

CLEARSY

Safety Solutions Designer

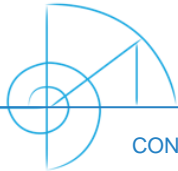
Dec 2024

AIX
LYON
PARIS
STRASBOURG

WWW.CLEARSY.COM

CLEARSY Safety Platform

Controller including safety critical interfaces



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The CLEARSY SIL4 computer

▶ Safety critical computer designed by CLEARSY

- ▶ Single board computer with 2 out of 2 architecture
- ▶ Fully integrated software library included in the SIL4 certificate
- ▶ Compilation and loading toolchains included
- ▶ Ready to use SIL4 certified solution

▶ Features

- ▶ Single board computer powered by PIC32MX microcontroller
- ▶ 80 MIPS
- ▶ 72,5x45 mm
- ▶ All peripherals available to end user.
- ▶ Low power consumption (less than 2W)



CLEARSY Portfolio is growing

▶ Currently

▷ SIL4 Safety critical computer

Certified against EN50128-50129-50126

Safe and correct execution of custom software with possible use of formal proof

▷ Starter kit

Motherboard which exposes

32 non-vital inputs and outputs

Enable fast and efficient prototyping

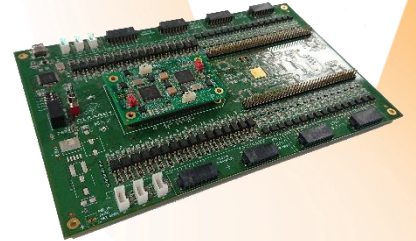
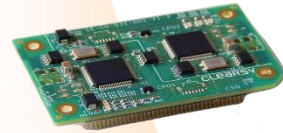
▶ 2024

▷ CLEARSY Safety Controller

Ready to use

Built-in safety critical inputs and outputs

Evolutive rack format



Target of the CLEARSY Safety Controller

▶ Perform proof of concept

▷ Quickly

No hardware design
Product available in stock

▷ Known and limited cost

Re-use of existing knowledge database from CLEARSY

▷ With a SIL3 or SIL4 level

Based on already SIL4-certified computer
Based on already in revenue service SIL3/SIL4 interfaces (input/output/network)

▶ Build a tailor made safety critical system

▷ Adding extra interfaces or features

▷ Other possible evolutions

Form factor redesign
Customer specific constraints (maintenance, power source, local regulation, ...)
Variation on IO or interfaces count

▶ Easing the deployment of relevant safety critical solution

▷ CLEARSY's expertise at the service of the project



CLEARSY Safety Controller

▶ Off the shelf product

- ▶ Architecture based on **already certified SIL4** platform
- ▶ Programmable in B (formal language)
- ▶ Integrated in a 3U rack with 4 inputs and 3 outputs
- ▶ 1 ETHERNET base 10/100 TX
- ▶ Compliant to railway standards
- ▶ Universal power supply (24VDC or 110VDC)

▶ Entirely designed in France by CLEARSY



Technical features

- ▶ Power supply compliant to EN50155 – (24 – 110 VDC)
- ▶ Double cut outputs (x3)
 - ▷ Switching capacity [10mA ; 8A]
 - ▷ Working voltage max 250VAC
 - ▷ Dielectric strength 2kVAC
- ▶ On/Off digital inputs (x4)
 - ▷ 0-140VDC (other voltages possible on demand)
 - ▷ Polarized DC
- ▶ T3/T2 toolchains
 - ▷ Double compilation chain with T3 level (EN50128:2011)
 - ▷ T3 Configuration tool (EN50128:2011)
 - ▷ Possibility of writing formally proved software (language B) with the IDE « Atelier B » T2 (EN50128:2011)

Benefits of the CLEARSY Safety Controller

Device based on already **SIL4 certified** solution

Available for short time to market proof of concept

Modular and **evolutive** system

Upgradable to comply quickly with customer requirements

Limited and **known** costs

References

▶ Systems based on a similar architecture are already in use on revenue service railway assets (wayside and onboard)

▷ **PSD Control system**

Monorail Sao Paulo line 15

SIL4 CERTIFER certificate n° 8891/200-1 (27/01/2017)

▷ **PSD Control system**

Stockholm City Line

SIL3 Bureau Veritas certificate n° 63937413 (03/03/2017)

▷ **Bi-directional communication between train and wayside**

Brisbane Cross River Rail

SIL3 Bureau Veritas certificate n° 16323751 (15/11/2024)

▷ **Remote input/output controller for CBTC**

Generic **SIL4** Bureau Veritas certificate n°7092509

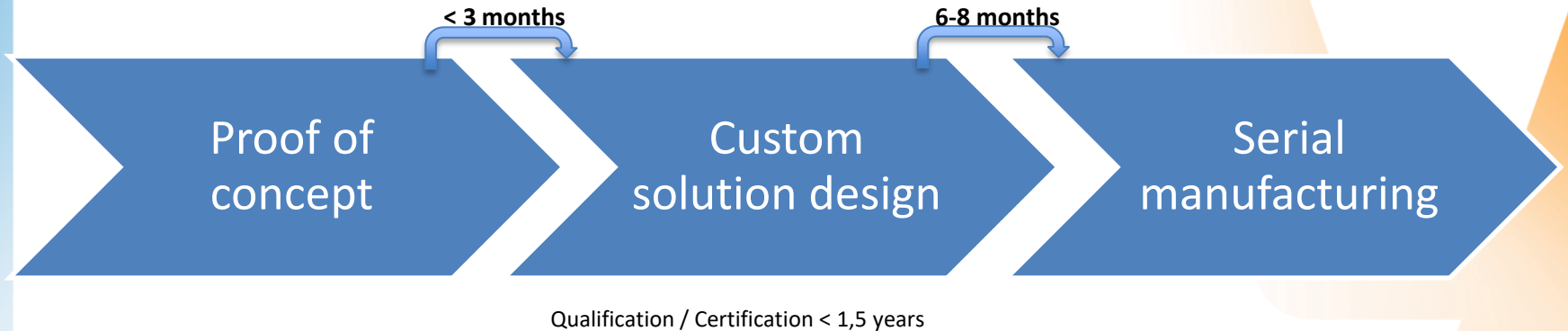
(23/07/2019)

Compliant to **AREMA** standard (TÜV approval)



Your project timeline

- ▶ **Goal:** Offer a **ready-to-use SIL4 architecture** that facilitates the design and deployment of **custom applications**



▶ CLEARSY's services for the

- ▶ Proof of concept
- ▶ Design of custom application
- ▶ Use case validation
- ▶ Safety certification
- ▶ Upgrade of the design
- ▶ Manufacturing

Summary

- ▶ **Adaptable** off the shelf product
- ▶ **Expert** in design of safety critical systems
- ▶ **Proven** technology in revenue service
- ▶ **Agile** and **adaptable** design process
- ▶ Risk and cost managed – use of already **SIL4 custom certified** solution



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