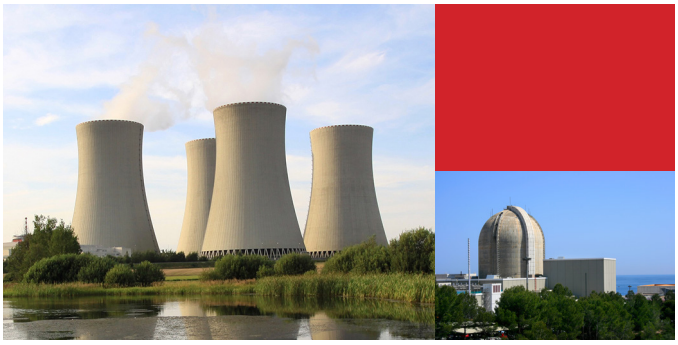
CURTISS-WRIGHT



Best Practices in Plant Reliability and Performance

A DIGITAL SYSTEMS SUCCESS STORY

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— Site Engineer

Organization
A Utility in the Midwestern United States

Challenge
Replace old plant process computer systems

Solution
A comprehensive digital system upgrade

Results
A cost reducing, easily refreshable system built to mitigate obsolecence

When a large Midwestern utility decided to retire its legacy plant process computer (PPC) systems in favor of more modern digital alternatives, the utility's engineering team turned to Curtiss-Wright for assistance upgrading the entire fleet to a standardized digital platform.

"Several of our key technology vendors were retiring support for their system platforms," says the responsible engineer at the site, who preferred to remain nameless due to a corporate policy. "We launched a corporate-wide effort to replace these legacy systems and take advantage of digital technology."

After a thorough evaluation of PPC vendors, this utility selected Curtiss-Wright's PPC system and R*TIME software as the fleet standard. "We conducted lots of industry benchmarks, and we sent out RFPs to a number of different vendors," the engineer recalls. "[Curtiss-Wright] offered the greatest versatility and experience in this area."

Working closely with Curtiss-Wright, this utility laid out a comprehensive strategy to bring its nuclear units into the digital age.

"PPCs touch just about everything in the plant, so these are big, multiyear projects that require thousands of drawings and lots of engineering," the engineer says. "We had a good working relationship with Curtiss-Wright right from the start. We gave them input on the design and there was lots of information sharing back and forth. This interchange of ideas and expertise set the tone for the entire fleet-wide project."

Curtiss-Wright supplied the PPC software and integrated it with an RTP Corp. (RTP) Input/Output (I/O) system. Curtiss-Wright also maintains a close working relationship with RTP, which ensures tight integration and utilization of the latest technology and best practices established by operating experience. Curtiss-Wright continues to play an important strategic role in these systems, as they are "refreshed" to eliminate system obsolescence and

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>
> *— Site Engineer*

ensure compliance with NRC cyber security requirements.

DIGITAL TECHNOLOGY FOR A DIGITAL AGE

A typical installation of Curtiss-Wright's Plant Process Computer system includes four primary elements:

- An I/O system that collects data from up to ten thousand analog and ten thousand digital data points
- A redundant communication network and server environment (including cyber security components)
- A set of large-format displays, workstations, and peripheral devices
- Nuclear software applications that execute on the digital platform

Optional supporting systems can include a simulator, annunciator, radiation monitoring system, and other digital gear.

To interface with all types of digital and analog systems, the Curtiss-Wright platform features R*TIME Server and R*TIME Viewer software, which can simultaneously access up to 16 active databases, each of which can support up to 60,000 analog and 60,000 digital data points—with 12 configurable alarm limits for each point in the system. This allows operators to monitor not only individual units, but in some cases, an entire fleet, with all data displayed through a single R*TIME screen. Comprehensive tools enable them to monitor the health and stability of each reactor, including I/O chassis, card, and point information.

"One of the reasons we went with [Curtiss-Wright's] R*TIME system is its versatility to integrate with many types of hardware, software, and systems," the engineer says. "We can interface a new digital system to the R*TIME platform relatively easily."

The new systems allow operators to obtain significantly more data, all the time. Instead of their former monochrome monitors, which periodically scrolled out information via rudimentary graphics, they now have a complete graphical interface, and real-time diagnostic data is displayed through multiple overhead monitors and workstations. Alarms connected to steam flows, pressures, temperatures, and the reactor core remove the uncertainty that came with the old analog systems.

Training takes place in control room simulators, which are full-scale replicas of the actual control rooms. The PPCs interface with the simulator computers in the same way that they interface with the actual plant systems.

"We have better data, better analytics, and a more accurate view of real time operations," the engineer states. "Better SCRAM timing is another big benefit—something that we couldn't do before. With the old chart recorders, we needed to have a maintenance technician behind the panels. Now the operators can do SCRAM timing whenever they want, right on their computers. They can visualize operational data continuously, which makes it a lot easier to spot trends."

STANDARDIZATION REDUCES COSTS AND ENFORCES CORPORATE-WIDE CONSISTENCY

Perhaps most importantly are the economies of scale that come with having a fleet-wide standard. Each successive Curtiss-Wright installation serves as a template for the next one. This has allowed the utility to "right-size" its IT organization and fine-tune its staffing needs by sharing resources among plants.

"Having the same platform at every site is much more efficient," the engineer confirms. "Once people are trained on R*TIME, the skills are transferable, which allows for easier staff movement during maintenance and outages. We have reduced the implementation cycles significantly as we've gained greater competence with these projects."

As this utility wraps up its final PPC replacement projects, its asset management strategy is shifting from replacements to refreshes. "Going forward, our strategy calls for a refresh of the computer hardware, software and operating systems every seven years, and a full replacement of the hardware and RTP I/O gear every 21 years," he explains.

Many other nuclear power plants are learning from this

example, driven by a common industry need to upgrade operations costs. “Instead of doing a typical refresh, which involves new servers and infrastructure, we have switched to hardware refreshes and virtualized software platforms, which, in one instance, cut costs by 60 percent,” he adds.

The refresh strategy considers aging and obsolescence issues in all system components, with an eye to reducing the cost of system maintenance and extending the viability and stability of these systems to end-of-plant-life. The utility also saves costs by sharing best practices across the fleet. When one plant discovers a way to do something more efficiently, other plants can quickly apply it.

This same type of knowledge sharing and skills transfer characterizes this utility’s relationship with Curtiss-Wight. “We encourage transparency and we communicate regularly,” the engineer concludes. “If we run into issues, we sit down and talk through them together. We have had a great partnership with Curtiss-Wright.”

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