

A SPECIAL MODERN MATERIALS HANDLING SUPPLEMENT

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Planning Guidelines for Manufacturing, Warehousing, and Distribution



FIVE world-class facility layouts for THIRD PARTY LOGISTICS

Retail goods
crossdocking operation

Manufacturing
machines and parts DC

Value-added retail clothing DC

Retail computer distribution

Consumer electronics
spare parts DC

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MODERN
Materials Handling

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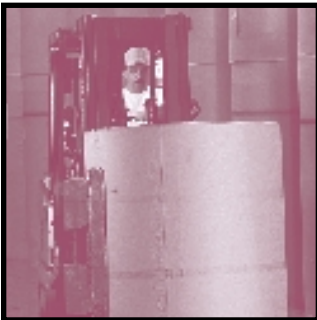
Planning Guidelines for Manufacturing, Warehousing, and Distribution

JULY 2001

What's inside



WITH MORE AND MORE COMPANIES RECOGNIZING THE value of turning to a third party to do their logistics work, the 3PL industry has been growing at a phenomenal rate. But at the same time, 3PLs face some specific challenges: Get orders out quickly, accurately, and cost-effectively. And have flexible systems that can handle unexpected changes in business. To be successful, 3PLs need the right combinations of materials handling equipment, systems, and software to meet all of those goals. In this special 3PL edition of Design Plans & Ideas, we show you five different facility layouts – each highlighting a different application of technology or functional area – that are world-class in their overall design.



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Looking ahead: In November, we take a look at Productivity as a Priority for materials handling.

SECRETS of the Top 3PLS

A functional warehouse layout and clever use of basic materials handling equipment and systems are keys to success



Ingram Micro Logistics, a 3rd party logistics provider for high-tech manufacturers, handles some 14,000 orders daily with 99.92% accuracy thanks in part to the application of proven equipment and systems.

“One of the things that we like to say is that we no longer run warehouses. We operate distribution centers, or flow-through facilities,” says Chuck Lounsbury, senior vice president for Global EHT and CPG Industries for Ryder Logistics.

What is Lounsbury's rationale for this new definition of 3PLs? He says it's the fast-paced nature of the 3PL business today. “It's unusual for us to hold a particular item longer than 30 days – and in fact normally it's a much shorter timeframe than that. With seemingly every company out there trying to take inventory out of the channel, there is now extra pressure on the 3PLs to do it quickly and get it right the first time.”

Oh yeah, and add in the need for flexibility to boot. “From a materials handling perspective, we have to make sure that we have designed in the flexibility to handle a broad cross-section of product. Not only in terms of dimensional variability, but also in terms of order profile variability,” says Chris Sang,

"We no longer run warehouses, we operate distribution centers,"

Chuck Lounsbury, senior vice president, Ryder Logistics

founder, chairman, and CEO of the 3PL iFulfillment.

But it doesn't mean they always have an infinite budget with which to meet those goals. "We do lots of work with the 3PLs, and one of their major objectives is to limit the amount of capital investment that they put into their facilities," says John Yacka, a systems designer with the consulting company Gross & Associates. "As a consequence, we're seeing some very clever things being done with lower-cost designs."

For example, Yacka says that he is seeing more mixing and matching of storage and staging systems – even within a single picking line. "The benefit to 3PLs is that by combining equipment in creative ways, they can achieve the best trade-off in terms of cost, flexibility, and throughput," says Yacka. Similarly, different types of industrial trucks are brought into the mix to interface with these diverse storage systems.

When it comes to the econom-

ics of building new facilities, Lounsbury concurs with Yacka. "It's not to say that we never put something like high-speed automation into our facilities – in fact we just installed a new high-speed conveyor system at one of our DCs – it's just that we have to be sure that the payback is there. We don't want to make the investment without the assurance that we are going to have that business for the long-haul."

Increasingly, 3PLs – like everyone else these days – are looking for ways to get the most bang out of their buck. Often that means sticking with the traditional, proven technologies, including storage racks and systems, industrial lift trucks, dock equipment, reusable containers, and WMS software.

"They are not so much looking for the latest bells and whistles as they are really looking to build solid functionality into their systems – whether it be the warehouse layout or the equipment itself," says Yacka. "They want to make sure that they can get the

product out the door quickly, accurately, and efficiently first."

"We look initially for off-the-shelf technologies that will help us accomplish those goals," explains Lounsbury. "Frequently, when it comes to software, where no one application exactly meets our requirements, we tailor it. But the less development we have to do with any new technology, the better for us."

Software makers are responding to that need, with more add-on modules and products targeted at particular industries – including 3PLs. Hardware and equipment suppliers are also introducing new products with functionality and flexibility in mind – many of which are featured here in this special report on world-class 3PLs.

We also feature layouts of five world-class 3PL facilities that have creatively combined materials handling equipment and systems to meet a host of operational goods, including:

- High throughput
- Picking efficiency
- Rapid order processing
- Efficient use of space
- Efficient processing of value-added services

The goal is simple: To provide you with ideas on how you can create a world-class facility of your own.

FIVE KEYS TO 3PL SUCCESS

1. Employ proven materials handling equipment and systems
2. Seek to minimize amount of additional development required to apply specific software and technology
3. Strive for an appropriate trade-off in equipment cost, productivity, space requirements, and utility
4. Build flexibility into your operations
5. Never bring anything into the facility that you cannot create an audit trail for

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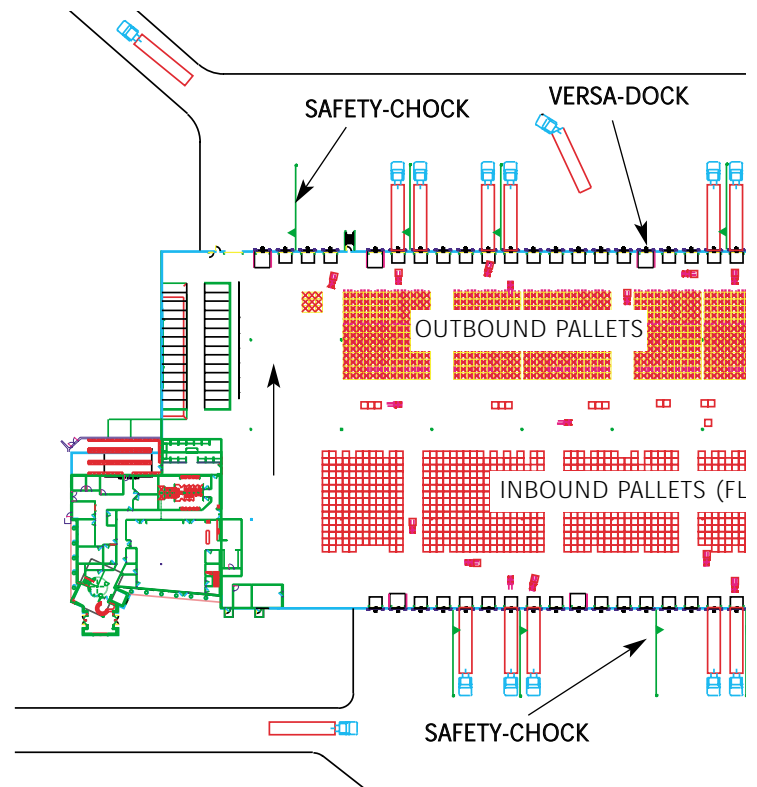
The SercO S-2200 ULTRA Dock Shelter™ combines the flexibility of a dock seal with full trailer access afforded by a dock shelter. The S-2200 ULTRA Dock Shelter creates a tight seal between the building wall and the back of the truck, providing energy savings and added comfort for dock employees. The S-2200 ULTRA Dock Shelter's unique steel frame design and construction provides strength and durability while also allowing full access to the truck. If an off-center trailer backs into the side pad, it will compress and resist damage.

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Circle 704

Retail goods cross-docking operation

Throughput is key at this fast-paced 3PL crossdocking facility that relies on versatile dock equipment to ensure safety



- Locating shipping directly across from receiving minimizes travel distances and boosts throughput
- Vehicle restraint systems improve dock safety by minimizing trailer movement and eliminating potential for a vehicle to drive away during unloading/loading activities
- Easy-to-use hydraulic dock levelers accommodate a wide variety of truck sizes and facilitate quick loading/unloading of trucks
- Advanced inside/outside dock communication system that notifies

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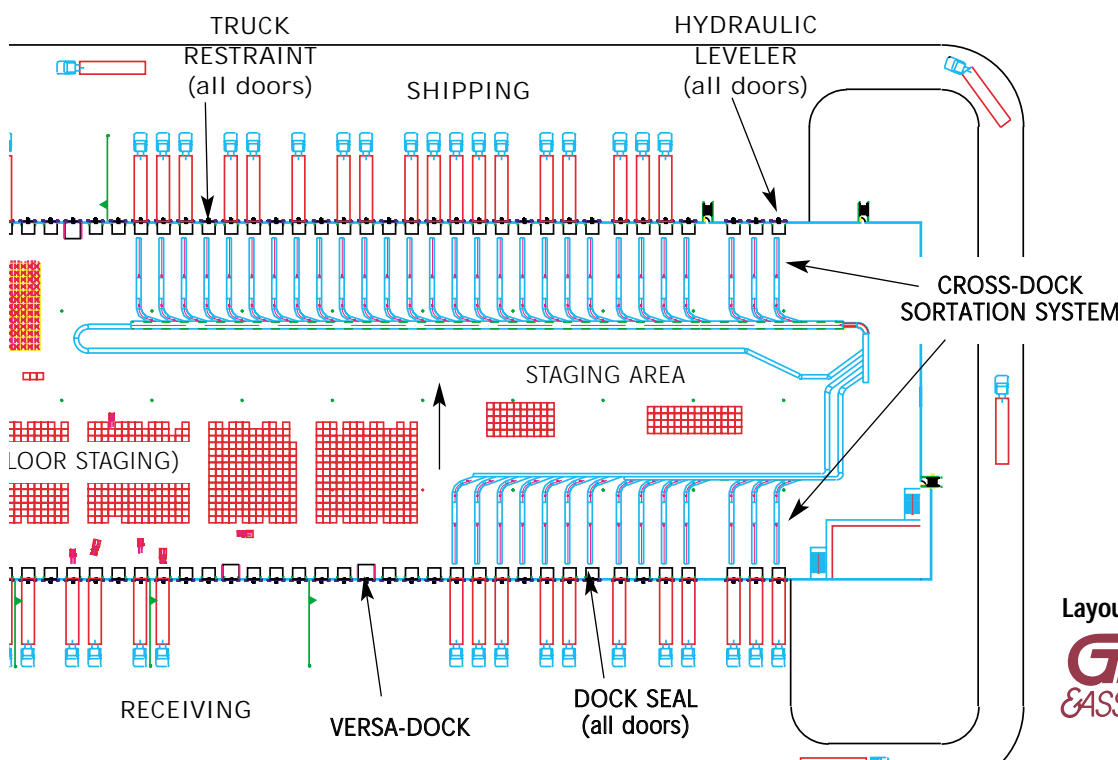
Rapid turnaround of orders is the primary mission of this 3PL crossdocking operation for a major retail chain. As is the case with any typical crossdocking operation, goods are staged, not stored. Incoming pallet loads are transferred directly to a pallet flow rack staging system (10 pallets deep) at the shipping dock, bypassing storage entirely. Individual cases, which make up approximately 25% of the volume, are sorted by destination and queued up on

sortation lanes directly adjacent to the dock doors. A majority of products enter and leave the facility the same day. Given the hectic pace of this busy facility, management has paid particular attention to the safety and efficiency of dock operations, installing flexible hydraulic level-

ers, vehicle restraints with clear inside and out communication and dock seals to protect the dock from inclement weather.

FACILITY OVERVIEW

Total warehouse space: 230,000 sq ft
Number of dock doors: 104
Daily throughput: 350 trailers/day
Number of full-time employees: 43
Number of shifts: 2
Equipment budget: \$6 million



Layout Provided By:

GROSS & ASSOCIATES

- personnel of dock status at all 104 dock doors supports safe operations, and eliminates confusion – critical features for any busy dock area
- Dock seals increase worker comfort and minimize energy loss through the dock doors

- The longer and narrower the configuration of a crossdocking facility, the greater the inventory velocity
- Ample staging areas at both receiving and shipping help keep crossdocking activities organized and eliminate congestion

- Sortation conveyor automatically sorts individual cartons to appropriate shipping lanes, eliminating handling and speeding order processing; overhead design frees up floor space below

dock equipment

**NISSAN FORKLIFT CORPORATION,
NORTH AMERICA -**

A PROFILE

THE NISSAN INDUSTRIAL EQUIPMENT DIVISION of Nissan Motor Company Limited began manufacturing forklifts in Japan in 1957, and has been selling forklifts in the United States since 1965. In 1988, Nissan Industrial Equipment purchased Barrett Industrial Trucks, a manufacturer of industrial equipment in the Chicago, Illinois area since 1914. This purchase made Nissan the first Japanese company in North America to manufacture and distribute all five classes of industrial trucks. The first Nissan forklifts were assembled in Marengo, Illinois in May of 1988. From that small beginning thirteen years ago, Nissan has seen sales and production grow to over 15 times that first year's production number. In 1993, the consolidation of operations was completed in



Marengo and a new corporation was formed, Nissan Forklift Corporation, North America, manufacturing the Nissan Forklift and Barrett Industrial Truck brands for distribution to the North American market,

and export to other global markets.

Nissan Forklift Corporation employs 530 full time employees in their 400,000 sq. ft. facility. The Nissan facility in Marengo is the largest of three Nissan forklift production facilities in the world. Nissan's forklift operations have consistently posted operating profit for the company. Its Industrial Machinery Division employs 1,730 people in Japan, Europe, and the United States, and approximately 30,000 units were sold last year in more than 60 countries worldwide.

Nissan Forklift Corporation, North America is a full line supplier of engine powered forklifts, electric sit-down and stand-up riders, narrow aisle reach trucks, electric pallet trucks, electric tow tractors, electric walkie stackers, and manual pallet trucks in the Nissan and Barrett Industrial Truck brands. Both products are sold and serviced through a North American dealer network with more than 140 locations.

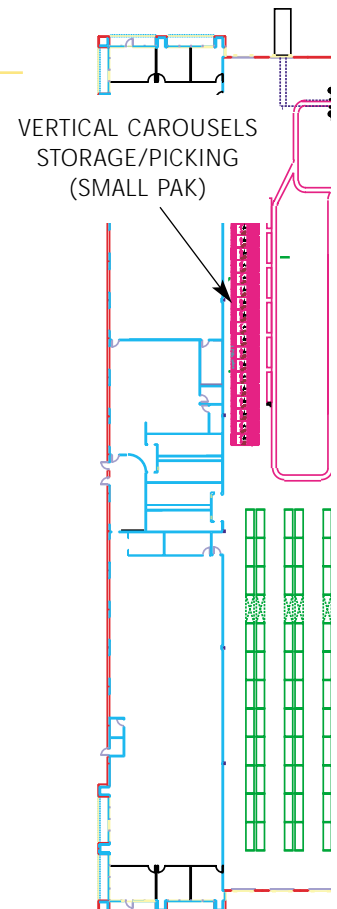
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Circle 700

Manufacturing machines and parts DC

This high-volume 3PL depends on a flexible mix of industrial trucks/storage equipment to handle a broad range of products

- Locating receiving and shipping areas side-by-side promotes a U-shaped flow, which streamlines handling and eliminates backtracking
- Combining vertical and horizontal carousels in same layout allows segmentation of inventory by activity level
- Horizontal carousels provide high picking throughput combined with high picking accuracy while vertical carousels deliver high-storage density in a small footprint
- Short picking aisles in the narrow aisle pallet storage boost picking productivity by reducing travel distances
- Double-length pallet jacks facilitate handling of oversize items, but also improve picking productivity in handling smaller items, as an operator only has to visit a single location once to fill two orders
- The storage area for machines and oversize items features 12-ft aisles, facilitating the easy maneuvering of large pallets and double-length pallet jacks
- Narrow-aisle pallet racks and orderpicking trucks maximize use of the cube
- Block stacking of pallets at the shipping dock help to streamline handling of goods that ship in full pallet loads and reduce congestion at the dock



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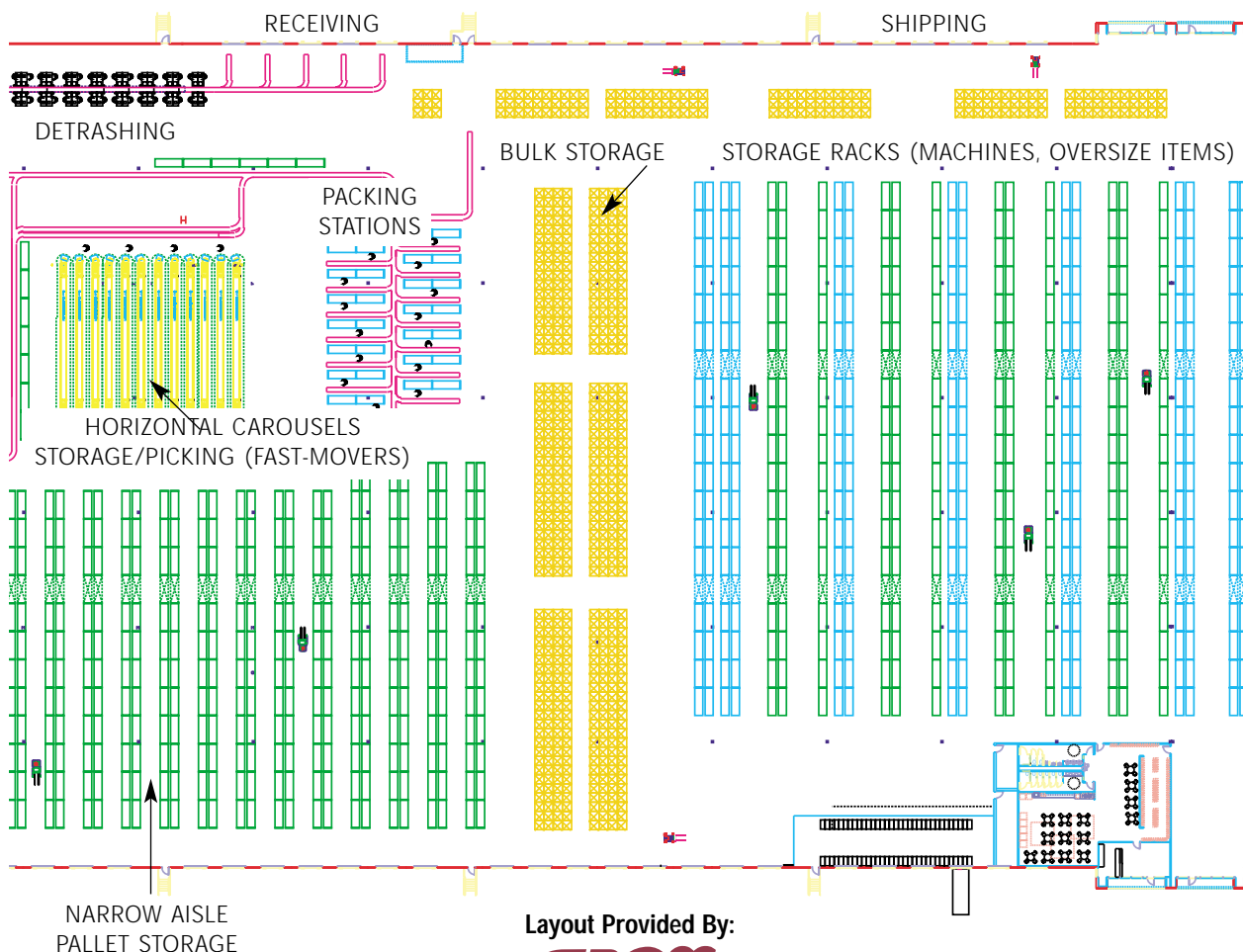
From small parts received in cartons to large machine components and machines, this busy 3PL handles just about everything but the kitchen sink. Small parts and components received in cartons travel through a detrashing operation, where all packaging is removed and the product is placed into totes bound for a horizontal or vertical carousel. Conversely, items are picked into totes, then travel to a packaging station where they are placed

into cartons for shipping. Larger incoming items travel to one of several storage/staging areas, depending on size, weight, and activity level.

A combination of bulk pallet storage, single-deep pallet rack, double-deep pallet rack, and narrow-aisle racks have specific requirements for lift trucks, and the facility uses a combination of pallet jacks, counterbalanced trucks, high-capacity trucks, and narrow-aisle trucks.

FACILITY OVERVIEW

Total warehouse space: 190,000 sq ft
Daily throughput: 1,200 orders
Number of SKUs: 36,000
Number of full-time employees: 88
Number of shifts: 1
Equipment budget: \$4.5 million



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MARC GLOBAL SERVICES

IN TODAY'S COMPETITIVE BUSINESS-TO-BUSINESS (B2B) and business-to-consumer (B2C) marketplace, businesses are progressively looking to technology to provide a competitive advantage. While technology alone cannot reap these rewards, technology combined with experts knowledgeable of systems and operations can.

MARC Global Services has established itself as a leading Supply Chain Execution (SCE) systems integrator in the global 3PL market space by providing integration of leading SCE packages with a proven project management philosophy. MARC Global Services offers integrated solutions to large and mid-sized companies that recognize e-fulfillment, warehousing, distribution or discrete production as a vital part of their core business.

For distribution environments, we offer a premier SCE solution based on the MARC product suite with its best-of-breed warehouse management system, MARC-CS, and a host of complementary products that support value-added services, labor standards, customs, billing, mechanization control and visibility into MARC-based operations via checkMARC.net. The MARC product suite can go from traditional distribution to the new ebusiness fulfillment models. MARC's Internet-centric, Web-based architecture provides global visibility of fulfillment operations while incorporating flexibility and configuration tools that allow for quick reaction to new and changing business models. In addition, MARC-eXchange Manager provides an enhanced architecture to support business community integration.

MARC Global Services engaging change across the supply chain by providing proven technology combined with expert knowledge of systems and operations.

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Circle 706

Value-added retail clothing DC

This 3PL relies on a functional layout and strong WMS to provide value-added garment hanging/labeling services quickly, efficiently

Layout Provided By:

GROSS
& ASSOCIATES

- U-shaped flow of facility streamlines order processing and eliminates any backtracking or double handling of material
- Staging area at receiving helps to reduce congestion and provide orderly flow of incoming material into facility
- WMS provides seamless handling of the same SKU for multiple customers
- WMS automatically determines the value-added service required per product based on order and assigns products and tasks accordingly to balance workflow and streamline order flow; work flow is readjusted on the fly to maximize productivity and avoid bottlenecks
- Bar code identification and RF scanning equipment provide real-time tracking of inventory and orders
- Use of trolley transport system and delivery boom eliminates manual handling and facilitates quick loading of outbound product onto trailers
- Functionality of WMS can be extended to include billing system that captures all billable activities across multiple operations

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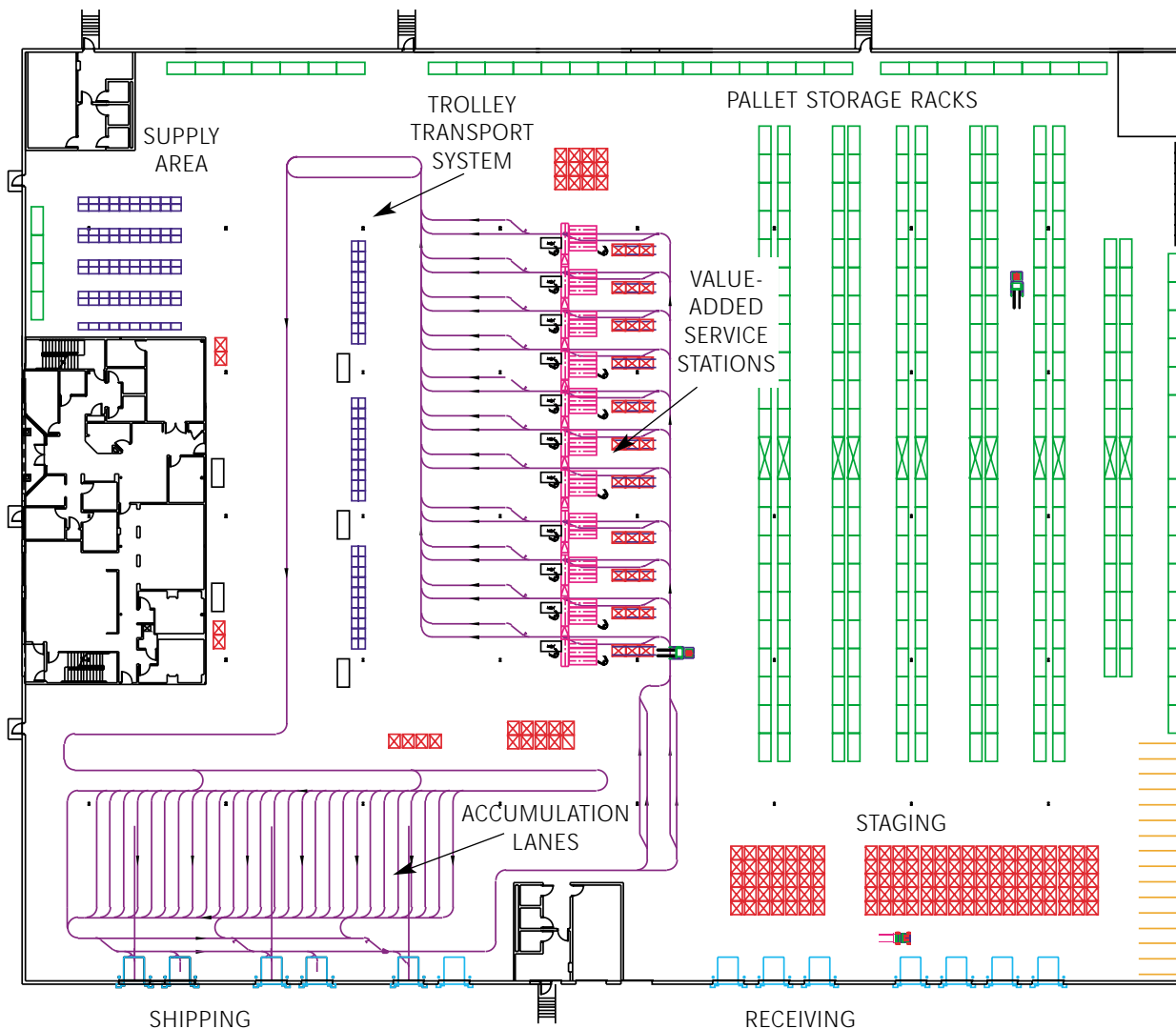
Seamless delivery of services is the primary goal of this 3PL, which provides value-added garment hanging and labeling services to a number of major clothing retailers. Product arrives at receiving in a flat condition and is taken either to a staging area prior to storage or directly to the pallet storage area. When orders are to be processed, pallets and cases are placed on pallet flow lanes feeding processing stations,

where labels are applied and/or garments hung on hangers. The hanging garments travel by trolley on a rail system to a sortation area, where they are diverted to the appropriate shipping lane and loaded onto delivery trailers using an extendible boom. A

FACILITY OVERVIEW

Total warehouse space: 90,000 sq ft
Daily throughput: 50,000 garments
Number of SKUs: 50-500
Number of full-time employees: 35
Number of shifts: 1
Equipment budget: \$800 thousand

WMS helps the facility manage the complexity of providing value-added services to multiple customers.





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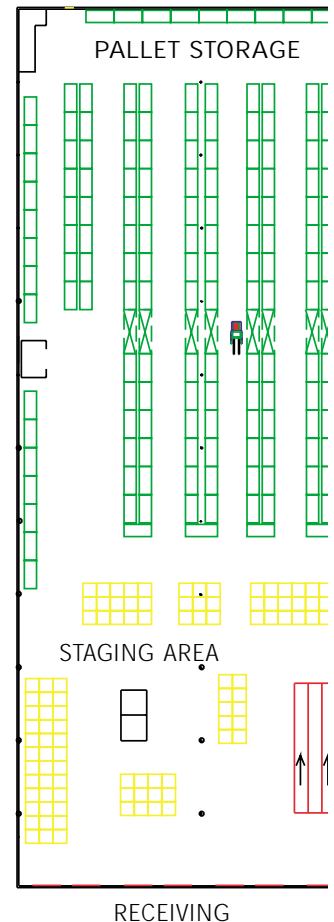
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Circle 708

Retail computer distribution

Segmenting inventory by size, activity levels and using proven picking methods and systems help this 3PL pick up pace

- Oversize dock areas reduce congestion and potential for any bottlenecks
- Short pick lanes and use of pallet flow rack for picking large items maximizes picking efficiency
- Locating replenishment racks adjacent to pick areas reduces travel distances and times
- Storage/staging equipment is carefully matched to item size and frequency, optimizing the use of space and maximizing picking productivity
- Use of different storage equipment on same pick line creates flexibility, optimizes orderpicking throughput
- Use of dynamic staging systems (flow lanes) at both shipping and receiving reduce congestion, ensure FIFO rotation of items, and promote efficient operations
- A WMS facilitates consolidation of orders coming from multiple pick points within the facility
- Should business expand, a mezzanine can be added to the small parts picking area, thereby increasing order-handling capacity



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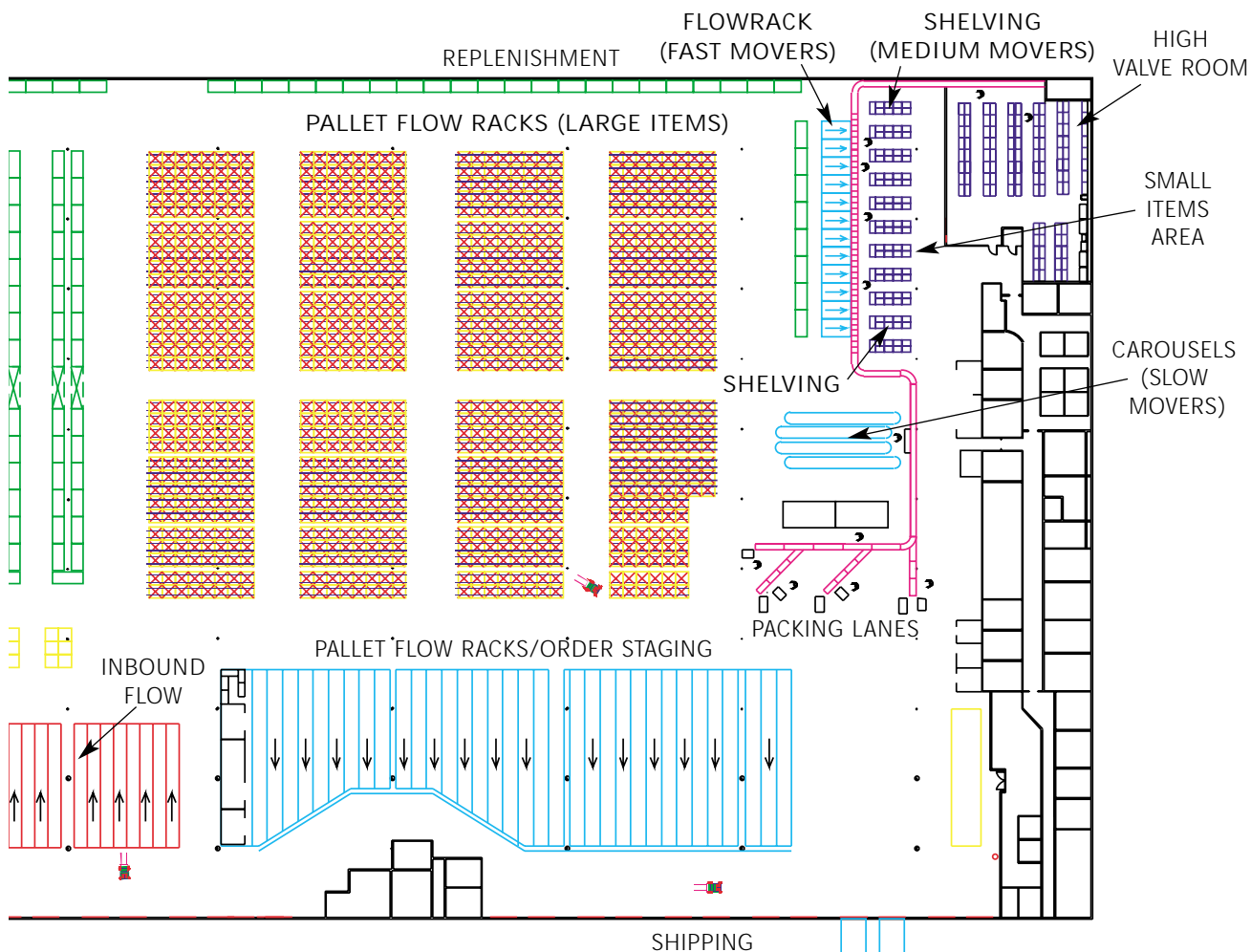
Rapid turnaround of orders is critical for this 3PL, which distributes computers and peripherals to retail stores. Most items are received in full pallet loads, which are staged on the receiving dock prior to being put in the pallet storage area. Large items are picked directly from pallets on flow racks. Smaller items are segregated by activity level: The fastest items reside on flow rack; medium-movers are

from shelving; and the slowest-moving items, which represent 70% of the SKUs, are picked from carousels. High-value items, such as microprocessors, are housed in a controlled area adjacent to small parts picking. Individual items are packed, put onto pal-

lets, and merged with the remainder of the order. Completed orders are staged on flow racks prior to shipping.

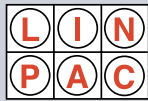
FACILITY OVERVIEW

Total warehouse space: 135,000 sq ft
Daily throughput: 5,000 orders
Number of SKUs: 2,300
Number of full-time employees: 55
Number of shifts: 1
Equipment budget: \$2.75 million



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LINPAC Materials Handling

NEW AND IMPROVED ROPAK™ 4048ns OFFERS MORE HEIGHT OPTIONS

THE NEW ROPAK™ 4048ns REUSABLE, collapsible container from LINPAC Materials Handling now offers more height options and greater material handling efficiency, convenience and cost savings. Made of tough, durable high-density polyethylene (HDPE), the 4048ns has a 40" x 48" footprint and is available in seven heights: 25", 29", 34", 39", 42", 47", and 50".

The 4048ns now features non-sequential folding sidewalls for easier use and drop doors with articulating hinges, allowing the open door to lay flat against the side of the container. This provides tighter, safer stage and increased application versatility. Doors that open on opposing or adjacent sides of the container can be specified.

The 4048ns containers can be stacked up to 6-high (previously 4-high), conserving more floor space, and are compatible with the original 4048 containers. The containers have load capacities up to 2,000 lbs., and collapse to a fraction of their height for compact storage and shipping. A dunnage container model is also available.



Other design enhancements include more labeling and product identification options, solid base, and a replaceable fork strap. Custom colors, ventilated base, lids, ID plates and other options and accessories are also available.

The reusable containers manufactured by LINPAC are used to replace single trip paper, cardboard and metal packaging. The ROPAK product line includes pallets, hopper bottom containers and collapsible and non-collapsible container models with footprints ranging from 32" x 30" to 70" x 48", and heights to 50". A full range of design, implementation, financial and support services are available.

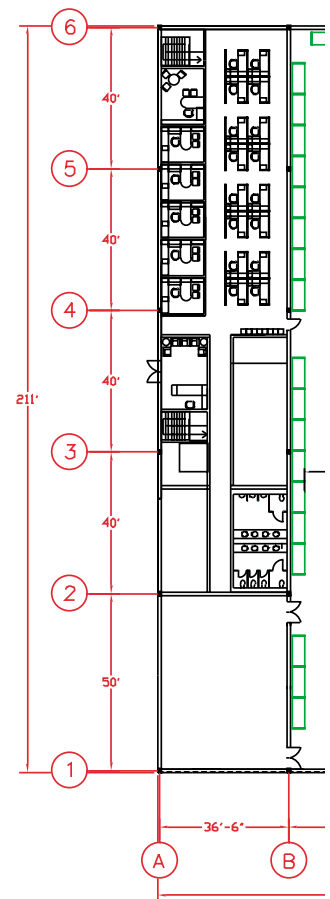
Contact us at (800) 442-4892 or visit our Web site at www.LinpacMH.com.

Circle 702

Consumer electronics spare parts distribution

Reusable containers that streamline handling and an efficient layout factor heavily in the success of this busy 3PL

- Combining flow rack and shelving in the broken case pick module provides flexibility and achieves an appropriate trade-off in cost, storage space requirements, and picking efficiency
- Locating fastest-moving items in most accessible areas of pick zones further improves picking efficiency
- Overhead sortation conveyor reduces handling steps and frees up floor space below
- The fact that the number of suppliers and customers of this 3PL is relatively small, and they are located relatively close by, facilitates the use of reusable containers
- Use of containers helps to maintain a neat and sanitary operation, which is critical when handling delicate electronic components
- The fact that the containers are collapsible allow them to be staged in a folded-flat condition when empty, adjacent to the receiving dock
- Full containers are staged in a bulk stacking area located next to the shipping dock for quick delivery of orders
- Containers can be stacked six high, helping to reduce floor space requirements



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Rapid handling is the name of the game for this busy 3PL spare parts distribution center, which handles a variety of full and broken case items. A high percentage of the items travel to and from the facility in large, collapsible reusable containers. Incoming containers, with a standard 40 by 48 footprint, are staged on the floor for picking. Incoming pallet loads of inventory are housed on pallet racks adjacent to the container picking area. Lift

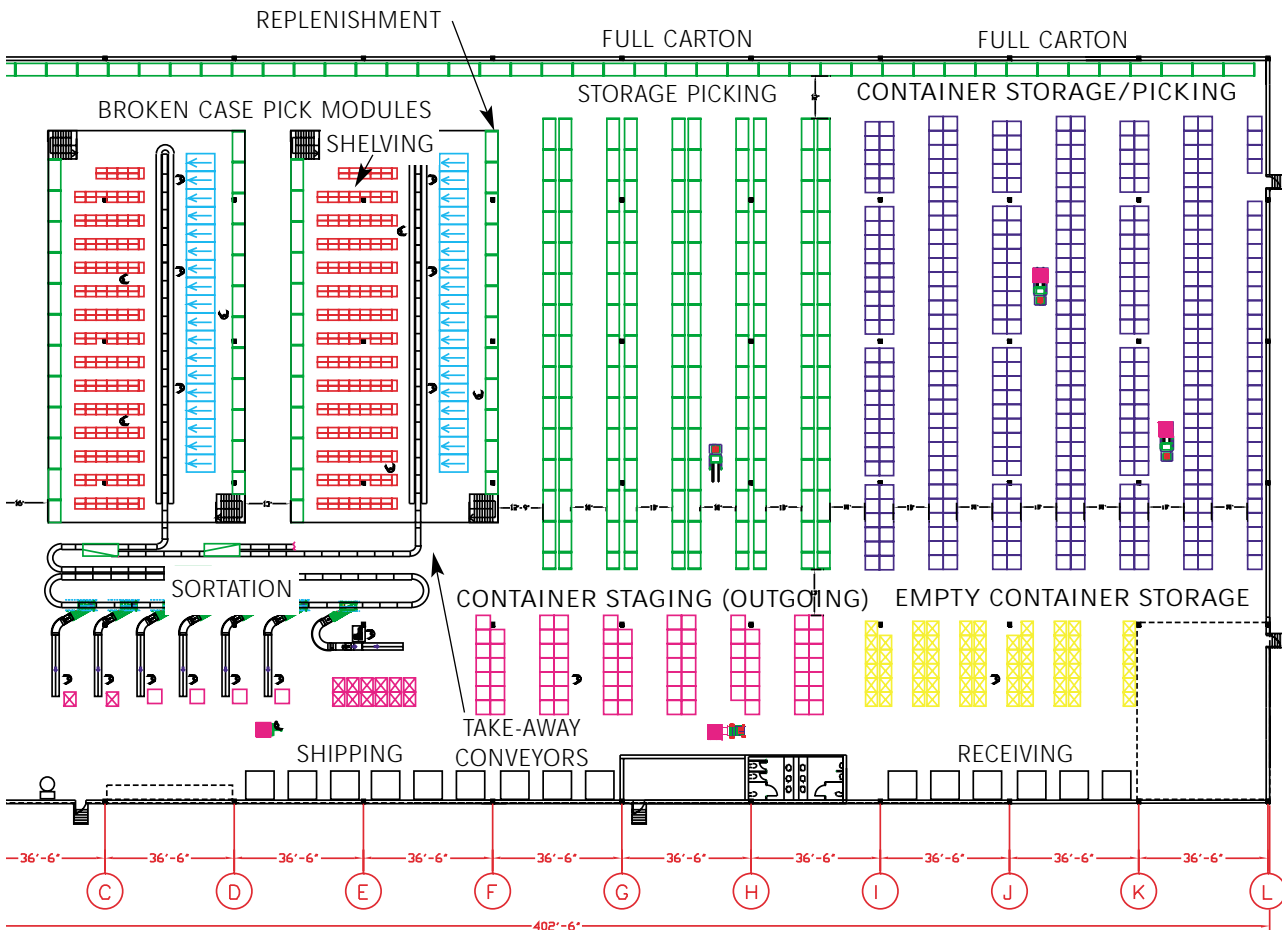
truck operators travel the aisles picking full cartons directly into empty containers. Items that ship in less than full-case quantity are staged

and picked in a broken case pick-to-belt module. Picked items travel through a sortation conveyor, where they are diverted to the appropriate

ship lane and consolidated into a container with the picked full case items. Completed orders are staged at the dock prior to shipping.

FACILITY OVERVIEW

- Total warehouse space: 82,000 sq ft
- Daily throughput: 400 containers
- Number of SKUs: 7,000
- Number of full-time employees: 75
- Number of shifts: 1
- Equipment budget: \$3.3 million



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