SENSORS TODAY PLUS

It's All in How You Package It

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What's NEW with Allen-Bradley Products?

IVAN corners your questions

BACKGROUND checks: easier than you think

UBE and **ROCKWELL AUTOMATION:** another successful application in the bag

SAC and **ROCKWELL AUTOMATION** rearrange your furniture… with **DEVICENET**

Southern Automation & Controls
Rearranges Your Furniture… With DeviceNet

In 1998 BenchCraft®, a leading designer and manufacturer of upholstered furniture, reached a bottleneck. The business was growing so quickly that their 600,000 square-foot distribution center at the corporate headquarters in Blue Mountain, Mississippi would soon be unable to keep up. It was time to replace their antiquated equipment—both hardware and software—with a new warehouse distribution system that could accommodate the accelerated growth and provide the feedback that BenchCraft had been seeking for years. Southern Automation & Controls, a systems integrator in nearby Tupelo, and Lone Star Automated Systems of Houston, Texas stepped up to the plate, designing a system that would allow BenchCraft to move 15,000 pieces per week—just for starters.

Southern Automation & Controls (SAC) has been handling jobs of increasing complexity from one coast to the other and in points between since entering the market in September 1997. When BenchCraft, who doesn't have control engineers on staff, was discussing a new conveyor system with Lone Star Automated Systems, they expressed the need for local support in addition to expertise in the automation of conveyor systems. SAC was immediately contacted as a possible partner in the endeavor. Together, Lone Star and SAC proposed and configured a system that could not only effectively transport products, but that would allow BenchCraft access to information they were previously unable to capture.

Exceeding Expectations

Before meeting face-to-face with potential partners, Vickie Chaffin, Vice President of Logistics and Greg Harrison, Facilities Manager at BenchCraft sat down and compiled a list of things they hoped to achieve with the new system. Ultimately, they wanted to harvest information from the plant floor and seamlessly tie it into their mainframe operations for retrieval. Considering BenchCraft's continued growth, the system would also have to be flexible enough so that it could evolve and expand as needed, basically preventing the present situation from occurring again in a few years. And, it was imperative that the new system could be installed while the existing system was in operation—otherwise, it couldn't be installed at all.

A forty-five minute drive away, at roughly the same time, Jack Cameron, David Winstead, Gary Purdon and the rest of the SAC team were working with Jeff Dickson and Les Russell of

Lone Star, putting together their own list—one outlining the services their proposal would offer BenchCraft. While the engineers at SAC were familiar with the capabilities of device networks, they turned to the Stuart C. Irby Company, their local Rockwell Automation distributor, for further assistance. David Winstead elaborates, "We had experience with other distributed control and bus systems in the past and had been exposed to DeviceNet and its capabilities through the guys at Stuart Irby. From what we had learned about DeviceNet, we already felt it could be the right approach." But Marshall Lovelace, Regional Controls Specialist; Mac Fennell, Sales Representative; and Anthony Johnson, PLC Specialist of the Stuart C. Irby Company enlightened the SAC crew even further with a training session detailing the volumes of information DeviceNet could move between the plant floor and the front office, the high-powered diagnostics and the potential savings in installation, labor and maintenance costs. The training materials were modified and used by SAC's Gary Purdon in the proposal to BenchCraft.

When Lone Star and SAC met with BenchCraft to discuss the proposal, both parties were shocked at how similar their lists were—SAC's offerings coincided perfectly with BenchCraft's expectations, almost as if they were done in parallel. But SAC's list was slightly different in that it not only covered all of BenchCraft's ideas, but it suggested several new ones. According to Vickie Chaffin, "I don't think there was anything on our list that [SAC] couldn't accommodate and yet, at the same time, there were other things that…we would've missed had they not told us what the system was capable of doing." Vickie Chaffin and Greg Harrison had entered the

meeting with no pre-conceived solutions in mind, ready to partner with the provider that brought the best solution to the table. Lone Star and SAC came in armed with the perfect solution as well as some input that BenchCraft hadn't expected. "We were open to any suggestions," Chaffin continues, "and Southern Automation was constantly asking, 'Would you like this?' or 'Have you considered this?' It was a union that was meant to be."

Sensors, Sofas and Scanners

That February, SAC started installing a DeviceNet system on the 3300+ feet of new conveyor built by Lone Star Automated Systems. The final control system would actually consist of five DeviceNet networks operating seamlessly with a dedicated safety system capable of shutting down the entire process as needed. Timing of the process was critical; the network would have to maintain product traffic of various package sizes, from ottoman to recliner to sofa, with seven seconds between. But the system wouldn't simply maintain traffic from BenchCraft's on-site manufacturing—furniture brought in from BenchCraft's other manufacturing facilities had to be flowed in as well.

Jim Jones, SAC Projects Manager, Jack Cameron and the rest of the Southern Automation & Controls team had a few concerns that were quickly dispelled once they started to assemble the DeviceNet system, one of which was the learning curve. They had worked with other device networks in the past, but this was their first DeviceNet installation. As questions regarding the implementation of the network arose, the local Rockwell Automation representatives immediately addressed them. "We knew some of the problems we'd encounter would be attributed to our inexperience with the system," says Jones, "but we knew we could get the support we needed from the folks at [Stuart C.] Irby."

They opted for KwikLink™ flat media for DeviceNet, which made installation quick and easy with its keyed cable

and snap-on connections while saving considerable labor and installation costs. The cable's enhanced noise immunity also served well as SAC was able to run the KwikLink trunk cable in the same tray with the 480V AC line using a simple divider for added protection. The result was a clean, conduit-free system that didn't require the extensive engineering required of competitive networks using predetermined cable lengths. David Winstead describes his experience with such networks and the flexibility KwikLink brought to the BenchCraft project: "We had used other manufacturers' round, pre-cut media in our previous experiences with networks, and it was a nightmare. With KwikLink, we were able to go ahead and run the media, have it in place and worry about exact device locations afterward." This was especially important considering that there were segments of conveyor still under development at Lone Star that would be added later. As new conveyor sections came in, SAC could effectively integrate the controls without overhauling the network layout. Likewise, the flat cable could be installed while the plant was still in operation and would allow for future expansion, addressing BenchCraft's biggest concerns.

The remaining concerns had to do with the electrical limitations of the system, notably network speed. David Winstead asked himself, "OK—when this system is loaded to max capacity and all traffic is flowing, are we going to be able to process all the information?" With the time-critical nature of the process and the amount of information that needed to be moved, would DeviceNet have adequate bandwidth? Time would tell, and the finished system was able to handle it—and more. "We were able to do it, no problem," Winstead continues, "and the system hasn't had a hiccup since startup."

Controlled by three Allen-Bradley SLC 5/04's, the system uses a broad range of devices from Allen-Bradley 190E starters and Bulletin 160 drives to stack lights and sensors. The DeviceNet Series 9000 retroreflective photoelectric sensors
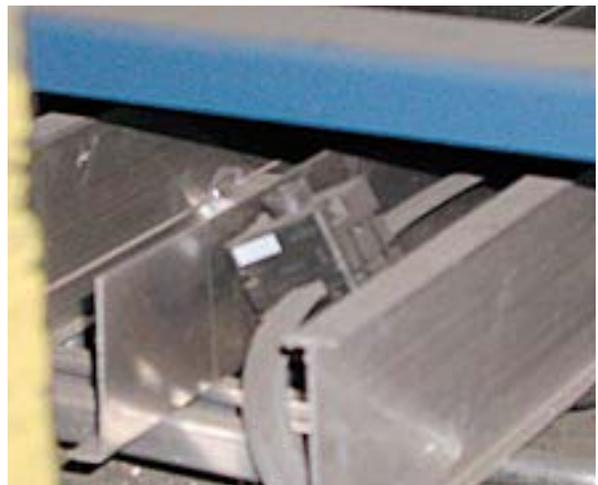
effectively sense the shrinkwrapped furniture and, based on the variation in package lengths, trigger off the trailing edges of the packages. Timing functions for regulating traffic and maintaining the seven-second interval do not reside in the sensors, but are done via the network. Meanwhile, the sensors aid in the positioning of packages for clear reading by bar code scanners, which pull letter-based destination codes for determining drop locations. At the main transfer station, two more bar code scanners retrieve information for product tracking. And there is more information that, while not crucial to the process, is gathered at the bar code readers and stored in a database for BenchCraft's use. Greg Harrison elaborates, "We redesigned our shipping label—and not because we needed to accommodate the system. We adjusted it to take advantage of the amount of information the system allowed us to gather."

Furniture from other BenchCraft facilities is loaded from the docks onto a series of conveyors that introduce deliveries into the main product flow. The new pieces are hand-loaded

onto the conveyor, yet the proper product spacing must be maintained. SAC installed DeviceNet stack lights that give workers the green light when loading is appropriate and the red light to indicate when a piece should not be loaded. The HMI package, designed by SAC's Carl Purdon, also maintains production data and sounds voice-annunciated alarms in the event of fault conditions.

A Leap Forward

Prior to installing DeviceNet, BenchCraft required two shift operations to flow in a single day's production. Now an entire day's production flow can move through in one shift operation. So even if the business grows to such an extent that BenchCraft runs three-shift manufacturing, the distribution center still has ample capacity. And should they max out *that* capacity, the system can easily be enhanced to support that growth. "That was definitely one thing we tried to do," says David Winstead, "leave the system in a state that would accommodate BenchCraft's potential for growth—DeviceNet gave us the luxury of considering that while allowing us to be cost-competitive."

For Vickie Chaffin and the rest of the BenchCraft team, their new DeviceNet system isn't just a control system—it's an effective management tool. "When you're in a 600,000 square-foot distribution center and you have limited management resources," says Ms. Chaffin, "you need the tools and information that help you to be a better management team. Our DeviceNet system is that tool."