Varland Plating Upgrades 30-Year-Old Legacy System

Digital Transformation through the Ages—from Serial Comms to Serious SCADA

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VARLAND PLATING UPGRADES 30-YEAR-OLD LEGACY SYSTEM

Digital Transformation through the Ages—from Serial Comms to Serious SCADA

Varland Plating™ has been a leader in the electroplating industry for nearly 80 years. Electroplating improves the durability, corrosion resistance, and aesthetic appeal of metal objects by coating them with a thin layer of another metal, using an electric current. All kinds of industries use electroplating—from automotive to aerospace to consumer goods.

UNDERSTANDING VARLAND'S SERVICES

Varland Plating is a job shop that specializes in bulk barrel electroplating, processing thousands of different parts for hundreds of different customers across a wide range of industries, including:

- Automotive components ranging from internal engine parts to fasteners used on fuel covers
- Military parts that are used in a wide range of applications, including next generation military vehicles

Chemical vats at Varland Plating

- Firearm components and ammunition
- Fasteners and components for furniture and retail
- Electrical components ranging from service delivery hardware to individual breaker components

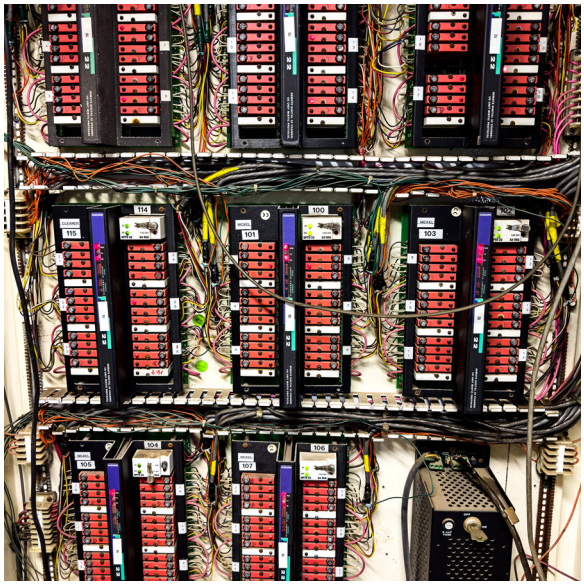
A Varland Plating employee working in the shop

FROM MANUAL METHODS TO AUTOMATION

For years, Varland performed plating operations manually, but electroplating is a complex process. For example, barrel plating requires:

- Controlling barrel rotation speed and direction with Variable Frequency Drives (VFDs)
- Tracking the movement of parts throughout the plating line, including tracking how long parts spend in each step of the process
- Maintaining precise vat temperatures, fluid levels, and pH/conductivity readings
- Managing automated chemical feeds

Varland Plating's legacy Opto 22 *mistic* analog racks



Varland Plating's legacy Opto 22 *mistic* digital racks

- Applying and tracking precise electrical current using a rectifier to facilitate electrolysis, resulting in the deposition of metal ions onto the components

Varland has always strived to push the boundaries in terms of quality and efficiency, and Varland engineers began automating plating processes where possible in the early 1990s. Their decision to use Opto 22's SNAP-LCM4 controllers, *mistic*™ racks with G4 single-point I/O, and FactoryFloor® flowchart-based programming software helped Varland establish a reputation in the industry.

VP of Technology Toby Varland explains, "Our early adoption of electroplating automation allowed us to excel in producing high-quality work for challenging jobs. This also enabled us to offer better-than-average turnaround times and consistent product quality."

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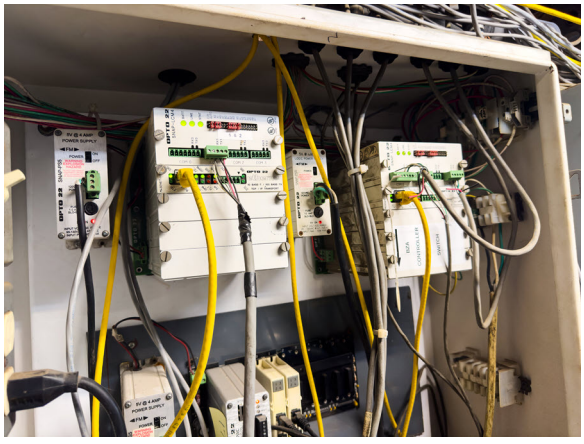
- Toby Varland, VP of Technology at Varland Plating

FROM SERIAL SYSTEMS TO ETHERNET

Automation advanced Varland's business objectives for decades, but as time marched on, the limitations of legacy hardware became evident.

"Every barrel on our automatic plating lines has an RFID [radio frequency identification] tag, and our hoists use serial RFID readers to help us track jobs through production. Each SNAP-LCM4 controller supports a maximum of four serial ports. At least one of those ports had to be reserved for I/O, so we were limited to a



Varland Plating's legacy Opto 22 SNAP-LCM4 controllers

Varland Plating's *groov* EPIC equipment

maximum of three RFID readers per controller," explains Toby.

The limited number of serial ports necessitated daisy-chaining dozens of I/O racks on individual serial communication ports and in some cases expanding the architecture to add additional processors. This setup led to increased communication latency, potential data collisions, and complicated troubleshooting, ultimately hindering system performance and reliability.

In contrast, Toby notes that a single GRV-CSERI-4 serial module on Opto 22's latest *groov* EPIC system supports 4 serial ports, and a single EPIC processor can support up to 4 of those modules, equating to 16 individual serial connections on one controller. "Hooking up RFID readers to serial modules on EPIC allows us to condense to a single processor per plating line."

And while serial communications still have their place in Varland's process, Toby knows that Ethernet, not serial communication, is the future of industrial automation.

"We could theoretically keep running SNAP-LCM4 processors," Toby asserts. "Most of our systems have been running reliably for many, many years. But these newer [*groov*] products just have so much more capability in every aspect, from installation to programming to operator experience, that they do a great job of getting out of the way and making it easier for our staff to do their jobs."

I/O UPGRADE—A PIECEMEAL APPROACH

A common pain point in upgrading control systems is replacing and rewiring I/O. With several thousand digital and analog I/O points running key systems at Varland Plating, Toby says "rip and replace" is not a viable upgrade path. Shutting down the entire operation is simply not an option, so he explains that they've "put a lot of thought into the upgrade path." Varland engineers decided to upgrade I/O systems one rack at a time.

"Of course LCM4 processors running FactoryFloor software from the 1990s can't directly address I/O registers on a brand new *groov* EPIC I/O rack," Toby notes. But a clever workaround enabled Varland to avoid a costly downtime situation. Taking advantage of Opto 22's "scratch pad"—a temporary memory storage area for data exchange between controllers and I/O processors—Varland is able to map EPIC's I/O channels to internal memory registers their legacy SNAP-LCM4 controllers can access.

Open communication between legacy and new equipment enables them to maintain the existing program on legacy hardware while developing a new one in parallel.

"So the control logic on the LCM4 doesn't change. We can start developing a new solution on the *groov* EPIC. For testing, I can flip a switch, do some testing, and then flip back to the old program," Toby confirms.

"...these newer [*groov*] products just have so much more capability in every aspect, from installation to programming to operator experience..."

- Toby Varland, VP of Technology at Varland Plating

IDENTIFYING INSIGHTS

With critical process variables now available in a modern, Ethernet communication interface, Varland faced their next challenge: limited visibility and no long-term trend analysis.

A savvy use of free resources helped Toby advance Varland's understanding of their processes with some software development—specifically, a homegrown data historian. Using Opto 22's open-source friendly REST API, Varland deployed a suite of PHP™ command-line scripts that retrieve I/O and critical data values and log them into an InfluxDB® time series database. The data is then

Varland Plating's dashboard of visualized data in Grafana via Opto 22's REST API

Varland Plating's plant kilowatt-hour data visualized in Grafana via Opto 22's REST API

visualized and contextualized using Grafana®, an open-source monitoring platform.

BUT DIGITAL TRANSFORMATION IS NEVER DONE

Varland's homegrown data historian was a step forward, but scaling homemade data collection scripts is challenging. As the system grows, maintaining continuity poses a risk, especially if the original developer becomes unavailable. They needed a scalable platform with professional support and documentation to ensure long-term reliability in SCADA.

It's a good thing Toby understands that digital transformation is an ongoing process because, in 2023, it took another turn.

"Through *groov* EPIC, we learned about [Inductive Automation®'s] Ignition®, and we feel we can leverage the software to accomplish a lot of SCADA goals that we haven't yet hit," Toby notes.

"We started with an Ignition Edge® license on one of our *groov* EPICs, and I liked it enough that we bought a full Ignition® license that we now run on an Apple® Mac Studio® server. InfluxDB and Grafana worked really well for long-term storage and trend analysis," Toby says, but, "Ignition allows us to remove the pain point of custom data collection and allows us to use Ignition Historian as a passthrough to get data into InfluxDB more reliably and with significantly less work."

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- Toby Varland, VP of Technology at Varland Plating

IMPACTFUL RESULTS

When asked about the impacts of their *groov* EPIC and Ignition upgrade, Toby explains, "Getting data into a historian platform where we can be flexible about how we access and study that data has given us new insights into our processes. We've reduced downtime, improved our operator experience, and freed our operators to focus on parts and quality. No one doubts the impact, although it's hard to measure."

When customers tour their facility, they are impressed by Varland's tight control over their processes.

"When customers see those screens, they realize we aren't dependent on vendors to update our systems. We do it all ourselves and have full control over our automated systems."

"Other automation companies tell you it's time for an upgrade, while Opto 22 helps us troubleshoot 30-year-old control systems."

- Toby Varland, VP of Technology at Varland Plating

NEXT STEPS AND FINAL THOUGHTS

Varland's digital transformation journey has been just that—a journey. And that's how it's supposed to be. Digital transformation is never complete. To use a car analogy: it's not just about driving from point A to point B but about continuously enhancing the vehicle itself.

Varland's future plans include *groov* EPIC upgrades for several more automated lines, a full migration to Ignition for HMI and SCADA, and exploration of CODESYS® for IEC 61131-3 compliant PLC programming languages—but there's still a long way to go.

All of these upgrades certainly require a great deal of effort on the part of Varland Plating's engineers and technicians, but Toby explains the value of working with a trusted partner in automation.

"It's hard to quantify the value of the relationship you can have with Opto 22," he says, "whether that's a simple thing like the factory-manned OptoForums, or calling on the phone and speaking with a tech support person who is a knowledgeable, high-level employee."

Toby concludes, "Other automation companies tell you it's time for an upgrade, while Opto 22 helps us troubleshoot 30-year-old control systems."

ABOUT VARLAND PLATING

Since 1946, Varland Plating, based in Cincinnati, Ohio, has specialized in providing high quality, precision barrel plated finishes to their customers. With their high quality plating finishes, quick turn-around times, around-the-clock service, knowledge, and reliability, they are able to solve even the most demanding and challenging plating problems.

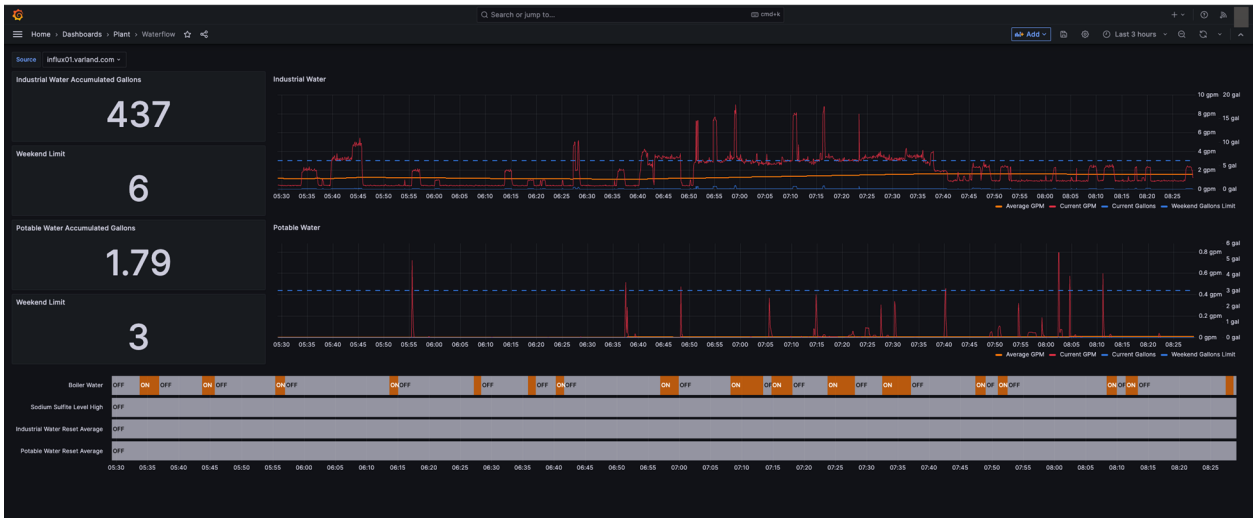
For more information, please visit:
https://varland.com

ABOUT OPTO 22

Opto 22 was started in 1974 by a co-inventor of the solid-state relay (SSR), who discovered a way to make SSRs more reliable.

Opto 22 has consistently built products on open standards rather than on proprietary technologies. The company developed the red-white-yellow-black color-coding system for input/output (I/O) modules and the open Optomux® protocol, and pioneered Ethernet-based I/O.

Famous worldwide for its reliable industrial I/O, the company in 2018 introduced *groov* EPIC® (edge programmable industrial controller). EPIC has an



Varland Plating's waterflow data visualized in Grafana via Opto 22's REST API

open-source Linux® OS and provides connectivity to PLCs, software, and online services, plus data handling and visualization, in addition to real-time control.

groov RIO Ethernet-based edge I/O modules, introduced in 2020, include I/O and IIoT software in a compact industrial package that goes anywhere.

All Opto 22 products are manufactured and supported in the U.S.A. Most solid-state SSRs and I/O modules are guaranteed for life.

The company is especially trusted for its continuing policy of providing free product support, free online training, and free pre-sales engineering assistance.

For more information, visit opto22.com or contact **Opto 22 Pre-Sales Engineering**:

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