

The Tricon system, offered to the nuclear industry exclusively by Framatome, simplifies the migration to digital control while addressing obsolescence and minimizing licensing risk.

Challenge

Nuclear facilities are committed to ensuring the safe and long-term operation of their systems. However, aging analog control systems face increasing challenges due to complex process requirements, the emergence of next-generation automation technologies, and the growing risks associated with globalization and evolving cyber threats. Additionally, tightening regulations and the constant demand for safe, reliable plant operations necessitate continuous monitoring and risk management.

The key challenge is identifying a reliable and future-proof solution to modernize legacy analog I&C control systems while ensuring minimal operational disruptions and reduced licensing risks.

Solution

Nuclear utilities are strategically investing in their reactors by prioritizing high-impact, efficient upgrades that enhance both operational effectiveness and safety. Tricon process solutions provide a robust response to an ever-evolving landscape of increasing complexity, emerging threats and heightened risks. These challenges demand a comprehensive, forward-thinking approach to ensure long-term safe and reliable plant operations.

Framatome holds exclusive rights to offer the Commercial Off-The-Shelf (COTS) Non-1E (SIL-3) Tricon system to the nuclear industry. The COTS Tricon is built on the same architecture and technology as the 1E Safety Tricon which has received a Safety Evaluation Report (SER) from the NRC. Having this SER reinforces the system's proven reliability, high availability and fault tolerance, making it a trusted solution for nuclear plant modernization.

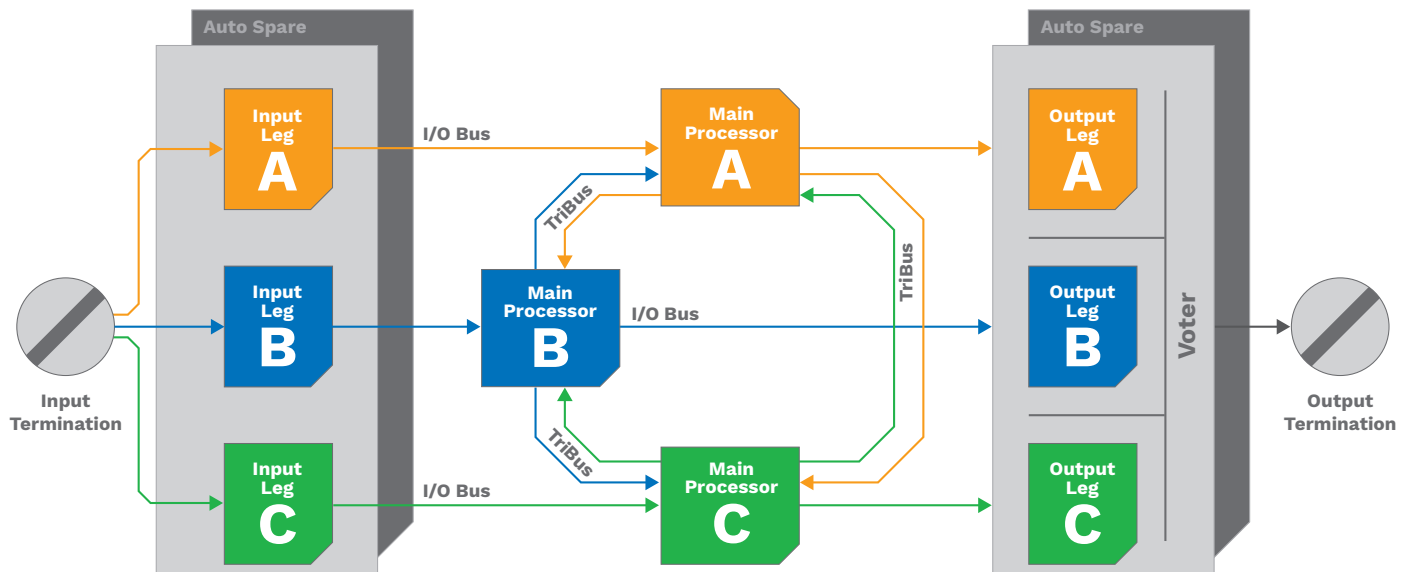
Fault tolerance is the key capability of the Tricon controller, enabling it to detect both transient and steady-state errors, and take corrective action in real time without disrupting operations. Fault tolerance significantly enhances the safety and availability of both the controller and the controlled process ensuring continuous, reliable performance.



Customer benefits

- **True Triple Modular Redundancy (TMR)** — full redundancy from input to output, eliminating single points of failure.
- **Industry-Leading Diagnostics** — real-time surveillance reduces testing needs and disruptions.
- **Online Repair & Hot-Swap** — seamless maintenance with repair, replacement and hot spares for greater system reliability.
- **Proven Reliability** — 1B+ hours in critical use with zero failures.
- **Offline Program Emulation** — efficient control application testing for faster, more reliable implementation.
- **Tailored Service Agreements** — custom support plans for long-term system performance.

Simplified Tricon System Architecture



Technical Information

- 19" wide chassis form factor supports up to 15 chassis per system. One (1) Main Chassis (chassis 1) houses the Main Processor modules and I/O modules.
- Fourteen (14) Expansion Chassis (chassis 2 to 15) houses up to eight slot sets of I/O modules and HART Interface Modules.
- An RXM Chassis houses a Primary or Remote RXM Module set and six slot sets of I/O modules. An RXM Chassis enables a system to extend to remote locations up to 7.5 miles (12 kilometers) from the Main Chassis, using SRXM modules.
- Supports up to 118 I/O modules (analog and digital).
- Each Tricon controller chassis houses two Power Modules arranged in a dual-redundant configuration. The Tricon Power Modules are 120 VAC/DC Power Module, 24 VDC Power Module and 230 VAC Power Module.
- The Tricon controller incorporates integral online diagnostics. All internal diagnostic and alarm status data is available for remote logging and report generation.
- Analog Input Modules available for use with Tricon system: 0–5 VDC, 0–10 VDC, –5 to +5 VDC.
- Analog Output Modules available for use with Tricon system: 4–20 mA, 20–320 mA, –60 to +60 mA.
- Digital Input Modules available for use with Tricon system: 115 VAC/VDC, 48 VAC/VDC, 24 VAC/VDC.
- Digital Output Modules available for use with Tricon system: 115 VAC, 120 VDC, 24 VDC, 48 VDC, Relay (NO).
- Applications up to approximately:
 - 2,048 Analog Input points (includes Thermocouple Input and Pulse Totalizer Input points)
 - 512 Analog Output points
 - 2,048 Digital Input points
 - 2,048 Digital Output points
 - 80 Pulse Input points

Key Figures

27 COTS Tricon systems operating in **12** North American nuclear plants.

The Tricon platform has more than **1 billion** hours of safe operation worldwide.

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