

The 1E SER-approved Tricon system simplifies the migration to digital control, while addressing obsolescence and minimizing licensing risk.

Challenge

Nuclear facilities remain committed to ensuring safe, long-term operations of their systems. The challenge is to update legacy analog I&C control systems with a minimal impact to operations with a reliable solution, while also minimizing licensing risk. Customers are making investments in their reactors by focusing on the most significant and efficient upgrades to increase operational effectiveness while enhancing safety. Other concerns include the use of untested engineering concepts, surveillance impacts, training personnel, and operational, procedural and maintenance changes.

Solution

Framatome has exclusive rights to offer both the Commercial off-the-shelf (COTS) 1E and Non-1E (SIL-3) Triconex Tricon to the nuclear industry. This simplifies migration to digital control, addressing obsolescence and minimizing licensing risk. The highly reliable Tricon system has more than one billion hours of operation without failure on demand. The Tricon system is the only NRC-qualified system based on Triconex True Triple Modular Redundant (TMR) architecture. Tricon is a COTS 1E platform that features a TMR fault tolerant controller designed for critical process control.

Tricon operation is based on the principle of safety and high plant availability, which identifies and compensates for failed control system elements and allows online replacement while continuing its assigned task without interrupting the controlled process. Fault tolerance is achieved through TMR technology.

TMR architecture employs three isolated, parallel control systems and extensive diagnostics integrated into one system. The Tricon system uses two-out-of-three voting to provide high-integrity, error-free, uninterrupted process operation with no single point of failure. Setting up applications is simplified because the TMR system operates as a single control system from the user's point of view. The extensive diagnostics are inherent and transparent to the programmer.

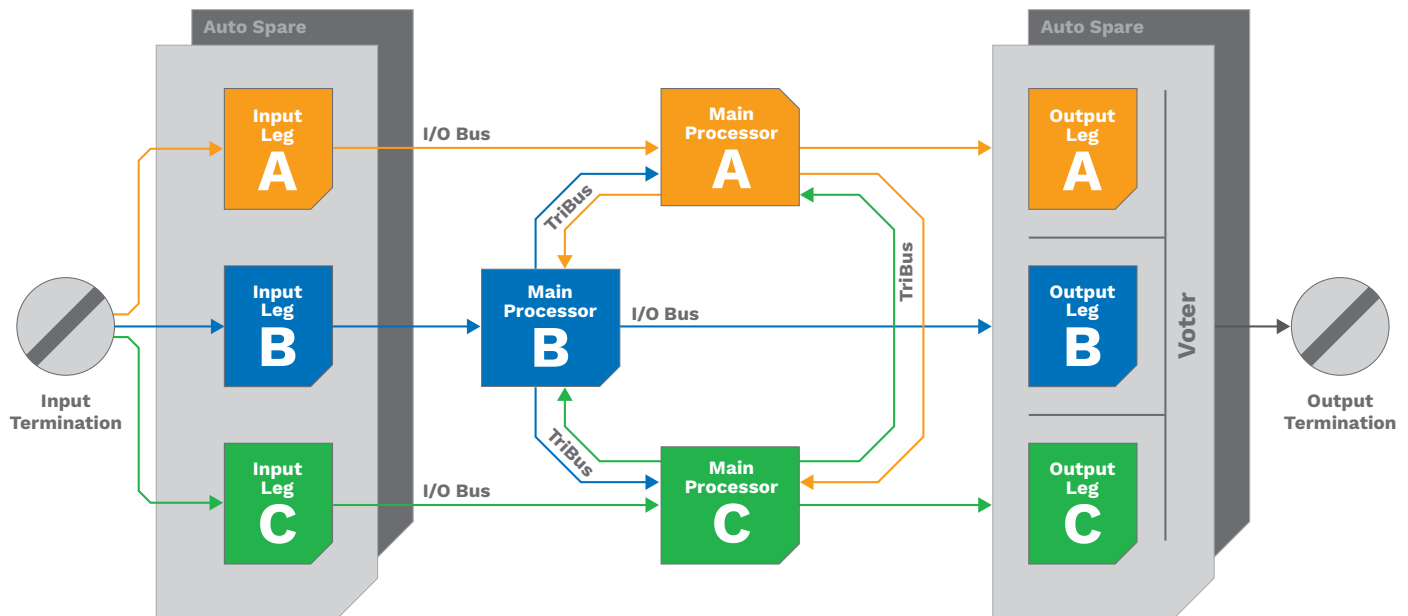


Customer benefits

- “True” Triple Modular Redundancy — from input to output — guarantees no single point of failure
- Second generation NRC approved for all 1E applications – regardless of the application, our proven experience increases licensing certainty, decreasing any risk
- Industry-leading internal diagnostics allow for online surveillance and reduced testing intervals
- Online repair and replacement and “hot spares” capability enable ease of maintenance and increased reliability
- Over 1 billion hours of operation without failure in safety critical applications demonstrate Tricon robustness and proven success
- Control application program emulation (offline testing) makes testing easier and faster to successfully implement

Your performance
is **our** everyday **commitment**

Simplified Tricon System Architecture



Use of Tricon continues to expand into new industries and applications as customers require increased system safety and/or high availability. It is the only safety system from a dedicated automation vendor to receive a generic safety evaluation report (SER) from the NRC. Nuclear utilities may now implement safety-related projects per the latest regulatory guidelines, cutting years from the project schedule and millions of dollars from the project costs. The Tricon V10 SER incorporates nearly 16 years of Tricon product enhancements since the V9 SER. V10 qualification validates nuclear sustainability and manufacturing capabilities into the future, simplifies migration to digital control, makes the licensing process straight forward, and mitigates obsolescence risk. The Tricon remains one of the world's most rigorously evaluated control systems. There are more than 10,000 Tricons in use today worldwide.

The Tricon is also available in Non-1E (SIL-3) configuration. It has been used in non-nuclear and regulated industries for decades and is also available for use in nuclear power plants. The SIL-3 Tricon uses the same technology, form, fit and function as the 1E platform. Most process automation industries, such as petrochemical, oil, gas, water, and fossil power

generation, have embraced digital solutions and used the Tricon in their critical operation and safety systems for more than 30 years. Digital control systems enable accurate monitoring, data collection, fault tolerance, sensor calibration and analysis, enabling increased productivity, reduced unscheduled outages, enhanced identification of failing equipment, supported by failure analysis while allowing plant optimization and increased efficiency.

Technical Information

- 19" wide chassis form factor supports up to 15 chassis per system
- I/O types = DI (AC and DC), DO (AC and DC), SDO (DC), RO, AI, TC, AO, PI, PT
- Wholly deterministic application scans
- Applications up to approximately 5,000 I/O points

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