

## APPLICATION BRIEF

E-COMMERCE AUTOBAGGER  
RECONTROL

## SOLUTIONS

Pyramid Director WCS  
Pyramid Controller Software Suite

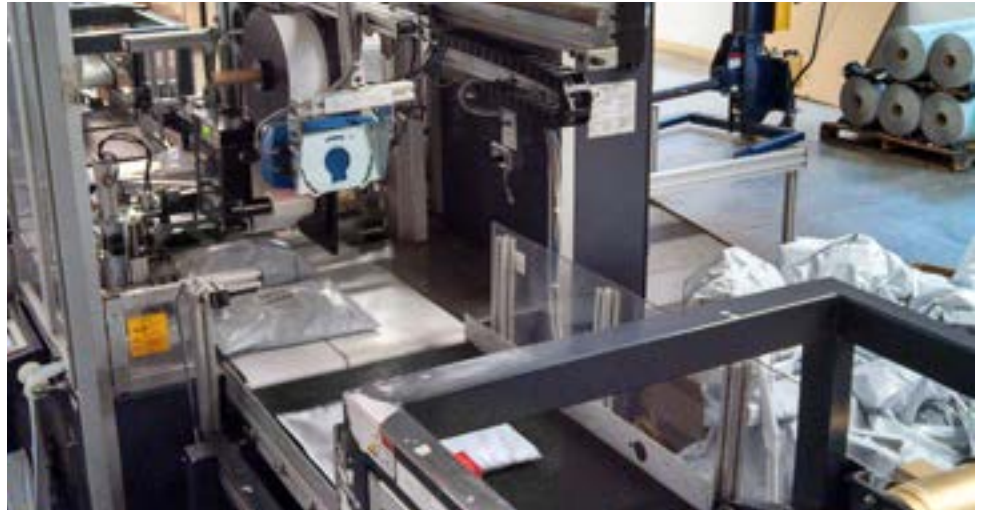
## INSTALLATION SCOPE

Pyramid Director WCS and the Pyramid Controller Series (control hardware and software) to replace the existing control platform and improve the efficiency and performance on two automated order fulfillment bagging lines. Project highlights include:

- Replaced the existing control platform with Allen Bradley/Rockwell ControlLogix
- Exceeded required 22 orders/minute/line minimum sustained throughput
- Near 100% reduction in released order error rate
- Reduced ongoing maintenance costs
- Enhanced visibility into all operational aspects to monitor, measure, track and report KPIs



**Matthews**  
AUTOMATION



## E-Commerce Autobagger Recontrol

Pyramid upgrades and re-engineers automatic bag insertion order fulfillment lines with new WCS and customized controls, boosting output to 20 orders/minute.

### THE APPLICATION

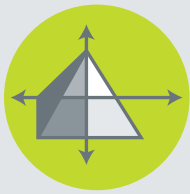
A leading e-commerce apparel retailer, and longstanding customer, asked Pyramid to assist in resolving serious problems associated with two automated order fulfillment bagging lines (called "autobaggers"). These autobaggers play a critical role in processing the vast majority of the fulfillment center's single- and multi-line orders by automatically:

1. Generating an invoice and returns authorization paperwork,
2. Combining the invoice with merchandise and marketing collateral,
3. Packaging all the aforementioned items, and
4. Printing/applying a GS1-compliant shipping label for delivery.

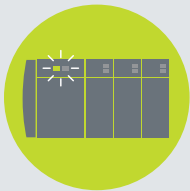
Initially implemented in 2007 (by a different system integrator), the autobaggers never achieved the facility's performance goals. Problems included:

- Poor order fulfillment accuracy (packaging, labeling) with error rates averaging 1,000 articles per shift.
- Instability of existing supervisory system and warehouse management system (WMS) gateway caused regular server crashes, leading to downtime.
- Unacceptable equipment and control reliability.
- Unpredictable overall system uptime/availability.
- Inability to properly maintain the system due to lack of service/support.
- Lack of visibility into operational and equipment/system performance (no tracking or reporting operational metrics, exceptions or critical maintenance diagnostics).

## THE SOLUTION



**PYRAMID DIRECTOR WCS**  
WAREHOUSE CONTROL SYSTEM



**PYRAMID CONTROLLER SOFTWARE SUITE**  
OF CONTROL HARDWARE AND PRE-ENGINEERED  
SOFTWARE FOR MATERIAL HANDLING EQUIPMENT

## THE CHALLENGE

Though there were many questions relative to the requirements, scope, approach, design constraints, logistics, success metrics, and the uniqueness of the application, Pyramid accepted the challenge, knowing it was critical to the fulfillment operation.

The following items were established as a framework for resolving the autobagger performance issues:

1. Completely replace the existing Siemens control platform with Allen Bradley/Rockwell ControlLogix to align with internal facility service infrastructure standards, and so service/support can be readily performed internally. Because the facility already maintained a large installed base of Pyramid Controller Series DC automation products (all Allen Bradley/Rockwell based), this platform shift provided an additional support advantage.

### Pyramid is a Rockwell Automation Authorized Solution Partner.

Pyramid specializes in preserving your investment in existing systems. We often integrate and update older SLC installations, replace PLC5 platform architectures and PC-based control systems with newer, more viable and easier-to-maintain off-the-shelf industry standard Rockwell ControlLogix-based technologies.

#### Allen-Bradley/Rockwell PLC platforms:

- ControlLogix™
- CompactLogix™
- Micrologix™

#### Pyramid control's host, peer and input/output (I/O) interfaces:

- Ethernet/IP™
- ControlNet™
- DeviceNet™



## PYRAMID DIRECTOR WAREHOUSE CONTROL SYSTEM



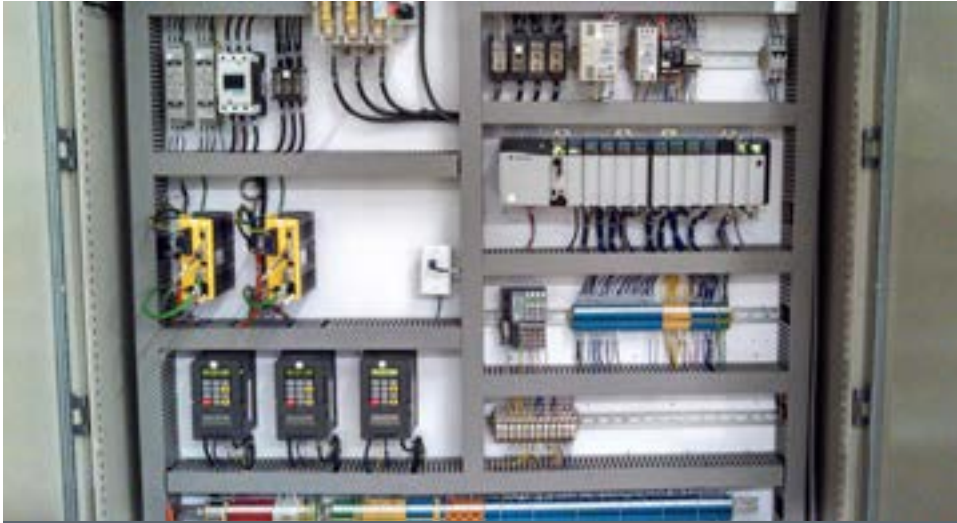
The Pyramid Director WCS provides a comprehensive suite of simple, easy-to-use graphical screens for management and users, as well as a central control dashboard. The dashboard's powerful, intuitive and functionally complete dashboard tools support up-to-the-second status assessments of DC processes, wave execution, inventory status/location and MHE operations.

The Pyramid Director WCS dashboard gives users complete, DC-wide visibility and control of inter-process routing of cases and totes. All screens are customized to provide:

1. Real-time visibility into all aspects of the DC's operational activity.
2. The ability to directly control the flow of inventory through the DC by wave, tote, case and more.

Views include:

- Process status performance metrics
- Exception reporting
- Inventory status and location
- MHE status and performance
- Communications status and statistics configurable security
- Parametric and diagnostic portals
- Up-to-the-minute information about vital aspects of the DC



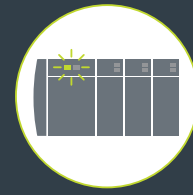
A control platform conversion was implemented featuring the Pyramid Director line of DC automation products.

## THE CHALLENGE

(continued from page 2)

2. Completely replace the existing PC-based supervisory system due to its inability to provide the required levels of visibility/reporting on operational performance, exception reporting and critical system diagnostics. Instead, the customer implemented Pyramid Director WCS to leverage its capabilities. These include seamless integration with Manhattan WMS host for customer order information, real-time supervision of all programmable logic controller (PLC)-based control systems driving the autobagger lines, robust, easy-to-use graphical interface that supports up-to-the-second reporting on all key performance indicators (KPIs) and critical operating metrics, exception reporting, and alarm management.
3. Implement continuous front-to-back order identification and tracking to significantly reduce or eliminate packaging and/or labeling errors.
4. Eliminate the existing invoice printer/folder/feeder for each line because of performance limitations, and the inability to secure spare parts and obtain service.
5. Retain the existing bagging machine, but improve its performance through selectively re-engineering input/output (I/O) and automatic identification (scanner) systems that are integral to its operation.
6. Retain the existing array of collateral inserters.
7. Retain the basic mechanics of the conveyor, but seek alternative methods of I/O and drive control to provide continuous, more accurate tracking and improved overall reliability.
8. Perform all the above while:
  - Unacceptable equipment and control reliability.
  - Reducing additional capital expenditures; and
  - Keeping at least one of the two autobaggers in fully productive operation during conversation.

## PYRAMID CONTROLLER SOFTWARE SUITE



The Pyramid Controller family of software products features an extensive suite of pre-engineered, robust, reliable and time-tested programmable logic controller (PLC)-based applications. The Controller suite controls for a broad array of different material handling technologies, OEMs and customer applications. Pyramid Controller solutions include:

### CASE SORT CONTROLLER

Controls sorting of cases, cartons, totes and other units over a broad range of MHE technologies including slat/shoe, pop-up wheel, swivel wheel, transfer and more.

### LOOP SORT CONTROLLER

Controls sorting of units or other individual articles of inventory over more advanced sorting technologies, such as cross-belt, tilt-tray, bombay and others.

### INDUCT CONTROLLER

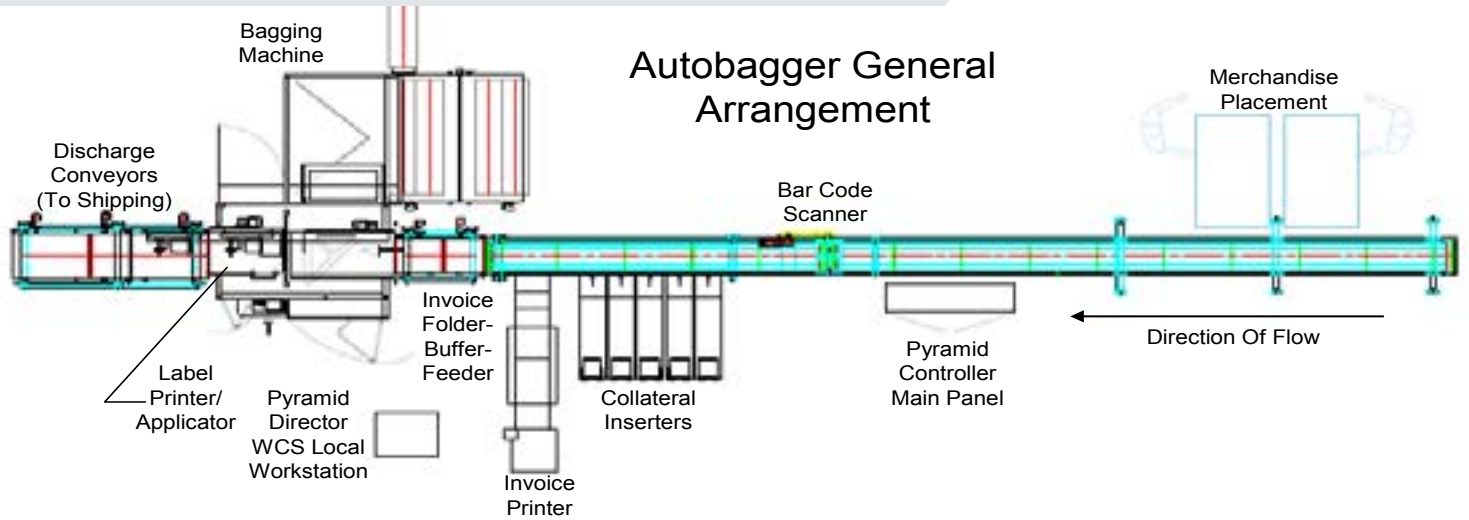
Controls the automatic identification (auto-ID) of unitized product or other inventory units and their induction onto sorters, emphasizing optimal sorting accuracy and throughput.

### MERGE CONTROLLER

Controls complex, high speed merging of cases, cartons, totes and other units from multiple sources, including feather, zipper, slug-build-and-release, saw-tooth and other forms of advanced merge technology.

### AUTO PRINT/APPLY CONTROLLER

Controls auto-ID, on-the-fly print/apply of compliance, carrier standard or other customer specific labels, and full process verification to ensure accuracy.



**KEY FUNCTIONAL HIGHLIGHTS**

The following provides a very high level summary of the autobaggers as they operate under the supervision of the Pyramid Director WCS, and the real-time control of the Pyramid Controller Series of DC automation products. The actual operation, technical design, and applied technologies are quite complex.

**Basic Operation & Schematic Overview**

Both single- and multi-line customer orders to be processed through the autobaggers are downloaded from a Manhattan WMS host to Pyramid Director WCS.

Each autobagger takes inbound merchandise positioned by an operator on a product belt. As products are conveyed downstream, they are sensed by the control system, continuously tracked by individual merchandise item, screened for excess product height, and automatically identified by a barcode scanner.

Based upon the scanned UPC, Director WCS selects the item to fill a customer order on file, and drives the printing of an invoice and return authorization paperwork at the invoice printer. It also determines collateral requirements, such as merchandise catalogs and other promotional materials.

The PLC controls the insertion of the invoice and collateral, which is synchronized to the corresponding merchandise. Merchandise, invoice and collateral are merged and verified for accuracy. Once verified, the PLC permits the package’s contents to enter the bagging machine. If either Director WCS or the controller software detect an error, the package is rejected.

Within the bagging machine, the bagged package is sealed and a GS1 standard compliant shipping label is printed, applied and verified automatically. The finished order exits the system via a series of discharge conveyors, then is conveyed to shipping. Should Director WCS or the PLC detect an error, the line stops to be purged and reset by operations.

Throughout the process, Director WCS and the PLC maintain constant, real-time communication to manage the status of each order and all equipment. Director WCS uploads a message for completed orders to the Manhattan WMS host.



**Real-Time Autobagger Control**

Operational performance is tracked by the Director WCS relative to many KPIs including: orders processed, labels printed and labels verified over time.



Autobagger operations are monitored continuously by Director WCS, and the status of all critical components are displayed.

## KEY FUNCTIONAL HIGHLIGHTS

(continued from page 4)

### Operational Improvements

- Exceeded required 22 orders/minute/line minimum sustained throughput; achieved near 100% reduction in released order error rate.
- All process anomalies are now tracked, quickly identified and cleared; subsequent recovery is quicker and cleaner.
- Total elimination of invoice and return authorization printer/folder/feeder issues; huge improvement in overall reliability, availability and uptime realized.
- Both short- and long-term ongoing maintenance costs reduced; both internal and third-party service/support is now readily available.
- Greatly enhanced visibility into all operational aspects to monitor, measure, track and report KPIs. With these tools, expectations have been established, and the process can be effectively managed.
- With the new, advanced diagnostic capabilities, graphical representation diagnostics and alarm management, services personnel can properly service and support the autobagger system. Issues can be quickly identified, quantified, reported and remediated.
- Total elimination of the server crash problems (and the lost time and productivity) associated with the old supervisory system.
- Zero production downtime during conversion process.
- Helped preserve original investment in the autobaggers to minimize capital outlays, and significantly extended the useful life of the systems.
- Established foundation for additional enhancements targeted at further improving the autobagger operations in the future.



# Software and Controls for Maximum Distribution and Fulfillment Center Performance

Matthews Automation provides Warehouse Control System (WCS) and Warehouse Execution System (WES) solutions that perfectly synchronize a wide array of material handling systems including motor-driven roller (MDR) conveyor, case sorters including sliding shoe, automated storage and retrieval systems (ASRS) and more.

Fully integrated with your WMS or ERP, our software and controls optimize wave creation logic and paperless pick/sort systems such as pick-to-light and put walls. Along with order finishing system controls for automated bagging, boxing and packing slip/marketing collateral document insertion, Matthews empowers your distribution center's transformation into a successful omnichannel fulfillment operation.

## MATTHEWS AUTOMATION SOLUTIONS

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