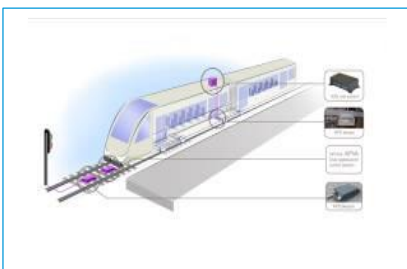
> TRACK SAFETY MONITORING



> PLATFORM DETECTION



> AXLE COUNTER
- WHEEL SENSOR
- FLAT TYRE SENSOR
- PEOPLE MOVER DETECTION



> AUTOMATIC TRAIN STOP
- OVERSPEED
- SIGNAL



> HMI PLATFORM
- ETCS BASELINE 3

R&D PROJECTS, INNOVATION

CLEARSY is always looking ahead and is working on various R&D projects.

- Train passage detection system based on HF technology
- Track plan editor
- Management tools for the supervision, exploitation and maintenance of systems
- CLEARSY Safety Platform for SIL4 applications
- New version of Atelier B, new tools and methods, training courses
- SIL4 relays for on board or signalling applications
- Train localisation systems with detection by induction loop or rail
- Various simulation tools

ERTMS/ETCS

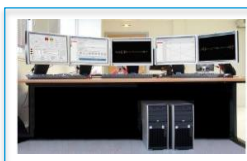
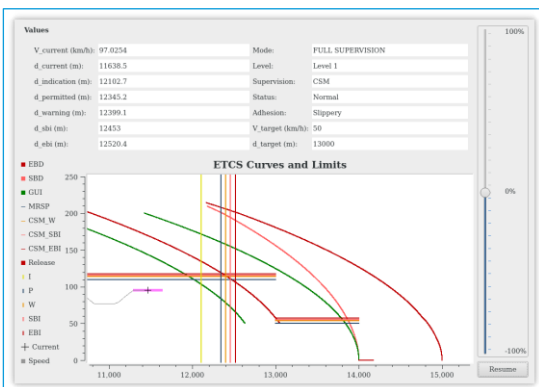
ERSA and CLEARSY are joining forces to offer the following services and products:

PRODUCTS AND TOOLS

- Simulation tools for ETCS baseline 3 braking curves
- ERTMS/ETCS Operational Simulator with optional STMs and optional 3D
- ERTMS/ETCS Traffic Simulator for baseline 2 or baseline 3
- Test Bench for ETCS on board units according to SUBSETs 094 or 111
- Test Bench for ETCS trackside components and/or cross tests (IOP testing)
- ETCS DMI software according to CENELEC SIL2
- Formal validation of ETCS data Specific applications (including HMI) tailored to the needs

SERVICES

- Consulting activities (specification, design, test ...)
- ERTMS Training programme
- Design and development of software, embedded software up to SIL4
- Validation testing (compliance with requirements)



CBTC

FORMAL MODELLING USING THE B METHOD AND LANGUAGE

Up to « unattended train operation (UTO) » (GoA4)

- Analysis of the safety of systems (train and track) for existing lines or new projects - mathematically proven
- Automatic production of safety critical code (ADA or C)
- Validation/verification of safety critical data through a B-model checker

SERVICES

- Training & consulting
- Safety demonstration
- Assistance to software project development (from specification, design, to integration, validation).

REFERENCES

- System analysis performed for major subway and railway operators



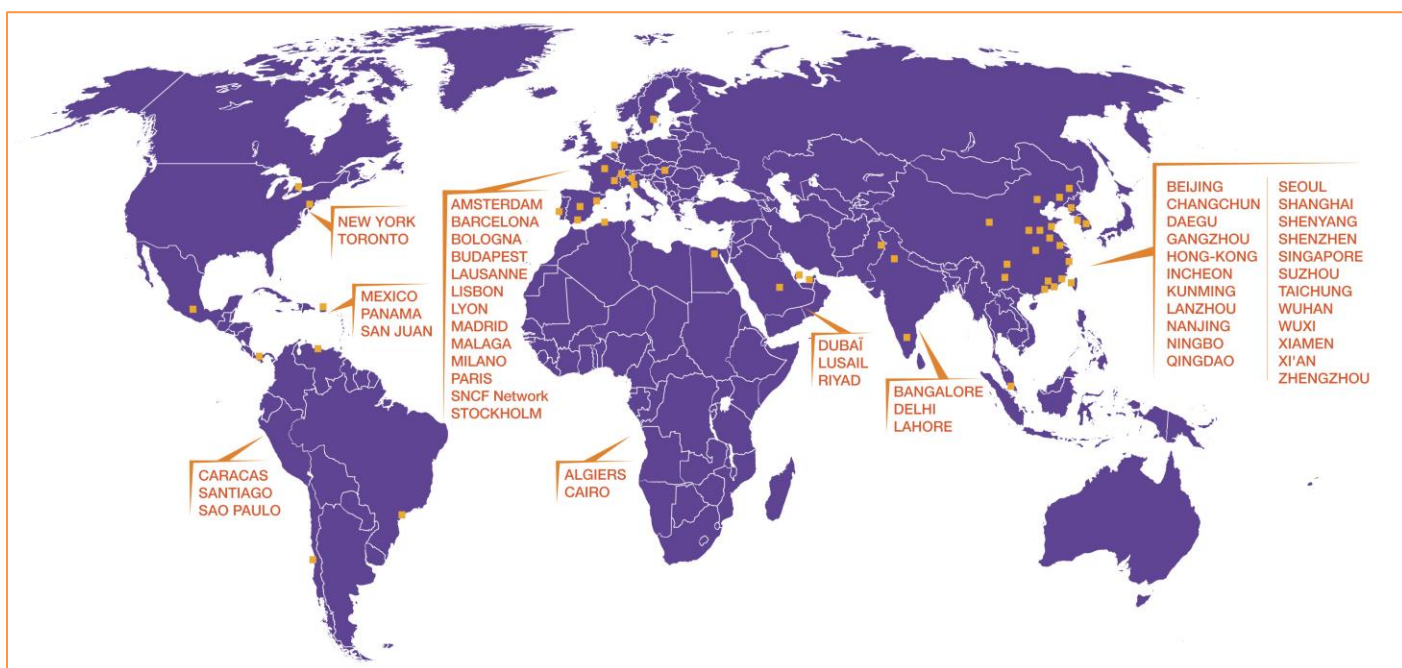
- Modelling, code production and related services for major signalling companies



- Data validation for major signalling companies and infrastructure managers



THE B METHOD TOOLKIT DEVELOPED AND EDITED BY CLEARSY

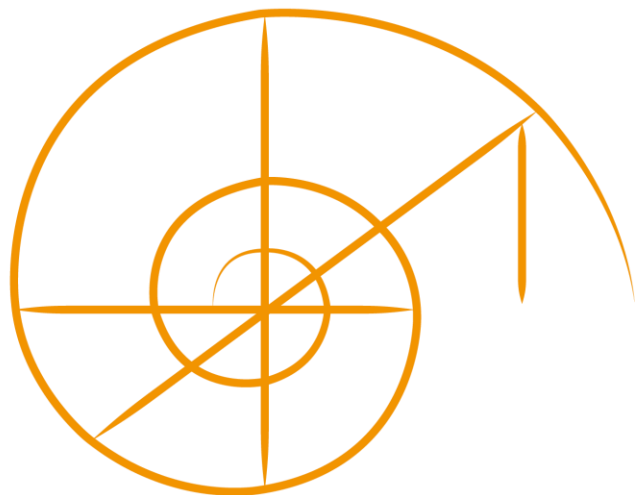


ISO 9001:2015 CERTIFICATE

The scope of the certificate is:

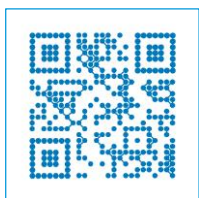
« *Design and Implementation
of safety control-command systems
and software – Consulting* »





CLEARSY

SYSTEMS ENGINEERING



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