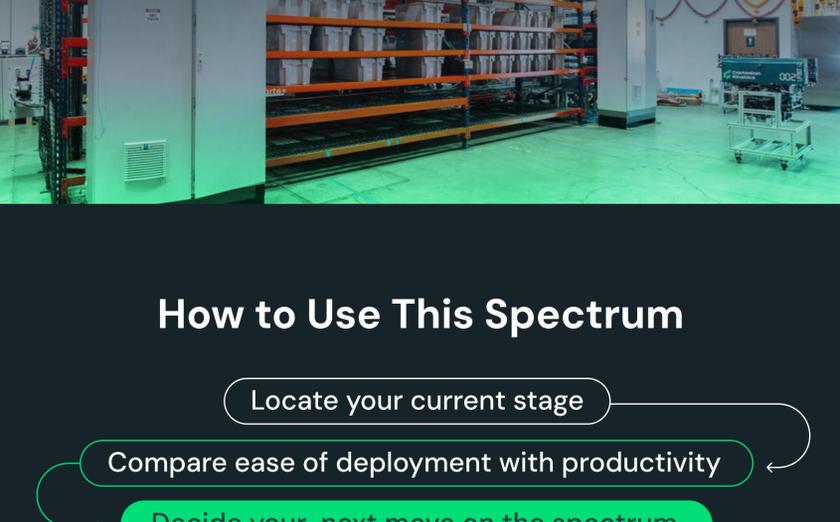


# The Warehouse Automation Spectrum

## Where Does Your Operation Fit?

From fully manual processes to Omni Rack Robotics (ORR)—how warehouses balance deployment ease against productivity gains.



## How to Use This Spectrum

Locate your current stage

Compare ease of deployment with productivity

Decide your next move on the spectrum

The spectrum runs from manual, labor-heavy operations to high-throughput, infrastructure-heavy ASRS. **Omni Rack Robotics** represents the “sweet spot” for brownfield sites that want **fast ROI with minimal disruption**.

## The 4 Positions on the Warehouse Automation Spectrum

High on productivity gains

High on ease of deployment

### Stage 3

## Traditional ASRS

(Big Iron, Big Commitment)

> high productivity gains but very low ease of deployment



#### Traits:

- Highly engineered crane- or shuttle-based systems, often in new or heavily remodeled buildings
- Dense storage, fixed aisles, integrated conveying, and rigid workflows
- Deep integration with WMS and upstream planning systems

#### Symptoms:

- Strong throughput and storage density once fully commissioned
- Long project timelines involving construction, permits, and cutovers
- Most changes require engineering work, not configuration tweaks

#### Risks:

- If demand or mix shifts, the system is hard to repurpose
- If capital is locked into one site, it's difficult to respond to network changes
- A mis-specified design can “bake in” bad assumptions for years

#### Deployment, Disruption, ROI:

- Deployment time:** Typically **12–18 months** from design to stable operations
- Disruption level:** High (construction, system cutover, multiple test phases)
- Typical ROI:** Multi-year horizon, tied to large, long-term capital plans and long deployment cycles

#### Relative Cost (\$):

- Highest up-front CapEx on the spectrum; requires a strong, stable business case

#### Ideal Use Cases:

- Large, highly stable networks with predictable, long-term volumes
- Sites where long project timelines and heavy infrastructure are acceptable trade-offs for maximum density

### Stage 2

## Omni Rack Robotics

(Cartesian Kinetics)

> high productivity gains with high ease of deployment



#### Traits:

- Rail-mounted robots operate on **existing racks** (standard, mezzanine, high bay)
- Overhead paths keep robots off the floor, freeing human traffic
- Digital twin (eCarte+) validates performance and ROI **before** deployment

#### Symptoms:

- Travel time collapses; goods come to people instead of people chasing goods
- Phased rollout **one aisle at a time**, while the rest of the DC continues running
- Operations teams see clear before/after metrics tied to specific aisles or clients

#### Risks: (if you stay off this stage):

- Competitors with ORR-like systems can deliver better SLAs and pricing
- The automation gap widens as others turn labor volatility into predictable, asset-backed capacity

#### Deployment, Disruption, ROI (4-4-4 model):

- Deployment time:** 4 days → initial design
- 4 weeks → digital twin validation with real order history
- 4 months → full deployment in production
- Disruption level:** Low; **phased rack-by-rack** retrofits instead of greenfield construction
- Typical ROI:** Measured in **months**, as each aisle comes online and starts paying back

#### Relative Cost (\$):

- Incremental CapEx** aligned to each aisle or customer footprint
- No need to rip and replace racks or re-pour floors

#### Ideal Use Cases:

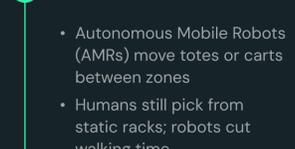
- 3PLs and mid-market operators** with time-bound contracts and limited appetite for 3–5 year paybacks
- Brownfield warehouses** where space, ceiling height, and existing racking are constraints, not a blank slate

### Stage 1

## AMR Deployments

(Mobile Robots on the Floor)

> moderate ease of deployment, moderate to high productivity gains



#### Traits:

- Autonomous Mobile Robots (AMRs) move totes or carts between zones
- Humans still pick from static racks; robots cut walking time
- Floor space is shared between people, pallets, and robots

#### Symptoms:

- Measurable improvements in pick rates and cycle times
- New routing rules and traffic patterns emerge on the floor
- More screens and dashboards appear, but core storage layout is unchanged

#### Risks:

- As volume grows, robot traffic and congestion can add complexity
- Adding more AMRs or zones can push CAPEX toward seven figures
- Benefits are limited if underlying processes and slotting are still manual

#### Deployment, Disruption, ROI:

- Deployment time:** Months (planning, mapping, integration, pilot)
- Disruption level:** Medium (changes to workflows, floor safety, and IT integration)
- Typical ROI:** ~2–3 years after go-live

#### Relative Cost (\$):

- Fleet plus software often near **“\$1M per warehouse”**
- Easier to phase than ASRS but still a major project

#### Ideal Use Cases:

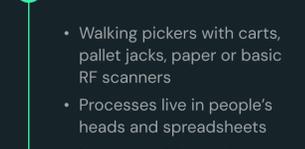
- Warehouses with **stable layouts** that primarily want to **reduce walk time**
- Operations willing to accept moderate disruption for meaningful, but not radical, gains

### Stage 0

## Manual Operations

(People-Heavy, Tool-Light)

> lowest automation, lowest productivity, highest volatility



#### Traits:

- Walking pickers with carts, pallet jacks, paper or basic RF scanners
- Processes live in people's heads and spreadsheets
- Layout decisions driven by habit, not data

#### Symptoms:

- Travel time consumes the workday; associates spend minutes walking to each pick
- Performance varies widely by shift or by who shows up
- Managers constantly “firefight” late orders and missing inventory

#### Risks:

- Labor costs and turnover keep rising; service levels stay fragile
- Small spikes in volume can break the operation
- Every new customer or channel adds complexity without structure

#### Deployment, Disruption, ROI:

- Deployment time:** N/A (already live, but no structured path to improvement)
- Disruption level:** High (churn, retraining, overtime)
- Typical ROI:** None; costs compound instead of improving

#### Relative Cost (\$):

- Most spend is **OpEx** on people and rework; labor dominates fulfillment cost

#### Ideal Use Cases:

- Early-stage operations that have not yet hit volume or SLA pain
- Very small warehouses where manual work is still manageable

## Mind the Automation Gap

The longer you remain on the manual end of the spectrum, the wider your **automation gap** becomes. The impact shows up as labor volatility, error costs, reactionary spending, and lost contract value.

See how Cartesian Kinetics’ Omni Rack Robotics can close your automation gap one aisle at a time.

Contact Us