

Reducing the Cost of Reverse Logistics with Vertical Storage

How Vertical Lift Modules and Vertical Carousels Can Improve Returns Processing



Returns are unavoidable. Inefficiency isn't.

Returned inventory can consume valuable floor space, require unnecessary handling and sit unresolved longer than it should. This guide explores how VLMs and Vertical Carousels can help organize returns, improve inventory control and move products toward disposition faster.

A Practical Guide for Retail, Ecommerce and Distribution Operations



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Executive Summary

Returns are a necessary part of ecommerce and retail, but receiving, inspecting, storing and dispositioning returned merchandise can quickly become expensive. As return volume grows, products can consume valuable floor space, require unnecessary handling and remain unavailable for resale while they wait for the next step.

Vertical Lift Modules and Vertical Carousels can provide controlled buffer storage before or after dispositioning. Instead of accumulating in Gaylords, pallets, carts or open shelving, returned merchandise can be assigned to defined locations and retrieved when it is ready for inspection, rework, restocking or another disposition.

The opportunity centers on four areas:

SPACE

Use vertical capacity instead of expanding returns across the warehouse floor.

TIME

Keep products moving toward inspection, rework, restocking or final disposition.

HANDLING

Reduce walking, searching and unnecessary movement of returned merchandise.

CONTROL

Improve visibility and accountability for returned inventory while it is in process.

VLMs and Vertical Carousels are not the right fit for every returns operation. This whitepaper examines where vertical storage can improve reverse logistics, which applications are best suited for automation and what to evaluate when building the business case.

19.3% of online sales were expected to be returned in 2025.

National Retail Federation

Returns Are Unavoidable. Inefficiency Doesn't Have to Be.



Returns have become an unavoidable part of retail and ecommerce. In 2025, retailers expected \$849.9 billion in merchandise to be returned, according to the National Retail Federation. Online purchases present an even greater challenge, with an estimated 19.3% of online sales expected to be returned. At the same time, consumers increasingly view easy returns as a basic part of the shopping experience. [1]

For retailers, that creates a difficult equation. Returns require transportation, receiving, inspection, storage, repackaging and disposition without creating another sale. The objective is not to eliminate returns, but to process them as efficiently as possible while recovering as much value from returned merchandise as possible.

\$849.9 billion

in merchandise expected to be returned in 2025

Vertical Lift Modules and Vertical Carousels cannot eliminate return shipping costs, but they can help address several expenses that arise after merchandise arrives, including the space used to hold returns, the time spent moving and locating products and the time it takes to move merchandise toward final disposition.

Where the Cost of Returns Accumulates

The cost of a return does not end when the package reaches the distribution center. Once received, merchandise may need to be identified, inspected, stored, repackaged, repaired or routed to another destination. Each additional step requires resources — and time spent waiting can create costs of its own.

HANDLING

Receiving, sorting, locating, retrieving and moving returned products all require employee time.

REPEATED TOUCHES

Products may be handled several times as they move between receiving, staging, inspection and storage areas.

SPACE

Returned merchandise occupies warehouse capacity while it waits for inspection, rework or final disposition.

DELAYED VALUE RECOVERY

Sellable merchandise cannot return to inventory — and damaged or seasonal goods may continue to lose value — while they sit unresolved.

Time Matters, Too.

Returned inventory may still have significant value, but that value can decline while the product remains in the returns process. Seasonal merchandise can miss its optimal selling period, while electronics and other fast-changing products may depreciate.

UPS identifies faster speed-to-stock, greater inventory visibility and improved value recovery as important elements of reverse logistics. It also notes that reducing transfers and double handling can shorten processing time. [2]

The economics of returns therefore extend well beyond return shipping. How merchandise is stored, handled and moved after it reaches the facility matters too.



The Storage Bottleneck in Reverse Logistics

**RETURN RECEIVED → IDENTIFICATION → INSPECTION & DISPOSITION →
TEMPORARY STORAGE / REWORK → FINAL DESTINATION**

Forward inventory is generally predictable. A distribution center knows what products it carries, how they are packaged and where they belong. Returned inventory is different.

Products may arrive in original packaging, replacement cartons or shipping bags. Some are unopened. Others require relabeling, repackaging or repair. Each item may be headed toward a different final destination, from return to inventory or vendor return to resale, recycling or disposal.

The challenge is what happens while those decisions and next steps are still pending.

Many operations use Gaylords, pallets, carts, racks or shelving as temporary buffers. At low volumes, these methods may work well. As returns increase, however, employees can spend more time locating individual products, moving containers and rearranging staging areas.



**Returned inventory needs somewhere to wait.
The question is how much space, handling and time that waiting should require.**

A VLM or Vertical Carousel can provide controlled buffer storage before or after dispositioning. Rather than placing an item somewhere within a mixed pallet or Gaylord, returned merchandise can be assigned to a defined location until it is ready for the next step.

The goal is not to automate every part of reverse logistics. It is to keep returned inventory organized and moving.

When Returns Begin Taking Over the Warehouse

Reverse logistics frequently occupies space that was never designed for it. Many distribution centers were planned around receiving new inventory and fulfilling customer orders. As ecommerce and return volume grow, returns often expand into available corners, pallet positions and staging areas.

During peak periods, that footprint can increase quickly. The obvious response is to find more floor space, but warehouse space is expensive—and every square foot devoted to returns is space that cannot support fulfillment, production or forward inventory.

Vertical storage approaches the capacity problem differently.

VLMS and Vertical Carousels use facility height to store inventory within a relatively compact footprint. In a returns operation, that capacity can support products waiting for inspection as well as merchandise awaiting repackaging, repair, vendor return or another next step.

This can be especially valuable during seasonal peaks. Instead of continually adding pallet positions, overflow areas or off-site storage as return volume rises, an operation may be able to absorb more of that fluctuation within its existing footprint.



How much valuable floor space is being used simply to hold products while they wait?

If the answer is significant, increasing storage density deserves consideration.

Reducing Unnecessary Handling



Returns are not expensive only because they occupy space. They also require people to receive, move, locate and retrieve them.

When products are stored in pallets, Gaylords, carts or conventional shelving, employees may need to walk to the inventory, search for a particular return, move containers or handle multiple products before finding the one they need.

Repeated across hundreds or thousands of returns, those small activities become significant non-value-added time.

Bring the return to the operator — not the operator to the return.

VLMs and Vertical Carousels use a goods-to-person approach. The requested storage location is delivered directly to an ergonomic access point, reducing the need to travel through a storage area searching for individual products.

In a returns operation, merchandise can remain associated with a defined location until it is ready for inspection, repair, repackaging or another process. When that item is needed, it can be retrieved directly instead of requiring an employee to determine which pallet, cart or container contains it.

Less walking. Less searching. Less unnecessary movement.

Faster Disposition Means Faster Value Recovery



A returned product has not necessarily lost its value. It may be unopened and ready to sell, need a new package or label, require a simple repair or retain value through a secondary sales channel or vendor return.

But none of that value can be recovered while the product remains unresolved.

UPS identifies faster speed-to-stock as an important part of reverse logistics because delays can contribute to inventory depreciation. That makes **time to disposition** an important measure of returns performance. [2]

Two Identical Returns. Two Different Outcomes.

RETURN A

Received → Inspected → Repackaged → **Back in Inventory**

RETURN B

Received → Waiting → Waiting → Waiting → **Eventually Processed**

Both products may ultimately return to stock, but they have not produced the same result. The first became available for resale sooner. The second consumed storage space and tied up inventory value while it waited.

Structured buffer storage can help keep the returns queue visible and accessible. Returned items can be organized by processing status, date received, required work, destination or other operational priorities. When supported by the appropriate inventory software, the operation can retrieve and process the items that need attention instead of simply working through whichever pallet, cart or container is easiest to reach.

The faster a return reaches its next destination, the sooner its value can be recovered.

Protecting and Controlling Returned Inventory



Returned merchandise can occupy an unusual position within the inventory process. It has arrived at the facility, but it may not yet be back in active inventory. Its value is known, while its condition, status or final destination may still be undecided.

For electronics, tools, jewelry, components and other valuable merchandise, leaving returns in open carts, pallets or shelving can create unnecessary exposure.

VLMs and Vertical Carousels store merchandise inside an enclosed system. When paired with inventory-management software and appropriate user permissions, access and transactions can also be controlled by user.

But the benefit extends beyond physical security. Defined storage locations make it easier to know **what was received, where it is being held and what needs to happen next.**

AWAITING INSPECTION
RETURN TO STOCK
REPACKAGING

REPAIR
RETURN TO VENDOR
SECONDARY SALES CHANNEL

The specific categories will vary by operation. What matters is replacing an unstructured returns buffer with a storage process that keeps merchandise visible and accountable while it moves through the returns process.

Returned inventory should be received, located and accounted for — even between destinations.

VLM or Vertical Carousel?



Both Vertical Lift Modules and Vertical Carousels use vertical space and bring stored inventory to the operator. The better choice depends on the products being returned and how the operation needs to handle them.

Vertical Lift Module

A VLM stores inventory on trays and automatically retrieves the requested tray to the access opening.

Best suited for:

- Products that vary in size and weight
- Changing inventory profiles
- Parts, tools and electronics
- Packaged merchandise and components

Adjustable tray spacing allows a VLM to accommodate different product heights, making it especially useful when returned merchandise is not uniform.

Consider product size, weight and variability, normal and peak return volumes, and how long merchandise typically remains in the returns process.

Vertical Carousel

A Vertical Carousel stores inventory on carriers that rotate vertically and deliver the requested carrier to the access opening.

Best suited for:

- Smaller, more consistently sized products
- Inventory organized into bins or compartments
- Accessories and jewelry
- Small electronics and components

Its fixed carrier structure can work particularly well when returned inventory has relatively predictable dimensions.

Those factors should determine which storage approach makes sense.

Is Your Returns Operation a Good Fit?

Not every reverse logistics operation needs automated storage. If return volume is low, merchandise moves directly from receiving through inspection, or products are too large or irregular for the equipment, a VLM or Vertical Carousel may provide little value.

A Stronger Application Usually Has Several of These Characteristics

RETURNS ARE ACCUMULATING

Merchandise waits for inspection, rework or another process.

FLOOR SPACE IS CONSTRAINED

Returns are consuming pallet positions, staging areas or other valuable warehouse space.

EMPLOYEES SPEND TIME SEARCHING AND MOVING

Workers regularly locate, transport or rearrange returned merchandise.

VALUABLE PRODUCTS NEED MORE CONTROL

Returned inventory requires better visibility or controlled access.

SEASONAL PEAKS OVERWHELM CAPACITY

Return volume temporarily exceeds available storage or staging space.

SELLABLE INVENTORY SITS TOO LONG

Products that could return to stock remain tied up in the returns process.

Start With Your Current Process

- How many returns do we process each day — and during peak periods?
- How much floor space do returns consume?
- How long does a return typically wait for disposition?
- How much employee time is spent transporting, searching for and locating returns?
- How many times is the average product handled?
- How much sellable inventory is currently sitting in the returns process?
- How difficult is it to locate a specific returned item?

These questions establish the baseline needed to evaluate the potential return on automation.

The business case is not automated storage versus pallet rack. It is the cost of the equipment compared with the ongoing cost of the process it can improve.

Four Areas to Look for Savings

A realistic reverse logistics automation project should focus on the costs the storage system can actually influence.

01 SPACE

Using facility height can reduce the floor area devoted to work-in-process returns and help absorb higher volumes without continually expanding staging areas.

Measure: Floor space used during normal and peak periods.

02 HANDLING

Goods-to-person access can reduce walking, searching, product movement and repeated handling.

Measure: Travel time, search time and touches per return.

03 TIME

Better organization can shorten the period between receipt and final disposition.

Measure: Average time from receipt to disposition.

04 CONTROL

Defined storage locations and directed transactions can improve visibility and accountability.

Measure: Search incidents, misplaced inventory and access requirements.

The goal is not more automation. It is reducing the space, handling, time and lack of control that make returns more expensive.



Make Returns a Process, Not a Pile



Returns are not going away. The challenge is handling them without allowing unresolved merchandise to consume more space, time and attention than necessary.

Vertical Lift Modules and Vertical Carousels are not a universal solution to reverse logistics. They do not eliminate transportation costs, make disposition decisions or prevent products from being returned. What they can do is bring structure to the inventory waiting between receipt, inspection, rework, restocking and final disposition.

For the right application, vertical storage can help reduce the footprint required for returns, limit unnecessary handling, improve visibility and control, and keep merchandise moving toward its next destination.

**Spend less time and space storing unresolved returns.
Spend more time moving products toward value recovery.**

Could Vertical Storage Improve Your Returns Operation?

White Systems can evaluate your returns volume, inventory profile, available space and current workflow to determine whether a Vertical Lift Module, Vertical Carousel or another storage approach makes sense for your operation.

Talk with a White Systems automated storage specialist about your returns process.

SOURCES

The research and industry data referenced throughout this whitepaper are listed below. Source numbers correspond to the citations shown in the text.

01 — National Retail Federation and Happy Returns, a UPS company

2025 Retail Returns Landscape. October 15, 2025.

Used for: projected return volume, online return rate and consumer returns expectations.

Referenced on: Executive Summary; Returns Are Unavoidable

02 — UPS Supply Chain Solutions

Reverse Logistics Solutions.

Used for: speed-to-stock, value recovery, inventory visibility and reduced double handling.

Referenced on: Where the Cost of Returns Accumulates; Faster Disposition Means Faster Value Recovery

Note

Operational results will vary based on return volume, inventory profile, workflow, facility layout and system configuration.

About White Systems

White Systems provides automated storage solutions designed to help organizations make better use of space, improve inventory access and bring greater control to material handling. Solutions include Vertical Lift Modules, Vertical Carousels, Horizontal Carousels, inventory software and nationwide service and support.

Learn more about White Systems automated storage solutions.

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