Intralogistics Basics for SAP EWM Starters

A practical Guide to prepare for learning EWM based on the Best Practices.

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1. Introduction

1.1. Welcome!

Welcome to the world of warehouse management!

If you're starting with SAP Extended Warehouse Management (EWM), you might feel like you've been dropped into a complex system full of abbreviations like RF, HU, and TU or terms like activity area or warehouse order. But here's the secret: EWM is just a powerful tool designed to mirror the real-world processes happening on the warehouse floor.

This Mini-eBook is your translator. We're not diving into complex software configurations; I'm giving you the Intralogistics Essentials - the practical "why" behind the buttons you press.

Based on this knowledge, you will be able to connect the foundational intralogistics actions to the specific EWM features you see every day. I am convinced that once you understand the physical flow of goods, navigating EWM becomes intuitive.

Let's make the complex simple!

1.2. Intralogistics Fundamentals

Every well-run warehouse, whether it uses SAP EWM or not, follows a set of core processes.

These robust industry practices (documented, e.g., by organizations like the VDI) ensure that processes are:

- Predictable: Every employee should be able to perform the tasks in the same way.
- Efficient: Wasteful movements and mistakes are minimized.
- Scalable: The warehouse can grow without chaos.

Why does this matter to you? The core functionality of SAP EWM - and thus, also its Best Practice Scope Items - are built directly upon these logistics fundamentals. When you look at an EWM process, you're not looking at a random software function; you are seeing a standardized logistics principle mapped into a digital workflow. Understanding the principle is the first step to mastering the system.

This book will take you on a short journey through the logistics chain of a warehouse. We start with the notification for the Inbound Process and finish with the GI posting and the goods leaving the warehouse.

Big thanks to Michael ten Hompel and his co-authors, as well as the team behind the VDI norm 3601. The content of the book *Warehouse Management* and the VDI paper inspired me to write this e-book and contributed a considerable part of the content.

2. Inbound Processes

From the arrival at the yard to the completion of the putaway process.

2.1. Arrival Notification and Yard Management

Let's look at the crucial steps that happen before the goods even get off the truck—the Goods Receipt preparation.

Goods Receipt is the process of physically accepting, counting, comparing, and finally storing incoming materials. But the magic starts way before that. Effective management of this process, right up until the start of unloading, relies on two essential logistical principles: forward-looking planning and coordination of transports in the yard.

2.1.1. Advance Shipping Notification (ASN)

Imagine trying to host a party without knowing how many guests are coming or when they'll arrive—chaos! In warehousing, the Advance Shipping Notice (ASN), or delivery notification, is your RSVP.

By sending this data ahead of time, the receiving department can:

- Smooth out the workflow: Coordinate system loads to avoid "load peaks" where too many trucks show up at once.
- Plan resources: Know how much buffer space is needed and which receiving doors (gates or bays) are best for the load's size and type.
- Get a head start: Prepare internal labels for identifying the goods before they arrive, speeding up the actual receipt process.

What's in an ASN?

This digital "pre-alert" typically contains key information that drives the planning:

- Estimated arrival time at the warehouse.
- The purchase orders or order items included in the delivery.
- Material details (item number, quantity, etc.).
- Potentially, weight and/or volume of the shipment.
- Potentially, packaging information like HU IDs and packaging materials.

If this vital information is missing, staff has to manually piece together the information from a delivery note, which slows everyone down. The data usually flows from the supplier to the ERP system, and then to the WMS.

2.1.2. Coordination in the Yard Area

In large warehouses, where the main office and the receiving area are far apart, a system is needed to control the flow of traffic outside the building. This is where Dock and Yard Management comes in. It's all about efficient traffic control to ensure the right truck is at the right door at the right time.

Yard vs. Dock

- Yard Management: This manages the entire premises (the Yard). It controls parking spaces, monitors the movement of trucks, and tracks transports between different points on the property.

- Dock Management: This focuses specifically on the loading ramps/docks/doors. It ensures that a truck is assigned to a specific door based on its planned arrival time and the load type.

These coordination functions—like assigning time slots, registering arrivals/departures, and planning ramp/dock use—are essential for a seamless transition from "truck on property" to "unloading begins."

2.1.3. The Role of the WMS

A WMS, like SAP EWM, supports this phase by accelerating the process, enabling the use of ASN data, and by providing the coordination tools needed for Dock and Yard Management. It gives you the tools to control the pre-unloading preparation.

2.2. Unloading, Quality Checks, and Inventory Creation

Now that the truck is registered and at the dock, the actual Goods Receipt (GR) process begins. This is the critical stage where physical actions meet system updates. Goods Receipt is defined as physically accepting the materials, counting them, matching them against what was expected, and preparing them for storage.

The actions taken here are vital for two main reasons: establishing accurate inventory records and ensuring product quality.

2.2.1. Verification and Inventory Establishment

The first task immediately after unloading is Verification (or Receipt). It's all about confirming what the carrier delivered and reconciling that against what was ordered.

You can't trust what you don't check! This stage transitions the responsibility for the goods from the carrier to your warehouse.

- Accurate Counting and Matching: Staff must physically count the incoming goods and compare them against the supporting documents (like the delivery note or the ASN data in the system). This is a logical comparison of what was ordered versus what was delivered.
- Carrier Relief: The initial check confirms the goods match the freight bill, relieving the carrier of liability.
- Inventory Creation: Only after a successful physical comparison and booking can the inventory officially be created in your Warehouse Management System. The WMS uses technologies like Barcodes or RFID to quickly identify and confirm materials and documents.
- Handling Discrepancies: If you find too much, too little, or the wrong material (an over- or under-delivery), the discrepancy must be immediately noted and addressed.

2.2.2. Quality Inspection (QI) and Master Data

Verification focuses on quantity; Quality Inspection focuses on condition and compliance.

You don't want to ship damaged, incorrect, or expired goods. This inspection ensures that the materials meet your company's standards before they become available for use.

- Scope of Check: Inspection can range from a quick visual check (did the right item arrive and is the packaging okay?) to an extensive visual or laboratory inspection of a sample or

the entire batch. The rules for the check are usually defined by the ERP or Quality Management system.

- Tracking Requirements: The receiving process might also include the tracking of parameters, such as serial numbers or the expiry date. This data could later dictate how the goods are picked (e.g., first-expired, first-out).
- Inventory Impact: If goods are under inspection or found faulty, they can be marked with a corresponding indicator. The WMS typically moves this stock into a special status, ensuring it's not accidentally shipped out.
- Master Data: For new materials, this is a possible process step to measure and weigh the physical items. Recording accurate weights and dimensions is vital for optimizing storage space and planning future volume utilization.

2.2.3. Restructuring and (De)Consolidation

Once the goods are verified and quality-checked, they must be prepped for the specific conditions of your warehouse.

The way goods arrive (on a supplier's pallet, perhaps damaged or mixed) is rarely the best way to store or handle them internally.

- Deconsolidation and Splitting: Incoming containers or units (like a large pallet holding many smaller cartons) are often broken down (deconsolidated) into smaller storage units to fit into different storage zones or to separate items for different subsequent processes, such as Cross-Docking or Quality Inspection.
- Standardizing Loading Units: Goods might need to be transferred to your company’s specific, standardized pallets or containers (e.g., if the supplier’s pallet is damaged). For smaller deliveries, staff might build mixed pallets to maximize space utilization.

2.2.4. The Role of the WMS

The WMS ensures these physical actions are seamlessly reflected in the system. It uses the confirmed data to establish inventory and manages the stock characteristics (like distinguishing between available stock and Quality Check Stock) to control its usability and location.

2.3. Putaway: Finding a Home for Your Inventory

We'll now cover the movement of goods from the receiving dock into their final home in the warehouse.

Once goods are received, quality-checked, and counted, the next crucial step is Putaway. This process is the logistical bridge that physically transfers the material from the Goods Receipt area to its final storage location and administratively books it into that specific storage bin in your WMS.

2.3.1. Physical Movement and Verification Checks

In large or automated warehouses, the journey from the dock to the shelf isn't just one long trip; it involves precise identification and routing.

You must ensure that the right material ends up in the right place, or your entire inventory record becomes useless.

- Internal Distribution: As goods move from the receiving area, they must be correctly routed. If a customer order is waiting (a back order), some goods might be split from the

main delivery and sent directly to the shipping area (cross-docking) to be sent out immediately, saving time.

- The Identification Point (I-Point): Especially in high-tech systems (like high-bay warehouses), the goods often pass through an I-Point. This is a dedicated checkpoint where one final physical check is done to synchronize the physical unit with the system data.
- Contour and Weight Check: Here, sensors verify the physical dimensions and weight of the load. This ensures the unit isn't too tall, wide, or heavy for the storage rack or the automated equipment (like cranes) that will handle it. Accurate data here is vital for maximizing space and avoiding accidents.

Only after the WMS confirms the item's identity and its physical fit does it get the green light for final storage.

2.3.2. The Art of Bin Determination

The most complex part of Putaway is not the movement, but the decision: Which bin should this item go into? The WMS uses sophisticated putaway strategies to make this decision, maximizing space and ensuring efficient access later.

Every storage decision is a trade-off between maximizing space (using every inch of the warehouse) and optimizing retrieval (making it easy to pick the goods later).

Your WMS usually considers three main factors when finding a bin:

- Physical Requirements: Does the item physically fit? (Dimensions, weight, load carrier type). Does the rack have enough load capacity?
- Security & Legal: Are there rules about what cannot be stored together? (e.g., hazardous goods cannot be near certain materials, or food needs separate storage).
- Operational Optimization: Will putting it here minimize the travel distance later during removal/picking? Will this maximize the warehouse's overall capacity?

Some of the most common Putaway Strategies:

- Random Storage (‘Chaotic’): When space utilization is the top priority. Stores goods in any free bin.
- Fixed Storage Bin: For very fast-moving items or manual systems. An article is always assigned to the same bin. Reduces search time and increases access security.
- Zoning (e.g., based on ABC Classification): To optimize picking performance. Fast-moving (A) items are stored close to the access starting position; slow movers (C) are stored further away. Minimizes total travel distance.

2.3.3. The Role of the WMS

The WMS is the brain of the Putaway process. It implements the complex putaway strategies/algorithms and manages all the master data (dimensions, weight, safety rules).

When the operator places the goods into the assigned storage bin and confirms the task in their WMS device, the system immediately updates the inventory, officially booking the material from the temporary Goods Receipt area to its new, permanent home in the warehouse.

3. Internal Processes

Core Idea: Everything that happens while goods are "resting."

3.1. Post-Storage Optimization: Keeping the Warehouse Fast and Flexible

Once goods are put away, the work isn't over. A smart warehouse constantly monitors and adjusts where items are stored and how they flow internally. These necessary steps are called internal warehouse processes, and they are essential for speed and accuracy when processing outbound orders.

Some of the most common processes here are Slotting, Rearrangement (strategic location decisions), and Replenishment (tactical flow to the picking face).

3.2. Slotting & Rearrangement

Warehouses are not static; conditions are always changing! Products change, customer demand shifts, and inventory moves. Optimization processes are necessary when you see issues like:

- Changes in Demand: A product suddenly starts selling much faster or slower than before.
- Poor Utilization: You have too many half-empty pallets or single items scattered across different bins.
- Growing Complexity: Products are accidentally stored in the wrong zone, making picking less efficient.

The Benefits:

By actively optimizing, you achieve concrete results that benefit every subsequent process:

- Faster Picking: The biggest gain—staff travel shorter distances to find the goods.
- Better Space Use: You fit more inventory into the same footprint.
- Fewer Delays: Minimizing unnecessary movement and time spent searching.

Slotting and Rearrangement processes try to make sure every product is in the best possible long-term location based on its characteristics and how often it's picked.

Slotting is the analytical, planning step. The WMS analyzes data (like sales volume, packaging type, and demand frequency—often using ABC analysis) to determine the optimal storage zone and bin type for that product. For example, a fast-moving item (A) should be closer to shipping than a slow-moving item (C).

Rearrangement is the physical process that implements the plan. It involves moving items that are currently in a "wrong" or sub-optimal location to their new, ideal slot.

- Stock Transfer: If a product's demand has increased, rearrangement triggers an internal stock transfer to move it from a distant, low-turnover zone to a high-turnover zone, re-establishing the desired ABC zoning.
- Consolidation/Merging: This is a crucial physical action where staff actively retrieves several partial pallets or containers of the same item and consolidates them into one full, well-utilized storage unit. This frees up valuable storage space.

3.3. Replenishment

While rearrangement fixes long-term storage locations, Replenishment is the short-term, tactical process that ensures the picking area (the "picking face") never runs out of stock.

Running out of stock in the picking area is a critical failure. It stops the picker, causes delays, and forces immediate, unplanned actions. Replenishment prevents this by moving materials from the reserve stock to the active picking location.

Replenishment is a specific type of stock transfer that typically involves:

- Movement of a full unit (e.g., a reserve pallet from a high rack) to a primary picking bin (e.g., a flow rack).
- The goal is to fill the picking area just enough to meet immediate demand, based on strategies like minimum and maximum levels.

The movement can be:

- Planned (Proactive): The WMS constantly monitors stock levels and automatically creates a replenishment task before the bin is empty, based on forecasted consumption.
- Unplanned (Reactive): A picker arrives at a bin, sees it's almost empty, and triggers a manual request for stock to be brought over immediately.
- Order-based: The WMS analyzes the current demand based on orders for a given time frame and triggers replenishment based on those quantities.

3.3.1. The Role of the WMS

Your WMS is key here, constantly analyzing inventory and consumption to correctly calculate when and how much to replenish, and then creating the necessary internal stock transfer tasks.

3.4. Inventory: Ensuring Stock Accuracy

The Necessity of Stock Accuracy

The Inventory Process is the formal, mandated process of physically counting all your stored assets. The goal is to ensure the physical count perfectly matches the system count in your WMS.

- Trust in Your Data: The primary goal is achieving stock accuracy. High accuracy allows warehouse managers to rely on the system, which eliminates the need for excessive "safety stocks" held just because managers don't trust the numbers.
- Legal Compliance: Inventory is a required accounting process to correctly determine a company's financial assets.
- Theft and Error Detection: The count helps detect losses due to negligence, damage, or theft.

Physical Inventory Methods

Different methods of counting have major consequences for your daily operations, especially regarding whether you need to stop the flow of goods.

1. Annual Stocktaking
    - The Physical Process: This is the classical, total count. On a specific date (the accounting date), you check all stock.

- Organizational Impact: The entire material flow must essentially be stopped. Since nothing can change while you are counting, this method causes a massive, but short-lived, interruption. It is only practical for smaller operations.

2. Permanent Inventory and Cycle Counting The most efficient approach for a modern, busy warehouse is Permanent Inventory. This means you count stock throughout the year, spreading the effort out and providing continuous data quality. These are the most common methods:
    - Cycle Counting: Specific items or bins are counted on a rotational, cyclical schedule throughout the year. All movements to that bin must stop during the count. Provides continuous control. It spreads the workload and constantly corrects small errors, leading to high data accuracy year-round.
    - Warehouse Stocktaking: Items are physically counted away from their final bin, often at a controlled processing point like the I-Point (Identification Point) at Goods Receipt. Shifts the counting workload out of the dense storage area to a dedicated, easier-to-access area, improving efficiency.
    - Zero-Crossing Stocktaking: The count is performed on a bin only after it has been completely emptied (the stock crosses zero). Perfect for systems where direct access to the bin is difficult (e.g., deep-lane storage). You simply confirm the bin is empty when the last item is picked out.

3.4.1. Supporting Role of a WMS

The modern inventory process is impossible without a WMS:

- Process Control: The WMS is legally required to manage this process. It must support functions like blocking storage units or shelf areas to prevent any stock movement during a count.
- Data Integrity: It manages the permanent, separate booking of all receipts and issues.
- Efficiency: By using strategies like Cycle Counting and Zero-Crossing, the WMS ensures that stock is checked with minimum interruption to the primary business (picking and shipping). This sets the foundation for high operational readiness and short response times.

3.5. Scrapping and Disposal Processes

Not all inventory can be sold or used. Scrapping is the formal process of physically removing damaged, expired, or obsolete goods from usable inventory and preparing them for disposal.

Scrapping is critical for inventory accuracy and legal compliance. Unusable stock artificially inflates your inventory count and consumes valuable storage space.

The Scrapping Process Essentials

The process must be tightly controlled to maintain an audit trail and ensure proper accounting.

1. Identification and Staging: Scrapping is triggered when faulty stock is identified (e.g., during inspection or expiration checks). The material is physically moved to a designated Scrap Zone and immediately placed in a Blocked or Non-Usable status in the WMS.

2. Administrative Booking: The decision to scrap requires formal approval due to the financial loss. The WMS executes a formal system transaction that permanently removes the stock, simultaneously updating the financial system (ERP) to reflect the loss in value.
3. Physical Disposal: The scrap material is separated based on its disposal method (e.g., recycling, hazardous waste). Final documentation confirms its complete removal from the premises, closing the logistical loop.

3.5.1. The Role of the WMS

The WMS ensures the process is auditable and controlled:

- Audit Trail: It records why, when, and by whom the material was scrapped, which is essential for compliance.
- Safety: It blocks the material immediately upon identification, ensuring staff cannot accidentally pick or ship damaged goods to a customer.

4. Outbound Processes

All steps from customer order to loading and goods issue.

4.1. Fulfilling Orders and Optimizing Picking

The Outbound process starts with a customer's order and ends with the delivery leaving your dock. The initial phase focuses on Order Management, which translates the simple request for products into complex, efficient Warehouse Tasks.

Step 1: Order Management and Task Creation

Your WMS receives the delivery order from your ERP system. Before anyone can physically move, the WMS must perform critical planning steps.

Customer order data is usually not optimized for warehouse efficiency. The WMS has to re-plan the data to minimize travel and maximize output.

- Stock Allocation: The WMS reserves (allocates) the required quantities from the freely available stock. This prevents the same stock from being promised to two different customers.
- Order Preprocessing: This is the essential optimization step where the WMS takes the list of items and:
    - Sorts the items based on their physical arrangement in the warehouse (so the picker walks the shortest path).
    - Divides the order into sub-orders if different items need to be picked from different zones (e.g., small items from shelving, large items from a high-bay rack).
- Task Creation: The WMS then releases the processed information as clear, executable Warehouse Tasks for physical processing.

Step 2: Retrieval Strategies (Which Stock to Pick)

Once tasks are created, the WMS applies rules to decide which specific unit of stock to pick and when to pick it. The following table lists some of the most common strategies applied during stock retrieval.

Strategy	Objective	Practical Example
FIFO (First-In, First-Out) or FEFO (First-expires, First-Out)	Avoid stock obsolescence or expiry (e.g., food, medicine).	Always pick the item that was put away earliest or expires earliest.
LIFO (Last-In, First-Out)	Simplify picking in certain storage types (e.g., block storage).	Always pick the item that was put away most recently.
Quantity Adaptation	Improve handling performance.	If an order needs 50 units, prefer to pick a partial pallet of 50 units rather than breaking a full pallet of 100.
Tour-Related	Reduce handling and reloading time.	Sequence the picking tasks so the goods for the first delivery stop are picked first.

Step 3: Wave Management

The Wave Management concept is the ultimate method for optimizing the picker's workload and maximizing the output of the entire warehouse. Wave management's core purpose in a warehouse is to organize and schedule order fulfillment for maximum efficiency. It involves grouping multiple customer orders or order items into a "wave" based on shared characteristics like shipping destination, priority, or cutoff time. This strategic grouping enables the creation of optimized picking routes, for example, allowing workers to collect items for numerous orders in a single, efficient trip.

Instead of one picker fulfilling one order, Wave Management can help to group several delivery orders into large batches. This is usually implemented using Two-Step Picking (two physical steps):

- Article-Oriented Picking (Batch Picking): The picker is given one task: collect all units of Article A needed for the entire batch. They walk the route only once, picking 20 units for Customer X, 10 for Customer Y, and 5 for Customer Z. This drastically reduces walking time and gripping time per order.
- Consolidation: Once all articles for the wave are collected into a central staging area, the goods are then sorted and assigned to their individual customer orders—often using specialized Sorters or distribution facilities.

This grouping action greatly increases the density of pick points, meaning the picker achieves more work in less time, making the entire outbound process faster.

4.1.1. Supporting Role of a WMS

The WMS is the strategic controller of the entire outbound flow:

- It performs all the complex calculations for Wave Management and Batch Calculation (determining the optimal size and content of a wave).
- It applies all the necessary Retrieval Strategies (like FIFO) to ensure the right unit is picked.
- It translates the external customer order into the internal, efficiently sequenced picking tasks the warehouse staff execute.

4.2. Picking and Packing

We've arrived at the heart of the outbound process: the physical act of gathering the items and preparing them to leave the building. This is where efficiency makes or breaks your warehouse!

Picking is the core logistical task of assembling the specific products and quantities requested by the customer (your delivery order) from your total inventory. It involves separating partial quantities or retrieving full units.

4.2.1. Picking

The efficiency of picking comes down to two variables: how much the picker moves and how much the picker handles the goods.

Physical Movement Principles

The way goods and people are brought together defines your system's efficiency:

- Person-to-Goods: The picker moves (walks or drives a forklift) to the goods' location to retrieve them. *E.g., a picker walking aisles in a shelving area or driving to a pallet in a rack.*
- Goods-to-Person: The goods (or their storage unit) are automatically transported by conveyor belts or robots to a fixed workstation, where the picker stays put. *E.g., an automated system bringing a tote to a picker's station.*

The single biggest factor in picking is the time spent walking or driving. One of the goals of your WMS is to minimize this. It guides the picker through the warehouse in a route-optimized sequence. It's like finding the most efficient route for a delivery driver (often called the "Travelling Salesman Problem"). Strategies ensure that the picker visits retrieval points in an order that minimizes the overall walking distance. By optimizing the sequence, the system prevents unproductive time spent on empty trips or searching for the next location.

4.2.2. Packing

Once all items for an order are picked and consolidated, they move to the Work Center for packing. This dedicated area is where the internal process meets the external world of shipping:

- Repacking: This is the main physical action—transferring the retrieved goods from the internal totes or carts into the final shipping packaging (boxes, cartons, etc.).
- Weight Control: Usually, the final package is weighed. The result can be used for verifying the weight against declared limits and for calculating accurate shipping costs.
- Documentation: The final shipping documents, such as shipping labels, delivery notes, and customs forms, are printed and secured onto the package.

The concept of a Handling Unit (HU) is crucial for ensuring the goods can be handled by the WMS and tracked through the supply chain. An HU is a logical, uniquely identified physical unit. It can be a carton, a pallet, or even a mixed crate. The packaging's main job is to protect the goods during transportation, transshipment, and storage, ensuring they arrive at the customer without damage.

Every HU is assigned a unique number. For external shipping units, this is often the Serial Shipping Container Code (SSCC). This unique ID makes the entire package traceable by the WMS and by the shipping carrier, from your dock to the customer's door.

Your WMS is the tool that makes all this possible!

4.3. Staging, Loading, and Goods Issue (Shipping)

This final section brings the physical journey of the goods to a close. Everything we've done up to this point—receiving, storing, and picking—leads to these final, critical steps.

The final phase, often called Shipping, is the physical transition of the packed customer orders from your internal warehouse control to the external transport carrier (e.g., the truck). This involves Staging, Loading, and the final administrative Goods Issue posting.

4.3.1. Staging (The Shipping Buffer)

Once an order is completely picked, consolidated, and securely packed, it must wait for the correct means of transport to arrive. This waiting area is the Staging Area.

The Staging Area acts as a buffer zone between the fast pace of picking and the usually slower pace of truck arrival and loading. The fully packed units (pallets, boxes, etc.) are physically placed in a Staging Area or floor storage zone directly in front of their assigned Shipping Gate (or dock). This is the last chance to ensure all packed items belonging to a single delivery order are physically gathered together (Consolidation).

In a very busy warehouse, the WMS might instruct staff to temporarily Restock finished packages into a standard storage bin and then retrieve them again just before the truck arrives. This frees up the valuable staging area floor space for other orders.

4.3.2. Loading (The Physical Transfer)

Loading is the physical act of transferring the prepared shipments from the staging area onto the transport unit (e.g., truck, van, or train).

Before the truck can be loaded, the WMS creates a digital Load/Transport Unit (TU) record. All the packages going onto that specific unit are then logically assigned to it. To prevent shipping errors, the physical transfer is usually secured by a Scan function at the gate. The staff must scan the Handling Unit (HU) barcode (e.g., the SSCC) as it's placed on the truck. This verifies that:

- The package is correct.
- It is being put on the correct truck.

Even during loading, efficiency matters. Staff must consider Stackability (will this pallet crush the box underneath?) and the Loading Sequence (do the last items loaded need to be the first items unloaded at the customer's site?). Once the physical loading is complete, the necessary freight documents (e.g., bills of lading) are generated and signed.

4.3.3. Goods Issue (The Administrative Finish)

The Goods Issue (GI) Booking is the final, definitive administrative action. It's the moment your company officially gives up possession of the stock.

The Goods Issue Booking is the key moment of inventory synchronization.

- The Trigger: The Goods Issue is typically booked when the Transport Unit physically leaves the warehouse premises.
- Stock Synchronization: This booking tells the WMS to remove the inventory from the system immediately. This update is then reported back to the ERP system, ensuring that both systems show the same, correct inventory count. The delivered goods are officially booked out of inventory.
- Delivery Feedback: The WMS simultaneously updates various internal statuses (e.g., "loading ended"). This status update often triggers other subsequent administrative processes in the ERP, like printing the final invoice for the customer.

4.3.4. The Role of the WMS

Your WMS is indispensable for controlling these steps, managing the staging areas, tracking the contents of the Transport Unit (TU), and executing the final, crucial Goods Issue booking that closes the logistics loop.

5. Special Functions & Processes

5.1. Production Supply and Integration

Production Supply is the specific intralogistics process dedicated to moving components from the main warehouse storage to the manufacturing lines or individual workstations. It's a special type of "picking and shipping" where the recipient is your own factory, not an external customer.

The Physical Flow: From Warehouse to Workstation

The organizational goal is simple: ensure the continuous delivery of components exactly where they are needed for the production process.

The Production Supply Area is a designated interim store in the manufacturing environment. Think of it as a temporary staging zone right next to the assembly line. This area physically aggregates workstations and holds a small, dedicated inventory to feed the machines directly.

Supply to production often differs from standard customer distribution:

- Picking Flexibility: When picking for production, you might intentionally combine production orders with distribution orders to make one efficient picking run, or you might separate them entirely based on the line's urgency.
- Simplified Outbound: Since the goods aren't going to a customer, the process often bypasses the usual, time-consuming steps like complex packaging, shipping label printing, or formal staging for a carrier truck. The goods are simply transferred internally.
- Reverse Flow: Unlike customer orders, production supply can involve a Reverse Flow—moving unused material or the finished goods back from the production line into the main warehouse storage (restorage).

The WMS must be able to model and track inventory not just on the shelves, but also in these Production Supply Areas.

Material Staging Strategies: Delivering the Right Amount

The core principle here is using special Material Staging Strategies to ensure components are available just in time (or just in sequence) for manufacturing. The strategy determines the type and quantity of material delivery.

- Order-Specific: When a product is complex or customized. Material is reserved and picked only for one specific manufacturing order, preventing errors or mixing components.
- Cross-Order: For common parts (like screws or fasteners). Material is provided to support multiple manufacturing orders simultaneously, maximizing efficiency for high-use items.
- Fixed Lot Size (KANBAN): For repetitive manufacturing with stable consumption. Material is delivered in predetermined, fixed replenishment quantities. This *pull* system relies on a signal (like an empty bin) to trigger immediate replenishment, keeping stock levels minimized but stable.

By linking the production needs (e.g., manufacturing lot size) to these strategies, the WMS ensures that the expensive production lines are never starved of materials.

5.1.1. Supporting Role of a WMS

While complex long-term planning (like what should be manufactured next) is handled by separate Production Planning systems, the WMS manages the physical logistics execution:

- Strategy Execution: It implements the chosen replenishment strategies (like ‘order-specific’ or KANBAN).
- Stock Visibility: It provides real-time visibility into the stocks in production, allowing supervisors to react quickly if a line is running low on a critical component.

5.2. Resource Management

We'll now look at the people and machinery that make the warehouse processes happen. This is all about getting the most out of your staff and your equipment.

Resource Management is a feature of a modern WMS that focuses on the efficient control and optimization of the executive units in your system—your employees (personnel) and your physical vehicles (conveyors, cranes, etc.). It's the fine-tuning level of the WMS that ensures no one is idle and no machine is running empty.

Core Principles of Resource Planning

Resource planning is broken down into managing the human and the mechanical aspects.

Manpower-Related Planning is about effectively deploying your employees. The planning is based on:

- Availability: When employees are scheduled to work.
- Qualifications: Which employees are certified to use specialized equipment (e.g., a specific high-reach forklift).
- Areas of Deployment: Assigning staff to the zone where they are needed most (e.g., inbound or picking).

Mechanical resources (physical equipment) range from manual pallet jacks to automated rack feeders. The system uses data like the vehicle's loading capacity and lifting height to ensure the right tool is assigned to the right job.

The WMS manages all movement as simple commands: *Move X material from Source A to Sink B.* For complex equipment (like stacker cranes in a high-bay warehouse), the WMS sends the command to a specialized control system. This system communicates with the vehicle using a wireless medium and a mobile terminal on the truck.

The control and optimization of these resources directly increase the speed and efficiency of the entire warehouse. The main goal of transport optimization is to maximize throughput and virtually eliminate non-value-adding time.

- Minimizing Empty Trips: This is the fundamental goal. An empty forklift is an unproductive forklift. The WMS constantly looks at pending tasks and assigns them in a sequence that ensures a vehicle is never returning to base empty. It should always be moving inventory.
- Creating Double Cycles: The most effective optimization, especially for automated systems, is combining two tasks into one continuous run (a double cycle). For example, a rack feeder finishes a retrieval (pulling a pallet out) and, instead of

returning empty, immediately performs a storage (putting a new pallet in) on its way back. This drastically minimizes travel time and maximizes the equipment's output.

Shortest Route and Load Balancing

- Shortest Route Determination (Routing): For equipment that can choose its path (like a forklift or a driverless system), the WMS calculates the shortest physical path to the destination.
- Workload Balancing: The WMS constantly adapts to changes, ensuring a continuous system load without creating bottlenecks. If one zone is slammed with tasks, the WMS re-routes resources from a calmer zone, ensuring optimal utilization of every resource available.

The WMS is the central brain, recording the current job status of every vehicle and the overall system demand. This allows it to flexibly and dynamically react to changes, increasing the overall throughput of your physical material handling equipment.

Now let's dive into the powerful machinery that physically moves goods through a modern warehouse: the Material Flow Systems. These are the gears and levers that connect the WMS's logical instructions to the actual movement of product, making high-speed logistics possible.

5.3. Material Flow Systems: The Automation Backbone

Automation Technology and Material Flow Systems are the technical foundation of modern warehousing. They allow a technical system to operate independently, ensuring high performance. Essentially, they take the complex instructions from the WMS and execute them by controlling and coordinating the movement of physical goods.

Automation relies on a clear hierarchy of components working together.

These are the elements that physically interact with the goods or the environment:

- Drives: These are the mechanical parts that convert control signals into movement. They provide the force and energy for transport, ranging from spinning a conveyor belt to executing the complex, multi-axis movements of a Rack Feeder or robot.
- Sensors: These are the eyes and ears of the system. They send data about the system's status back to the control systems. Examples include:
    - Light Barriers: Used to check for the presence of a box.
    - Specialized Sensors: Used for precise positioning, speed checks, and counting.

The WMS doesn't talk directly to a motor; it goes through a chain of command:

- Control Level (MFC/PLC): This is the traffic cop of the automation world. The Material Flow Control (MFC) and the Programmable Logic Controllers (PLCs) take the transport request (e.g., move Pallet X from A to B) and translate it into the exact, unambiguous instructions needed to control the conveyors and equipment.

The MFC coordinates the sequence and flow between all the automated components.

- Higher Levels (WMS/WCS): The WMS sits above the MFC, handling the overall strategy, inventory, and order management. Some WMS (like SAP EWM) have an embedded MFC.

Material flow equipment is categorized based on how it moves the goods: continuously or individually.

Conveyors (Continuous Systems)

These systems are stationary and create a continuous flow of goods. They are ideal for high-volume, high-speed movement over defined paths.

- Roller Conveyors: Move goods using turnable rollers, reducing friction.
- Conveying Belt Systems: Highly reliable and capable of managing inclines and high speeds.
- Sorters and Distribution Systems: Specialized, automated devices (like cross-belt sorters) used to rapidly distribute a large batch of goods to their individual destination lanes.

Transporters (Unsteady Systems)

These are single devices that travel with the goods from a source to a target. They are highly flexible and cover large distances or heights.

- Rack Feeders (Cranes): These are rail-bound overhead vehicles that operate inside the deep aisles of High-Bay Warehouses (HBW). They use telescopic forks to physically place and retrieve units.
- Automated Guided Vehicles (AGVs): Staff-less, mobile transporters used to automatically move goods on the floor without human intervention. They offer high precision and operational safety.

Automation Integration: Synchronizing Flow

Automation is critical where the material enters the automated system:

- I-Point Function: The Identification Point (I-Point), usually in the pre-storage zone of an automated warehouse, is where the Material Flow is synchronized with the Information Flow. Physical checks occur here, such as a Contour Check and Weight Control, ensuring the unit is safe and correctly sized before it's accepted into the high-speed automated racks.
- Automated Storage and Retrieval: The WMS sends commands to the MFC/PLC to coordinate the Rack Feeders. This is how the system executes efficient double cycles (storage combined with retrieval), maximizing the throughput of the equipment.

The WMS is the ultimate authority, managing the strategy and inventory data. It defines the "what, where, and when" (source and sink) and hands the "how" (the technical movement) to the subordinate control systems.

6. Conclusion

This book has explored the foundations of intralogistics—how goods move, are stored, and are managed within a warehouse—and the crucial role of the Warehouse Management System (WMS) in coordinating it all. Every process, from receiving goods to shipping them out, is built upon standardized logistics principles that aim to make warehouse operations efficient, reliable, and flexible.

Ultimately, the WMS is the core intelligence that unites every part of the warehouse. It transforms strategic goals into executable, optimized tasks—coordinating people, machines, and data in real time. The system ensures seamless interaction between physical and digital processes, turning high-level business objectives into precise, efficient actions on the warehouse floor.

Before implementing a system like SAP EWM, it's vital to understand these physical and operational principles. The WMS does not merely automate processes—it embodies the logic and discipline of well-structured intralogistics, ensuring that every movement contributes to overall business performance.

7. EWM Scope Items and Their Intralogistics Foundation

This table links the functional SAP EWM Scope Item (the "how") to the underlying Intralogistics Essentials (the "why") described in this E-book. It serves as your quick reference guide for connecting the EWM system to the reality of the warehouse floor.

EWM Scope Item	Primary Process	Relevant Chapter(s)	Online Help Chapter
Basic Warehouse Inbound Processing from Supplier (1FS)	Inbound Core Flow	2. Inbound Processes (All sections)	
Basic Warehouse Outbound Processing to Customer (1G2)	Outbound Core Flow	4. Outbound Processes (All sections)	
Basic TM/EWM - Inbound Advanced Shipping and Receiving (7GP)	Dock & Yard Management	2. Inbound Processes (All sections)	
Basic TM/EWM - Outbound Advanced	Outbound Shipping & Loading	4. Outbound Processes (All sections)	

Shipping and Receiving (7GQ)			
Basic Warehouse Inbound Processing from Supplier with QM (1V9)	Inbound Inspection	2. Inbound Processes (All sections)	
Warehouse Inbound Processing from Supplier with Batch Management (1V5)	Inbound & Stock Classification	2. Inbound Processes (All sections)	
Warehouse Outbound Processing to Customer with Batch Management (1V7)	Outbound & Picking Strategy	4. Outbound Processes (All sections)	
Replenishment in Warehouse (1FY)	Internal Stock Flow	3.3 Replenishment	
Decentralized EWM - Replenishment (4RS)	Internal Stock Flow	3.3 Replenishment	
Physical Inventory in Warehouse (1FW)	Stock Accuracy & Counting	3.4 Inventory	
Decentralized EWM - Physical Inventory (4RR)	Stock Accuracy & Counting	3.4 Inventory	
Production Integration - Component Consumption and Receipt in Warehouse (1VB)	Production Staging	5.1 Production Supply and Integration	
Scrapping in Warehouse (1G0)	Internal Stock Disposal	3.5 Scrapping and Disposal processes	
Initial Stock Upload for Warehouse (1FU)	Stock Initialization (Go-Live)	Not described in this ebook	
Decentralized EWM - Inbound Processing (4RO)	Inbound Core Flow	2. Inbound Processes (All sections)	
Decentralized EWM - Outbound Processing (4RP)	Outbound Core Flow	4. Outbound Processes (All sections)	
Decentralized EWM - Ad Hoc Goods Issue (4RQ)	Non-Planned Outbound	Not described in this ebook	

Decentralized EWM - Technical Integration ERP (4UA)	System Integration Foundation	Not described in this ebook	
SAP Fiori Analytical Apps for Inventory and Warehouse Management (BGG)	Reporting and Analysis	All chapters are relevant to provide the foundation	