

Gunk® Manufacturing hits high gear  
with IPCs and EtherCAT

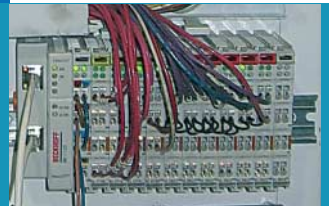




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"Our production systems are vital to meeting customers' expectations for quality products at competitive prices," said Shawn Lahart, electrical technician at Radiator Specialty, based in Charlotte, North Carolina, USA. "Key to keeping our production systems at this competitive level is using efficient, high-performance and cost-effective controls," the control expert said.

## Driving out the drivers

Since his first experience with industrial PCs in 1999, Radiator Specialty Lahart has been a strong proponent of the technology. "The IPC is my preferred controller because I believe it gives me far more control over Radiator Specialty's machine designs," said Lahart. "IPC manufacturers that specialize in open technologies have the type of technological focus that aligns best with ours."

The Radiator Specialty move to PC-based control culminated in a production line integration and introduction of new machine designs to produce Gunk from raw material to labeled and packaged final product. Two of the newer machines purchased from one of Radiator Specialty's OEMs would have been supplied with controls from a major PLC manufacturer, but Radiator Specialty specified a change to a PC-based design utilizing equipment from Beckhoff Automation.

"With the Beckhoff TwinCAT software and IPC hardware, the transfer of parameters and settings is a breeze and most of the functions we use are already included in TwinCAT," Radiator Specialty project engineer, Murray Williamson said. "For PLC-based systems, the cost of buying drivers to ensure all controllers and devices communicate properly can add thousands of dollars to the cost of systems. In addition, one change affects everything connected to the controller and drivers – even to add something as simple as a single I/O point. When the entire system has to be updated over and over again, programming time skyrockets into many hours of work. With TwinCAT, the required programming time is cut to a matter of minutes," project engineer Williamson said.


## Ethernet brings everything together

There are several production lines involved in Radiator Specialty's Charlotte plant. Four of the facility's fill and packaging lines are controlled by Beckhoff C6320 or C5102 Industrial PCs. A variety of Beckhoff Control Panels equipped with touchscreens are used as the operator interface. The Beckhoff IPC runs both the machine control and the line's HMI. Beckhoff Bus Terminals communicating with the control system via BK9000 Ethernet TCP/IP I/O Bus Couplers are used as I/O system. The I/O Bus Couplers are deployed around the lines to reduce wiring effort. "Earlier machines (circa 1999) were networked via PROFIBUS; the vast majority of the Radiator Specialty networking is now done via Ethernet TCP/IP." Lahart and Williamson determined that industrial Ethernet paired with PC controls was a cost-effective way to network production machinery and brought great benefits for uniting the manufacturing and corporate networks to access valuable production and recipe data. "Achieving this any other way is often too expensive," Williamson said. "In addition, Ethernet is one of the most stable and noise-tolerant methods of machine communication that I've worked with."

Low-cost BC and BX Bus Controllers have been installed on Radiator Specialty's non-integrated lines for lower level control. "Where possible we've standardized on BC9000 and BX9000 models since we can still get data and parameters in and out via ADS and Ethernet TCP/IP," Williamson said.

## Capper machine gets EtherCAT treatment

The newest machine at the plant, a capper near the final production stage for Gunk products, is the facility's first major EtherCAT implementation. EtherCAT offers high performance and maximum stability and enables seamless integration into the Radiator Specialty corporate network.



“One key factor to use EtherCAT was that we didn’t have to use switches: CAT-5e cabling goes right to the EtherCAT I/O Bus Couplers,” Williamson said. “All our IPCs have at least two Ethernet cards: one connects to the corporate network using regular TCP/IP, the others are dedicated for real-time TwinCAT or EtherCAT,” said Williamson. “We use TwinCAT 2.10, largely due to its comprehensive support of EtherCAT,” said Williamson. “TwinCAT also comes in handy when creating our low-cost HMIs.”

## Thinking outside the black box

“With our upgrades and line integration, we were able to achieve production increases from our machines ranging from 10 – 20 percent,” Lahart said. “We probably could have increased our production to a meaningful level with traditional PLCs, but equipment and installation cost as well as extra programming time would have eaten into the bottom line. Using scalable PC controls, we reduced our controls cost on our capper machine by over \$5,000. Much of this was brought on by the ability to control an entire line with one PC, rather than controlling each machine or line component with multiple PLCs.”

In this way Radiator Specialty solved its biggest challenge: “With PC control we’re definitely able to be more competitive. With a little programming, ideas can become realities and as controls designers we are challenging ourselves to develop even better solutions – continually developing the process and ourselves. With proprietary ‘black boxes’ you are somewhat limited in how far you can go,” Williamson said.

Radiator Specialty’s upcoming plans include greater integration of production lines, a further reduction in proprietary controls and a potential inventory management system controlled by Beckhoff PC-based equipment. “We’re also going to increase our utilization of EtherCAT,” Williamson said. “We feel that it’s the most versatile network out there.”