framatome

TELEPERM XS and Tricon

Inadequate Core Cooling Monitoring System Upgrades

State-of-art safety platforms for long-term operation

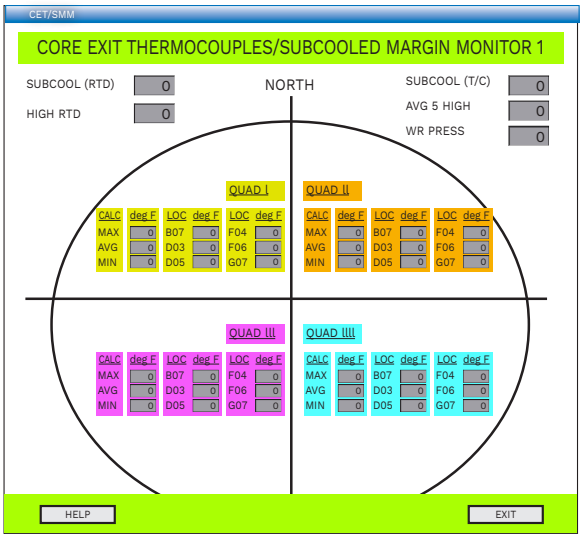
Challenge

In order to ensure the long-term operability of the global nuclear fleet, utilities are addressing obsolescence and reliability issues in many critical plant systems, including the existing Instrumentation and Control (I&C) systems. Monitoring systems are crucial to the continued safe and efficient operation of today's plants. Post-situation monitoring systems, used by the operator to assess the damage, have been required and mandated by many regulatory bodies and in use since the mid-1980s.

Solution

Framatome can offer: Inadequate Core Cooling Monitoring System (ICCMS) and Reactor Vessel Level Instrumentation System (RVLIS), using either of our TELEPERM XS or Tricon 1E digital platforms. We have proven experience with systems installed on several reactor types globally. Our experience includes competencies required to address obsolescence, procurement, engineering, licensing support, integration and installation/commissioning services.

The installed platforms receive process signals from various analog plant transducers and transmitters then provide digital outputs to annunciators, analog outputs to indications, and computer point data through a gateway to the plant operator computer.



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

Customer benefits

TELEPERM XS and Tricon 1E platforms are proven, versatile and robust digital I&C systems which fulfill the demands of nuclear power plant control platforms which utilize:

- Human Machine Interfaces (HMIs) to ease maintenance, troubleshooting, display parameters and condition updates
- Self diagnostics
- Safety Video Display Unit (SVDU)
- Components designed with backward compatibility mitigating obsolescence issues
- Early detection of faults due to extensive self-diagnostics and internal calibration
- Common communication protocols (i.e., MODBUS, OPC)
- Utilizes standard IEC 61131-3 application programming languages
- Isolation of redundant subsystems through fiber-optic cables
- Prevention of fault propagation by means of intelligent signal status processing
- Versatility in addressing cyber security
- Connections to existing differential pressure transmitters, Core Exit Thermocouples (CETs) and other field devices

Either platform can perform any or all of the following functions:

1. **Reactor Vessel Level Indication System (RVLIS)**
   RVLIS is used by the control room operator to monitor the levels in the reactor vessel.
2. **Core Exit Temperature Monitor (CETM)**
   CETM is used by the control room operator to monitor values (direct and calculated) of the core exit thermocouples in the reactor vessel during non-operational modes or events.
3. **Sub-cooled Margin Monitor (SMM)**
   SMM is used by the control room operator to monitor the following values:
   - Saturation margin temperature and pressure of the Reactor Coolant System (RCS).
   - Temperature and pressure margin to saturation based on core exit thermocouples.
   - Temperature and pressure margin to saturation based on Resistance Temperature Detectors (RTDs), or Thermocouples.

Project Experience

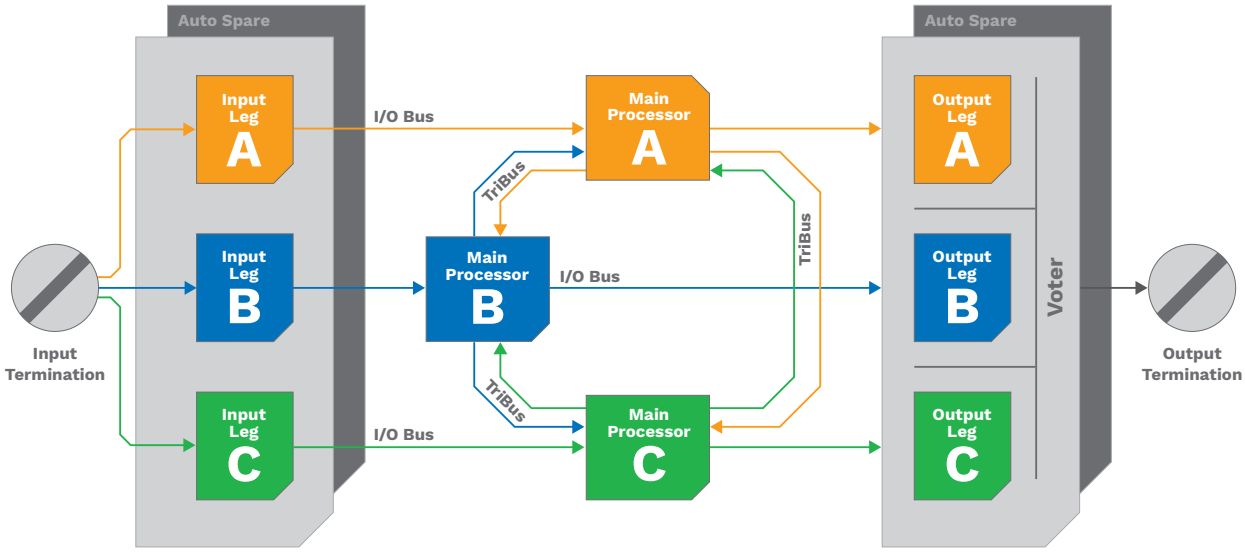
As a market supplier and innovator of digital instrumentation and control platforms for nuclear applications, Framatome focus continues to be safety and quality, leading to the highest levels of performance. Framatome has global project experience with RVLIS/ICCMS for both platforms. Framatome is the only supplier that has supported the successful licensing, engineering, procurement, installation and commissioning of a full-scope digital I&C reactor protection systems.

Meeting your Objectives

Framatome can tailor a solution to fit your site's needs. Both systems have the flexibility to accommodate site specific designs. The TELEPERM XS and Tricon 1E platforms have been designed exclusively for use in nuclear power plants and for nuclear safety related applications.

Our ability to customize a solution for you combined with our proven track record translates into licensing, procurement, installation and operation certainty for your plant.

Tricon, Triple Modular Redundant Architecture



- TMR 1E architecture for Safety-Critical and Important to Safety applications.
- Zero calibration plus built-in diagnostics = minimized surveillance costs
- High diagnostics coverage through self-test (2oo3 comparisons) and reference tests

Contact ic@framatome.com
www.framatome.com

framatome