

# THE FUTURE OF PRODUCTION INTRALOGISTICS: THE FINAL FRONTIER FOR MANUFACTURING OPTIMIZATION



Introduction	2-3
Gaining Control of Inventory and Movement	3-4
Flexible Automation	4-5
Industry 4.0 Capabilities	6
Conclusion	7

## INTRODUCTION

Manufacturing processes and technology look nothing today like they did 40 or 50 years ago. Automation has largely replaced manual processes, creating dramatic leaps in productivity, accuracy and throughput.

Yet, the intralogistics processes that support manufacturing, in many cases, look exactly like they did 40 years ago. The processes for receiving, storing and transporting materials and parts to and from the various stages of manufacturing continue to use the same legacy systems and processes that have been in place for decades.

This is partly because manufacturing automation has been an all-consuming proposition for many organizations. With all available resources focused on manufacturing, production intralogistics processes were left behind.

In addition, until recently, the intralogistics solutions available for enhancing material control and movement were often expensive and inflexible. They were difficult to adapt to new model launches and product changeovers and therefore posed a business risk. Instead of making investments that might prove inflexible in the near future, production intralogistics systems in manufacturing were designed with an "if it isn't broke, don't fix it," approach, trading off efficiency for flexibility.

But the production intralogistics process, if not technically "broken," is highly inefficient. Manufacturers lack the visibility to effectively manage and control the inventory that manufacturing processes depend on. As a result, they are forced to compensate by overinvesting in production equipment and personnel and carrying excess inventory. This waste of resources is becoming increasingly unacceptable in today's hypercompetitive, dynamic markets. Moreover, fundamental changes have occurred in material handling technology: inflexible automation systems have been displaced by modular, flexible technology that is ideally suited to the challenges of production intralogistics.

Today's warehouses and distribution centers routinely have full visibility into product as it moves through the warehouse.

Technology, such as automated storage and retrieval systems and AGVs, are improving material flow and delivering significant improvements in speed and productivity. These solutions can be applied as effectively to production intralogistics as to warehousing and distribution.

# INTRODUCTION

As manufacturers face the reality that further investments in manufacturing automation will not pay dividends unless intralogistics processes are addressed, they have a range of proven material handling solutions available to them to enable:

- Better process control upstream and downstream from production
- Optimized inventory levels
- Improved inventory visibility, control and traceability
- Improved accuracyIncreased productivity
- Maximized production capacity



## GAINING CONTROL OF INVENTORY AND MOVEMENT

From a solution perspective, the technology required to address production intralogistics inefficiencies must be tailored to the materials, processes and facility of a particular manufacturer. The solution may or may not be automation centric; however, production intralogistics optimization does require software that integrates with the manufacturing execution system to provide two key capabilities:

#### 1. Positive Inventory Control

Optimizing production intralogistics, regardless of any other technology deployed, requires control of all inventory from receipt through storage and transport. Using software that has been proven in demanding material handling applications, manufacturers can achieve full, positive and transparent control of inventory through automated or manual processes.

#### 2. Intelligent Material Flow

Swisslog

Many of the challenges associated with production intralogistics involve material movement. While part of the solution to this challenge may be automation, many issues can be addressed simply through software that provides intelligent control of material flow. By orchestrating the flow of materials to eliminate congestion while prioritizing flows based on demand, production intralogistics software eliminates unnecessary or inefficient movements and increase the productivity of personnel and equipment supporting material movement.

# GAINING CONTROL OF INVENTORY AND MOVEMENT

Production intralogistics is essentially a warehousing and distribution operation that occurs within the manufacturing process, so it should come as no surprise that the same software that controls inventory and material flow in the modern warehouse can be applied to manufacturing.

Intelligent, warehouse management systems, such as Swisslog's SynQ platform, provide an established and proven platform for production intralogistics. A fully integrated and modular platform, such as SynQ, allows users to only deploy the modules required to support current processes and technology, minimizing the initial investment in production intralogistics.

As needs change or new technology is deployed, additional modules can be added.

For example, the software can be installed today to manage manual storage and retrieval processes and then easily expanded to control automated storage and retrieval if the need for that technology is identified at a later date. State-of-the-art systems, such as SynQ, encompass inventory management, material flow and automation control in a single platform, while also providing an array of business intelligence tools that allow smart forecasting through real-time data analysis.



## FLEXIBLE AUTOMATION

While there are benefits to be realized from the positive inventory control and intelligent material flow management provided by the addition of a production intralogistics software platform, many environments will also benefit from the range of modular and flexible automation solutions currently available. These include:

### Automated Storage and Retrieval

Manufacturing environments that need to store materials on pallets can maximize throughput and storage density, while reducing energy consumption and keeping costs low, with pallet cranes and shuttle systems. Pallet shuttle systems provide efficient, automated storage and retrieval of up to 60 percent more pallets in the same space compared to manual systems.

For smaller size products, modular shuttle systems offer double- to quadruple-deep storage of totes, trays and cartons. Storage and retrieval vehicles are available with load handling devices in either fixed or adjustable widths to handle different product sizes. Managed by the software platform, these automated pallet, case, tray or tote storage and retrieval systems retrieve product quickly and efficiently based on manufacturing demand, dramatically increase storage density and support optimized transport.



# FLEXIBLE AUTOMATION

#### AGVs

Intelligent automated guided vehicles (AGVs) bring increased flexibility and efficiency to material transport. AGV systems automate workflows by executing transport tasks based on optimized and flexible strategies managed by the production intralogistics software.

They also provide the ultimate in flexibility and scalability. If additional manufacturing cells are required, more AGVs can be added to operate alongside those existing. They can be moved to another facility easily and one AGV can replace another during maintenance. Ideal for most types of material handling, AGVs safely and reliably fit into the manufacturing environment. With modern navigation options and customized load handling, they are efficient in highly complex logistics systems and simple A-B scenarios.



#### Good-to-Person Storage, Picking and Kitting

Goods-to-person systems can be deployed to deliver materials or subassemblies to a manufacturing or kitting cell for further processing. These solutions are based on proven principles to boost efficiency, maximize storage space and make it virtually impossible to pick the wrong product.

Swisslog's AutoStore is a unique and simple goods-to-person solution that uses robots and bins to quickly process small parts. It provides better use of available space through a design that enables direct stacking of bins on top of each other and storage of multiple SKUs in a single bin. Swisslog's CarryPick is another established goods-to-person system that employs a swarm of mobile vehicles to deliver racks of products to manufacturing workstations. Over time, the system automatically learns which products have a higher rotation, storing them on the top layer to ensure faster picking times.



### Case and Pallet Conveyors

A variety of conveyor systems are also available for use in production intralogistics. Multi-function pallet conveyors provide energy-efficient transportation of pallets with both light and heavy loads. They can be configured to meet a wide range of requirements and can carry loads up to 1,500kg.

Smaller conveyor system can transport a wide range of small loads like totes, trays and cartons of up to 50kg. These systems can be used to connect cells within the production environment and ensure smooth material flow between cells.



These proven material handling solutions are all being deployed in production environments to manage materials and their movements. The software has the power to integrate these various components together to improve visibility and movement across multi-stage manufacturing operations. Production intralogistics will be an essential requirement for manufacturing organizations seeking to employ Industry 4.0 capabilities, such as decoupling and postponement.

### Decoupling

Manufacturing processes today typically consist of multiple steps where subassemblies or components are assembled or produced in cells prior to final production. This allows machines to be staged to eliminate bottlenecks created by the slowest machines. However, truly optimizing a cell-based process requires visibility into work in progress between cells to more effectively manage production at each stage.

For example, consider a two-stage process with a desired throughput of 2,400 parts per hour. Machines in the first cell can produce 600 parts per hour and machines in the second cell 400. If all machines were operating at full productivity, the process would require four machines in the first stage and six in the second. However, equipment efficiency is typically closer to 85 percent. When you combine the efficiency of the two stages you get a combined efficiency of approximately 72 percent. This drop in operational efficiency neutralizes some of the cost savings that are realized through a cell-based manufacturing matrix. However, by using production intralogistics software to intelligently manage the buffer capacity between the two stages, the drop in efficiency can be eliminated.

Operational efficiency is effectively increased from 72 to 85 percent. This provides an ideal alternative to adding new machines when production capacity increases.

### Postponement

Virtually every manufacturer desires to produce product based on actual market demand rather than projected demand. Postponement makes this possible. By using production intralogistics to stage some product in advance of final production or packaging, the manufacturer retains the flexibility to delay final production until orders have been received. This can greatly reduce waste, rework and markdowns while allowing a manufacturer to remain responsive to its customers.



SYSTEM EFFICIENCY: 72% 1,720 PARTS PER HOUR

### PROCESS WITH INTELLIGENTLY MANAGED BUFFER CAPACITY



SYSTEM EFFICIENCY: 85% 2,040 PARTS PER HOUR

The core competency of production intralogistics is to better manage movement and control of inventory between various production and manufacturing processes. The investments that have been made in manufacturing automation have paid dividends, but, in most cases, additional investments will have diminishing returns without addressing production intralogistics.

The technologies, in the form of intelligent material management software and flexible automation technologies, are available today to provide the positive inventory control and intelligent material management required to optimize inventory levels, productivity and production capacity. Manufacturers moving to production intralogistics are creating competitive advantage by reducing costs, increasing throughput and responding faster to changes in market demand.

Swisslog can help you determine your requirements and tailor a production intralogistics solution to your products, processes and facility.

Manufacturers moving to production intralogistics are creating competitive advantage by reducing costs, increasing throughput and responding faster to changes in market demand.



Swisslog www.swisslog.com