



## Critical Embedded Systems

Company presentation



# LEROY AUTOMATION

Since 1983, Leroy Automation **designs and manufactures** control and automation solutions for the railway, energy, defense and industry markets.



We specialize in embedded electronics for on-board **rolling stock**, train **signalling**, and **communication** gateways.

Recognized skills and expertise in the integration of turn key **TCMS** (*Train Control and Monitoring System*) architectures and system solutions.

## Headquarters: Toulouse (France)

*Representation office: Montreal, Quebec (Canada)*

*Manufacturing plant: France*

*Localization support compliance:*

- *Buy America Act*
- *Canadian Contents*
- *Make in India*



## Staff ≈ 70

*Senior Executives: 5%*

*Business strategy: 5%*

*Design and engineering: 50%*

*Methods, Industrialization and Production: 20%*

*Quality and support functions: 20%*



## Turnover ≈ 15 M€

*Capital: 210K€*

*Family-owned company (MCC group)*

*F3+ financial rating*



# OUR POLICY

“ Leroy Automation manufactures **highly reliable** automation products suited for harsh environments. Our company is a **globally recognized** supplier of **control products** designed for the **railway** industry.

**Each employee** is part of a global network of partners linked by a **spirit** of long-term **trust**, continuously fulfilling **commitments** and a proactive drive to meet the **excellence** in our domain of **expertise**.”

- Alain WOJTASZAK, General Manager



# GROUP STRUCTURE

MCC, a **midcap** consortium of 5 SMEs with **complementary** competencies addressing **high-mix/low-volume** cross industries with **outstanding** quality performance and services.

## Core competencies



- Innovation + R&D
- PCBA Prototyping & lean mass production
- Turnkey System Integration
- Maintenance, Repair and Operations (MRO)
- Obsolescence management
- Quality, product life-cycle metrics and analytics

## Workforce ≈ 300



- Systems design engineering
- Electrical and embedded electronics
- Real-time embedded Software
- Mechanical design and integration
- Test, Verification, Validation, Qualification
- IPC-A-6XX certified experts



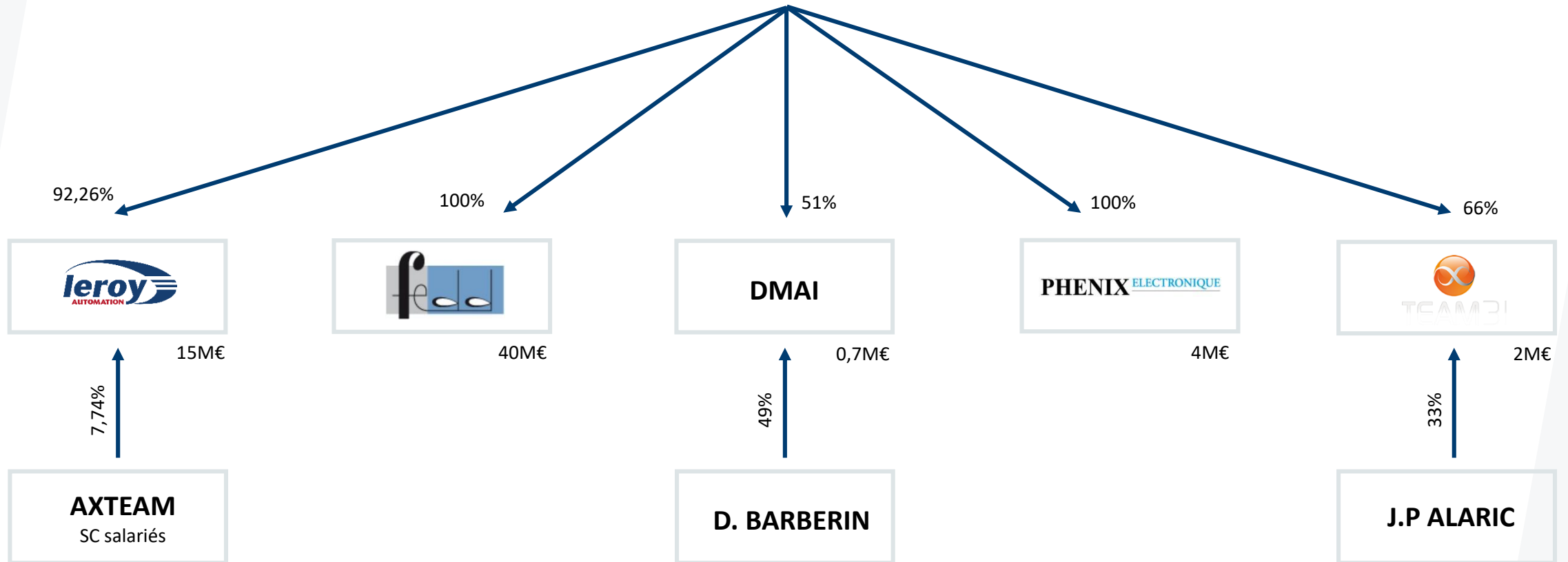
## Turnover ≈ 60 M€

Yearly production ≈ 50,000 systems  
Industrial capacity ≈ 8,000 sq. meters

# GROUP STRUCTURE

**MCC**

C. DELAGE/ML. AUBURTIN/C. AUBURTIN

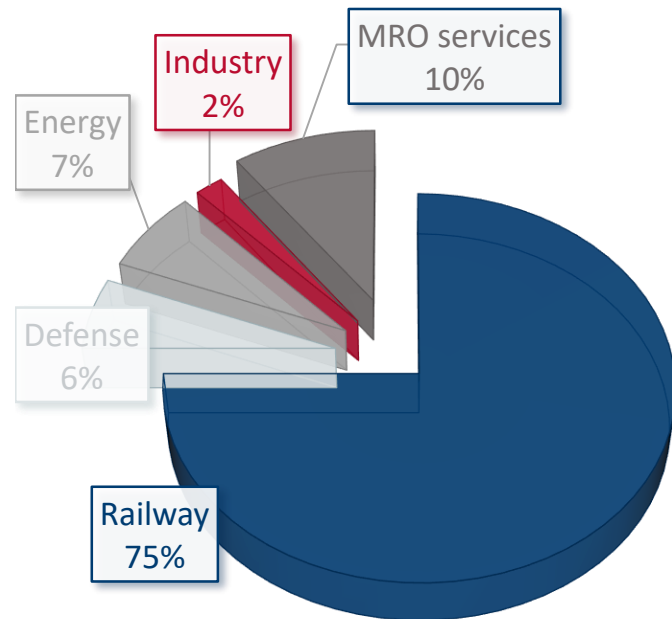




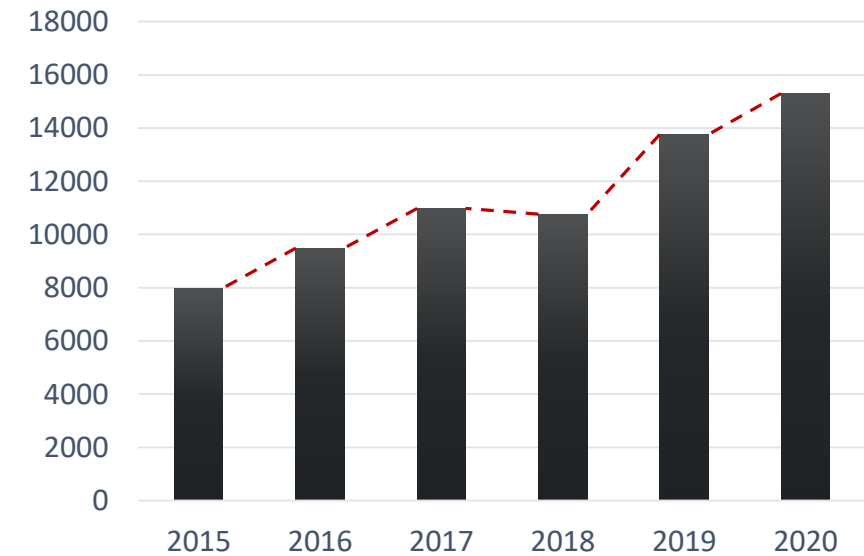
# FINANCIAL REPORT

5+year sustained growth and steady market development

## MARKETS OVERVIEW



## BUSINESS CONSOLIDATION



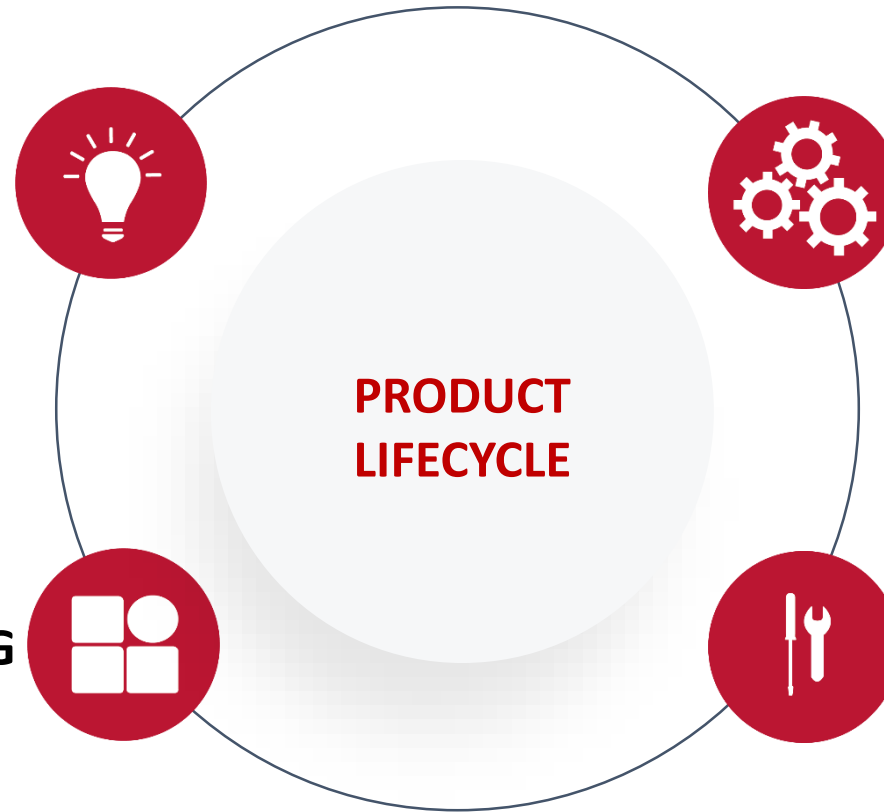
# COMPETENCIES

## DESIGN

- Feasibility studies
- Prototyping
- Demonstrators
- Counselling
- Specification

## MANUFACTURING

- Industrialization
- Series manufacturing
- Supply Chain
- Test & Integration



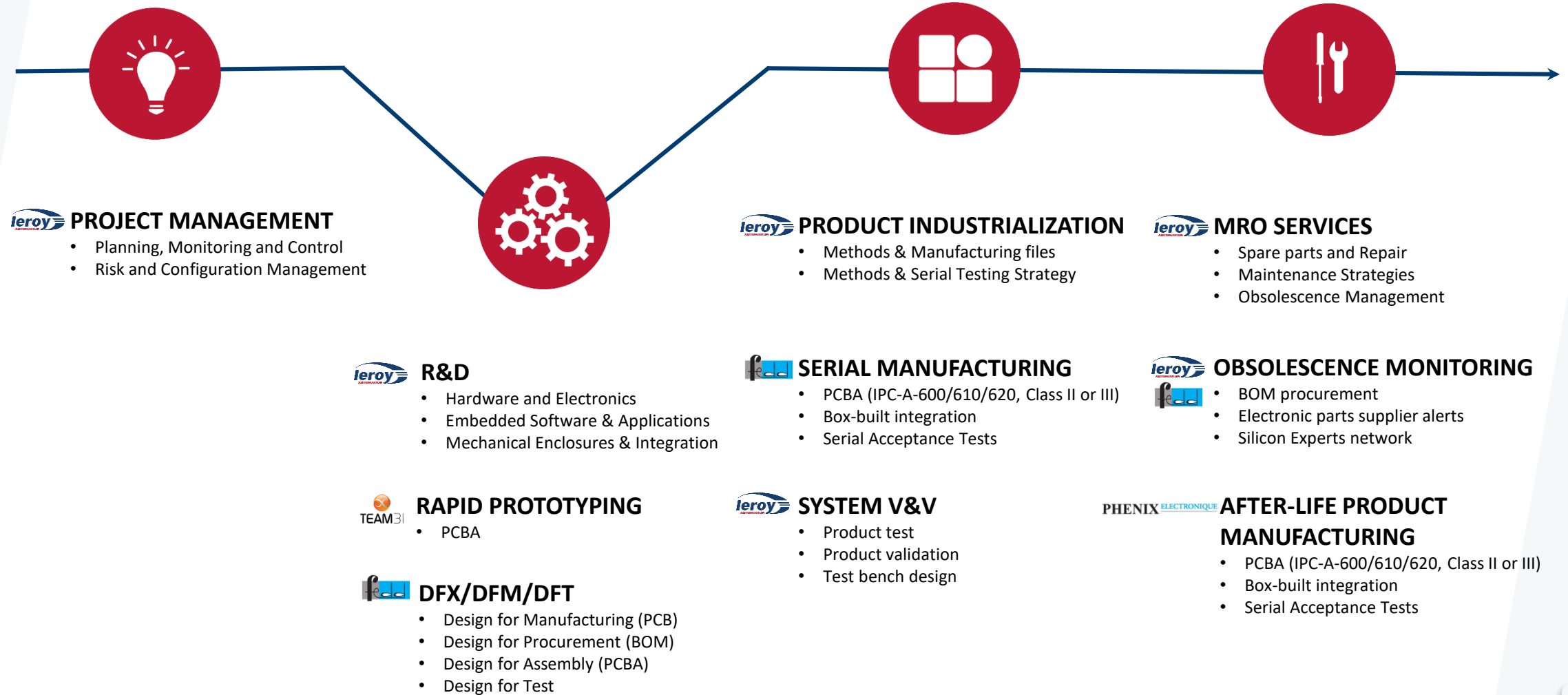
## DEVELOPMENT

- Project Management
- Quality insurance
- Electronic, software & mechanical engineering
- Test & validation
- RAMS

## MAINTENANCE AND OVERHAUL

- Repair
- Obsolescence Management
- Strategic Stock
- Analysis and preventive maintenance

# GROUP STRATEGY





# SERVICES



## DESIGN

Our team of expert engineers is committed to meet your specific needs *and to tailor our solutions and products to fit your specific needs.*



## ADVICE

We help our customers refine their requirements (pre-sales engineering) and propose **feasibility studies.**



## TRAINING

Our expert electronic technicians deliver **tailored training sessions upon request.**



## SUPPORT & ASSISTANCE

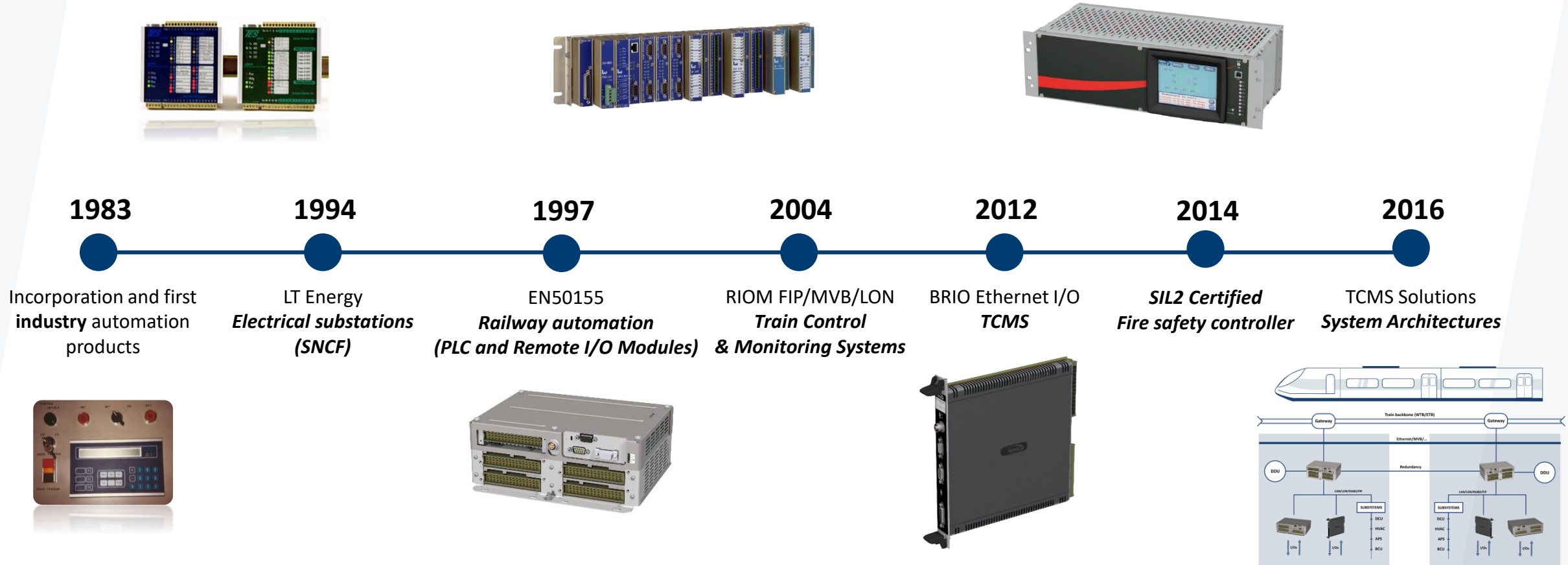
We offer free **technical support for immediate intervention**, assistance during project **commissioning phases**, and high-end **expertise** services.



## MAINTENANCE & REPAIR

We **repair** and maintain our products beyond their commercial life, and provide **third-party** repair services.

# PRODUCT MILESTONES



# CERTIFICATIONS

## Quality Management System



## Corporate Social Responsibility



## Standardization committees partner



# REFERENCES



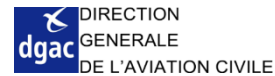
**BOMBARDIER**



**THALES**



**SIEMENS**



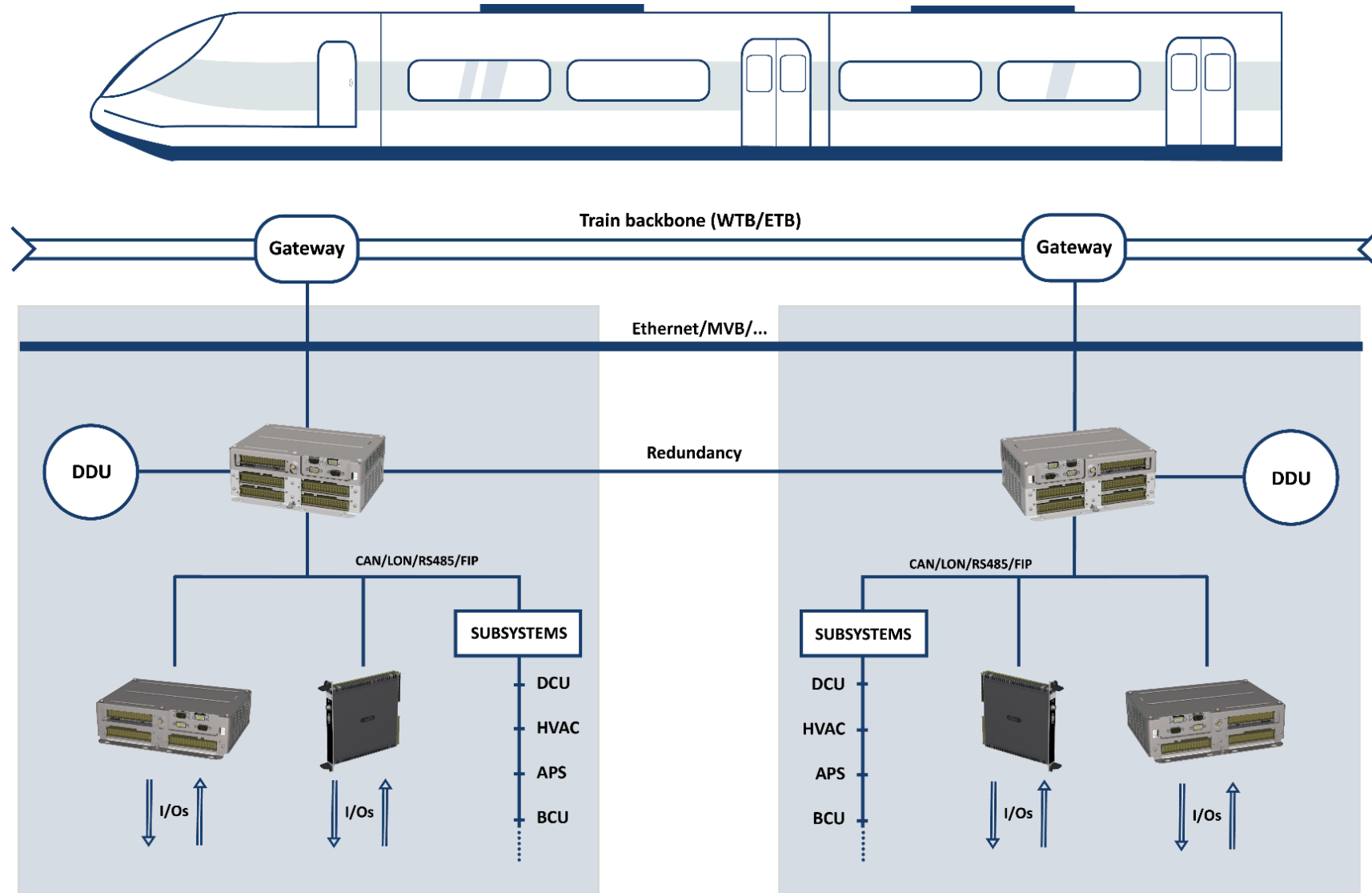
**ALSTOM**



# > 80,000 PRODUCTS OPERATING AROUND THE GLOBE



# RAILWAY PRODUCT LINES & SYSTEMS





# PRODUCT CHARACTERISTICS

Leroy Automation products are designed and **thoroughly tested** (EMC Environment, Thermal Management, Rugged Mechanical Enclosure, etc.) in order to ensure **long-lasting** operational availability in challenging environments.



- **Broad range of COTS products**
- **On-demand product customization**
- **Custom developments upon specifications**
  - Hardware and software
  - Mechanical integration
  - Maintenance and repair service contracts

# RAILWAY PRODUCT LINES

## RIOM Range

The RIOM is a powerful, multipurpose PLC featuring integrated communication gateways and remote input/output capabilities. It is typically used as a vehicle control unit able to manage electrical subsystems in **TCMS architectures**. Its powerful processing capabilities and robustness makes it the perfect candidate for integration in a **SIL 2 system architecture**.

### Main features:

- EN 50155/IEC 60571-compliant
- Power supply: 24Vdc, 36Vdc or 72-110Vdc
- DI: up to 64
- DO: up to 32
- AI : 4 I/U inputs  $\pm 10\text{V}$  ( $10\text{k}\Omega$ ) /  $\pm 20\text{mA}$  ( $125\ \Omega$ )
- AO: 4 I/U outputs 0-10Vdc (50mA max) / 0-20mA (10Vdc max)
- Communication: Ethernet, CAN 2.0, MVB, LON, RS485, RS-232



# RAILWAY PRODUCT LINES

## BRIO Range

The BRIO is a versatile and easy to adapt remote input/output module. It is designed for fast integration in TCMS architectures and can also be used as an input/output module for signalling systems. Its streamlined structure requires no programming (configurable device), features a full range power supply and output read-back capabilities. The FPGA-based I/O control allows fast reaction times ( $<100\mu\text{s}$ ).

### Main features:

- EN 50155/IEC 60571-compliant
- Power supply: full range 24-110Vdc
- DI: up to 40
- DO: up to 16
- AI : 4 I/U inputs  $\pm 10\text{V}$  ( $10\text{k}\Omega$ )/ $\pm 20\text{mA}$  ( $113\ \Omega$ )
- AO: 1 I/U outputs 0-10V (50mA max)/0-20MA (10V max)
- Communication: Ethernet bus 100Mbits IEEE802.3, UDP, TCP, Ethernet/IP-CIP scanner or adapter, IEC 61375-2 TRDP
- Serial Links: RS485 HDLC daisy chain, RS232 local settings, CAN 2.0 A or B, CANopen slave

### Variants:

- BRIO CEE (energy exchange controller)
- BRIO CANopen (for traction control)
- BRIO extension (increased available I/Os on single point-of-entry)
- Your choice...



# RAILWAY PRODUCT LINES

## BRIO SIL2 products

Leroy Automation is experienced in safety-related developments. Our latest developments integrate intrinsic safety architecture allowing internal voting capabilities. The product is designed for integration in TCMS architectures and are compliant with EN 50126, EN 50128 and EN50129 standards. This device can also be used for fail-safe I/O availability in signalling systems.

### Main features:

- EN 50155/IEC 60571-compliant
- SIL2-compliant according to EN 50126, EN 50128 and EN 50129
- Power supply: full range 24-110Vdc
- Fully configurable (no programming required)
- DI : up to 20 SIL2 channels
- DO : up to 10 SIL2 channels
- Galvanic isolation between each DI channels
- Galvanic isolation and floating DO (Mosfet technology) channels
- Communication: Ethernet/IP-CIP, UDP, IEC 61375-2-3 TRDP
- Cybersecurity hardware mechanisms and software features (TRNG, asymmetric key encryption, etc.)

### Variant:

- BRIO SSPC (Digital and configurable circuit breaker with TCMS-enabled re-arm)



# RAILWAY PRODUCT LINES

## Gateways

Leroy Automation offers a wide variety of communication gateways, whether embedded in our I/O modules and featuring processing capabilities and fast customization to specific needs. We also provide a range of COTS gateway products, and can design specific communication platform upon request

### Example: Serial Link Gateway (SLG)

- EN 50155 compliant
- Power supply: 24Vdc
- RS 422 port (DB9-female type)
- 0-20mA Current loop port (DB9-male type)
- Data transmission:
  - Asynchronous, full duplex
  - Bidirectional communication interface
  - Speed : 1,200 bauds in full duplex mode
  - Data format : 1 start bit, 8 data bit, 1 parity bit, ODD parity and 1 stop bit

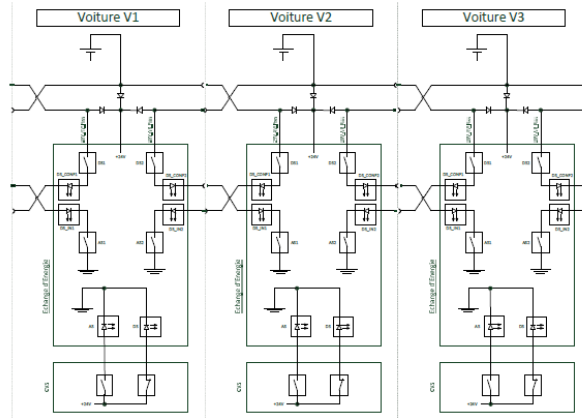
### Variants:

- Field bus communication buses: WTB, MVB, FIP, LON, Ethernet, etc...
- Integrated Ethernet train backbone network (ETBN) and consist routers/switches

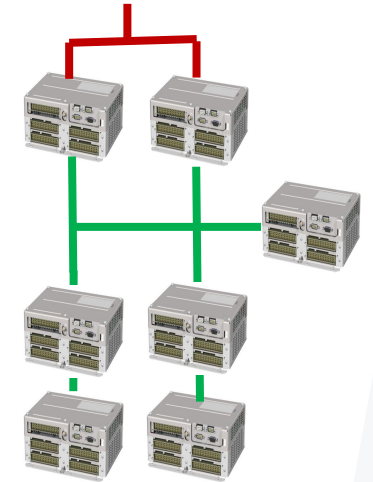
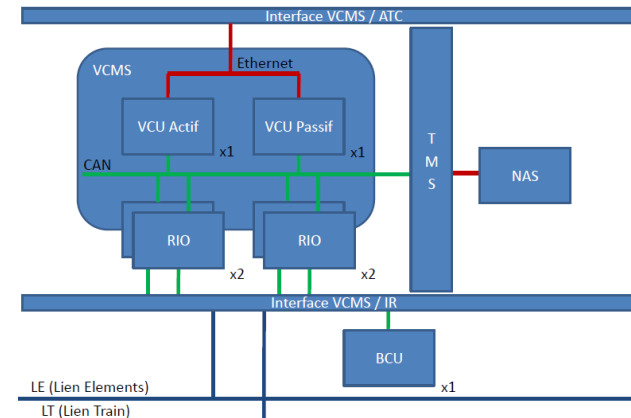


# TYPICAL APPLICATIONS

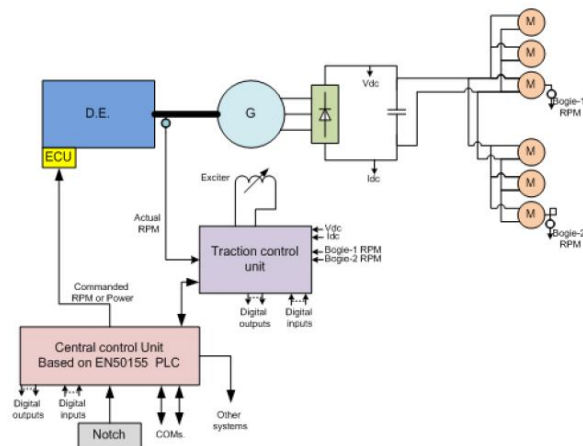
## Energy Exchange Controller



## TCMS GoA4 Metro



## Locomotive CCU



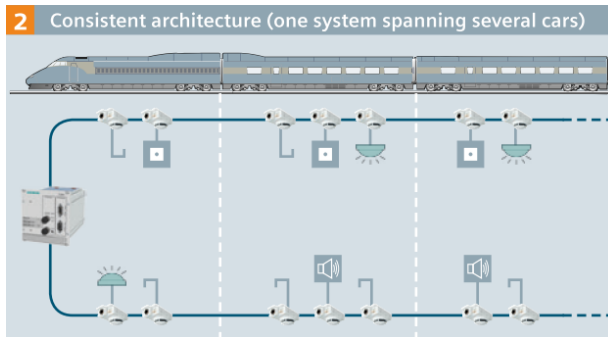
## TCMS Simulator



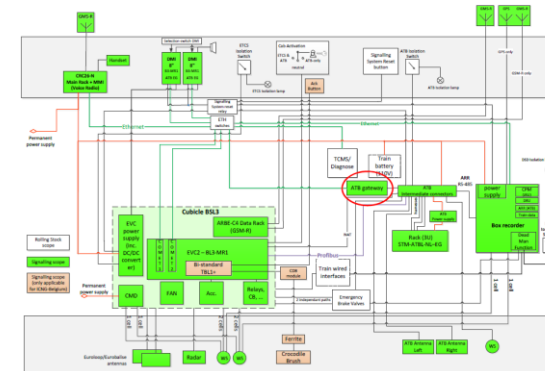


# TYPICAL APPLICATIONS

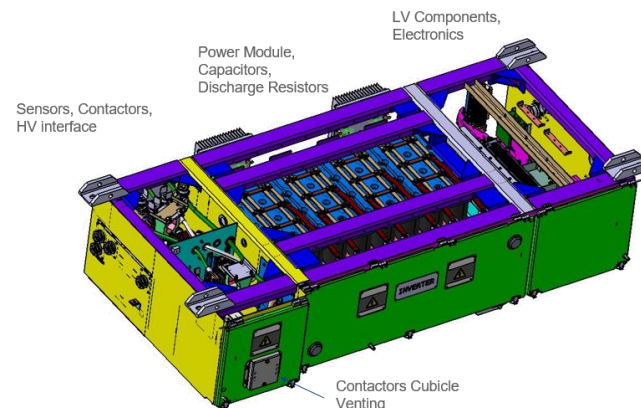
## SIL2 Fire Safety



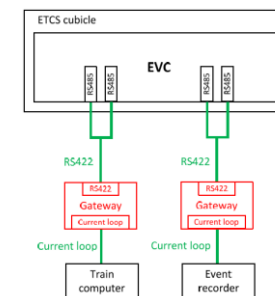
## Signalling ATP – DMI Gateway



## Traction Inverter Auxiliary Power Converters



## Signalling Gateways EVC-KVB/EVC-DMI/EVC-ER



# REFERENCES



**ALSTOM**

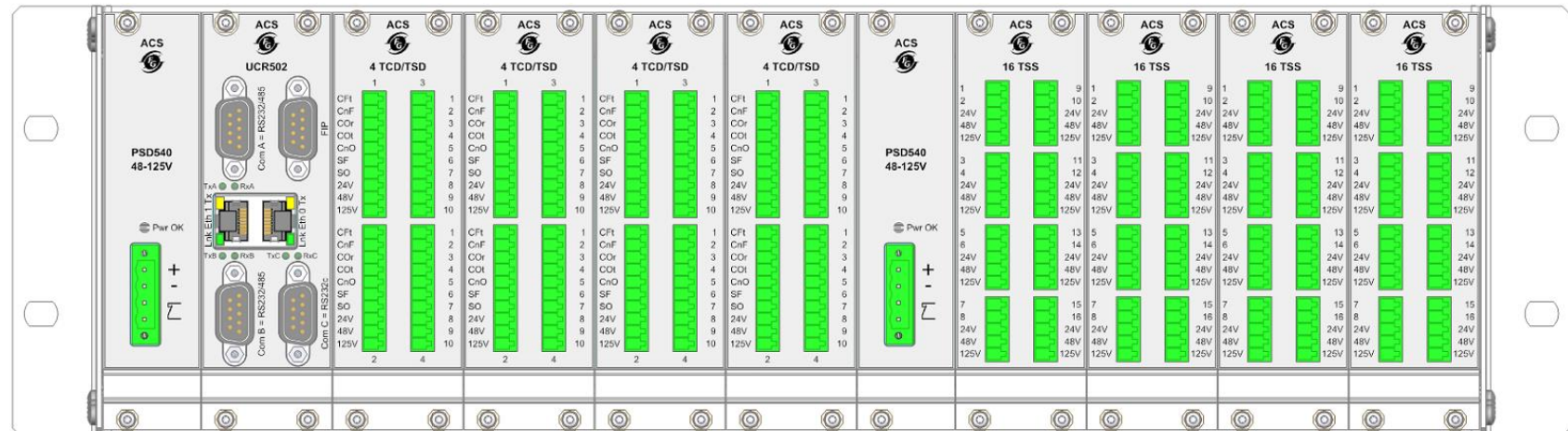
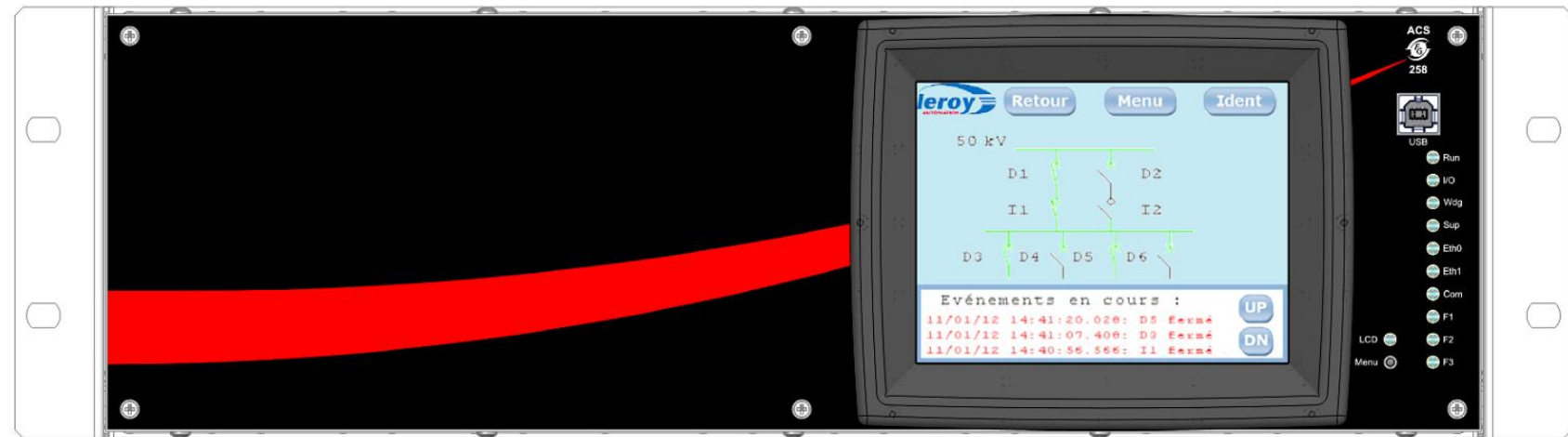
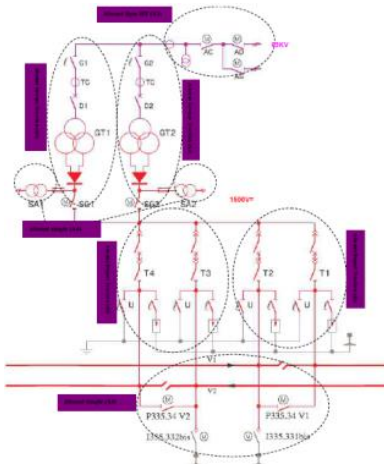
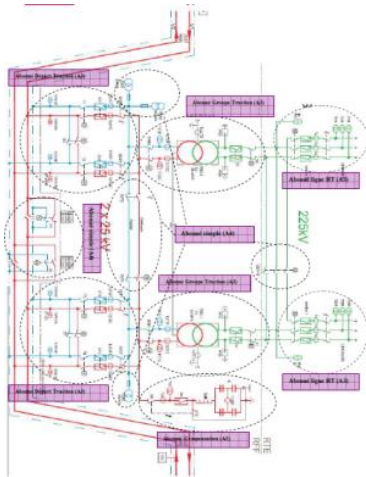
**BOMBARDIER**

**中国中车**  
**CRRC**



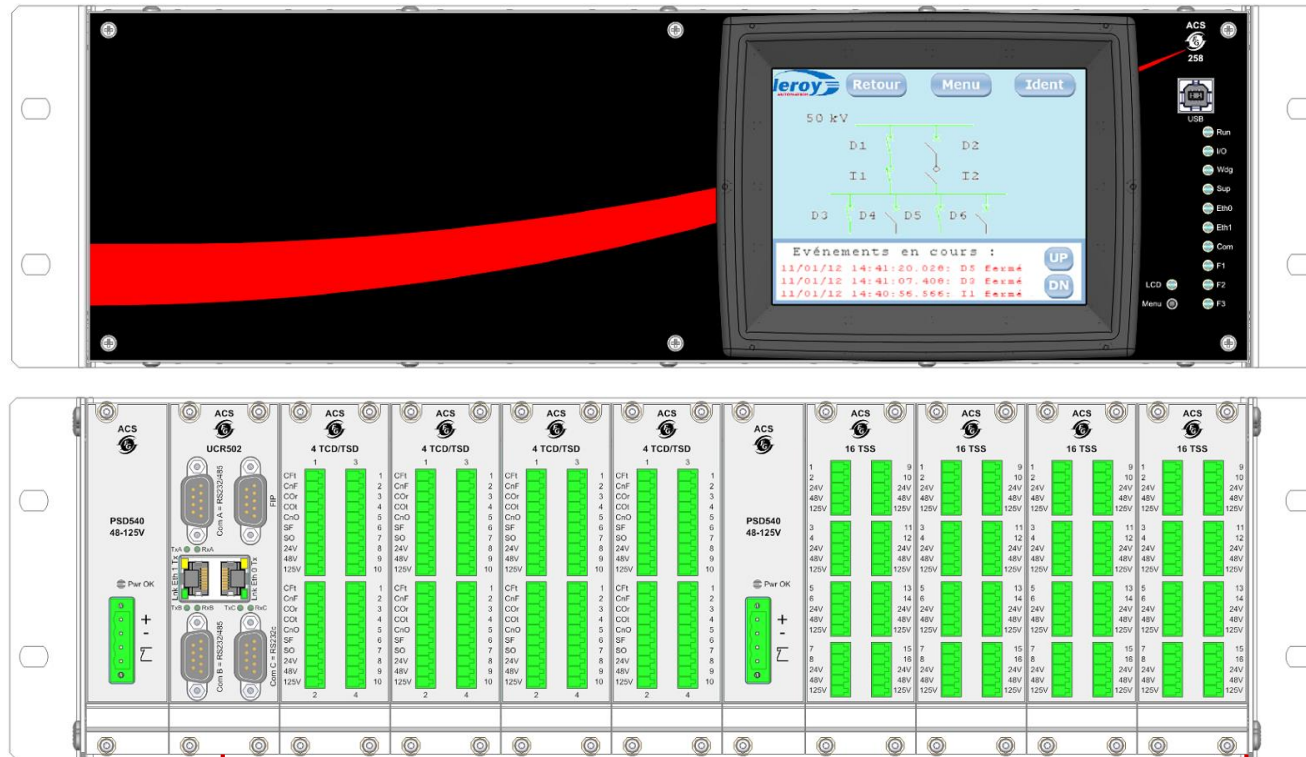
**SIEMENS**

# ELECTRICAL POWER SUBSTATION AUTOMATION





# PRODUCT CHARACTERISTICS



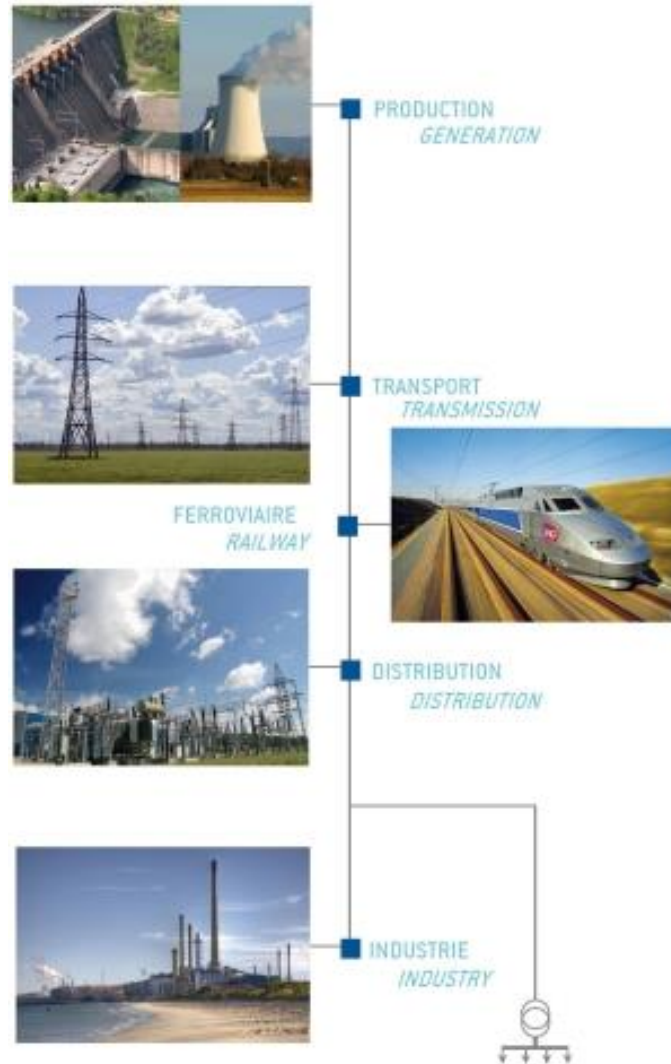
I/O Modules « TCD/TSD/TSS »

CPU and communication modules

Power supply module (48-125Vdc)

- **IEC 61131-3 STRATON**
  - Online mode support
- **COMMUNICATION PROTOCOLS**
  - IEC 61850
  - IEC 60870-5-101/-104
  - DNP3
  - MODBUS TCP/RTU
  - HN2
- **COMMUNICATION INTERFACES (CPU502)**
  - 10/100Mbps Ethernet (2 ports)
  - RS-232c (1 port)
  - RS-485 (2 ports)
  - FIP (1 port)
  - USB (1 port)
- **DIGITAL OUTPUTS (SCS001 : 4TCD/TSD)**
  - Secured relay outputs (double command)
- **DIGITAL INPUTS (ECS001 : 16 TSS)**
  - 24, 48 and/or 125Vdc
  - Isolated secured inputs (double check)
- **POWER-SUPPLY (PSD540)**
  - From 48 to 125Vdc (50W)
  - Polarity reversal protection
- **DIAGNOSTICS**

# SUPERVISION & CONTROL-COMMAND SOLUTION



- **SYSTEM INTEGRATOR**
  - Site integration and deployment
- **IEC 61131-3 STRATON**
  - IEC 61950
  - IEC 60870-5-101/-104
  - DNP3
  - MODBUS TCP/RTU
  - HNZ
- **PLC**
  - Field bus communications
  - Digital outputs
  - Digital inputs (24, 48 and/or 125Vdc)
  - Power-supply (48-125Vdc)
  - Diagnostics
- **MEASURES AND PROTECTIONS**
  - HV/MV/LV
  - Relays
  - Etc...

# REFERENCES

**25kV (SNCF)**



**25kV (KORAIL)**



**25kV (SNCF)**



**25kV (CFL)**



**25kV (SNCF)**



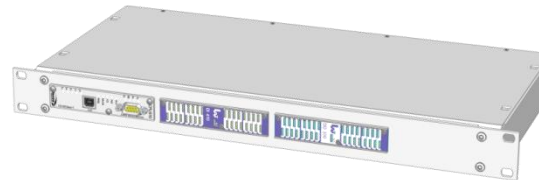
# KEY R&D SKILLS AND COMPETENCES

- ***Embedded Systems for harsh environment***
  - ***Rugged Hardware***
    - *-40°C to +70°C ; Shocks : 30 G. ; 0-500Hz Vibrations and 0-200Hz Sine Vibrations*
    - *EMC protected (EN 61000-6-3)*
    - *ESD immunity (EN 61000-4-2)*
    - *Rad-hard EMC (EN 61000-4-3)*
    - *Fast transient, Surge, Conducted/Inducted EMI (EN 61000-4-4, -4-5, -4-6)*
  - ***Embedded software***
    - *C-based API with Linux OS*
    - *IEC 61131-3 STRATON*
  - ***Mechanical integration for military applications***

# RUGGED PLC FOR HARSH ENVIRONMENT



**19" Rack – Size-2U**



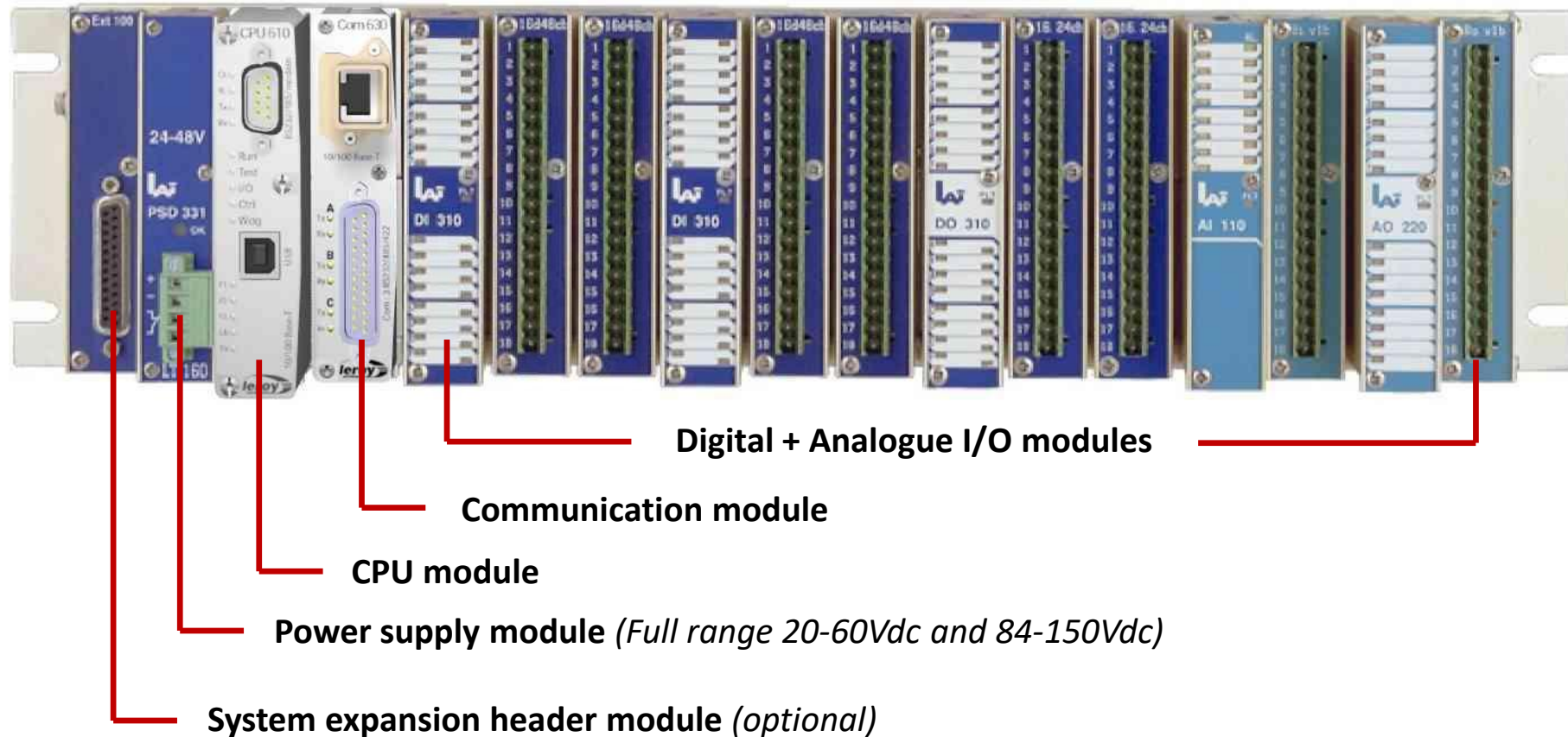
**19" Rack – Size-1U**



**DIN-rail mount**

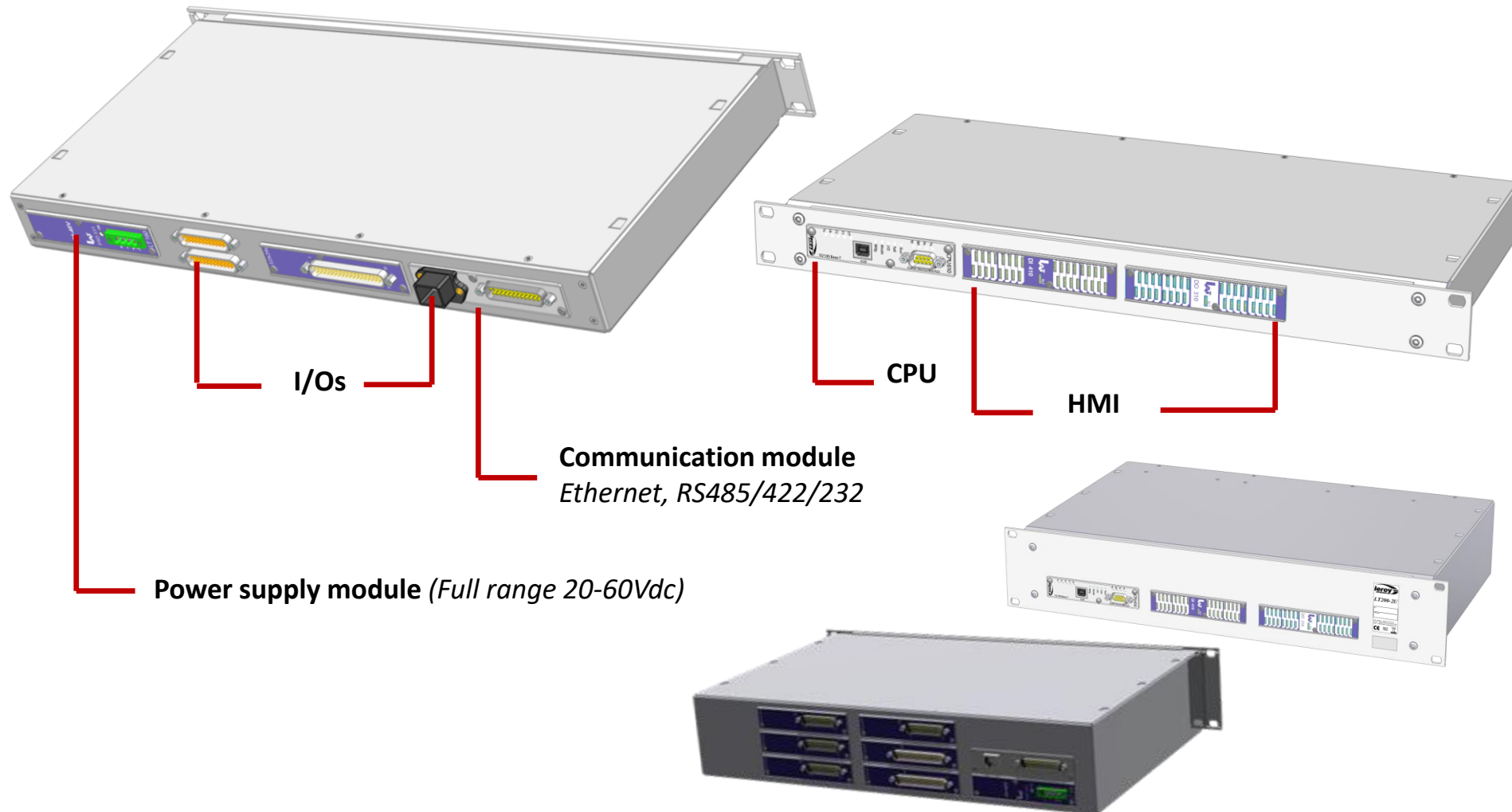
# HIGHLY-RELIABLE MODULAR PLC

*MODULAR AND SCALABLE HARDWARE ARCHITECTURE*



# 19-INCH RACK-MOUNT PLC

*SIZE-1U, SIZE-2U AND SIZE-3U FORM FACTORS*





# UNLIMITED AUTOMATION IN EXTREME ENVIRONMENTS

**THALES**



*RADAR automation  
& Antenna Deployment*



*Oil & Gas Instrumentation*

**DCNS**



**DAHER**



*Tactical SHELTER automation  
& Power-Supply Management*

ارامكو السعودية  
**Saudi Aramco**

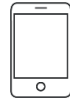


*Site Security & Access Control*

# LET'S BUILD YOUR FUTURE TOGETHER

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