

Introduction to Warehouse Operations

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Designed as a quick-reference guide for students, new hires, or anyone needing a clear overview of how modern warehouses function.

1. Core Objectives of a Warehouse

Objective	Why It Matters	Typical KPI
Receive & Inspect	Ensure inbound goods match purchase orders & are undamaged.	Receiving accuracy (%), damage rate
Store Efficiently	Maximize space utilization and protect inventory.	Space utilization (%), dwell time
Pick & Pack	Retrieve the right items quickly and prepare them for shipment.	Order pick rate (lines/hr), order accuracy
Ship & Dispatch	Move orders out on time to meet customer expectations.	On-time shipments (%), dock-to-ship time
Maintain Inventory Integrity	Keep records accurate to avoid stockouts or excess.	Cycle-count accuracy, inventory turnover

2. Warehouse Layout Fundamentals

1. **Receiving Area** – Dock doors, staging zones, inspection stations.
2. **Put-away Zones** – Bulk storage, pallet racks, shelving, automated storage/retrieval systems (AS/RS).
3. **Pick Zones** –
 - *Zone picking*: workers assigned to specific zones.
 - *Batch picking*: multiple orders picked in one pass.
 - *Wave picking*: synchronized picks for a group of orders.
4. **Packing & Consolidation** – Tables, conveyors, packing material stations.
5. **Shipping Area** – Dock doors, cross-dock lanes, loading docks.
6. **Support Spaces** – Offices, break rooms, maintenance, safety equipment.

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Tip: Use **flow-through design** (receiving → storage → picking → shipping) to minimize backtracking and reduce travel time.

3. Key Process Steps

3.1 Receiving

1. **Pre-arrival notification** (ASN – Advanced Shipping Notice).
2. **Dock check-in** → unload onto dock levelers.
3. **Verification** – scan barcodes/QR codes, compare PO, count units.
4. **Quality inspection** – damage check, temperature check (if needed).
5. **Put-away decision** – direct to storage location or quarantine.

3.2 Put-away

1. **Location assignment** – using WMS (Warehouse Management System) rules (e.g., FIFO, LIFO, size, weight).
2. **Transport** – forklifts, pallet jacks, conveyors, robots.
3. **Stocking** – place on pallet racks, shelves, bins; update system in real time.

3.3 Picking

Method	Best For	Typical Speed
Discrete	Small, high-mix orders	30–60 picks/hr
Batch	Medium-mix, moderate volume	70–120 picks/hr
Wave	Large volume, time-based shipping	100–180 picks/hr
Pick-to-Light / Voice	Accuracy-critical, labor-intensive	80–150 picks/hr

Steps:

1. Receive pick list (digital).
2. Navigate to location (guided by WMS, voice, or light system).
3. Scan item, confirm quantity.
4. Place in tote/cart.

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3.4 Packing

1. **Consolidate** items from pick tote.
2. **Select packaging** (box size, cushioning) – often automated by pack?optimization software.
3. **Label** – shipping label, barcodes, handling instructions.
4. **Seal** – tape, strap