Computer Design

Engineering for Modernization of Control and Monitoring Systems
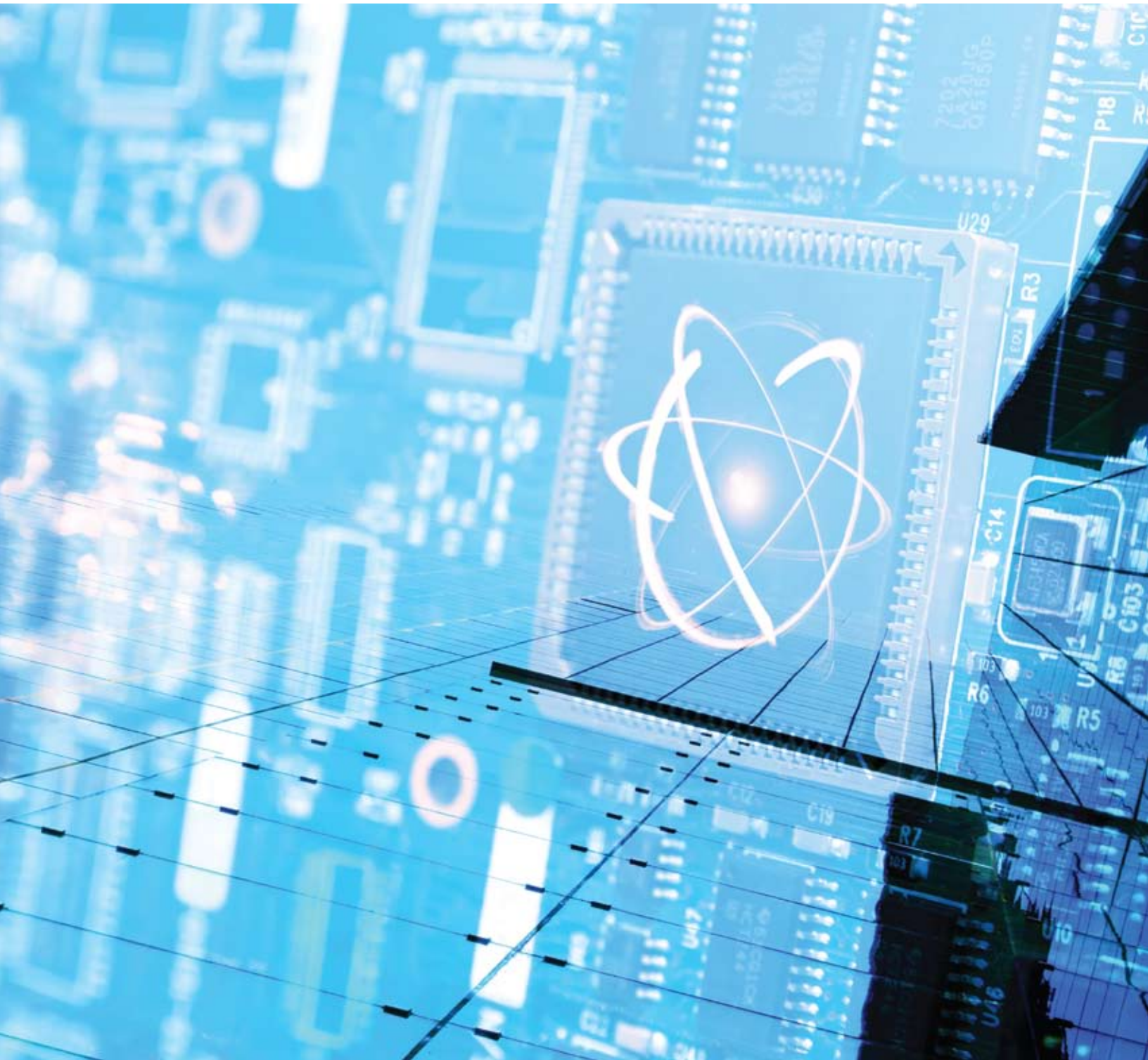
KINECTRICS

Kinectrics has successfully modernized aging and obsolete control and monitoring systems as well as designed new digital systems at Canadian and US Nuclear Power Plants for over 20 years. These projects ranged from: replacement of multiple individual analogue single loop controllers with a triple modular redundant (TMR) PLC-based system for the safety-related heat transport system, conversion of the analogue control system for a water treatment plant with a redundant PLC-based system, incorporation of digital field components such as valve positioners and smart transmitters into existing and new systems, to the upgrade of OEM analogue turbine electro-hydraulic control (EHC) system to a digital based TMR distributed control system. Kinectrics has kept pace with the evolving digital technologies and understands the criticality of cyber security for Operational Technology devices employing the requisite cyber and physical security measures as part of the design solution.

DIGITAL SYSTEM INTEGRATION

- Conversion from analog to digital control, monitoring, and user/operator interface system (e.g. Control Room recorders)

- Upgrade of obsolete digital system and equipment with current state-of-the-art replacements

- Identification of suitable digital and "smart" device replacement for obsolete analogue and previous generation digital equipment and components such as field installed sensors, indicators, and controllers

- Preparation of system and project/modification design requirements, equipment specifications (including Plant Process Computer replacement), digital device input/output (I/O) list, modification change package consisting of drawings (cable block diagram, logic diagram, connection wiring diagram, network architecture diagrams, general arrangement and layouts), Design Bill of Material, and commissioning requirements This includes Plant Process and Secuirty Computer replacements and upgrades.

- Design of cyber secure architecture employing cyber and physical security measures in compliance with CSA N290.7 or 10CFR73.54 for connection of plant Operational Technology (OT) devices to enterprise Information Technology (IT) systems to facilitate use of big-data analytics

- Installation and integration of Security Information and Event Management (SIEM) systems to gather syslog data from capable devices on the plant process and security networks to comply with NEI 08-09 requirements. Syslog data was colledted and sent to a centralized computer system to view and alert on events. These designs include local monitoring as well as sending the data through various cyber security layers and out to a remote monitoring center.

SOFTWARE DESIGN

- Software categorization and identification of Software Quality Assurance requirements consumerate with Software Category

- Software Quality Assurance documentation consumerate with requirements of CSA N290.14, Regulatory Guide 1.152 and ANSI N45.2.11-1974 including development (digital hardware requirements, software requirement specification, software design description) and testing (unit and system integration test plans and test reports)

- Software configuration management documents such as Software Release and Software Maintenance documentation

- Digital equipment and software qualification assessment of Original Equipment Manufacturer (OEM) product in accordance with CSA N290.14

VALUE-ADDED SOLUTIONS

- Staff with experience on a wide variety of OEM digital platforms ranging from programmable single loop controllers to Programmable Logic Controllers (PLCs) to Distributed Control System (DCS) for applications in nuclear and balance of plant systems. This enables preparation of software requirements and customized software development specific to the needs of each system at the Nuclear Utility

- The team is well-versed in the area of cyber security completing assessments and implementing mitigating measures in compliance with N290.7, NEI 08-09 and NEI 13-10 as part of equipment specification and system design

- In-house team of Human Factors Engineering (HFE) specialists to provide input to Design Engineer for Human Machine Interface (HMI) specification and development

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