

Case Study: Toyo Tanso USA

Manufacturer of isotropic graphite finds I/O and PACs to match the tough industrial demands of their process.

Graphite is a form of carbon that has been used by mankind since as far back as the 4th millennium B.C., when it was used for decorating pottery. Later it found its way into use as a refractory material to line molds for cannonballs, resulting in rounder, smoother balls that could be fired farther, contributing to the strength of the English navy.

Today graphite is used in many applications including batteries, steel production, brake linings, foundry facings and lubricants, pencils, and electric motor brushes.

Some of today's graphite applications require a finer grade graphite, called *isotropic* graphite, that has more stable properties than the graphite used in applications of the past. This graphite is used primarily in semiconductor and solar panel manufacturing.

One manufacturer focused on delivering isotropic graphite is Oregon-based Toyo Tanso USA. Toyo Tanso USA is a subsidiary of Toyo Tanso Japan, which was the first company to achieve mass production of isotropic graphite.

Their products are used in a variety of applications today, including nuclear power, which requires high reliability, electrical discharge processing, where accuracy is everything, and semiconductors to support today's massive demand for new technology.

Toyo Tanso USA also offers a variety of services related to graphite, including silicon carbide surface treatments. These surface treatments protect substrates from customer process environments and also control the generation of particles and gas from the substrate.

Toyo Tanso's process also ensures excellent blister resistance, while improving the abrasion and oxidation resistance of the substrate.

The Challenge

Toyo Tanso performs their surface treatments in a tough industrial setting.

"Our production environment is very busy and physically demanding, yet requires precise control of all the interacting systems," says Peter Souvanna, IT Manager for Toyo Tanso USA.

Souvanna is responsible for managing the batch automation process systems that perform the silicon carbide surface treatments. The treatment process is performed in multiple vessels that act as reactors, where the coating process takes place. These multiple vessels have varying specializations and require careful management to ensure that each process is successful and within specifications.



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To automate their batch process, Toyo Tanso needed something rugged and able to survive in their demanding production environments, with a lot of I/O options and controls that could be easily programmed and deployed.

The Solution

Toyo Tanso USA implemented the Opto 22 SNAP PAC control system to automate their surface coating process. A total of 8 separate programmable automation controllers (PACs) are used to manage the batch automation process. Each controller is configured to communicate with other

controllers to leverage the distributed control and intelligence features of the Opto 22 PACs and ensure system uptime.

The I/O modules and PACs are responsible for everything: controlling pumps and motors, temperatures, and power and pressure to the vessels; heating the vessels; and supplying cooling water during the coating process.

Pressure and temperature are both controlled using PID loops that run on the PAC's built-in I/O brain. Other dynamics inside the vessel are also controlled using the SNAP PAC system, including dozens of valves in each vessel.

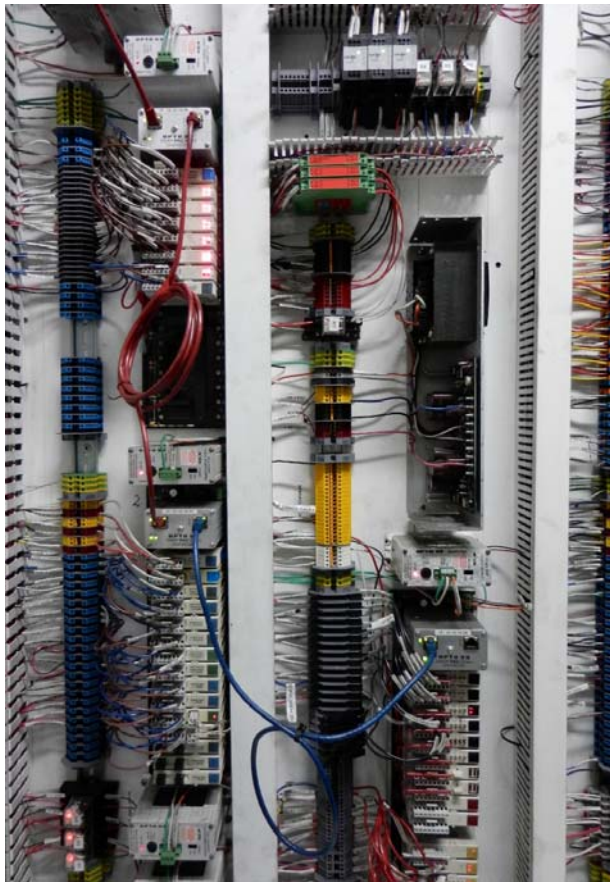
The PAC and I/O monitor pH and pressure during the coating process while maintaining critical setpoints using PID loops and a variety of other control points to manage Toyo Tanso's proprietary coating process. In total the vessels use over 1,000 I/O points for control and monitoring during batch process runs.

Souvanna found the flowchart programming style of the PAC Project programming tools to be very easy to use.

"The scratch pad features of the controller make it easy to move data in and out of the controller," he notes. "Ladder logic is useful for basic on/off procedures and control. But for a complete software solution for batch process automation, the Opto 22 SNAP PAC and PAC Project tools are far superior.

"Ladder logic can be difficult to troubleshoot. The ability to step in and out of a control block to pinpoint exactly what's happening in the process makes troubleshooting much easier.

"And the HMI tools that come with the product offer many standard features built directly into the software that allowed us to build rich HMI screens to know exactly what's going on with our process at all times."



As an I/O processor, the SNAP PAC brain independently handles functions such as latching, thermocouple linearization, watchdog timers, and PID loop control. These functions continue to work on the brain even if communication with the SNAP PAC controller is lost.

Keeping the Process Safe

Toyo Tanso USA also implemented the *groov* mobile interface tool to develop a gas monitoring system that can be accessed directly from operators' mobile devices.

During the coating process, a number of potentially dangerous gases are used. *groov* acts as a backup to the standard control system HMI. Wherever operators are, they have access to alert notifications and system status directly from the mobile device using an interface served from an industrially hardened *groov* Box.

"The *groov* Box also supports unlimited concurrent connections and user accounts, allowing the entire plant to use a single *groov* Box for all of our operators," says Souvanna.

Souvanna also took advantage of the redundant Ethernet jacks on the PAC controllers. Each controller is connected to both the production network and the business network.

"If there's a broadcast storm or network outage on the business network, the controller isn't affected and continues to operate," says Souvanna.

About Opto 22

Opto 22 develops and manufactures hardware and software for applications involving industrial automation and control, energy management, remote monitoring, and data acquisition. Designed and made in the U.S.A., Opto 22 products have an established reputation worldwide for ease-of-use, innovation, quality, and reliability.

Opto 22 products, including the *groov* mobile operator interface, use standard, commercially available networking and computer technologies, and are used by automation end-users, OEMs, and information technology and operations personnel in over 10,000 installations worldwide.

The company was founded in 1974 and is privately held in Temecula, California, U.S.A. Opto 22 products are available through a global network of distributors and system integrators. For more information, contact Opto 22 headquarters at +1-951-695-3000 or visit www.opto22.com.

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- Peter Souvanna, IT Manager
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Some of the more than 1000 points of I/O the Toyo Tanso USA factory uses in their SNAP PAC control system.