

IT/OT Convergence Starts with Software-Defined Platforms

To compete in dynamic markets ruled by evolving customer demand, manufacturers must make quick changes in production, shifting workloads as needed from one system to another to adjust output capacity and boost product quality.

Software-defined industrial platforms that operate in hybrid environments, combining edge, cloud, and on-premises infrastructure, can help them achieve flexibility. These containerized solutions decouple the hardware in computers that drive industrial functions—Programmable Logic Controllers (PLC) and Distributed Control Systems (DCS)—from the software that runs production processes.

The approach solves a lot of problems for industrial operations, explains [David Rapini, Industrial Technology Strategist at Red Hat, a provider of enterprise open source software solutions](#). One of the biggest issues involves technology upgrades. Legacy industrial systems are siloed and proprietary, and therefore complicated and expensive to upgrade when new technologies become available.

“Being able to adopt new technologies sooner means you can increase yield, reach new production targets faster, and make significant improvements to product quality. The faster you get new technology into your facility, the faster you can take advantage of what that technology brings,” Rapini says.

Proprietary Systems Create Challenges

Historically, controllers are dedicated to specific functions. So a PLC cannot easily be repurposed for a different application. “Even though I may have horsepower, bandwidth, and connectivity on that PLC, I have to go buy

another piece of hardware,” Rapini continues. “So that hardware being dedicated to a specific task raises not just the initial cost but adds long-term ownership burdens.”

Integrating controllers with additional applications, sensors, and other devices has also been a big challenge. For instance, if a controls engineer wants to connect a vendor’s controller to a competitor’s industrial-historian application (which compresses and retrieves OT system data), it takes significantly more time and money than using the original vendor’s software. This forces manufacturers to lock into specific vendors and proprietary Inter-Process Communication (IPC) systems, so manufacturers often get locked out of other vendors’ technology advances.

Then manufacturers face cybersecurity issues. Traditionally automation systems were air-gapped or ran disconnected, which is no longer the case in today’s digital world. Patching these legacy systems isn’t easy, and in some cases may require an expensive upgrade. But a software-defined approach takes care of that, Rapini explains.

“Being able to patch more frequently without a million-dollar price tag helps you keep those cybersecurity holes closed and ensure a more secure environment that aligns with your corporate policies,” he says. And that means manufacturers can rest easier knowing their systems, which increasingly connect to hybrid cloud and edge environments, are up to date on cyber defenses.

Open Systems: Key to Industrial Automation

To address these issues, [Red Hat works with Intel and a variety of partners to provide a software-defined](#).

[containerized edge platform to modernize industrial operations](#). The open platform delivers the infrastructure—or “plumbing”—that enables flexibility so that PLCs and DCSs are no longer dedicated to specific functions. Instead, control engineers and operations can swap out software and hardware as needed.

The platform integrates Intel® Edge Controls for Industrial (Intel® ECI) with Red Hat® Enterprise Linux®, Device Edge, Ansible® Automation Platform, and OpenShift® to deliver functions such as real-time factory control, AI, and augmented reality.

This open, containerized approach does away with the restrictions imposed by siloed proprietary systems. It lowers the cost of hardware, and simplifies lifecycle management, especially the IPCs that allow applications to talk to one another.

And it eliminates the dreaded vendor lock-in that inhibits flexibility and agility. “We can have an industrial component that runs whatever process—safety, motion, discrete control, process control, analytics, AI—on the same piece of hardware,” Rapini says. “It opens the ability to migrate platform to platform. It allows manufacturers to take best-in-class vendor capability so they can pick the one that they want, and easily change between vendors if they need to adopt a new technology or find a spare component.”

These changes can occur without costly upgrades or interruptions to production. In a refinery, for instance, adding or moving a workload from Bioreactor 1 to Bioreactor 2, or Distiller 1 to Distiller 2, becomes a lot easier because containerized applications are designed to be modular.

Also easier is load leveling, which involves balancing production lines to reduce waste and increase efficiency by making sure underloaded or overloaded systems don't happen, says Rapini, who before joining Red Hat had worked in industrial environments.

“One of the big challenges I used to always struggle with in the industrial automation space is load leveling. So I'd have

PLC 1 running at 95% utilization and PLC 2 sitting next to it running at 10%, with a high-speed vision system running on a third machine, but it wasn't easy to transfer workloads. This containerized solution makes load leveling just so much easier. I can move workloads where they have capacity and free up bottlenecks on systems that are working at the edge of max capacity.”

Production flexibility helps not only industrial operations but also the communities they serve. For instance, during COVID some manufacturers had to switch from making one product to another. Let's say an air filter manufacturer needed to start making face masks. A software-driven approach creates a more agile, flexible manufacturing environment.

IT/OT Convergence Still Evolving

Rapini says adding flexibility to industrial processes is the natural next step in industrial automation and IT/OT convergence. “Ten years ago, if you talked to somebody about IT/OT convergence in the OT world, we would say things like, “We have Ethernet on the plant floor,” he says. “Now, we're seeing deeper integration of IT technologies into the OT space.”

Automation has replaced a lot of manual tasks, such as connecting different systems or deploying a Cisco switch, for example. In the past, spinning up a DCS server would require as many as 700 mouse clicks. “By leveraging Red Hat's Ansible for automation, you can cut that error-prone, labor-intensive installation process down to one-third, but more important, take out variability system to system, site to site,” Rapini says.

The integration of partner technologies will reduce those clicks even further. The software-defined, open-platform approach will bring levels of flexibility and agility to industrial operators that proprietary systems could never deliver.

The transformation won't happen overnight. “Process industries are notoriously conservative, so they're going to move nice and slow,” Rapini says. “But as the technology proves itself, more companies will adopt it when IT/OT convergence will become just industrial technology.”