



Rockwell
Automation

| KALYPSO

Closing the Gap: From Digital Silos to Connected Operation

How to Streamline Material Movement with
Production Logistics

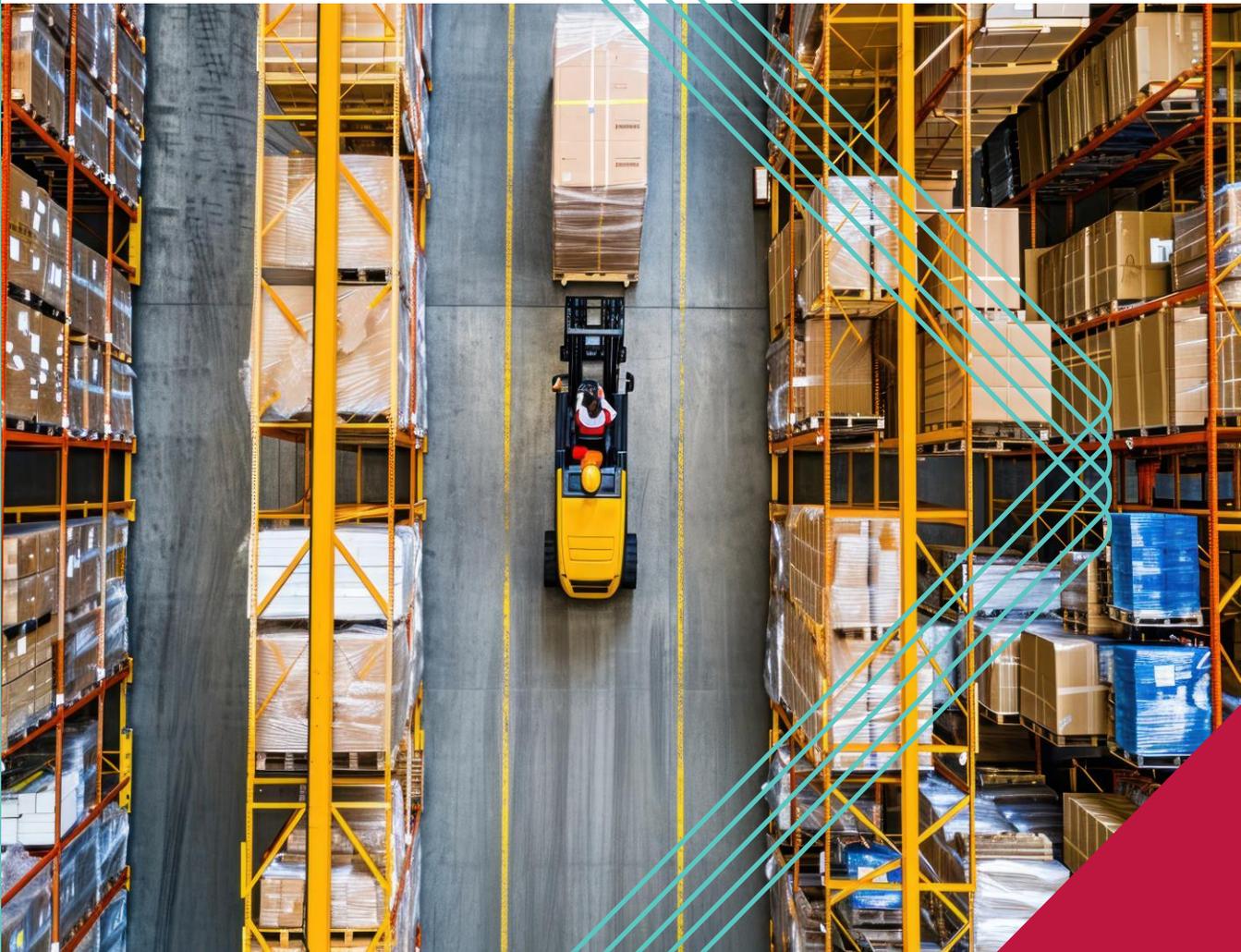
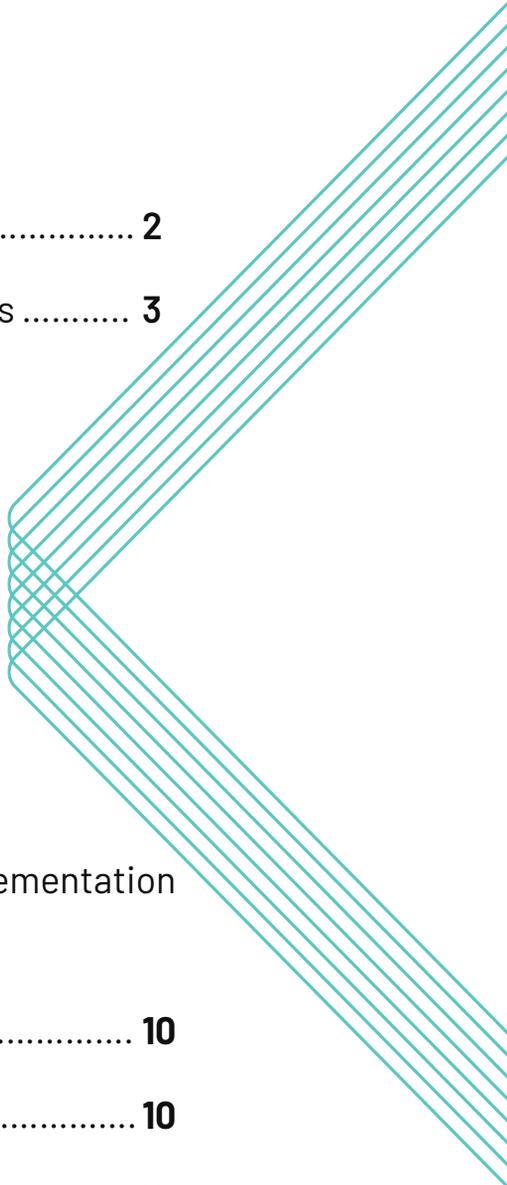


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Executive Summary

In modern manufacturing, every hour spent manually moving material is an hour of revenue lost. Despite this, many modern manufacturers remain reliant on the manual movement of material due to outdated processes and technologies. Upgrading is viewed as costly and disruptive, but these outdated operations invite errors, delays, and missed customer orders that are far costlier in the long run. Manufacturers who fail to evolve are not just missing opportunities; they are falling behind.

While process automation has already transformed manufacturing by bringing greater efficiency, safety, and consistency, there remains significant untapped potential. Many manufacturers have taken important first steps by adopting advanced technologies; however, such technologies are often implemented in isolation, limiting their full impact.

By embracing a more integrated approach, manufacturers can unlock even greater value. Seamlessly connecting new automation equipment with legacy systems helps eliminate bottlenecks and ensures that productivity gains are realized across an entire operation. Rather than focusing solely on incremental improvements in isolated areas, forward-thinking manufacturers must holistically modernize; reducing manual efforts and

scrap to enhance overall productivity.

The opportunity is clear: those who take a strategic, connected approach to automation are not just keeping pace; they're setting the standard for the future of manufacturing. The vision, then, is to seamlessly incorporate automation into processes and operational activities in a way that supports connection and integration in the long term.

The reality is that achieving this vision isn't easy. Manufacturers are introducing new automation tech to their facilities to solve specific challenges. Though these technologies may be well-integrated into operations at the time of implementation, as point solutions they generally don't account for long-term growth and agility. These organizations are on the path to connected operations, with a long journey still ahead toward unlocking the efficiencies that fully connected operations offer.

So why are some manufacturers missing the mark and how can you make sure you're not one of them?

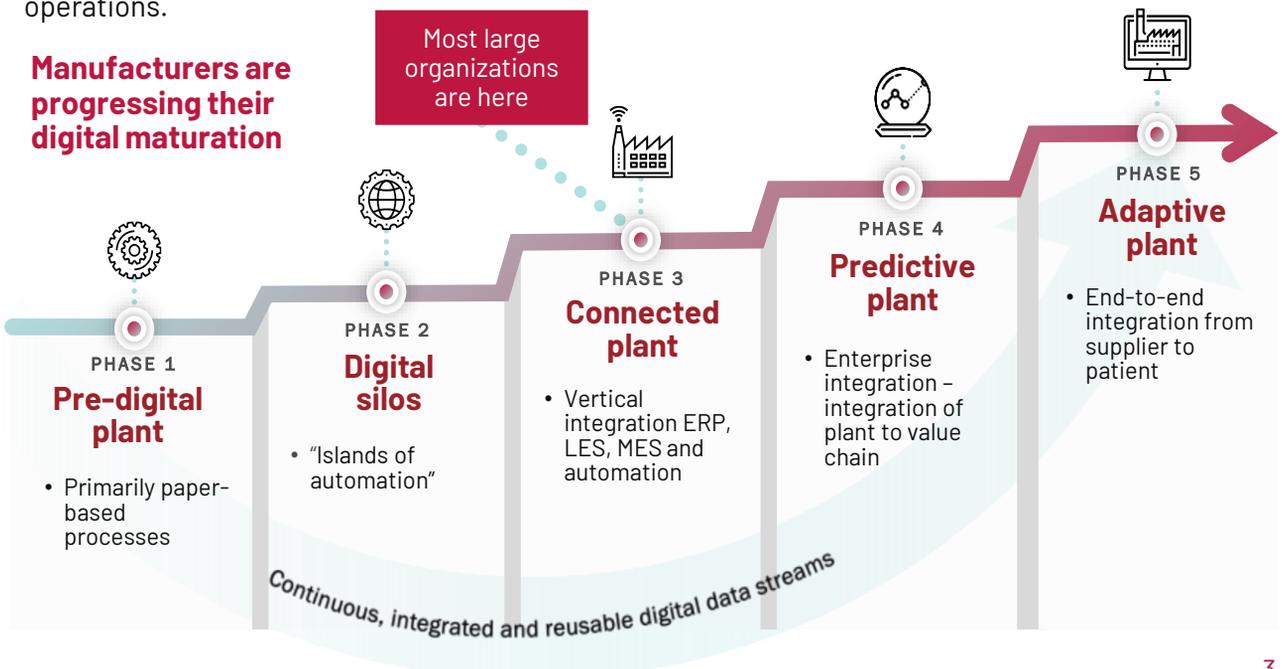
Solving Challenges for Connecting Operations



For modern manufacturers seeking connected operations, each disconnected process and manual task represents added liability and cost they can't afford. Manufacturers struggling to bring their vision of connectedness to life are not only inefficient; they are vulnerable. Those vulnerable companies frequently face challenges with implementing and scaling the intelligent solutions that enable connectivity. What is needed is a practical, informed approach paired with robust execution capabilities to modernize the manufacturing floor and unlock potential savings. This eBook discusses these challenges and lays out the steps toward achieving connected operations.

Manufacturers are progressing their digital maturation

Most large organizations are here





Challenge #1: Workflow or Workforce Challenges

Industrial manufacturers face rising labor costs, difficulty finding skilled workers, and rapidly changing customer demands. These issues contribute to workflow and operational inefficiencies, negatively impacting profitability.

Manual Material Handling

Despite the desire to cut labor costs, many manufacturers still rely on manual methods to move materials. Contract labor and manual forklifts are common but inefficient and costly. Manufacturers have traditionally focused automation efforts on primary processes, often overlooking the efficiency gains to be had by automating secondary processes such as material movement.



Workforce Shortages & Rising Labor Costs

A large portion of the labor force is retiring, resulting in a workforce shortage that is driving up the cost of labor. Manufacturers are struggling to balance the hiring and retention of skilled workers required to staff plants while maintaining profitability. This has driven manufacturers to invest in automation technologies like Autonomous Mobile Robots (AMRs) to reduce dependency on human labor. We discuss AMRs more later in this eBook.

Cost Predictability

Predicting labor costs is difficult due to fluctuating wages and the need for temporary workers during peak times. Automated systems provide more predictable costs and performance, allowing manufacturers to better forecast expenses and manage budgets.

Adapting to Customer Demands

Manufacturers must be agile to respond to changing customer demands and supply chain fluctuations. This requires flexible and efficient production processes, which are hard to achieve with a constrained workforce. Autonomous systems can quickly adapt to changes in production requirements, helping manufacturers respond more effectively.

Solution: Autonomous Material Handling

Autonomous material handling offers a promising solution to these labor challenges. By automating the movement of materials, manufacturers can achieve significant labor savings and improve operational efficiency.



Achieving Efficiency and Cost Savings

Manufacturers that automate material handling see up to **30% faster throughput and 20% lower labor costs**. AMRs unlock faster, smarter material movement, eliminating delays and accelerating production. They also reduce the need for contract labor, leading to substantial cost savings.

Ready to see how much you can save?

Use the **OTTO ROI Calculator** to instantly estimate your potential savings and efficiency gains. Or, speak with an automation expert to explore how AMRs can transform your operations.



Addressing Workforce Shortages

Automation allows businesses to reassign their labor force to value-added activities, making it easier to maintain production levels with a smaller workforce.



Improving Adaptability to Changing Production Needs

AMRs are significantly more **adaptable to changing production requirements** compared to traditional automation systems like automated guided vehicles (AGVs). Unlike AGVs which follow fixed paths and require infrastructure changes for reconfiguration, AMRs can **dynamically adjust to new workflows and layouts** with minimal intervention. Particularly in high-throughput or multi-shift operations where fatigue and human error can impact performance, AMRs offer a balance of flexibility, safety, consistency, and scalability.



Enhancing Cost Predictability

Automated systems come at a more **predictable cost and offer more predictable performance**, allowing manufacturers to **better forecast expenses** and manage budgets. This predictability greatly simplifies the management of operational costs.



Challenge #2: Automation Silos

Over the past few decades, manufacturers have introduced automation technology to various portions of the production line. However, these technologies often lack interconnectivity, creating automation silos that stand in the way of end-to-end visibility and efficient material planning.

Lack of Interconnectivity

New automation technologies have been implemented in isolated parts of the production line, but they often do not communicate with each other. This lack of interconnectivity prevents the seamless flow of information and materials. Addressing these automation silos can yield significant cost savings and productivity gains.

Hidden Costs

Automating in silos has a less obvious but equally burdensome side effect: hidden costs. These costs arise from inefficiencies, redundant processes, and the inability to optimize material flow across an entire production line. Manufacturers who embrace holistic material planning report reduced hidden costs and better overall efficiency, forecasting, and growth at scale.

Data Gaps

Automation silos produce data gaps that impede comprehensive material planning. Without a unified system bridging these gaps, manufacturers struggle to gather and analyze data from different parts of the production line. Integrating autonomous material handling systems and orchestration solutions can bridge these gaps and enhance decision-making capabilities.

Standardization Challenges

After addressing initial automation gaps with production logistics, manufacturers are then faced with the challenge of standardizing siloed material handling robot systems before they can scale and expand the solution. Standardization and expert consultancy are vital to achieving seamless integration and scalability.



Solution: Systematic Material Planning and Integration

To overcome the challenges of automation silos, manufacturers need to adopt a holistic and systematic material planning approach. This approach marries autonomous material movement, orchestration solutions, digital intelligence, and expert consultancy to achieve true efficiency and connectivity.



Autonomous Material Movement

Implementing autonomous material handling systems, such as AMRs, ensures efficient and reliable movement of materials in a facility. These systems reduce the need for manual intervention and improve overall productivity. Automating and optimizing material flow can unlock new levels of efficiency and competitiveness.



Digital Intelligence

Leveraging digital intelligence tools allows manufacturers to analyze the effect of automation solutions on productivity and optimize the solutions to suit their goals. These tools provide insights into performance metrics and help identify areas for improvement, improving decision-making capacity and operational efficiency.



Consultancy and Deployment Services

Consulting with automation experts for scoping, deployment, and post-deployment services ensures that all solutions are effectively integrated and optimized. These experts provide guidance on best practices, standardization, and scaling of automation systems.

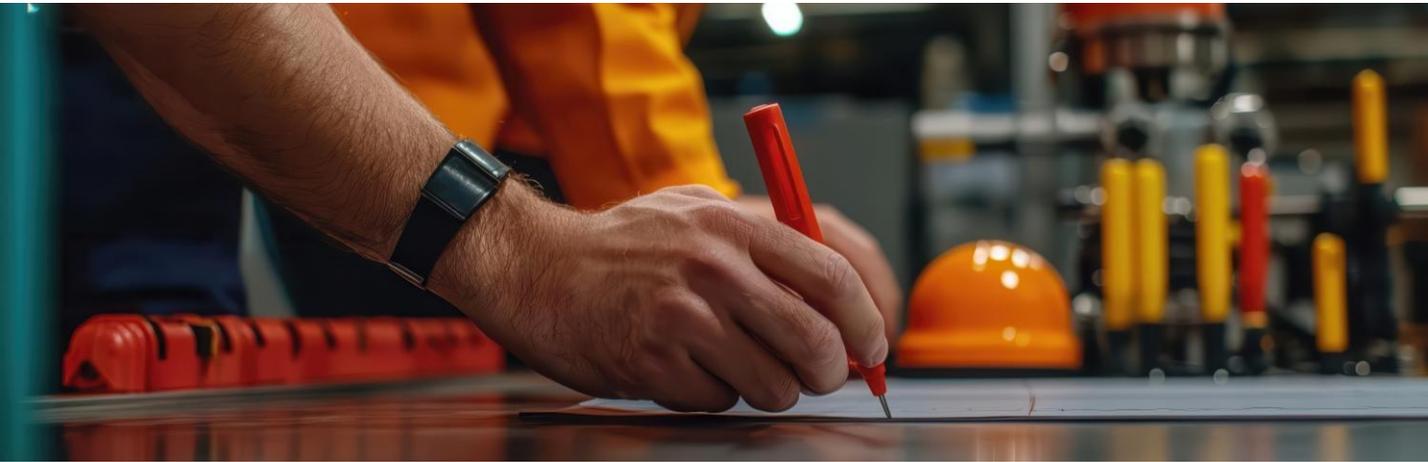
Bridging the Gap with Orchestration

Orchestration solutions enable separate automation systems to communicate with each other, bridging the gap between siloed technologies. This integration ensures seamless data flow and coordination across the production line, leading to reduced inefficiencies. **Rockwell Integrated Production Logistics** provides a unified and user-friendly experience that enables a wider group of users to integrate their IT and OT systems to optimally manage the movement of material to, through, and from production.

Large companies require integrating with disparate AMR providers, AGVs, and other systems, and both small and large companies require automation between their fleets and other systems. As the need for multi-fleet orchestration and complex integrations with existing systems increase, lack of interconnectivity presents a significant barrier to growth.



Challenge #3: Implementation Planning



Lack of Integration

New automation technologies are often implemented without the necessary integrations, leading to disjointed systems that don't work seamlessly together. This lack of integration can create bottlenecks, reducing efficiency.

Insufficient Validation Testing

Without thorough validation testing, new automation solutions may not perform as expected in a real-world environment. This can lead to production downtime. Validation testing can identify and resolve potential issues before full-scale deployment, protecting performance.

Post-Deployment Bottlenecks

If they are not properly integrated and tested, it follows that automation solutions can encounter bottlenecks. These bottlenecks hinder the flow of materials and information. Ongoing monitoring and optimization of automation solutions to prevent post-deployment bottlenecks and maintain productivity is important.

Evolving Needs

As production requirements change, so must the automation solutions manufacturers employ. Without the right teams and tools in place, it can be challenging to evolve these solutions to meet new demands.

Solution: Effective Enablement and Implementation Planning

Manufacturers must equip themselves with the right teams and digital intelligence tools to deploy, maintain, and evolve automation solutions. This involves comprehensive planning, integration, validation testing, and ongoing support.



Comprehensive Planning

Effective implementation starts with thorough planning. This includes assessing the current production environment, identifying integration points, and developing a detailed deployment strategy. Engaging automation experts can provide valuable insights and ensure all aspects are considered in the plan.



Integration and Validation Testing

Ensuring that new automation technologies are properly integrated with existing systems is crucial. This involves rigorous validation testing to identify and address any potential issues before full-scale deployment. Digital intelligence tools can simulate real-world scenarios to test the performance and reliability of the solutions.



Ongoing Maintenance and Support

Post-deployment, manufacturers must have teams in place to make regular updates, troubleshoot, and optimizing performance of automation solutions. Digital intelligence tools can help these teams by providing real-time insights into system performance and identifying areas for improvement.



Adaptability and Evolution

As production needs change, automation solutions must be able to adapt. This requires a flexible approach to implementation that preserves the ability to scale and evolve solutions as needed. Engaging automation experts for ongoing consultancy and support ensures that the solutions remain effective and aligned with business goals.

So, what solution offers you the power of autonomous material handling, the precision of systematic material planning and integration, and the foresight of effective enablement and implementation planning, all in one cohesive package?

The answer lies in embracing production logistics.



What is Production Logistics?

In the ever-evolving landscape of industrial manufacturing, the concept of production logistics has emerged as a transformative force. Production logistics refers to the efficient and intelligent automation of material handling within a factory, with the end goal being to achieve seamless coordination and optimization.

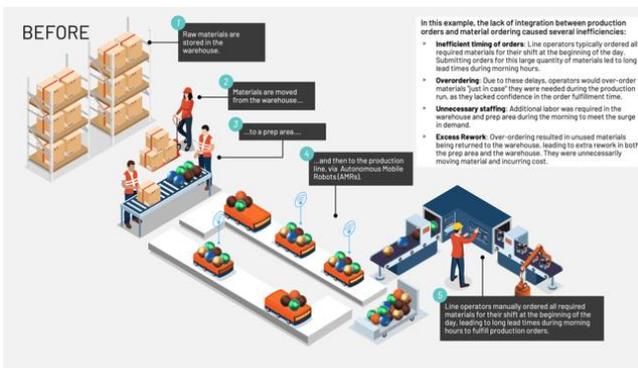


Production logistics is defined as the autonomous dock-to-dock flow and coordination of material movement throughout all operational functions, informed and optimized by data and insights.

Rockwell Automation's expert-led approach to production logistics transforms operations through autonomous material movement and digital solutions. By integrating software, hardware, and automation to move materials in a facility, manufacturers can streamline processes, improve efficiency, and productivity.

The Importance of Integration

Integration is critical to the concept of production logistics because it represents a holistic approach to managing material flow. Unlike traditional logistics solutions which often operate in silos, production logistics ensures that all systems and processes work together harmoniously. This integration is essential to achieve end-to-end visibility and efficiency, allowing manufacturers to optimize operations and make informed decisions based on real-time data.



Key Elements of Production Logistics

To fully understand production logistics, let's explore the elements that enable its success:



Automated Material Movement

Autonomous mobile robots (AMRs) and automated guided vehicles (AGVs) play an integral role in production logistics. These systems ensure efficient and reliable movement of materials, reducing the need for manual intervention and improving safety. While both systems are used for material transportation, AMRs and AGVs have distinct ways of operating:

- **AMRs:** AMRs are flexible and intelligent robots that can navigate independently within an uncontrolled environment. They use advanced sensors and AI to detect obstacles and find the most efficient routes.
- **AGVs:** AGVs always follow strict, pre-set paths and don't do their own planning or re-planning.

Data and Insights

Leveraging data and insights is essential for optimizing material flow. Digital intelligence tools provide real-time information on system performance, helping manufacturers make informed decisions and identify areas for improvement.

End-to-End Coordination

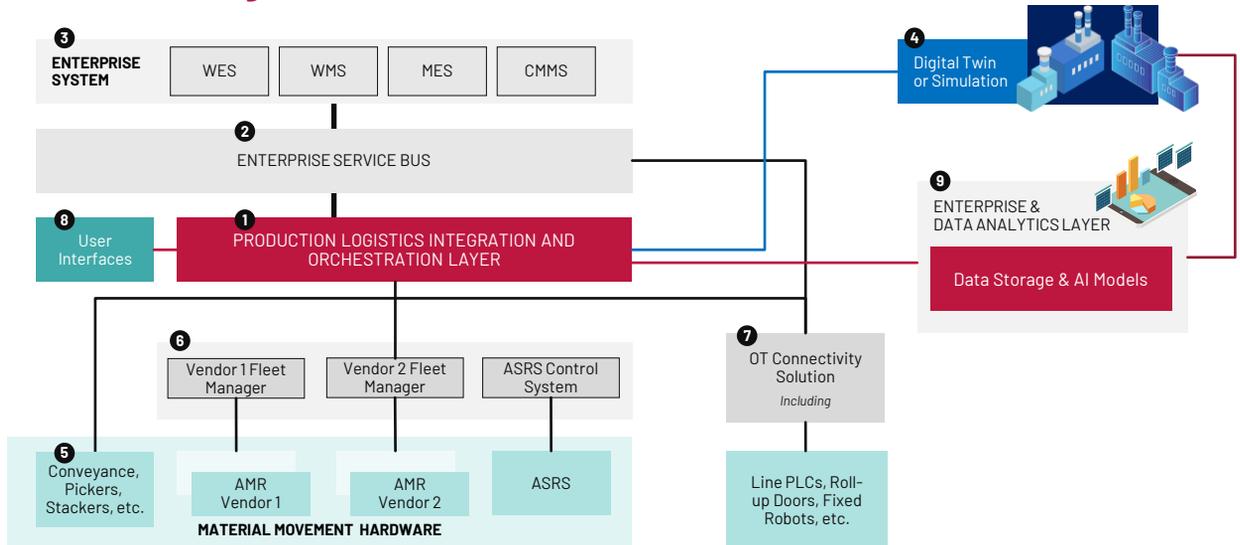
Production logistics involves the seamless coordination of material movement across all operational functions. This ensures that materials flow smoothly from one stage to another, minimizing bottlenecks and optimizing efficiency.

Architecture and Key Components

The architecture of production logistics includes various components such as AMRs, orchestration solutions, and digital intelligence tools. These components work together to create a cohesive system.

Each of these elements drives intelligent, synchronized operations and discover the technologies that bring production logistics to life.

Production Logistics Architecture



- 1 Production Logistics Integration & Orchestration Layer**

Connects and coordinates work between multiple material movement solutions, enterprise systems, and people. It acts as the integration point between automated and manual operations and can perform key functions like scheduling optimization and traffic management, serving as a data broker between systems.
- 2 Enterprise Service Bus**

Provides a consistent interface for core enterprise systems (e.g., MES, ERP), eliminating the need for point integrations.
- 3 Enterprise Systems (WES, WMS, MES, CMMS)**

Manage orders, inventory, production schedules, tracking, and maintenance plans.
- 4 Digital Twin or Simulation**

Continuously optimizes and tests new processes before implementation using a digital representation of material flow. These twins can serve as a foundation for building AI models.
- 5 Material Movement Hardware**

Includes robots, conveyance systems, pickers, stackers, or storage and handling equipment that move material within the facility.
- 6 Fleet Managers**

Coordinate and optimize the operations of a group of robots, handling tasks like deployment, configuration, task scheduling, and performance monitoring.
- 7 Operational Technology Connectivity Solution**

Connects to multiple hardware sources and translates or interprets various protocols, ensuring seamless communication between different systems.
- 8 User Interfaces**

Allow humans to manage operations with interfaces such as industrial HMIs and web applications. Orchestration platforms can provide a “single pane of glass” view, reducing the need for multiple interfaces.
- 9 Enterprise and Data Analytics Layer**

Logistics data should be captured, historized, and contextualized in the same spirit as production data. Includes tools for processing data, building analytical models, and visualizing performance.

Each of these elements has a role to play and should be considered in a successful production logistics architecture or roadmap.

What's Your Future Path Towards Connected Operations?

Achieving successful production logistics requires a deliberate plan and committed leadership. Organizations need to consider not only the implementation of production logistics, but a holistic view of what is required to make it successful. This includes:



Strategic Planning

Manufacturers must develop a comprehensive strategy that accounts for the integration of autonomous systems, orchestration solutions, and digital intelligence tools. This strategy should address current operational needs and anticipate future demands.

Continuous Improvement

Production logistics is not a one-time effort but an ongoing process. Manufacturers must continuously monitor and optimize their systems to maintain efficiency and adapt to changing conditions.

Leadership Commitment

Successful implementation of production logistics requires strong leadership commitment. Leaders must champion the adoption of new technologies and ensure that all stakeholders are aligned with the vision. Without employee buy-in and readiness for change, new technologies risk becoming isolated successes—or worse, losing momentum and failing to deliver value.

Collaboration and Training

Effective collaboration between disparate departments and thorough employee training are crucial. Ensuring that everyone understands the new systems and processes will facilitate smoother integration and operation.

Take the Next Step

Through a Rockwell Automation production logistics assessment, we can:



- 1 Assess** the current state of material flow and associated digital systems.
- 2 Identify** opportunities to improve material flow with process changes, automation, and digital systems.
- 3 Propose** a path forward to improve material flow through automation, digital projects, and process changes.

Production logistics is not just about moving materials; it extends automation across every step of material movement, creating a truly connected factory. By facing up to challenges such as bridging data gaps and silos, improving productivity, and empowering the workforce, we pave the way for a more efficient and resilient production environment.

The benefits of a connected factory are exponential. By bridging data gaps and eliminating silos, we ensure that information flows seamlessly across all levels of the organization, leading to better decision-making and streamlined operations. Productivity is improved through optimized workflows and reduced downtime, while an empowered workforce is equipped with the tools and knowledge to adapt to new technologies and processes.

Embracing a comprehensive production logistics approach is not just a strategic advantage but a necessity for facility operators aiming to stay competitive in the modern industrial era. By leveraging advanced motion and robotics, we can cement production logistics as a cornerstone of operational excellence.

About Kalypso

Kalypso, a Rockwell Automation business, helps companies bring digital solutions to product problems. Whether it's weaving a digital thread from product ideation all the way through manufacturing and service, or advancing operations from automation to autonomy, Kalypso specializes in improving what's being made and how it's made. Kalypso serves the largest names in the discrete, hybrid and process industries around the world.

After years with big firms, we built Kalypso to deliver a new kind of consulting experience, one clients were asking for:

- Radical candor and 100% transparency
- A rapid-results, lean startup approach
- Deep knowledge of both IT and OT

There's a lot of hype about digital, but we prefer to focus on results and reality. That's the only way to deliver the promise of digital.

For more information, visit [kalypso.com](https://www.kalypso.com).

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About OTTO

OTTO, a Rockwell Automation business, empowers businesses to be more human by creating safer, more productive and fulfilling workplaces for manufacturers around the world with the most comprehensive autonomous material handling solution.

For more information, visit [ottomotors.com](https://www.ottomotors.com)

About Rockwell Automation

Rockwell Automation Company are global leaders in Digital Transformation and Industrial Automation. Rockwell meets you where you are in your journey with market-leading hardware, software, and services to make you more resilient, agile, and sustainable.

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