Atlantic Custom Processors

The Hi-Rise Warehouse Freezer Storage Retrieval Machine was upgraded with state-of-the-art controls to provide more flexibility and improved diagnostics.

Atlantic Custom Processors
Fort Fairfield, ME

About Atlantic Custom Processors:
Located in Fort Fairfield, Maine, Atlantic Custom Processors (ACP) operates as a frozen storage facility for McCain Foods. McCain's is the largest producer of French fries in the world. ACP primarily handles short-term delivery (two weeks or less) for the frozen French fry business. The potato is northern Maine's primary agricultural product and 45% of all potato production is used for French fry processing. Maine is currently the 5th largest potato producing state in the US.

Business Challenges:

- The single Woodson freezer SRM was a critical part of the storage operations and downtime was not well tolerated. The maintenance and management groups were spending an inordinate amount of time supporting the equipment while waiting for technical services to arrive.
- The control drive that was upgraded six years ago was not being supported on a timely basis by the company that installed it.
- The existing SRM's vertical and horizontal fine positioning boards were approaching obsolescence. Inaccurate positioning was causing product spills that were negatively impacting system mechanics.
- Repairs to the SRM and components were expensive and frustrating because they could not handle them in-house. Only one vendor had the capability to perform them.
- The PLC program was proprietary and ACP did not have access to the source code to make changes or troubleshoot the SRM.

Highlights of the Project:
ACP commissioned Retrotech to modernize their Woodson freezer SRM PLC, drives and positioning. The main goal was to replace the obsolete and hard to repair components with newer, off-the-shelf, non-proprietary components.

The storage and retrieval system is a single aisle approximately 260 feet long, 45 feet in height with 57 lanes approximately 59 feet in length on five (5) levels for each side. The system is in a -12 degree F freezer environment and was serviced by one (1) Woodson SRM. The SRM is a man-aboard, manually operated, SRM with two (2) RVs. The 30 HP vertical and 10 HP horizontal motors were controlled by VF drives and the RV motors (travel and table) were controlled by one (1) DC drive per RV. The SRM was controlled by a combination of hardwired controls and a GE Series 3 PLC.

Retrotech replaced the GE Series 3 and I/O PLC with an Allen-Bradley CompactLogix PLC and I/O. The new CompactLogix PLC was placed in the cab enclosure in the same location as the prior PLC. The new PLC included the appropriate I/O modules required to facilitate connection to the existing control devices and a DeviceNet module to incorporate the new horizontal and vertical positioning systems and drives.

The existing 30 HP vertical motor Toshiba VF drive was replaced with a 30 HP Allen-Bradley PowerFlex 700 VF drive. The drive was set up for vector control and connects to the new CompactLogix PLC over the DeviceNet network. An encoder on the existing motor connects directly to the new PowerFlex drive in order to control the vertical motion using vector (torque) control. Vector control allows for more precise positioning, eliminates the need to use the axis brake as a stopping brake, and will hold the carriage in the correct position while the RVs are moving on of off the carriage. Both drive systems include input line reactors, external brake resistors and connect to the existing motors using new VF rated cables. The drives were mounted in the same place as the old Toshiba drives.

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The vertical and horizontal positioning system was updated with a SICK DME 5000 laser positioning system. The DME positioning system is an absolute positioning system that communicates the actual position of the axis it is measuring, in real time, to within a +/- 5mm. Because the systems are absolute, the SRM will not need to be "homed" to set "zero" position after a power failure and do not need to be recalibrated.

The horizontal DME was mounted on the SRM with its target on a fixed wall that is not in the direct line of product, rack, or maintenance activities. The vertical DME was mounted to the SRM base with the target on the carriage. The existing positioning targets (reflectors) on the rack and mast were no longer required. Retrotech also replaced the existing Emtrol proprietary horizontal and vertical brake modules with new off-the-shelf brake modules.

In addition, Retrotech provided an Allen-Bradley PanelView Plus 600 HMI color touch screen display that was placed in the cab of the SRM. The HMI replaced two digital positioning displays used by the operator. The HMI displays the status of all I/O and devices connected to the PLC along with any fault messages.

Results:

- ACP now has the flexibility to support and maintain the SRM independently, instead of relying on outside vendors.
- The upgrades added the ability to move and position the SRM with the ease of a touch panel. Positioning and preparing is now faster; with enhanced diagnostics, troubleshooting capabilities and better error correction.
- The new positioning system is more accurate and has reduced the incidence of product spills.
- Obsolete hardware and proprietary software were replaced with off-the-shelf components and non-proprietary software to make future upgrades convenient.

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