



enMotion Warehouse Control System (WCS)

Real-Time Warehouse Control, Integration and Visibility

The enMotion Warehouse Control System (WCS) is a modular, real-time control platform that integrates seamlessly with material handling equipment (MHE), warehouse management systems (WMS) and human-machine interfaces (HMI). Built on proven architecture, enMotion WCS ensures efficient, accurate flow of goods throughout your facility by orchestrating how and when equipment like conveyors, sorters, print and apply, pick- and put-to-light are controlled.

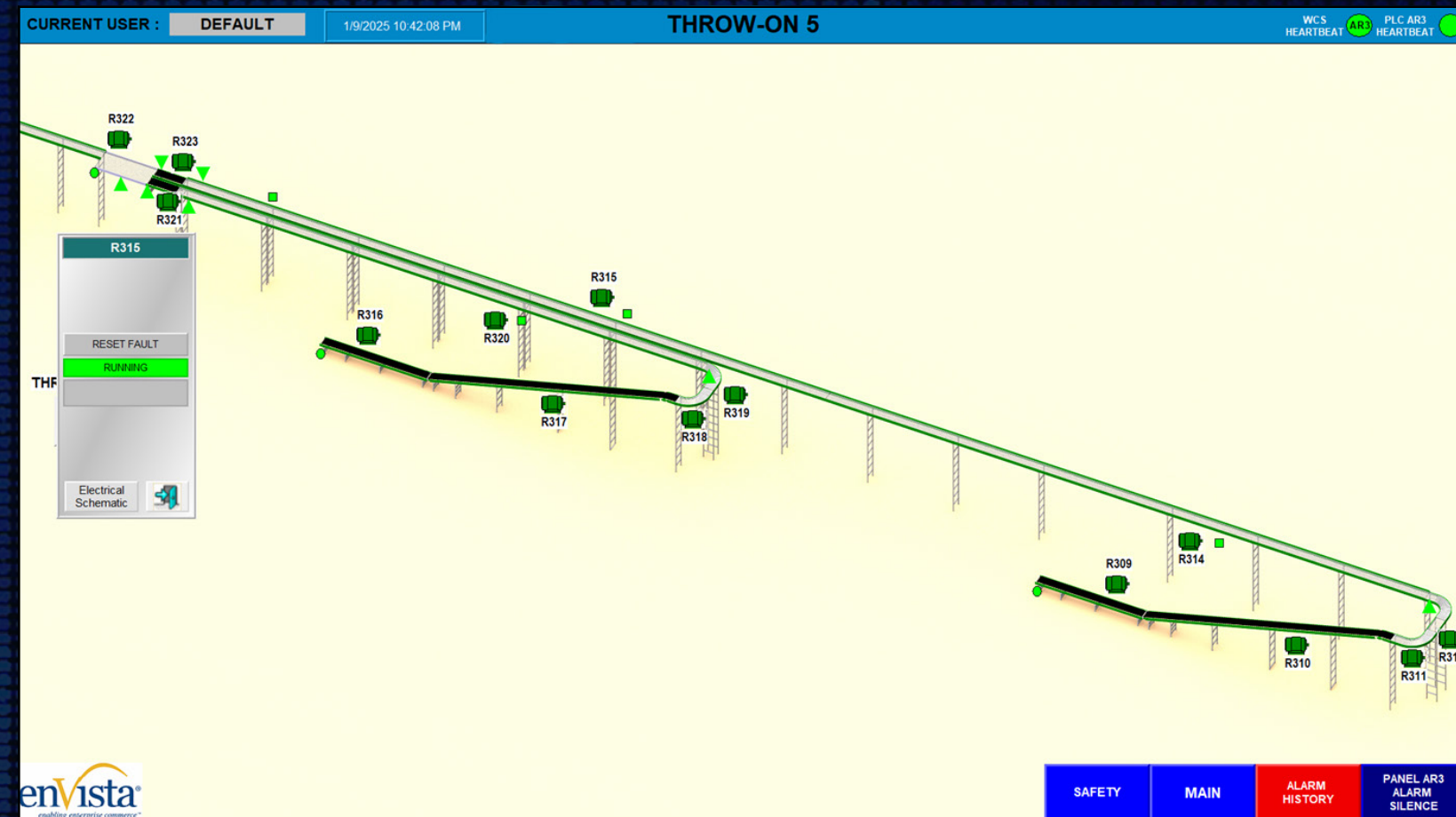
Our WCS connects directly with programmable logic controllers (PLCs), manages operational data and enables visibility across your automation environment. enMotion WCS improves throughput, reduces downtime and empowers your team with insights.

- enMotion is built on a modern Microsoft ecosystem using .NET Core, Blazor, EF Core, NATS JetStream and Memcached for speed and reliability, with sub-250 millisecond response times validated through real-world stress testing.
- Its microservices-based architecture enables modular deployment, real-time communication and robust observability.
- The enMotion WCS acts as a messaging hub with built-in support for legacy and modern systems via FTP, API, sockets and custom interfaces.



System Architecture: WCS + PLC + HMI

The enMotion WCS architecture is built for real-time control, seamless integration and end-to-end visibility. It brings together core components (WCS, PLCs and HMI) to coordinate automation equipment and deliver a responsive, intelligent warehouse environment.



Warehouse Control System (WCS)

- Coordinates the movement of goods across automation equipment
- Interfaces with WMS and enMotion WES+ systems to execute tasks
- Uses real-time decision logic to direct equipment behavior
- Handles device-level control with native support for conveyors, AS/RS, SureSort systems and cameras
- Provides lightweight print-and-apply label verification through direct camera interfaces
- Message Broker module enables orchestration between hardware, PLCs and external systems

Programmable Logic Controller (PLC)

- Direct control over equipment (motors, sorters, drives, solenoids, scanners)
- Millisecond-level communication with WCS for fast and reliable execution
- Critical for discrete I/O and motion control tasks
- Integration supported via EtherNet/IP and custom socket protocols
- Continuous connectivity checks between WCS and PLC, with alerts for offline status or network instability

Human-Machine Interface (HMI)

- Displays equipment status and real-time data in a visual format
- Enables operators to view alarms, diagnostics and process states
- Cross-platform, mobile-friendly UI accessible from phones to large displays
- WCS's fluid UI scales from handheld devices to overhead displays and supports quick user training

Supported Technologies and Integration

- WMS Integrations: HighJump, SAP, Manhattan, AS/400, Microsoft Dynamics AX
- Communication Protocols: TCP/IP, HTTP, MSMQ, Webservices, FTP, ODBC, API
- Devices: Scanners, Print-and-Apply, Scales, Robotics, ASRS, AMRs, Put-To-Light, Pick-To-Light, GTP Systems
- Includes native integration with SureSort (OPEX) systems for pack-to-light order fulfillment
- Supports direct camera verification and traceability logging for high-speed shipping workflows

Where WCS Fits: Understanding the Software Ecosystem

The enMotion WCS plays a critical role in modern warehouse automation. To understand where it fits, it's important to see how it works alongside WMS and WES systems.

WMS (Warehouse Management System)

- Manages inventory locations and order data fulfillment logic
- Allocates inventory and creates task assignments

WES (Warehouse Execution System)

- Orchestrates workflows and resource usage
- Determines when and where tasks are executed based on system state
- Executes how tasks are performed

WCS (Warehouse Control System)

- Sends real-time instructions to automation equipment via PLCs
- Monitors and controls each component at the device level
- Includes alarm monitoring, fault detection and centralized trace logging for full operational transparency
- Includes Supervisor Control and Data Analytics (SCADA) for each sub-system (Machine) and field devices (scanners, cameras and scales)

The Crossover

HISTORY/BATCH/WAVE	AUTOMATION REQUIRES DECISION MAKING SPEED		REAL TIME (1/50 TH SECOND)
WMS	WES	WCS	WCS
<div><ul style="list-style-type: none">• Transportation Management Integration• Order Management Integration• ERP Integration• Advanced Receiving• Management Reporting• Reverse Putaway• Slotting• Yard Management</div>	<div><ul style="list-style-type: none">• Shipping Management• Replenishment Management• Small-Parcel Manifesting• Non-Automated Pick Management• Voice Data Capture• Inventory Management</div>	<div><ul style="list-style-type: none">• Pack Sorter Management• Shipping Sorter Management• Automated Pick Management• Pick-to-Light Management• GTP/ASRS Management• Robot Management</div>	<div><ul style="list-style-type: none">• Fixed Scanner Integration• Machine Control Integration• Mobile Scanner Integration• In-Line Print and Apply• In-Line Weight and Motion</div>
WMS	WMS & WES	WES & WCS	WCS

What Makes enMotion WCS Different

enMotion WCS offers a unique combination of flexibility and real-time intelligence that sets it apart from traditional warehouse control systems with key features including:

- **Open and Flexible:** Runs natively on Windows, Linu, and macOS, with deployment flexibility across on-prem, cloud or edge environments without code changes
- **Vendor-Agnostic:** Connects with multiple WMS and hardware vendors without requiring proprietary middleware
- **Built-In Fault Monitoring:** Real-time fault detection and escalation through alerts and logs
- **Scalable Interface:** Cross-browser, responsive HMI that works on any screen size
- **Designed for Growth:** Modular architecture allows phased rollouts and future expansion without disruption
- **Resilient Communication Infrastructure:** Real-time messaging broker ensures continuity between systems even during disruptions
- **Reporting and Metrics:** End-of-day reporting, BI dashboards and performance metrics provide insight for continuous improvement



Why It Matters for You

enMotion WCS improves warehouse performance by enabling real-time orchestration, faster issue resolution and proactive system monitoring. Instant alerts, live diagnostics and fault tracking reduce downtime and keep operations running smoothly. The system bridges the gap between WMS planning and machine execution while offering performance data and historical trends to support better decision-making. With seamless integration to both new and legacy hardware, enMotion WCS extends equipment life and reduces disruption, while also lowering total cost of ownership.



NETWORKING / CONNECTIVITY / INTEGRATION / SECURITY



LEVEL 4
Enterprise Resource Planning (ERP)

BUSINESS PLANNING & LOGISTICS

- Inventory Management
- Supply Planning
- Demand Planning
- Financial System of Record
- Time Frame: Years, Months & Days



LEVEL 3
Warehouse Management

WAREHOUSE PLANNING

- Inventory Management
- Sales Order & Purchase Order Flow
- Receiving & Shipping Management
- Time Frame: Weeks, Days & Hours



LEVEL 2
Warehouse Execution

PLANNING PRODUCTION & WORKFLOW

- Operational Management
- Machine Scheduling
- Order Orchestration
- Multi-Agent Orchestration
- SLA Compliance
- Operational Control & Process Sensing
- Schedule Manipulation
- SCADA
- Time Frame: Hours & seconds



LEVEL 1
Programmable Control

MACHINE CONTROL

- Sorters
- Conveyors
- Goods-to-person
- Print and Apply

SYSTEM MONITORING, ALARMS & FAULTS

SUB-SYSTEM COMMUNICATION

Time Frame: Seconds to milliseconds



LEVEL 0
The Machine
FIRMWARE (I/O)



BUSINESS INTELLIGENCE

SOFTWARE DEVELOPMENT & SYSTEMS INTEGRATION

CONTROLS & AUTOMATION



About enVista

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Let's have a conversation.®

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