Once the switch to the PLC-5s and ControlNet was completed on three of its four production lines, The Budd Co. saved an estimated 294.9 production hours annually—or nearly six weeks of production time.

More Parts, Less Time

An upgrade to PLC-5s and ControlNet steers The Budd Co.'s press lines to 294 hours of greater throughput.

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The Budd Co.'s Shelbyville, Ky., plant is a technologically advanced, world-class operation. Providing automotive body components and systems primarily for BMW, Ford and Saturn, the plant's four high-speed press lines (one 180-in. line and three 144-in. lines) are completely automated, including computerized self-diagnostics.

But simply having world-class capabilities means nothing if you can't keep up with demand. The company operates 24/7, and new vehicles are rolled out every year—some with subtle changes, others with completely new looks or radically new contours. That means the company is constantly searching for ways to produce more hoods, fenders, frames, doors, decklids and bodysides in the same 835,000 sq. ft. plant.

When the need for increased capacity became acute a couple of years ago, plant management decided to modify three of its press lines by switching from PLC-3 controllers to Rockwell Automation's Allen-Bradley PLC-5s™ with ControlNet™. The modifications provided reductions in process cycle times and an increase in press shop manufacturing—meaning the plant now produces more parts in less time.

ROI of less than four months

Before the upgrade, Shelbyville's production speeds had peaked, primarily due to the PLC-3's overall scan times of greater than 100 ms. ControlNet permitted implementation of a faster architecture that replaced the single PLC-3 with seven PLC-5s, which have typical scan times of less than 20 ms.

The ControlNet network combines the functionality of an I/O network and a peer-to-peer network, providing high-speed performance for both functions. It delivers deterministic, repeatable transfers of all mission-critical control data, and also supports transfers of non time-critical data. The patented media-access method used on the ControlNet assigns a higher priority to the delivery of time-critical (scheduled) data than to non-time-critical (unscheduled) data. As a result, I/O updates and controller-to-controller interlocking always take precedence over program uploads, downloads and messaging.

On the Web

More information on the products that are in bolded type in this article can be found online at the following locations.

ControlNet:
www.ab.com/catalogs/b113/comm/cnet.html
PLC-5:
www.ab.com/plclogic/plc5.html

This article can also be found online with product hotlinks at www.abjournal.com.

Once the switch to the PLC-5s and ControlNet was completed, The Budd Co. realized significant production and time savings. The total annual estimated savings was 294.9 production hours—93.3 hours for Line 1, 108.76 hours for Line 2 and 93.0 hours for Line 3—or nearly six weeks of production time. That means the plant realized a return on investment in 4.13 months.

The savings were not isolated to a single product. Budd Shelbyville saw production rate increases for all 15 parts manufactured on these lines. The increases ranged from 0.1 parts per minute (ppm) on some doors and frames to 0.4 ppm on outer deck lids and a bodyside. The average increase for all 15 parts produced by the plant's three lines was 0.213 ppm.

> Production rates increased for all 15 parts produced on the three lines, freeing up enough time to produce an additional 150,000 parts annually.

Taken together, increased production rates freed up enough time for the Budd Shelbyville plant to produce an additional 150,000 parts annually.

Meeting all the goals

Making the switch to the new system required thorough planning and clear objectives. One of the main goals was to minimize the plant's risk.

Rockwell Automation's Metalforming Automation Control Solutions (MACS™) Press Applications engineering team knew the PLC-3 has a remote I/O structure that's completely supported by the PLC-5. They decided to keep the existing I/O structure by installing the ControlNet PLC-5 processors in place of the PLC-3's seven remote I/O adapter modules.

Thanks to the product family's compatibility, Budd Shelbyville was able to preserve its major dollar investment in I/O and wiring. ControlNet provided a high-speed link among the PLC-5s, allowing Budd Shelbyville to seamlessly implement a distributed control system that improved throughput.

Swap-out plan kept presses running

Since the plant operates continuously, another of the goals for the upgrade/retrofit was to continue production. Over a three-month period, the MACS Press Applications engineering team worked during scheduled disconnects that were less than 12 hours each. They swapped out the PLCs with minimal disruption and virtually no loss in production.

Budd Shelbyville and Rockwell MACS agreed on the plan and expectations for the overall upgrade and for each disconnect. First, all the ControlNet cables were run (the existing remote I/O cables were left in the cabinets for removal later). Then downtime was scheduled—the same as would be required for standard maintenance—to implement and test the system. The lines would be returned to production at the end of each scheduled downtime period.

The three lines each contained six presses, with seven cells of automation in each line. The plan called for the team to upgrade the first cell in a line, get it working correctly, then move onto the next cell in that line. This process continued until all the cells and presses in that line were running smoothly.

During each outage, the engineering team powered down and pulled out the ASB adapter cards in the PLC-3 system. The team then put in the PLC-5 processors, hooked up ControlNet, loaded the operating program, and began system testing. When it was time to go back on-line, the engineering team powered down and pulled out the PLC-5 processors, replaced the ASB adapter modules and powered up the PLC-3 system. This freed the line to start running parts again.

The process of changing out the PLCs required 1.5 to 2 hours each time. Completing the modifications and switching over to the PLC-5 ControlNet system required no more than 80 to 100 work hours per line.

In addition to the increased productivity, the PLC-5 system provided another benefit. Budd Shelbyville personnel had had difficulty troubleshooting and maintaining the PLC-3 system because its program comprised a single block of code. For the new system, the code was divided onto seven separate PLC-5s. Distributing the existing software program into manageable blocks means it can more easily be analyzed when problems occur.

With the upgrade complete for all three lines, the Budd Shelbyville plant is realizing marked improvements in its metrics. Those production metrics translate into increased capacity, so the plant can take on more jobs. More parts in less time, and a return on investment in just over four months—that's world-class results.

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