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Industrial Automation News for the Americas

## automation technology

## Valley Modularizes its Sorting Operation



Valley Record Distributors of Woodland, CA is one of the nation's largest, full-service wholesale distributors of pre-recorded music and video in the United States. Their customers consist of thousands of retail music and video stores, ranging from the small "Mom and Pop" to the large chain operation.

Founded out of the back of CEO Barney Cohen's garage in the early 1980s, Valley today distributes over 200,000 different selections each day from its 200,000-square-foot warehouse outside of Sacramento with a state-of-the-art material handling system.

From its inception, Valley's policy was to ship every order the same day it is received. But this policy has been tested over the years as business volume grew, with over 200,000 pieces currently shipped each day. This daily flow has necessitated continuous improvements in the way Valley handles materials.

### Automated labeling and sorting

In 1994, Valley added its first automated conveyor system that would apply pricing and bar code labels, as well as provide a means to sort the pieces using a bar code reading system. Dorner Manufacturing Corporation of Harland, WI, installed the system.

Here, the conveyor batched orders into an individual pick, then picked them in a pick-path sequence. The system placed products in a tote, then conveyed them to a sorter. From there, orders are downloaded to a sort computer.

The 100 sorting stations are split in two rows, 50 per side with



sensors at every station. When an item arrived at its assigned station, a gate opened to allow the item to be stacked and accumulated at the sort location. All of the sorters and their respective readers were hard wired back to a central computer at the front of the line through a data terminal block. When the computer recognized that an order has been completed at any of the stations, it automatically turned on a light beacon to indicate that the items could be placed in a shipping box and removed from the sorting station.

## A new and better system



In 1997, Dorner was once again called upon to install a second labeling and sorting system adjacent to the older one. Dorner awarded the control aspects of the system to Professional Controls Corporation (PCC) near Milwaukee. PCC incorporated newer, more flexible electronics to Dorner's modular design that would allow each sorter station to be maintained individually. Originally, a sorter station could not be taken out of service without affecting the rest of the sorting operations.

Another innovation to the new design would be a Y-split at the front end that would allow 50 sorting stations on one side and 50 sorting stations on the other side, operating simultaneously. The advantage is that each side is independent. The older machine has both sides sharing one core belt.

Dorner and PCC developed the following goals for the new system:

- Modularity
- High-speed sortation
- Ease of use
- Low maintenance
- Built-in flexibility for future growth

## The Advantage of the Networked PLC System

The new control system utilized six computers for main control and monitoring, three Profibus-DP networks controlled by Siemens Profibus interface cards used in conjunction with 126 Siemens S7-215 micro programmable logic controllers (PLCs). Also used were 12 Siemens ET200B distributed I/O nodes of Profibus-DP.

Aside from the obvious advantage of eliminating straight wiring to all the I/O points in the system, the Profibus-DP system has some tremendous advantages over non-networked systems. The biggest of these is modularity. Each sorting station has its own unique PLC and operates independently from the other sorting stations. The PLCs communicate with the main computers via the Profibus network. Because Profibus can communicate at almost 12 megabaud per second, it is extremely fast, being more than adequate to handle the speed requirements of the system described here.

The new sortation system provides the ability to off load some of the overhead of the main

control system to individual stackers. This simplifies the overall control scheme, dramatically decreasing troubleshooting time. PCC also developed a special maintenance tool that connects directly to the S7-215 PLCs that allows the stackers to be repaired and maintained individually. This means if there is a problem with one of the stackers, production does not need to stop for the repair.

## Project Success

Thousands of dollars were eliminated by not having to hard wire the I/O devices back to the main computers. The PLCs and Profibus made that possible.

The line operates very efficiently, increasing production substantially. The machine layout consumes less warehouse space. If the machinery has to be moved to another location, its modular design makes this much easier than previous designs. For example, four stackers can be broken down and shipped as one unit, making it easy to dismantle and reconstruct quickly.



All of the original goals have been met or exceeded. During the first few weeks of operation, the speed and efficiency of the new sortation line was exceeding that of the original system. There has been little downtime for maintenance and repair, and there are fewer errors with the bar code reading and transfer process. As Valley continues to grow its operations into the new millennium, the new capacity is ready to meet challenges that lie ahead.