MOMENTUM™ WAREHOUSE EXECUTION SOFTWARE



Honeywell
Intelligrated®

WAREHOUSE EXECUTION. SIMPLIFIED.

Modern distribution and fulfillment (D&F) operations face unprecedented complexities. As customer expectations rise and cycle times get shorter, your business is under continuous pressure to meet accelerated delivery schedules and protect profit margins. To succeed in this hyper-competitive retail market, you need a robust suite of warehouse execution software that can maximize automated efficiencies, streamline labor management, and orchestrate all fulfillment tasks within the four walls of the distribution center (DC).

Enter Momentum™ from Honeywell Intelligrated.

Momentum is much more than an advanced warehouse execution system (WES). It is a powerful software suite designed to greatly simplify e-commerce fulfillment in DCs, e-fulfillment in retail stores and traditional store replenishment operations. Built with a technology infrastructure that enables seamless scalability, future-proof flexibility, and the data-driven intelligence to enable real-time optimization, Momentum helps retailers meet next- and same-day delivery expectations — all while achieving peak levels of productivity, efficiency and end-to-end DC performance.



A FOUNDATION FOR CONTINUOUS GROWTH

As the competitive retail landscape evolves over the next decade, companies must be prepared to adapt quickly, expand and elevate their capabilities — or risk getting left behind by their competition. Momentum gives you a strong foundation for continuous growth that won't crumble under the weight of e-commerce pressures.

While every D&F operation faces unique challenges today, many will also experience inflection points in their business that will determine their long-term success. Whether you need to maximize the utilization of existing DC resources, introduce new robotics and/or warehouse automation systems, or add new facilities to a fulfillment network, Momentum is architected to grow in step with changing customer demands and business requirements.



GAINING MOMENTUM

OUR APPROACH:

- Robust, secure technology platform delivers stability and reduces customization complexities
- Decision Intelligence optimizes workflows in real time to meet changing levels of demand
- Ever-expanding list of functional modules scales to your fulfillment requirements

BENEFITS TO YOU:

- Reduce operating costs through optimized processes and less labor
- Improve order accuracy, on-time shipments and inventory control to reduce cost of goods sold
- Support annual growth by providing scalable solutions
- Maintain customer SLAs by enabling on-time and accurate shipments
- Manage high SKU density and order velocities
- Access a seamless user experience across DC workflows, assets, workers and warehouses
- Reduce total cost of ownership through ease of upgrades; less IT maintenance
- Decrease deployment time with simulation and testing; less custom development
- Adapt to changing customer demands and business requirements



DATA SCIENCE DRIVES DECISION INTELLIGENCE

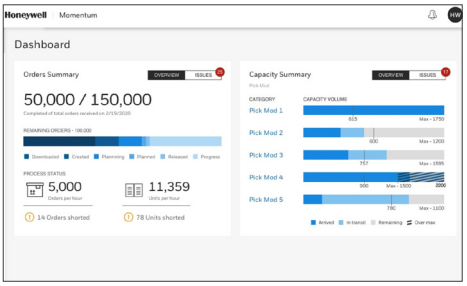
As delivery windows shrink and product varieties (SKUs) multiply, fulfillment speeds and order volumes are accelerating beyond the capabilities of even the most sophisticated DC operations. As a next-generation WES software platform, Momentum utilizes advanced machine-learning algorithms and data-driven optimization techniques to orchestrate disparate automation systems and empower operators with dynamic decision-making intelligence.

Traditional fulfillment strategies of planning for order waves in advance (days or hours) are inadequate for meeting modern consumer demands. E-commerce order priorities vary widely and can change in an instant, and DC operators need the flexibility and agility to adapt continuously to demand fluctuations and resource availability.

While increasing process automation has become a necessity, the integration of multiple automated systems and workflows can result in even more complexity. System interdependencies often are overlooked or underestimated, and the impacts of a decision made in one system can create a cascading effect of unintended consequences in others — often resulting in process inefficiencies and productivity bottlenecks that require frequent manual interventions and reactive troubleshooting.

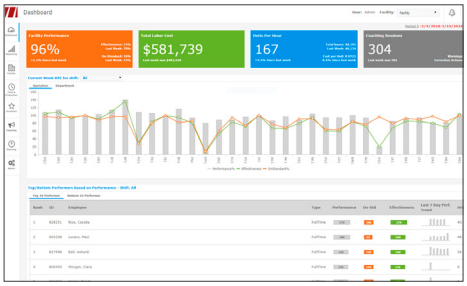
Momentum WES leverages advanced data science techniques to offer a robust alternative to these pervasive fulfillment inefficiencies. These powerful tools capitalize on the proliferation of data from nearly every corner of the DC to provide visibility and insights into the interplay between automation systems. In doing so, Momentum enables dynamic, real-time "Decision Intelligence" to achieve optimal execution strategies and business results in complex fulfillment environments.

Decision Intelligence allows DC operators to make informed decisions to streamline execution, maximize throughput, and balance workloads. Capabilities include:



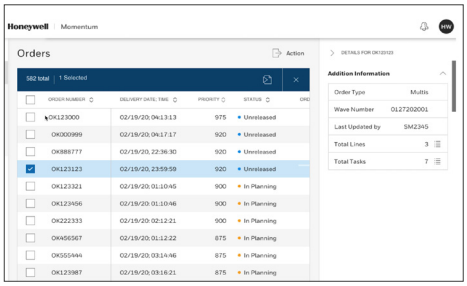
Smart Release

Smart Release automatically prioritizes your current order backlog and intelligently releases orders to meet aggressive service level agreements (SLAs). Each decision considers the downstream impacts on every fulfillment system and releases orders to the floor in the most optimal sequence, thereby minimizing congestion, balancing workloads, and stabilizing warehouse process execution.



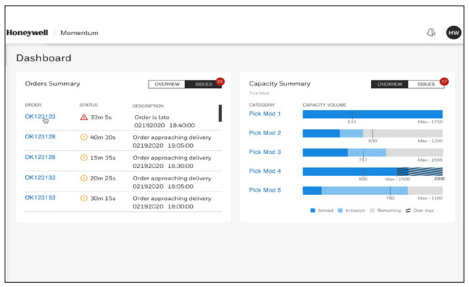
Labor Management

Labor Management maximizes workforce productivity and utilization through the dynamic allocation of resources in relation to ever-changing fulfillment priorities and workloads. This ensures the even distribution and allocation of resources while providing supervisors an engagement tool for the visualization of resource productivity.



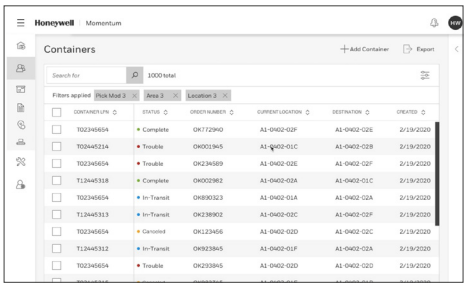
Pick Path Optimization

Pick Path Optimization provides the data-driven intelligence to maximize the efficiency of key picking processes throughout the warehouse. This minimizes the steps and distance pickers need to travel among pick zones while lowering dwell times and avoiding congestion.



Smart Routing

Smart Routing utilizes real-time, decision-making intelligence to ensure that orders are routed along optimal paths through the DC. The software considers orders of varying priorities to determine container routes and final destinations so that each order priority is handled accordingly — all while reducing order cycle times and avoiding routing bottlenecks.



Storage Optimization

Storage Optimization ensures maximum warehouse utilization by balancing optimal slotting locations and considering outbound demand. The solution integrates with automated storage and retrieval systems (AS/RS) to allow for the intelligent storage of different sized containers with the goals of achieving the highest possible capacity and optimal retrieval sequencing.

AN ECOSYSTEM BUILT FOR WAREHOUSE EXECUTION

Supporting a powerful fulfillment software platform requires a state-of-the-art technology infrastructure that can address a full range of fulfillment requirements and business objectives. Momentum software utilizes a next-generation technology ecosystem designed to give retailers an alternative to the status quo patchwork of multiple vendors, incompatible machine controls and stranded islands of automation.

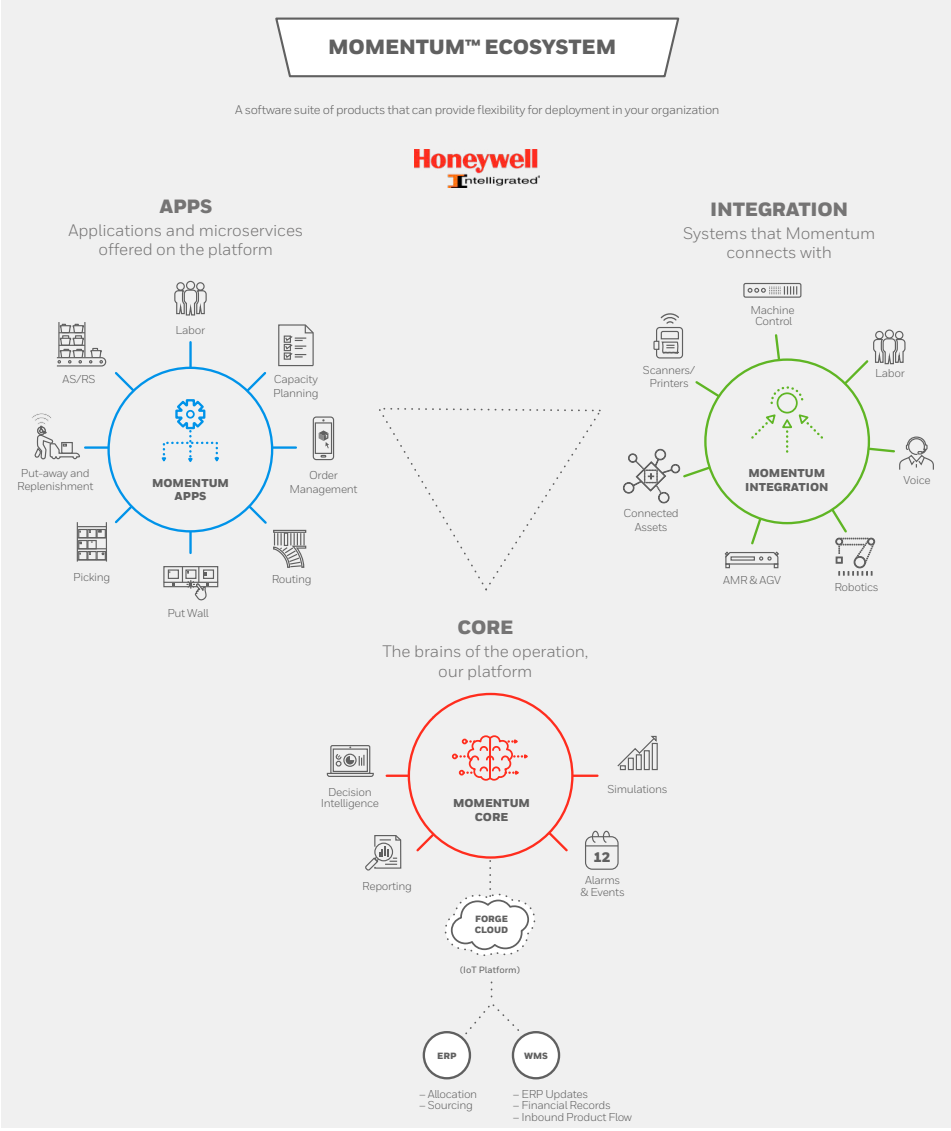
Instead, Momentum offers a new approach to warehouse execution software that features:

- Modular applications of the most critical DC functions
- Seamless system and asset integration
- A secure and stable data analytics core

This technology platform removes proprietary constraints, alleviates custom integration and configuration headaches, and greatly simplifies the complexities associated with the transition to greater degrees of warehouse automation. As a result, Momentum gives you the extensibility to add new automation, functionalities and fulfillment processes as needed, so your business can grow to meet ever-changing customer demands or business requirements.

MODULAR, SCALABLE APPLICATIONS

Momentum software is designed to support an ever-expanding suite of modular applications (apps), allowing you to scale rapidly to meet your next fulfillment challenge — without jeopardizing operational stability, getting locked into proprietary constraints, or introducing security risks. This significantly reduces the engineering and operational costs often associated with



deploying new features while minimizing implementation disruptions and timelines.

Momentum orchestrates every aspect of order fulfillment to streamline the execution of all critical warehouse functions. Key apps include:

- **Picking:** Leverage Honeywell Voice Guided Work solutions to drive continuous warehouse productivity gains and ensure the most efficient pick path optimization.
- **Order Prioritization:** Automatically prioritize order backlogs and intelligently release orders to meet aggressive SLAs.
- **Routing:** Provide real-time routing intelligence to ensure that orders travel via the optimal path to avoid bottlenecks.
- **Put-away and Replenish:** Gain more warehouse capacity with optimal slotting and smart storage optimization; balance slotting locations by considering outbound demand.

SEAMLESS SYSTEM INTEGRATION

Momentum provides seamless integration with proprietary automation equipment and systems — including Honeywell Intelligrated's extensive warehouse automation, robotics and productivity products portfolio — as well as third-party material handling equipment (MHE) providers. This allows you to leverage your existing hardware without impacting the underlying software infrastructure (i.e., Momentum Core).

With Momentum Integration, you can connect all current and future warehouse automation systems to provide real-time asset monitoring and the potential to leverage predictive maintenance via advanced data analytics:

- Connect your entire DC and warehouse execution ecosystem, including: MHE; labor management; automation systems (such as Honeywell Voice); autonomous mobile robots (AMRs); and automated guided vehicles (AGVs).
- Integrate with advanced robotic automation for rapid adoption of new and emerging technologies.
- Leverage the industrial internet of things (IIoT) to monitor asset health and system performance in real time; even make the transition to a predictive maintenance program.
- Preserve existing equipment investments via our hardware-agnostic integration methods.

STABLE AND SECURE, TO THE CORE

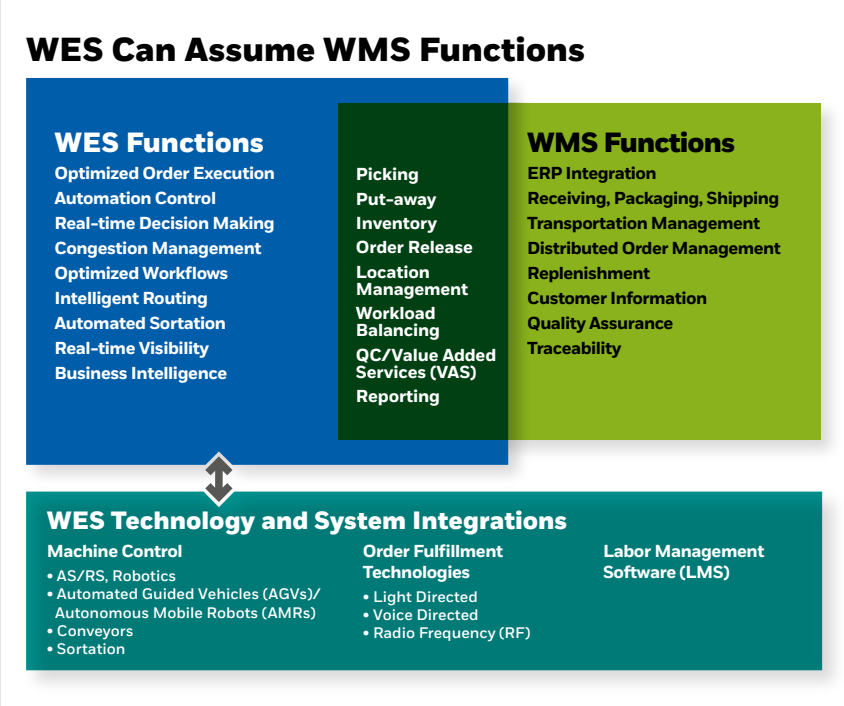
Momentum Core is the brains of the Momentum software suite, providing a stable and secure data storage, management and analytics platform with reliable communications protocols. From modular applications and microservices to data-driven, decision-making intelligence and seamless integration capabilities, Momentum Core facilitates connections, enables communications, and provides a master data repository.

Momentum Core leverages advanced data science techniques, an IIoT infrastructure and host system connectivity to deliver the functionalities and benefits which are most important to distribution and fulfillment operations:

- Safeguard data in a secure cloud-based infrastructure.
- Stay informed of DC issues and events with alarms and notifications about live status and system health.
- Safely test and validate fulfillment scenarios with robust simulation capabilities.
- Balance system workload, maximize throughput, and optimize performance with data-driven, decision-making intelligence.
- Connect to warehouse management systems (WMS) or enterprise resource planning (ERP) host systems for data mapping and process integration.

ASSUMING TRADITIONAL WMS FUNCTIONS

Momentum helps companies simplify their warehouse automation software footprint by adopting many traditional, upstream WMS functions. While integrating with WMS systems is often a critical part of a WES deployment, the more dynamic capabilities that Momentum can assume, the more agile a company's fulfillment operations will be.



POWERED BY MOMENTUM

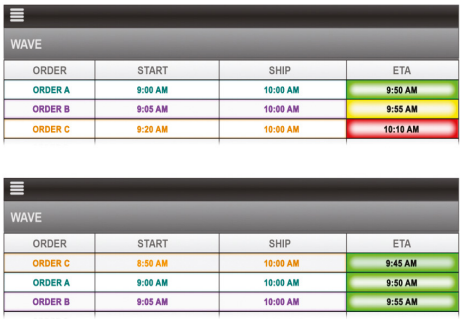
From receiving to shipping and everything in between, Momentum serves as the one system to seamlessly run, manage, and coordinate nearly every fulfillment operation within the four walls of the warehouse. Here are some common examples.



DYNAMIC SPACE STORAGE VIA AS/RS SHUTTLE

Too often, facilities squander the potential storage capacity of their AS/RS. Momentum can dynamically match product size and shape attributes to available locations in the AS/RS shelving system, providing:

- Increased storage density and capacity of the existing footprint
- Automated dynamic location assignment based on product size and space availability
- Accommodate variable SKU sizes without changing the square footage



WAVE

ORDER	START	SHIP	ETA
ORDER A	9:00 AM	10:00 AM	9:50 AM
ORDER B	9:05 AM	10:00 AM	9:55 AM
ORDER C	9:20 AM	10:00 AM	10:10 AM

WAVE

ORDER	START	SHIP	ETA
ORDER C	8:50 AM	10:00 AM	9:45 AM
ORDER A	9:00 AM	10:00 AM	9:50 AM
ORDER B	9:05 AM	10:00 AM	9:55 AM

INTELLIGENT ORDER RELEASE BASED ON CAPACITY, DELIVERY TIME, CONGESTION AND LABOR

Many fulfillment centers have difficulty consolidating and shipping orders comprised of products from varying locations and unique handling requirements. Momentum drives intelligent order assembly and release — taking labor availability, product attributes, value-added services and travel routes into consideration — to make sure products arrive at the shipping dock at the same time. Benefits include:

- Prioritize and escalate orders to meet SLAs
- Reduce congestion, bottlenecks and overloading



JUST-IN-TIME PUT WALL ALLOCATION AND ORDER CONSOLIDATION

Put walls have become integral tools for order consolidation, but many warehouse execution systems can only monitor complete waves and can't release individual orders based on put wall location availability. Momentum allocates demand based on real-time put wall availability data to:

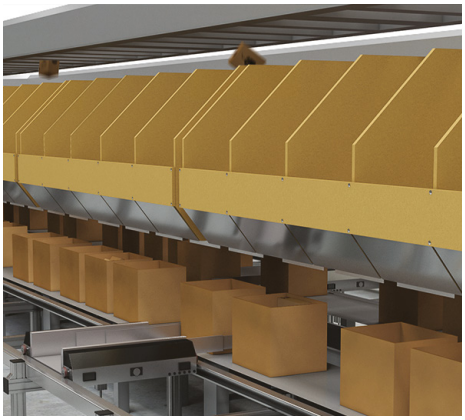
- Increase throughput while decreasing congestion
- Coordinate order picking with put wall station availability
- Combine the benefits of wave picking with just-in-time location allocation



HIGH-DENSITY PICK AND PUT VIA LOCATION SIZING AND CONFIGURATION

In most operations, pick faces and put walls are part of a fixed framework, regardless of changing product sizes or seasonal order demands. But what if this framework was flexible and capable of being configured to accommodate specific product and order sizes, and equipped with configurable light-directed hardware? With Momentum, this is a core operating principle, allowing you to:

- Maximize space utilization for high SKU density
- Accommodate variable SKU sizes without changing the square footage
- Respond to changes in order profiles



AUTOMATED SORT AND SHUTTLE ORDER CONSOLIDATION

Order consolidation is an essential step in the fulfillment cycle that's too often managed by inefficient manual workflows, where the only way to increase throughput is to add labor. But with lag time between orders and multiple manual touches for each chute closing, the opportunities for errors and wasted time from idle workers can be costly. Momentum significantly reduces labor requirements, inefficiencies and errors associated with order consolidation by employing a patented sorter and shuttle retrieval system:

- Reduces manual labor requirements via automated order consolidation, chute closure and take-away
- Increases throughput and order accuracy rates
- Delivers optimal product consolidation via demand-based sorter allocation



GOODS-TO-PERSON WORKSTATIONS (TASK INTERLEAVING, WORK PRIORITIZATION AND DYNAMIC ROUTING)

Modern distribution operations can't afford to blindly push work to operators without visibility to their workstation capacities, task lists or skillsets. Momentum eliminates these inefficiencies with intelligent workflows that release work to available, qualified workers and enables them to interleave multiple tasks for maximum productivity. Benefits include:

- Effectively managing workstation tasks, balancing demand while reducing congestion
- Reducing workforce, maximizing space utilization, and accelerating processing times
- Allowing operations the ability to assign tasks in real time based on labor availability

BUILDING BLOCKS OF WAREHOUSE AUTOMATION

From a modern machine controls platform to a WCS alternative

Because no two warehouses have the same automation requirements, Momentum's functionality is tiered to address a full spectrum of business requirements. Choose from an affordable controls platform or modular, stand-alone services for essential conveyor and sortation controls.

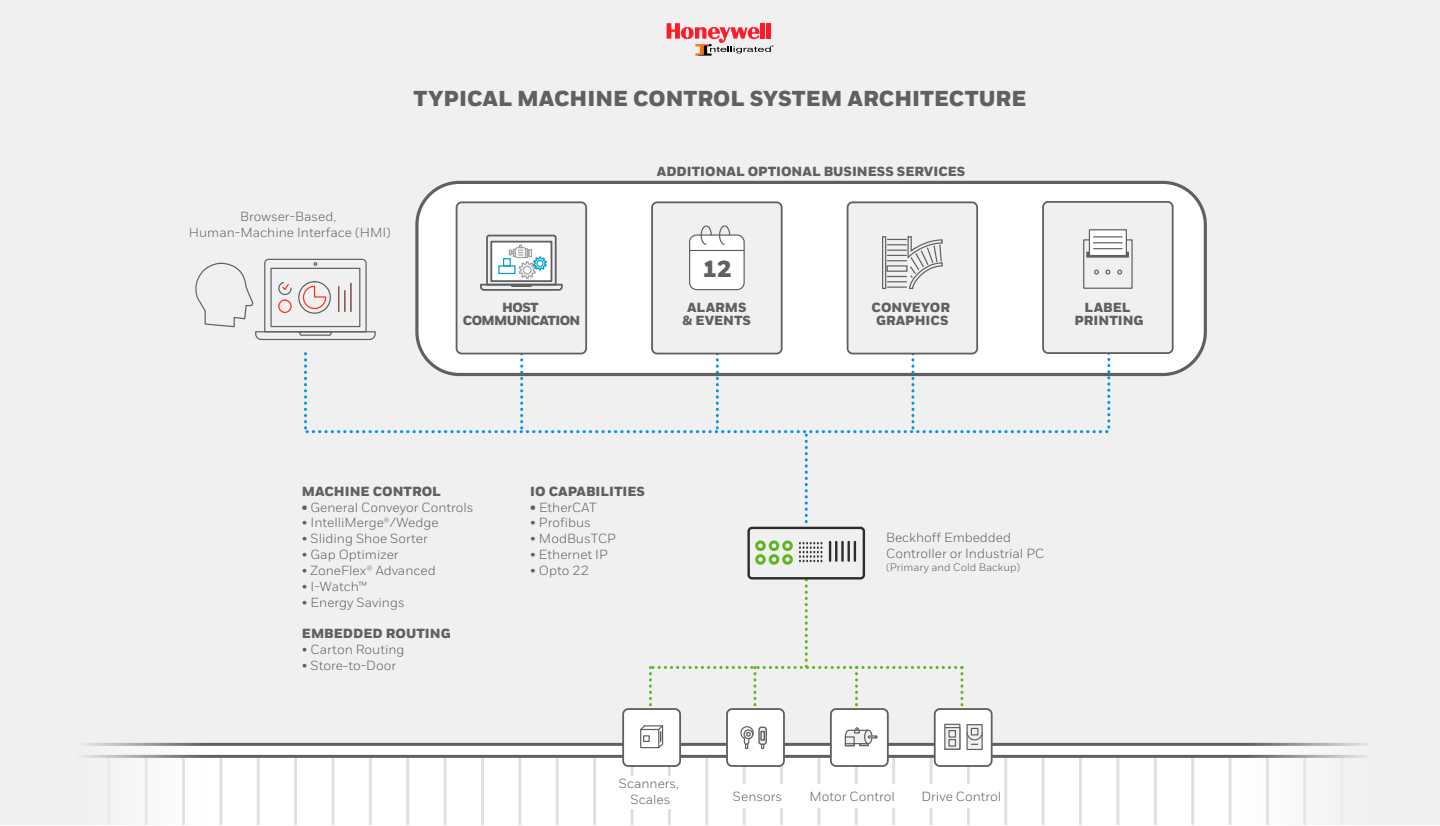
MOMENTUM MACHINE CONTROL (MC4)

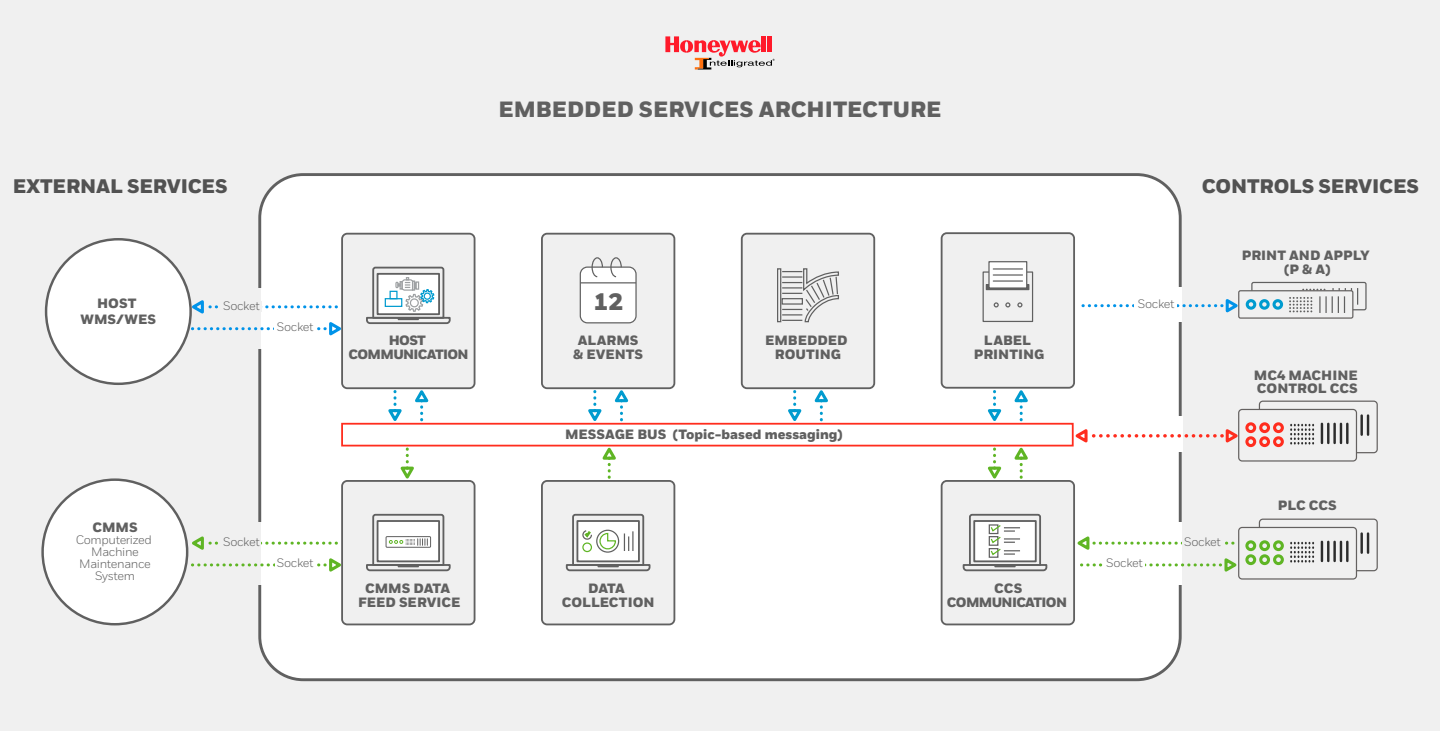
Experience the power of modern, web-based, modular and connected solutions for essential conveyor and sortation control. Momentum's proprietary machine control platform offers the same superior merge speed and much of the flexibility of PC-based systems, while retaining the capability to integrate with PLC-driven equipment. MC4 also offers the option of running distributed controls on an industrially hardened, embedded control with no moving parts.

MC4 runs on QNX, allowing for greater stability while reducing shutdowns for upgrades and security patches. By utilizing a standardized control architecture that focuses on configuration rather than custom coding, projects can be implemented faster while providing a true plug-and-play experience. Compared to PLC- or PC-based control solutions, MC4 can be implemented at lower capital and operational costs for projects of various sizes and complexities.

Functionality includes:

- **General conveyor control —** manages transportation and accumulation conveyors and handles any events or alarms associated with them
- **Sortation —** controls multiple sortation solutions, enabling them to run at a much higher rate while decreasing the risk of product damage
- **Merges —** can be configured to control a variety of merge systems with a hybrid logic, allowing lane types to be combined for optimal throughput





- **Gap optimizer —** measures and adjusts the spacing between cartons, enabling a high-speed merge rate of 400 cartons per minute with gaps as short as 1 inch between cartons
- **Diagnostics and calibration tools —** set, clear, and verify calibration values for merges and sorters; alert users when chain oil runs low or other maintenance is required

MOMENTUM EMBEDDED SERVICES

Momentum Embedded Services was designed for operations that need an affordable solution for one or two control system upgrades. This modular collection of innovative, state-of-the-art, web-based conveyor and sortation controls delivers high performance and easy IT support. Blending machine control, operator interface, system diagnostics, maintenance tools and host interfaces in a single, easy-to-use system, Embedded Services is available for PC-based machine control, and PLC and third-party controls.

This fully integrated ecosystem also eliminates the extra cost and challenges of third-party software or customized workarounds, enabling your system to expand and evolve over time. Available control modules can be used as stand-alone services or packaged together:

- **Embedded routing —** coordinates the movement of cartons from source to destination, managing movement on traditional conveyor and sortation systems. Provides real-time operational data that enables faster, informed decision-making while reducing manual labor.
- **Label printing —** provides flexible storage and printing of label data, compatible with Zebra (ZPL) and other major printing languages. User-friendly interfaces enable you to track print requests and printer information easily.
- **Historical data tracking and business intelligence (BI) reporting —** enables easy access to historical data, assisting proactive maintenance, increasing efficiency, and minimizing the chance of system failure. Metrics can be connected to a computerized maintenance management system (CMMS) where rules can be set to create automatic work orders.
- **Alarms and events —** provide real-time status, warning and alarm monitoring to your operational and maintenance staff for rapid issue diagnosis.
- **Visual status modeling —** provide easy-to-use, web-based overviews of your entire operation as it appears on the floor. Color-coded system indicates each component's status at a glance for fast troubleshooting.

THE CONNECTED DISTRIBUTION CENTER

The pace of change in modern commerce is putting tremendous pressure on fulfillment operations. To stay competitive and protect profits, companies need solutions that help them achieve maximum throughput, day-to-day flexibility, future-proof scalability and intelligence to make informed decisions.

The Connected Distribution Center helps companies make the digital transformation necessary to increase reliability, improve utilization and maximize productivity through:

- Intelligent, data-driven, high-speed execution
- Automated, adaptable processes for machines and workers
- Optimized utilization with the ability to seamlessly adapt and expand
- Insights and predictive analytics, from sensors to the cloud

THE FUTURE IS WHAT WE MAKE IT

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