The Manufacturing Exec's Guide to Managing Operational Technology

Decades of managing automation environments manually is giving rise to a reset of industrial operations.

The transition is calling for greater visibility and management of source control and configuration data as companies step up modernization efforts and empower a more agile and responsive enterprise.

3 challenges manufacturers face managing operational technology

1 Conventional ways of programming and managing PLCs and other industrial equipment can't keep up with the rapid pace of business change. Reliance on siloed expertise and laborious one-off programming routines greatly hamper the ability to evolve the automation landscape to emphasize digital innovation and to reap the agility, flexibility and improved decision-making benefits of operational technology (OT) and IT convergence.

Managing multi-vendor control solutions with proprietary, siloed tools limits visibility, minimizing an organization's ability to optimize plant performance or quickly adjust operations to meet changing business needs.

Without full transparency and a holistic view, companies are sorely limited in their ability to effectively and proactively respond to events that could cause downtime as well as quality and safety issues. A delayed response or decision based on incomplete or faulty data could result in actions that have significant financial repercussions, prompt recalls or cause undue damage to the company brand.

Resource allocation is another big issue with conventional automation and controls environments.

Most require organizations to maintain expertise versed in specific PLC products and programming tools, which prevents large-scale code reuse and keeps limited resources focused on time-consuming maintenance work as opposed to higher-value innovation.

With multiple PLC tools in play, it becomes harder to move around controls engineering resources due to the learning curve associated with training on new products as well as the cost of maintaining multiple, expensive software licenses.

2 There are also a lot of unknowns when it comes to OT, many that open the door to unnecessary cyber risks.

Devices might contain bespoke or unknown code that can introduce productivity challenges or even worse, possible security threats. Moreover, device code that isn't managed and stored centrally makes it far more difficult to track changes.

3 Cultivating talent ready and willing to work with conventional automation environments is another big challenge.

Manufacturers already grappling with skills gaps and worker shortages struggle to attract younger engineers to the process control environment. Generations raised on a digital diet are hungry for modern tools and emerging DevOps practices as opposed to being saddled with outdated and unfamiliar legacy automation platforms.

What are the different ways to manage OT?

There are a variety of ways companies are currently managing OT. Here is a look at some of the more common conventions:

SVN (subversion)	This is a proven version control tool for managing controls-specific source code. While the method provides robust check-in and check-out and file management capabilities, it lacks visualization functionality to provide context for what's been changed. SVN was also not designed as a collaborative platform so it lends itself to serial workflows, which are inefficient as industrial environments increase in complexity and scale. Unlike Git-based source control platforms, SVN lacks distributed capabilities so it does not excel at tracking changes when disconnected from the server.
Excel files and archive folders	A very common form of file management, this method requires engineers to be diligent about annotating the record so teams have the proper visibility into ensuing code changes. If descriptions are incomplete, updates can quickly become chaotic and inefficient, leaving engineers in the dark about critical code changes
Vendor tools	Most industrial automation providers have programming tools that support their proprietary platforms — however, they don't work well for multi-vendor environments, which is increasingly the norm. The alternative is to stick with single-vendor solutions and miss out on the benefits of best-of-breed tools or invest substantial dollars in system integration resources to tie everything together. If teams are working with multiple vendor tools, the training required to learn all of them is time consuming. Neither scenario is ideal.
Industrial DevOps	A more powerful approach to managing operational technology is Industrial DevOps, a set of tools and processes that borrow proven DevOps practices from the software world and apply them to the upkeep and management of industrial operations. Industrial DevOps tools and practices offer better visibility, improved collaboration and a one-stop-shop for all vendor files as they are centrally stored and managed from one location — preferably in the cloud for easy access. As a software development practice, Industrial DevOps is designed from the ground up for collaboration, with all vendor files and source code stored in a common repository with expanded visibility and context into changes. The combination of Git-based source control and automatic backup enables best practices such as code reviews, anywhere, anytime access, and standards and consistency, ensuring OT is managed with the same level of rigor and resiliency now commonplace in IT.

Who is the right Industrial DevOps partner?

The right platform and partner is crucial to Industrial DevOps success. Manufacturers should look for a one-stop platform able to deliver visibility and control of software across multi-vendor devices and that prevents downtime and recalls, expedites disaster recovery and enables quality control.

Copia's Industrial DevOps Platform streamlines manufacturing and delivery infrastructure through the following capabilities:

End-to-end visibility and control.

Proactive DevOps tools and processes can help prevent disasters, but in the event of a problem, active monitoring provides timely alerts that facilitate rapid diagnosis of code-caused downtime or product defects as well as preemptive insights to prevent catastrophic downtime or product recalls.

Making prior code versions readily available means businesses can easily revert back to an original functioning state as they address ensuing problems, promoting greater resiliency of automation devices.

New dashboard capabilities round out the features mix, enabling top-level management to properly visualize their OT framework without needing a detailed technical understanding of the low-level code environment.

Continuous code and device validation.

Copia's platform orchestrates constant communication between the programming environment and what the device is actually doing on the shop floor, which helps validate that code matches a device's operational state. The continuous feedback loop helps functional
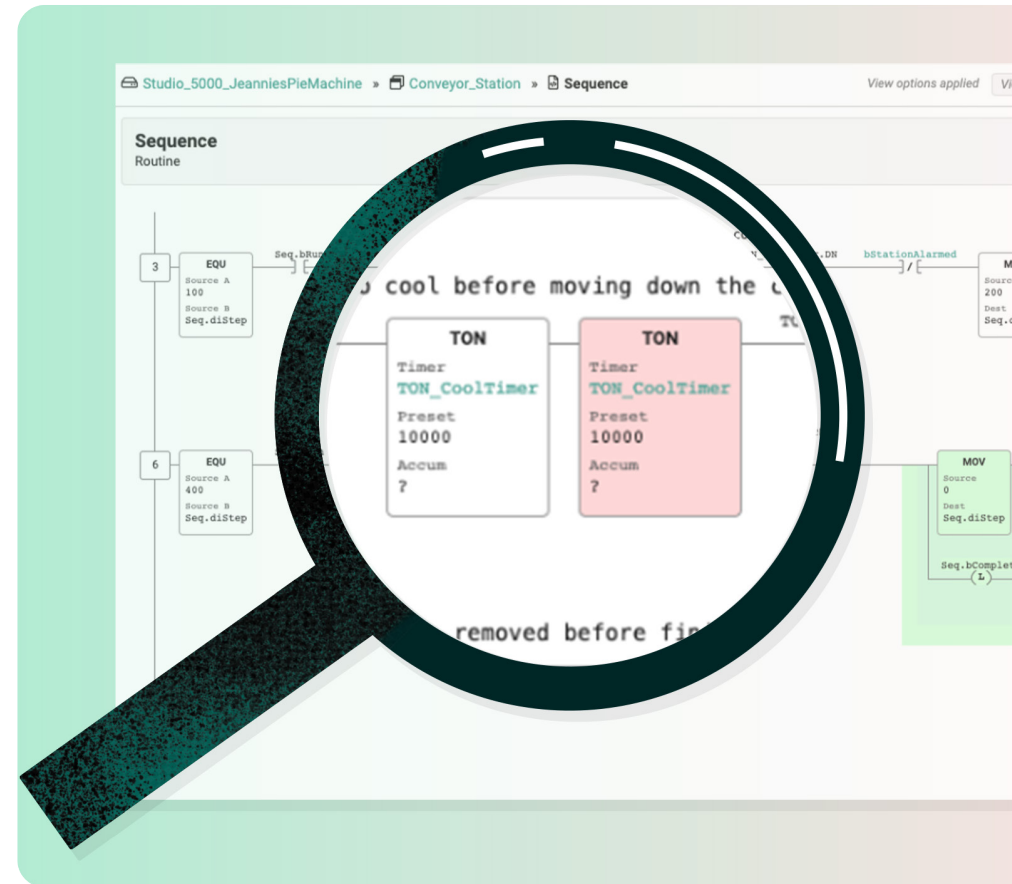
and operational leaders execute proactive problem solving, enabling more effective root cause analysis of issues caused by code.

Multi-vendor single source of truth.

Copia is a unified multi-vendor repository encompassing all code changes across all devices. This Git-based single source of truth provides transparency, simplifies management, and automates detection of code-device disparities across the entire industrial landscape. It also means controls and automation engineers only have to learn one environment to manage code across multi-vendor platforms as opposed to juggling myriad, proprietary tools.

Simplified cloud management.

Copia is cloud-based, enabling centralized and remote visibility and control of OT within multiple industrial plants. Controls engineers can view their code in the cloud, any time, from any Internet-enabled device. Support for cloud also empowers multi-developer collaboration on the same code or devices, bridging geographical gaps with remote diagnosis and mitigation while enhancing cross-plant optimization.

Rapid disaster recovery.

Revertible backup enables rapid, easy access to past configurations, streamlining a return to the most recent version so a device can quickly become functional after going offline. The ability for quick restoration minimizes costly downtime and slowdowns even after critical hotfixes.

Embracing proven DevOps practices for managing automation code can go a long way in modernizing the industrial landscape as it girds for innovation and opportunity in the new era of digital business.
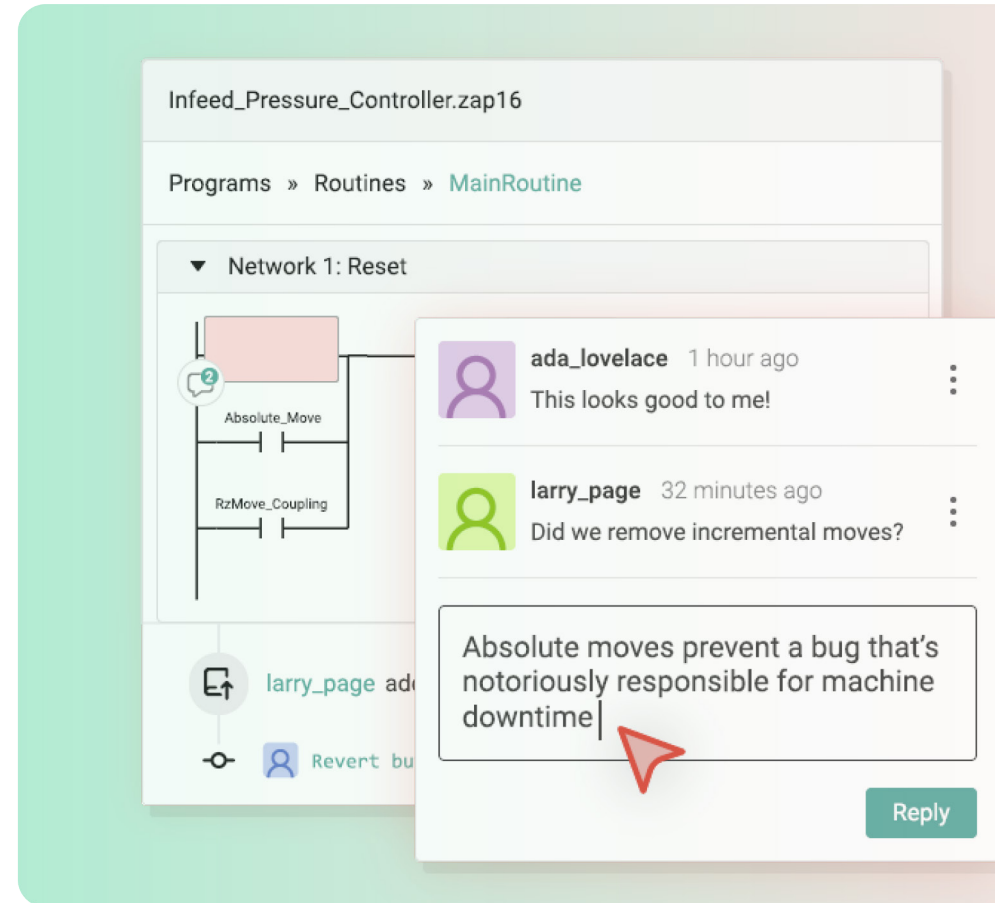
amazon

AMAZON'S STORY
Industrial DevOps in action

Challenge

Amazon fulfillment runs on a wide range of material handling equipment, robots, and work cells powered by different PLC manufacturers, each driven with proprietary vendor integrated development environments. Code changes caused variability throughout the network, and collaboration and file backups were performed manually, often enforced only through an honor system. While code and configuration management is a standard DevOps practice in software development, it's not as common in the world of industrial automation mainly due to lack of tooling. Amazon sought to change that dynamic and bring more rigor and flexibility to its PLC programming environment.

Solution

Amazon turned to Copia Automation to bring the power of modern source control to industrial automation. The Git-based source control platform enables engineers to compare code and collaborate on code reviews in the AWS cloud before bringing the right code back to the individual PLCs. The partners completed a proof-of-concept (PoC) of automatic backups of PLCs and configuration files for equipment at three warehouses. Eventually, Amazon extended Copia to a total of 16 sites and more than 500 PLCs to back-up code daily and provide smart reporting of changes. With the Copia platform, Amazon engineers can now take advantage of traditional Git workflows such as logic comparison, branching, merging, code reviews, and code commenting.

Benefits

Overall, the Copia cloud-based source control and automated backup systems are providing increased reliability while minimizing downtime and ensuring seamless disaster recovery. **Specifically, Amazon expects to reduce unexpected downtime from unapproved code changes by 80% and bolster high-severity issue resolution time by 25% thanks to having a proper code change history along with file backups.**

Getting started with Industrial DevOps

Want to learn more about getting started with Industrial DevOps for your business?

Schedule time with Copia team