MODERNIZING MATERIAL HANDLING MODULAR CONTROL SYSTEMS

Cost-effective Alternatives for High-performance Conveyor and Sortation Control

Honeywell

Intelligrated®

TABLE OF CONTENTS

1 Introduction

2 Lack of Affordable Modular Options Hinders Many Operations

3 The Need for a More Cost-effective Approach

4 Modular Capabilities for Real-world Operations

4 Embedded routing

5 Label printing

6 Historical data tracking and BI reporting

7 Alarms and events

7 Visual status modeling

8 Emerging WCS Alternatives

9 Communication protocol options for Embedded Services

10 Conclusion

INTRODUCTION

The material handling industry is grappling with a disruptive technological revolution. Customers and e-commerce retailers are demanding ever-faster delivery, often at no cost. To keep pace, logistics distribution centers (DCs), manufacturers and other operations face a growing need to ensure peak system performance.



These challenges inevitably involve upgrading existing warehouse control systems (WCS) to fully integrated, modern systems that enable coordinated machine control, optimized operation and informed decision-making. While many such control system upgrades are emerging, operators must carefully balance the capabilities they provide against other factors, including:

- Capital expenditure and operational expenditure costs
- Ease of integration with existing equipment and infrastructure
- Future-proof scalability
- Anticipated ROI

This white paper will discuss the need for upgrading to modern control systems, consider the advantages that could be gained from cost-effective modular solutions, and explore the robust functionalities these new control systems can deliver in DC operations.

LACK OF AFFORDABLE MODULAR OPTIONS HINDERS MANY OPERATIONS

1

> Most control system solutions currently on the market do not give customers the option to pick and choose from a range of services.

As a result, many operations that need just one or two capabilities — such as routing or system monitoring — struggle to find cost-effective, modular and agile options. Until recently, their only options have been to use comprehensive control systems, third-party software or custom solutions developed in-house — none of which present a viable long-term method to meet the challenges of today's logistics environments.

Of course, high-end solutions like warehouse execution systems (WES) address the full spectrum of modern order fulfillment with diverse automation and material handling requirements. While these systems deliver robust options for nearly every aspect of large-scale fulfillment and distribution, WES modules typically provide more functionalities than most small- and medium-sized operations require. And while some WES solutions allow operators to pick and choose the capabilities they need, using a WES for one or two warehouse improvements is neither cost-effective nor practical. In existing operations, implementing a WES also typically involves replacing most control systems currently in place, cutting short the useful life of past investments.

At the other end of the spectrum are third-party software solutions or customized workarounds that operations have developed to address their unique needs. Both of these approaches increase investment costs and slow implementation. They're also more difficult to keep up to date over time, and risk becoming unsustainable as technology and other aspects of your operation change.

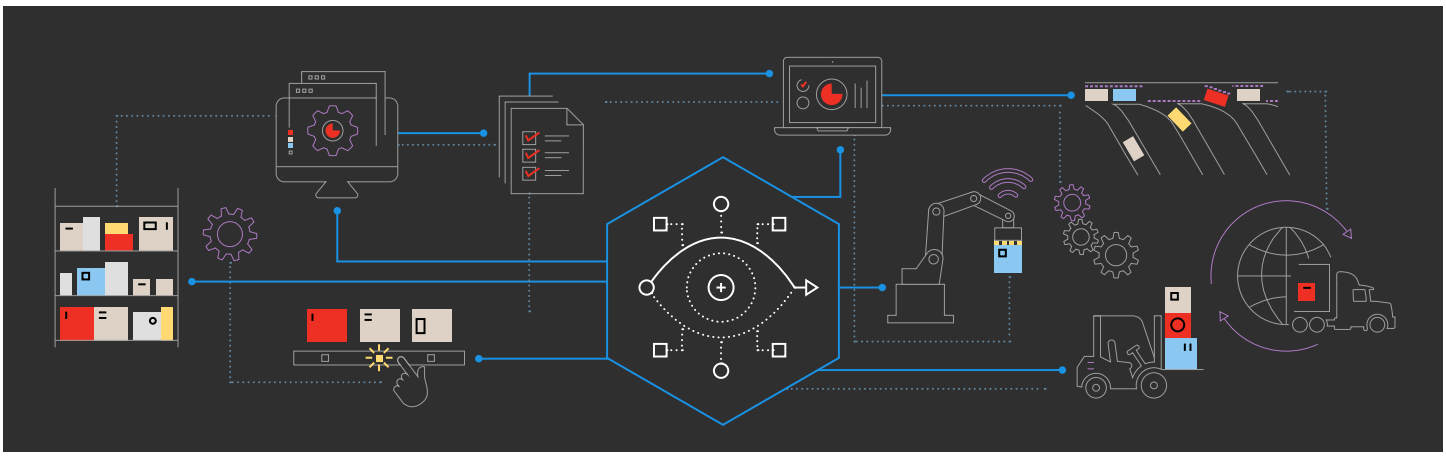
THE NEED FOR A MORE COST-EFFECTIVE APPROACH

2

The wide gap between these two options suggests the need for a different approach.

Many operations want to achieve throughput and efficiency improvements with less comprehensive solutions than a WES, but more reliable than third-party or homegrown customization. Some are ready for a holistic system if it works with PLC- or PC-based controls and doesn't require them to replace existing investments in WCS or warehouse management systems (WMS). Others simply want an affordable way to upgrade or optimize one or two functions now and expand controls later if necessary.

A solution capable of meeting all of these needs should ideally be cost-competitive and flexible enough to allow any given service to be used as a stand-alone solution or packaged together to meet a customer's unique needs. These options would combine the advantage of paying only for the services you need with smooth and easy upgrades as your operation grows or responds to market changes.



MODULAR CAPABILITIES FOR REAL-WORLD OPERATIONS

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Based on our experience with hundreds of DCs worldwide, Honeywell Intelligrated has identified five key conveyor and sortation control functions with a strong need for stand-alone or modular control solutions.

These include:

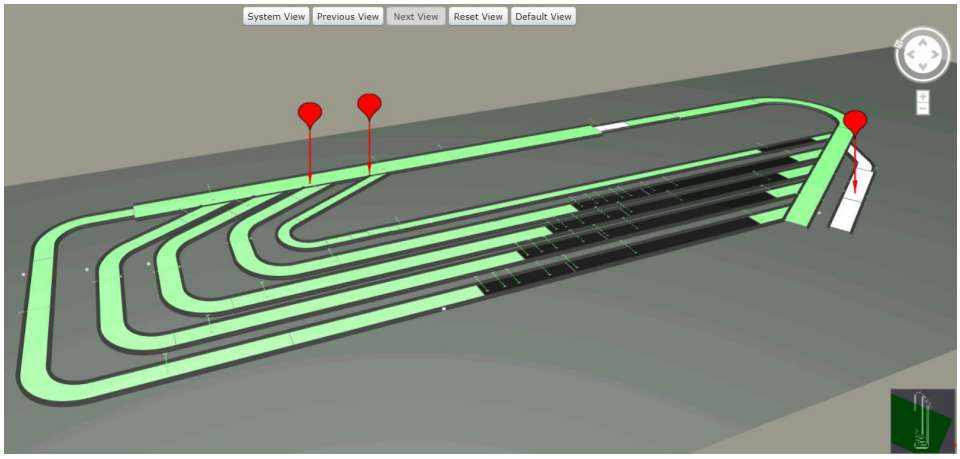
- Embedded routing
- Label printing
- Historical data tracking and business intelligence (BI) reporting
- Alarms and events
- Visual status modeling

The following sections will discuss each of these options in greater detail.

EMBEDDED ROUTING

Routing control capabilities are needed to coordinate the movement of cartons from a source location to a destination location, in addition to managing movement on traditional conveyor and sortation systems.

Enhanced routing control should provide operational and maintenance staff the capabilities to manage and track routing data in real time for any PC- or PLC-based system. It also should provide a variety of user-friendly commissioning screens to be used during system implementation, speeding the commissioning process.



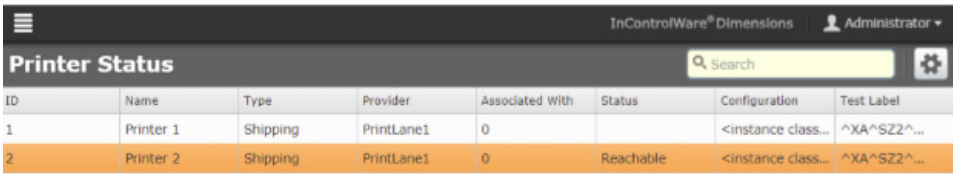
THE BENEFITS OF A STAND-ALONE ROUTING CONTROL MODULE INCLUDE:

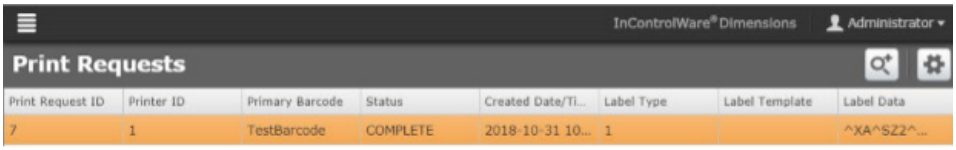
- Real-time operational data for better, faster decision-making
- Real-time status, warning and alarm monitoring
- Commissioning screens and tools to make implementation easy and fast, with significant cost savings
- Lane history functionality for auditing specific lanes
- Seamless integration with WMS and WCS
- Ability to work with both PC- and PLC-based systems
- Ability to perform with both Windows- and Linux-based systems
- Reductions in manual labor

LABEL PRINTING

Printing control should provide the capabilities to store and print label data, preferably in a manner compatible with multiple label printing languages such as Zebra Printing Language (ZPL). User-friendly interfaces should enable DC operators to track print requests and printer information easily. Benefits include:

- Easy tracking of print requests and printer status
- Flexible compatibility with multiple label printing languages
- Support for template-based label printing
- Seamless integration with WMS and WCS
- Ability to work with both PC- and PLC-based systems
- Ability to perform with both Windows- and Linux-based systems





HISTORICAL DATA TRACKING AND BI REPORTING

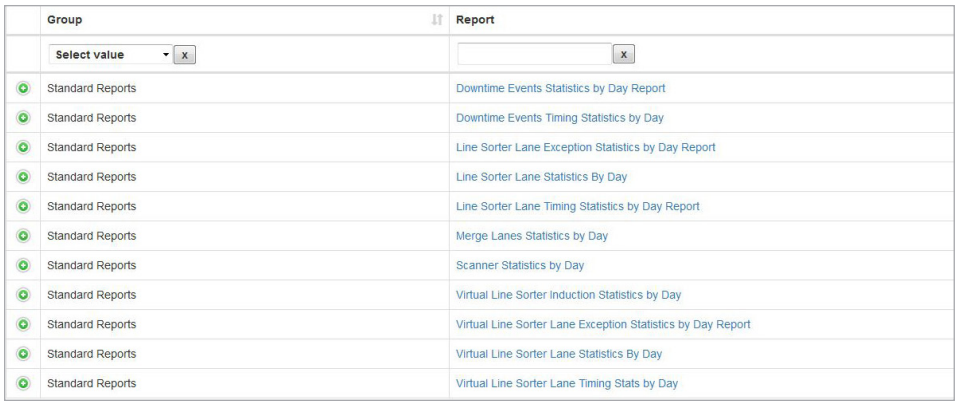
Historical data tracking has the abilities to collect and store all historical container-related data — such as where containers are inducted, diverted and recirculated — in an easily accessible dataset that is critical for simple auditing or generating managerial reports that enable informed decision-making. Benefits include:

- A self-maintaining historical archive for hassle-free data maintenance
- Easy access to historical data for better and faster decision-making
- Flexible data packaging based on user needs: data only, reporting only, or both data and reporting
- Seamless integration with WMS and WCS
- Ability to work with both Windows- and Linux-based systems

DC operations need system monitoring and data analytics tools to collect conveyor metrics from machine controls such as scanner, induction, merge and sorter statistics. These metrics then can be used for predictive maintenance of conveyor systems, potentially preventing unplanned downtime caused by a system shutdown. This data also can be integrated into maintenance processes with smart rules that create automatic work orders for conveyor maintenance based on the data. The collected metrics can be pushed into BI reporting to generate BI reports, which are useful for making informed decisions on conveyor maintenance. These metrics can also be pushed to a computerized maintenance management system (CMMS) and rules can be set to create automatic work orders.

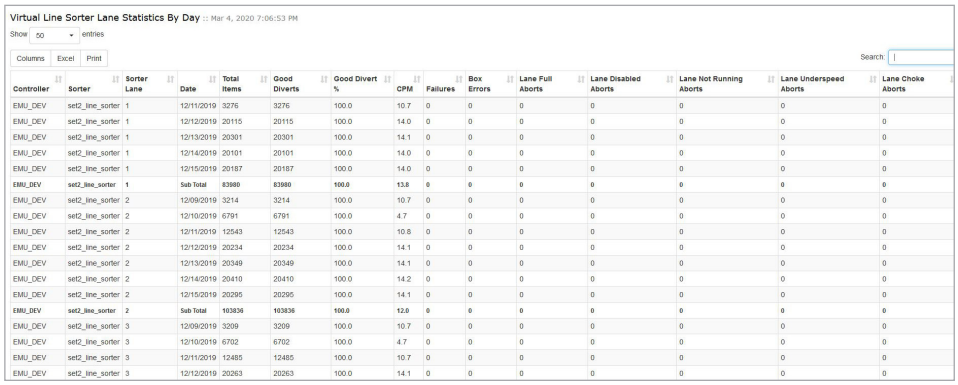
BENEFITS INCLUDE:

- Conveyor metrics for better, faster decision-making about conveyor predictive maintenance
- Flexible data use with graphical representation of conveyor metrics, automatic work order creation and BI reporting
- Automatic work order generation through IRIS, which helps in proactive maintenance
- Decreased chance of system failure, increasing efficiency
- Easy and fast implementation with significant cost savings
- Seamless integration with WCS
- Ability to work with both Windows- and Linux-based systems



Group	Report
Select value	
Standard Reports	Downtime Events Statistics by Day Report
Standard Reports	Downtime Events Timing Statistics by Day
Standard Reports	Line Sorter Lane Exception Statistics by Day Report
Standard Reports	Line Sorter Lane Statistics By Day
Standard Reports	Line Sorter Lane Timing Statistics by Day Report
Standard Reports	Merge Lanes Statistics by Day
Standard Reports	Scanner Statistics by Day
Standard Reports	Virtual Line Sorter Induction Statistics by Day
Standard Reports	Virtual Line Sorter Lane Exception Statistics by Day Report
Standard Reports	Virtual Line Sorter Lane Statistics By Day
Standard Reports	Virtual Line Sorter Lane Timing Stats by Day

Reports



Virtual Line Sorter Lane Statistics By Day :: Mar 4, 2020 7:06:53 PM

Show 50 entries

Columns | Excel | Print

Search:

Controller	Sorter	Sorter Lane	Date	Total Items	Good Diverts	Good Divert %	CPM	Failures	Box Errors	Lane Full Aborts	Lane Disabled Aborts	Lane Not Running Aborts	Lane Underspeed Aborts	Lane Choke Aborts
EMU_DEV	set2_line_sorter	1	12/11/2019	3276	3276	100.0	10.7	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	1	12/12/2019	20115	20115	100.0	14.0	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	1	12/13/2019	20301	20301	100.0	14.1	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	1	12/14/2019	20101	20101	100.0	14.0	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	1	12/15/2019	20187	20187	100.0	14.0	0	0	0	0	0	0	0
EMU_DEV	**set2_line_sorter**	**1**	**Sub Total**	**83980**	**83980**	**100.0**	**13.8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
EMU_DEV	set2_line_sorter	2	12/09/2019	3214	3214	100.0	10.7	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	2	12/10/2019	6791	6791	100.0	4.7	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	2	12/11/2019	12543	12543	100.0	10.8	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	2	12/12/2019	20234	20234	100.0	14.1	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	2	12/13/2019	20349	20349	100.0	14.1	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	2	12/14/2019	20410	20410	100.0	14.2	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	2	12/15/2019	20295	20295	100.0	14.1	0	0	0	0	0	0	0
EMU_DEV	**set2_line_sorter**	**2**	**Sub Total**	**103836**	**103836**	**100.0**	**12.0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
EMU_DEV	set2_line_sorter	3	12/09/2019	3209	3209	100.0	10.7	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	3	12/10/2019	6702	6702	100.0	4.7	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	3	12/11/2019	12485	12485	100.0	10.7	0	0	0	0	0	0	0
EMU_DEV	set2_line_sorter	3	12/12/2019	20263	20263	100.0	14.1	0	0	0	0	0	0	0

Virtual line sorter statistics

ALARMS AND EVENTS

System alarm and event monitoring capabilities are critical for enabling operational and maintenance staff to manage and track real-time concerns occurring anywhere in your warehouse, and make it easy to pinpoint exactly where an alarm or event has occurred. Advantages include:

- Real-time operational data for better, faster decision-making
- Real-time status, warning and alarm monitoring
- Commissioning screens and tools make implementation easy and fast, with significant cost savings
- Seamless integration with WMS and WCS
- Ability to work with both Windows- and Linux-based systems



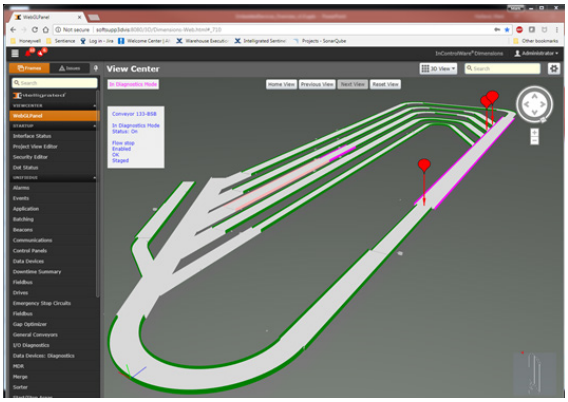
Type	Severity	Area	Tag	Description	Site
EmergencyStop	Alarms	-Unknown-	COS31026	Emergency Stop	Site1
Jam	Alarms	-Unknown-		Jam	Site1
LowAirPressure	Alarms	-Unknown-		Low Air Pressure	Site1
OilerFault	Alarms	-Unknown-		Oiler Fault	Site1
ScannerFault	Alarms	-Unknown-		Scanner Fault	Site1
ScaleFault	Alarms	-Unknown-		Scale Fault	Site1
TaperFault	Alarms	-Unknown-		Taper Fault	Site1

VISUAL STATUS MODELING

Web-based displays provide easy-to-use overviews of the entire operation, making them valuable live troubleshooting tools. Two- and three-dimensional models of material handling systems provide detailed graphical perspectives for daily status and help to train new users who may be unfamiliar with the subtleties of a facility.

All of the conveyors and many of the devices used in a system can be displayed with different colors to represent conveyor and device status. End users can pan and zoom the models to access detailed views of the system. Benefits include:

- A graphical model that allows you to see the entire material handling system as it appears on the floor
- System status displays for individual conveyor segments, logical areas such as shipping lines and electrical devices
- Search capabilities so that you can quickly find the conveyor or device that you want to view
- A graphical model representing conveyors, devices controlled by the machine controller and reporting status, with different colors used to indicate each component's status



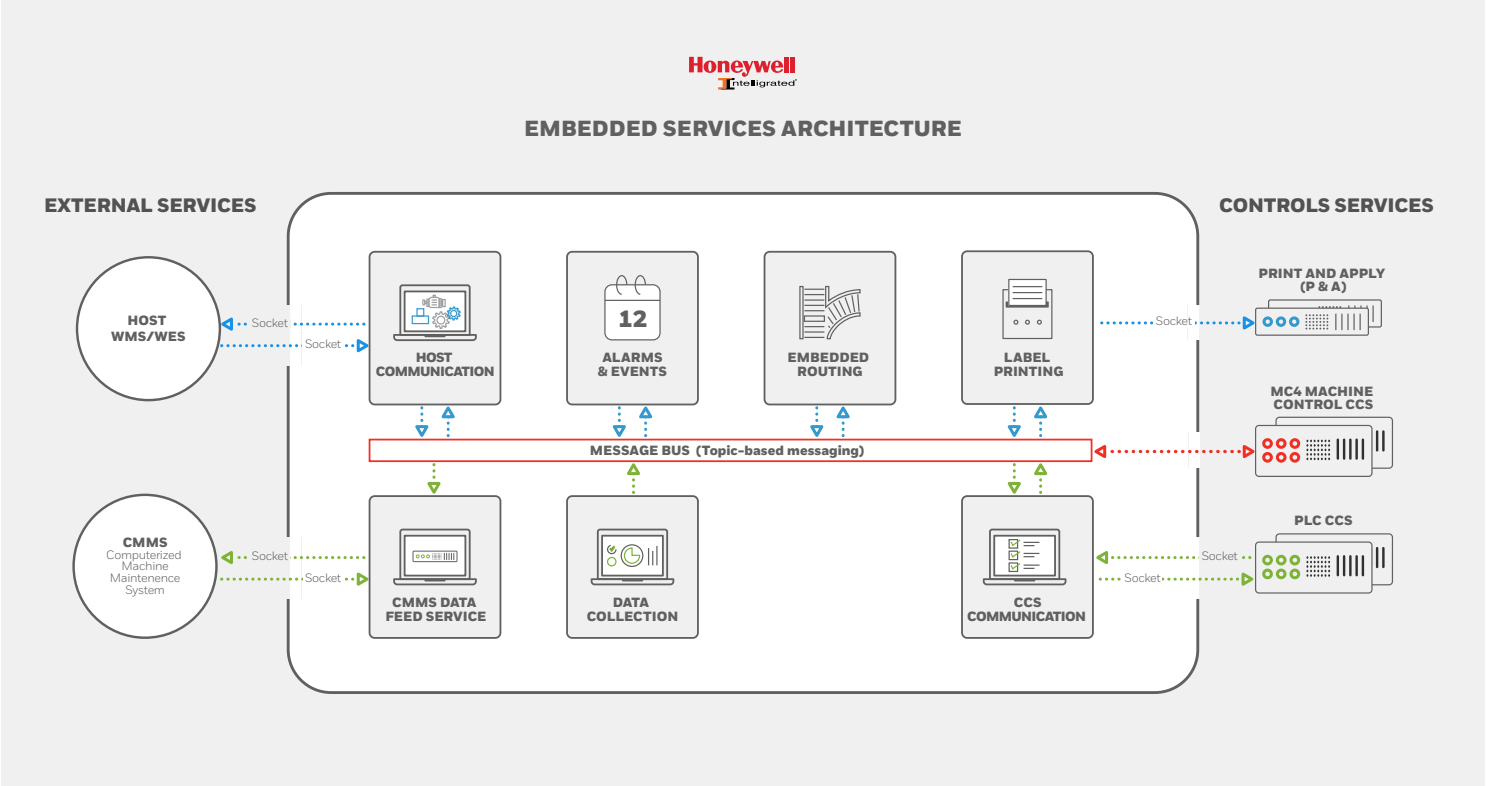
EMERGING WCS ALTERNATIVES

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All of the functions mentioned herein are made possible by a set of cost-competitive tools from Honeywell Intelligrated. Designed for high-performance operations and easy IT support, Momentum™ Embedded Services is a modular collection of innovative, state-of-the-art, web-based conveyor and sortation control services.

Embedded Services blends machine control, operator interface, system diagnostics, maintenance tools and host interfaces in a single, easy-to-use system. It is available for PC-based machine control, and PLC and third-party controls, often at a significantly lower cost.

Like the PC-based machine control (MC4) of Momentum, Embedded Services can operate on an industrially hardened embedded controller with a 20-year lifespan. It also can run on server-class or virtualized hardware.



Benefits of the solution include:

- Modular design
- Low-cost
- Reliable, high-performance conveyor and sortation control
- Automated maintenance routines that enable peak system performance
- Easy-to-access parts and maintenance information when needed
- Visibility to manage system resources and operations
- Modern, open-architecture design

No other solution on the market today makes the functions described herein available in a format that allows you to pick and choose only the specific capabilities you need. By providing an alternative to all-inclusive control systems, this modular approach is substantially more cost-effective for many operations that only require one or more specific upgrades.

COMMUNICATION PROTOCOL OPTIONS FOR EMBEDDED SERVICES

- **Host Communication (host comm):** Used for PC-based systems. Jobs are created to perform a specific task, such as processing forecast messages from MC4. Jobs are configured in the host comm settings and automatically start when the host comm service is started.
- **CCS Communication (CCS comm):** Enables the use of external services — such as carton routing, label printing, alarms and events — in solutions where CCS systems such as PLCs, embedded controllers or other machine control solutions are used.

CONCLUSION

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Embedded Services provides a much-needed alternative to all-inclusive WES systems and customized control logic patches that create longer-term risks.

By providing a modular suite of cost-effective tools, it allows you to implement stand-alone capabilities or create a package of services based on your operation's unique needs.

These tools make it easy and effortless for workers at every level of your operation to access and view the critical information they need. Operators easily can track where individual containers are routed. Warehouse maintenance managers can view and analyze conveyor metrics to identify areas where proactive maintenance is needed. Maintenance teams can view and track alarms raised on the conveyor system. And all of these options can be implemented on PC- or PLC-based systems at a much lower cost.



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ESWP | 04/20
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