



# CARTON FLOW GUIDE

 Cisco-Eagle

shop talk

## A GUIDE TO PRODUCT FLOW

Techniques for gravity flow racks, picking and storage density in order fulfillment operations

[cisco-eagle.com/cartonflow](http://cisco-eagle.com/cartonflow)

# OPTIMIZE YOUR STORAGE



## PICKING EFFICIENCY • ORGANIZATION • DENSITY • ERGONOMICS

### Applications

Use carton flow racks to enhance speed, reduce space consumption and increase organization.

Loads flow to the front, where they're picked—either from a tote or box as individual pieces or as full cartons. Flow racks can have multiple shelves, each with a number of lanes. One SKU is assigned to each lane so it can be efficiently located and picked. As the front item is removed, the next item rolls into place at the picking position.

Flow racks can be specified with wheels or rollers of various sizes, types and materials. Because they require no power, flow systems deliver products to picker in an efficient first-in, first-out system that rotates inventory.



“It's more efficient to deliver product to your workers rather than force them to walk and search. Flow racks are versatile, organized storage—and a better way to pick orders or parts. We integrate them with pick modules, in rack aisles, as part of order fulfillment systems and for point-of-use workcells. There are a million ways to make your operation more efficient—call us today for fast assistance.”

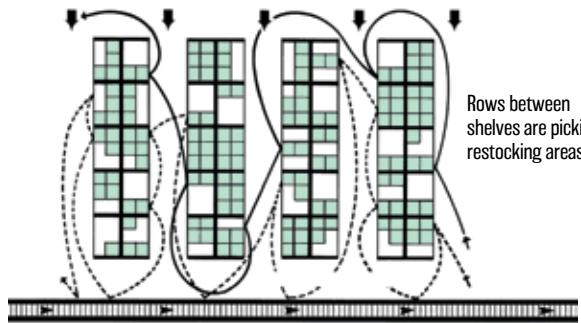
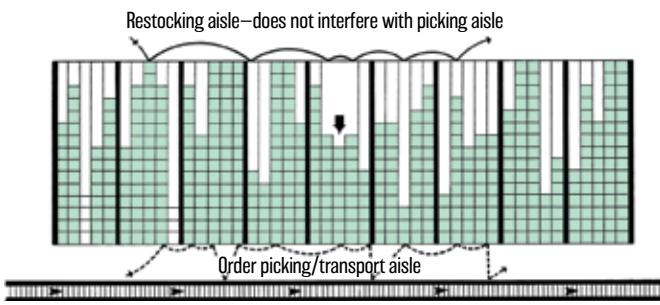
—Ross, Employee Owner, Account Executive

### Design considerations

How can you specify the right carton flow system?

- How frequently do you profile your inventory? How often do you re-slot?
- Are you in control of the size of your SKUs and other stored items—particularly the width?
- Do you pick full cases, individual items or a mixture?
- Is your stock variable width? Do you have control of the cartons or totes that may reside in your rack?
- Do you experience seasonal business surges?
- Will your carton/tote heights allow adequate numbers of shelves? The space between the load top and the shelf above it should be adequate for product movement and access.
- How often do you foresee facility reconfigurations?

# WHY CARTON FLOW?



## CARTON FLOW FACTORS

Gravity flow costs more than shelving, but reduces labor costs by decreasing the walking and searching time for pickers. With carton flow, 85% of the picker's time is spent actively picking and only 15% walking or searching. Flow storage also pairs well with modern automation like pick-to-light and voice picking.

### Restocking speed is doubled or tripled

Gravity flow re-stockers need only slice off the top of the case and slide it into the lane on the back of the rack for each picks or a full case for carton picks. Since flow is stocked from the rear, restocking never interferes with picking.

### Storage density

Gravity flow uses space more efficiently. Fewer aisles are required, so 50% more goods can be stocked in the same amount of space.

## STATIC SHELVING FACTORS

### Pickers spend 15% of time doing productive work

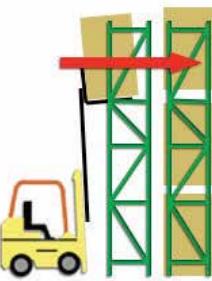
Static shelving systems are relatively inexpensive. The big hidden cost factor is labor—the amount of time workers spend restocking and picking. In the drawing above, note how many wasted steps are taken between the picks. In the typical static system, pickers waste about 85% of their time walking and searching, rather than productive work.

Factor	Gravity Flow	Shelving	Gain with Gravity Flow
If floor space is equal:			
Items stored:	155	120	+29%
Shelves high:	5	3	+2
Cases per opening:	15	12	+3
Total cases:	2,325	1,440	+61%

# STORAGE & PICKING STYLES

## ACCESSIBILITY, ORGANIZATION AND STORAGE DENSITY FACTORS

In the age of eCommerce, fast shipping and obsolescence, first-in/first-out (FIFO) storage strategies are critical tools. Some products fit the mold (food, perishables, some electronics, medicines and many other retail goods), while other types of inventory are more about storage density and efficiency. The question is, what type of storage strategy works best for you? And what types of storage systems should you use?



Method	Description	Application notes
<b>FIFO: First-in, First-Out</b>	The first products that enter your systems are the first picked, typically reinforced by storage media like carton or pallet flow systems. Most FIFO storage enforces one SKU per picking slot (bays, storage bin positions). Although not specifically FIFO, selective racks tend to be FIFO when full pallets are retrieved.	FIFO is typically used for products that can spoil or degrade based on their time in stock, or that must be rotated for other reasons. Although foods and medicines are very typical loads, others can include almost anything, including manufactured components that should be used in current designs.
<b>LIFO: Last-In, First-Out</b>	The last item stored is the first item picked in last-in, first-out storage systems. This is typical of pushback racks, drive-in rack storage, and some static shelving or handpicked rack applications.	LIFO picking is frequently executed for items that move quickly enough that rotation isn't necessary and items that don't spoil and do not require enforced product rotation. "Honeycombing" is possible in LIFO systems. This means that just one stored load (pallet, tote or carton) is placed at the picking position. This causes less handling, but it is very space-inefficient.
<b>Floor or block stacking</b>	Stacking pallets on the floor is a last-in, first-out storage and picking method, as the most recently stacked pallets are picked first. If there are multiple pallet stacks, the last stack is picked first. Also called block-stacking, this method is economical since no rack is required, but space-inefficient. Floor stacking leads to honeycombing and poor ventilation.	In a floor stack application, the loads must be substantial enough to support the weight of anything placed atop them – they shouldn't be "crushable." This can be alleviated using pallet stacking frames.
<b>Selective picking systems</b>	Storage equipment like shelving and selective rack don't tend to enforce any particular storage scheme. Pallets in a selective system are available to all pickers all the time. This is the same for bins of parts in static shelving.	In a selective picking layout, order pickers may have multiple pick options. In a selective rack system, if ten pallets are stored in ten different pallet positions, which is picked first? This tends to mean that selective picking is best suited for inventory that doesn't expire and when rotation is unimportant.
<b>Automated systems (ASRS and Carousels)</b>	Automated systems can help enforce a picking strategy by delivering products to pickers. Carousels and AS/RS can be programmed to deliver products in the desired method and can change on the fly in many circumstances.	Automated systems can mandate what product is delivered for picking, where and when. These solutions are expensive, but fit the right operation and situation. This tends to mean higher volumes of product moving in and out of the system.

# SPECIFICATION: PICK TYPES

## FULL CASE PICKING

Full case picking involves picking one carton (or can, or tote or other products) to send further through the process. Cases can be picked from pallets, shelving or racks. Carton flow is the most organized and efficient of these methods. Case picking tends to be a simple process compared to split-case operations. For most operations, the majority of faster movers are picked from pallet positions. Medium to slow moving products are generally picked from carton flow.

Rollers can drop into existing pallet rack, creating first-in, first-out storage lanes that are ideal for full case picking. They provide clear lines of sight and easy access to each carton, with one SKU stored per lane.



Above: Full cases presented for picking in a flow rack system.



## SPLIT CASE PICKING

In a split case picking system, individual items are picked from bins or open cartons. This method is sometimes called each-pick or piece pick. Most of the time, these operations involve a great many SKU's—in the tens of thousands at times—and low pick quantities. This is also called an each-pick system.

Carton flow racks with adjustable pick trays present open cases to order pickers so product can be picked from the case without interference from the shelf level above. Travel time is probably the most important basic split-case picking system issue. Examine your order volume and the number of picks per order. The higher the picks per order, the fewer orders, the more viable a basic system can be.



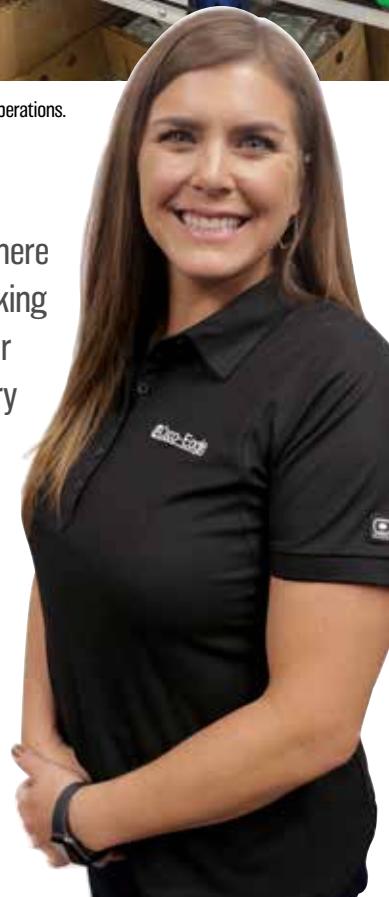
Above: tilted shelves to allow easy access for each-pick operations.

**“**Because you can load it from the rear, where replenishment doesn't interfere with picking at the front, carton flow is great for fast paced order picking. You can continuously fill orders across every pick face, even at the busiest times.

—Jodie, Employee Owner,  
Account Executive

**”**

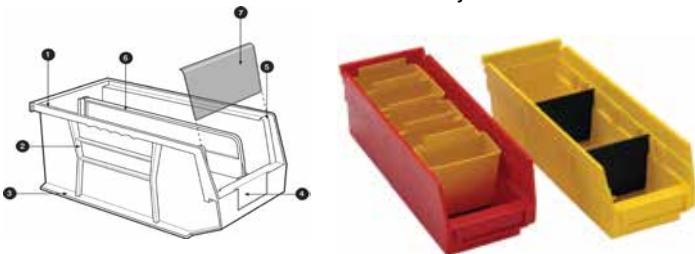
**shop talk**



# SPECIFICATION: MORE FACTORS

## LOADS, BINS AND CARTONS

The rack structure, pitch and roller types are critical to successful gravity flow projects, but one factor is often ignored: what load are you storing on the rack? With many options and flow storage manufacturers, it isn't a given that your carton or tote will flow. Like flow racks, there are many sources for bins.



### Bins and totes

Some things to know about your bins. A clear understanding of the load and bin types will help in flow rack specification.

- Dimensions:** If you are using carton flow lanes, you'll need to procure bins that fit both the width you need and the depth necessary to flow correctly.
- Load weight and weight distribution:** Uneven loads can affect capacity, balance and product flow.
- Construction:** plastic, metal, cardboard or other work on carton flow.
- Bin characteristics:** Define the bottom of your bins. Are they even and flat? Are there feet? Does the bin have handles, lips or other features?



### Cartons

You may not always control your cartons, but when you do, it's important to understand the same factors that pertain to bins and totes. Dimensions are critical. There are flow styles that allow you to store and pick cartons of any size (lane-free) if you experience frequent inventory and inbound product changes. Carton quality—particularly the bottoms—matter for smooth flow. For case picking, characteristics like size, handles and tops can also factor in.



### Other loads

If you intend to store components, bags, barrels or other loads in your flow system, you will need to have a clear understanding of that load's dimensions and characteristics. Inconsistent loads may not flow on some flow types.

## FLOW STORAGE & PALLET RACKS



### Mounting considerations

A common gravity flow application is to mount shelves of flow storage on pallet rack so you can mix & match gravity flow and bulk pallet storage in the same structure for both existing and new rack systems.

### What rack types?

Most carton flow types work in tubular or structural racks.

Teardrop and bolt-connection frames usually have the right mounting openings for carton flow systems. When you are using rack beams to support the tracks, the amount of adjustability relies on the available beam spacing—the more adjustable, the better. You can adjust flow storage pitch by offsetting front and rear beams.

Beam ties are recommended for wider beams to reduce bowing. Beam heights of 3.5" minimum are recommended. For double deep racks, intermediate supports may be required for both capacity and to increase structural integrity.

## SETTING FLOW ANGLES

Pitch requirements vary based on weight and quality of the load.

Tote/Carton	Pitch per Foot
Totes	3/4" to 7/8"
1-10 lb. cartons	7/8" to 1-1/8"
10-30 lb. cartons	7/8" to 1"
30-60 lb. cartons	3/4" to 7/8"

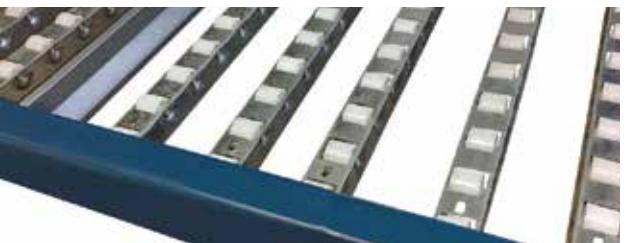


1. Set your front beam to the desired discharge elevation.
2. Set the rear beam at higher elevation per the table above (note that these measurements and capacities are approximate and rely on flow type and load; the table is a general guide).
3. Install the flow lane onto both beams. Set the first level, check the pitch to ensure flow, then install subsequent levels.
4. Test your proper flow when you install the first lanes, with a live load. Once it flows successfully, you can install the rest of the system.

# SPECIFICATION: ROLLER TYPES

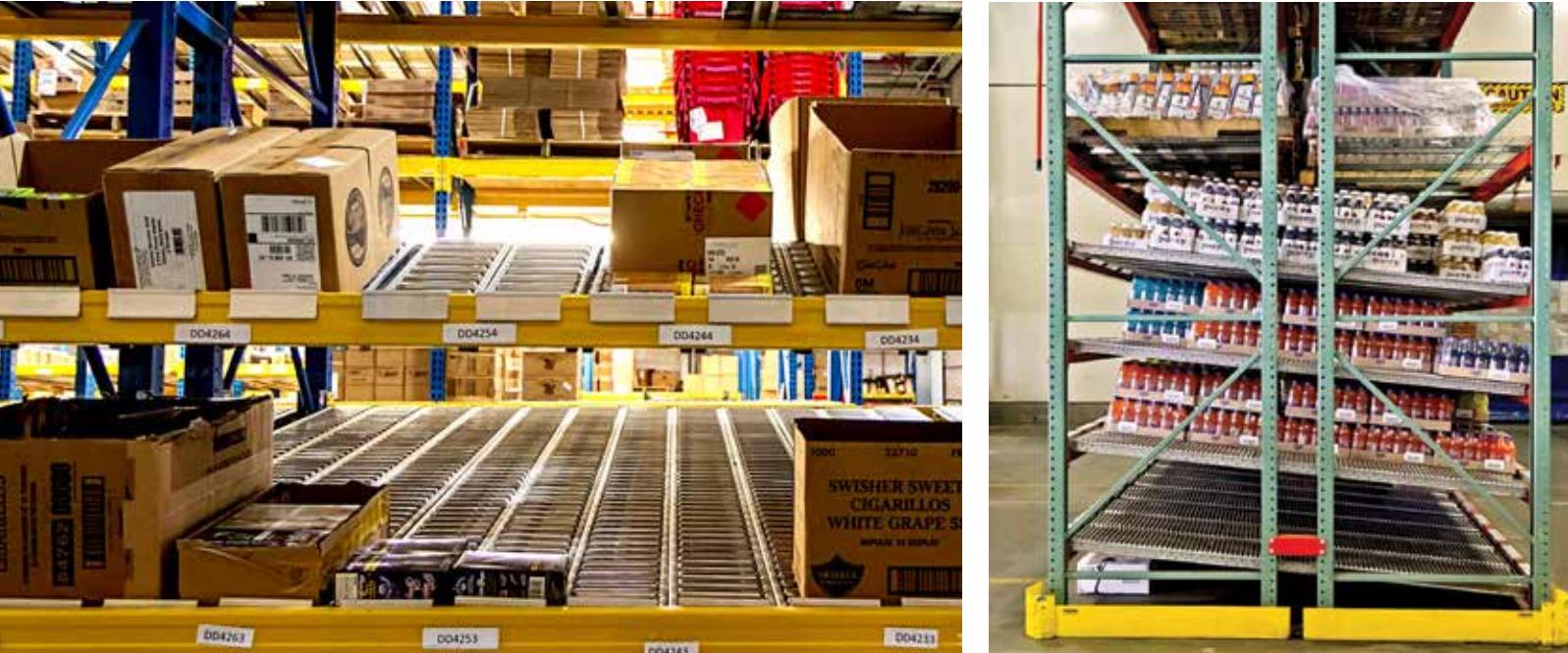
## Flow rollers and types: the best option depends on load and application needs

When designing a carton flow application, you have roller options ranging from rack structure to angle to lane width to roller type. Roller types are one of the most important factors. The wrong selection may not adequately convey your product from the infeed to picking sides of the rack, or cause undue jams or maintenance issues.

	Rack type	Application factors
Full-width rollers		Ideal for cartons, totes or variable size loads. If your carton is less than 6" in width or length, rollers ensure it will flow. Rollers tend to be costlier than wheels, but do not allow fall-through and are less prone to jams. Rollers are also good for round or other irregular load shapes.
Wheel bed		When you have more control of your inventory and loads, wheels are a good option. Your load should be rectangular and must be long enough that an adequate number of wheels will be under it for product support. Wheels are an economical option.
Skatewheel conveyors		Skatewheels are frequently used in manufacturing and "full shelf" configurations where capacity and product flow are desired. Although configured in lanes, a skatewheel shelf can allow products of many widths and sizes to flow from back to front. A somewhat expensive but very durable option that can be configured to multiple widths.
Angled picking shelves		Ideal for integrating slow movers and eliminate dead zones in manufacturing and warehousing operations. Adjustable shelving and pick trays provide flexible and accessible pick points. Suitable for loads that can slide down the shelf without the aid of rollers. Typically, shelves are shorter than flow lanes and can be configured to pallet rack beam widths to provide buffer storage in pallet rack aisles.
Flow rails		Flow rails use 7/8" wheels on 1.5" centers. Downward facing configuration makes it resistant to collected debris while its galvanized finish resists rust and wear. Use flow rail when the average order consists of multiple items, but only a few pieces per item. The rack should be deep enough to hold a 3-5 day supply of the average item.

# FULL-WIDTH ROLLERS

SpanTrack rollers roll smoothly and reduce hang-ups. Add, modify, expand and utilize carton flow throughout the operation, or at strategic picking points for either full or case picking. Ideal for cartons or totes of uniform dimensions—particularly widths. Full rollers provide 300% more contact with product than plastic wheel tracks.



## ROLLER OPTIONS

0.75" Roller available in aluminum and steel. Capacities up to 50 lbs. 6", 9", 12", 15", 18" widths.



1.38" galvanized rollers with bearings. Capacities to 100 lbs.. 9", 12", 15", 18", 24" widths.



### Low profile style

Nests between beams on hangers for maximum vertical space utilization for full case or each pick. Perfect for racks with pallet storage. Can be configured with knuckle-overs up to 24" long with 20° angled front ends for increased each pick efficiency.



### High profile style

Rests atop rack beams and adjusts for various contouring options. High profile can overhang both sides of the rack. Optional knuckles overhang structure up to 24" with 20° angled front ends.



### Deck style

Adjustable length track sits on the ledge of step beams in the front and rear. Good for single-deep racks. You don't need shelves, hangers or supports since its unique end cut fits onto standard pallet rack beams

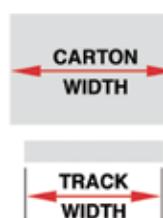


### Bed widths

Bed widths are determined by the best track combination that fits within the width of the racking. For example: in a 96" wide bay you can use (4) 18" wide beds & (2) 12" wide beds. This creates a 96" wide level of carton flow.



## CALCULATE TRACK WIDTHS



Product width determines lane width. Your cartons can overhang the lane up to 3" on either side and maintain smooth flow.

Track Width	Maximum Carton Width
6"	8"
9"	13-1/2"
12"	18"
15"	22-1/2"
18" 2	5-1/2"
24"	31-1/2"

# WHEEL BED ROLLERS

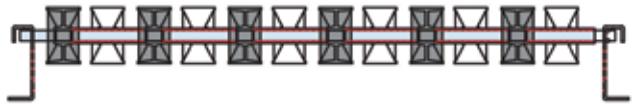


## Economical replacement for plastic wheel rails with 90% right-to-left shelf utilization

Shelf track provides left-to-right flexibility for ease of inventory reslotting. You can store totes and cartons of almost any size on its continuous shelves.

Hex hub wheel design makes the load flow smoothly.

- Eliminates hang-ups that can occur with flow rails. Solid shelves won't allow cartons to fall between
- Low maintenance costs
- Smooth, reliable product flow
- Drop-in design delivers an efficient and accessible pick point for workers
- Optional shark fin infeed guides make replenishment more regimented



1.6" Hex Hub. Patent pending low friction wheel bed design. 6", 9", 12", 15", 18" widths. Capacities range from 10 to 35 lbs. per square foot for light duty series. Standard duty series capacity ranges from 20 to 50 lbs. per square foot. Capacities depend on length of unsupported span.



Left: racks can be mounted on wheels for transport and maneuverability. Excellent for 5S and lean production.

Below: can be configured into work stations for fast access to parts or inventory



Left: allows loads to overlap lanes and still easily flow for versatile storage

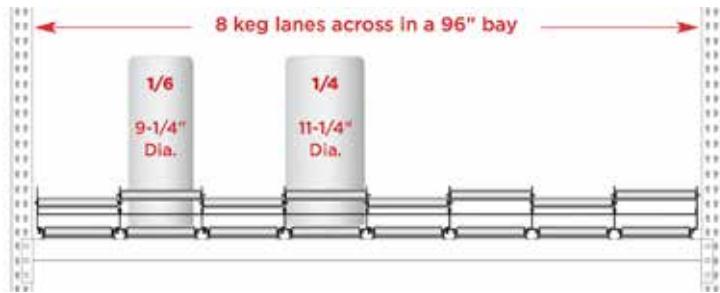


# SPECIALTY FLOW SOLUTIONS

## KEG FLOW SOLUTIONS



### Handle kegs safer & more efficiently



Beer keg storage is difficult: kegs are heavy, difficult to grip, unbalanced and shaped awkwardly—increasing the risk of drops and tip-overs. When the first keg is pulled, the second flows into its place for first-in, first-out stock rotation. With labeled storage lanes, you can slot one keg type per lane to increase organization and picking accuracy.

- Store up to 4 times the kegs in the same area, which could allow a beer distributor to add more beer varieties
- Makes kegs safer and more ergonomic to handle
- Each lane handles both 1/6 and 1/4 slim kegs with 1-3/8" diameter heavy duty steel rollers
- Up to 8 kegs may be stored in a 96" wide rack bay
- High roller stop for easy, ergonomic keg roll-out reduces wear on aluminum kegs and makes keg unloading safer for employees



## REPLACE WORN PLASTIC ROLLERS



Shelf tracks easily drop into your existing racks when older flow systems stop working or jam too frequently, giving older flow systems new life.

Plastic wheel rails can suffer wheel failures, bowing from overload, poor rollability, bowing rails, tracking problems and maintenance headaches. Often, the weight of cartons imprint onto wheels, making dimples so that the product can't flow forward. Shelf Track wheel beds combined with infeed guides, provide a superior solution that stands up to the stresses of industrial storage environments and support the full weight of the load from infeed to discharge.

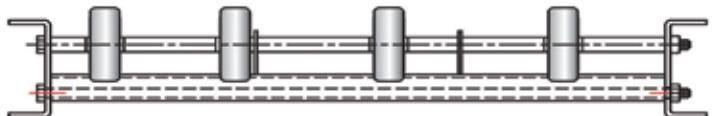


**Roller lanes** provide 300% more surface area compared to plastic wheel rails to reduce imprinting and eliminate product hang-ups

**Wheel beds** increase flexibility with slotting, providing 90% left to right bay usage. Both roller lanes and wheel beds are freezer and cooler rated.

- Eliminates carton hang-ups & drops in the middle of rack structure
- Low maintenance or replacement costs
- Extremely efficient product flow
- Works with any shelf
- Drop-in design creates an efficient and accessible pick point for workers

# SKATEWHEEL FLOW RACK



1.9" Skatewheel is available in steel; each wheel has a bearing. Available in widths of 12", 15", 18", and 24". Capacities up to 100 lbs. depending on length of unsupported span.

## Ideal for picking and assembly

Skatewheel Flow Racks are ideal for work-in-process, assembly lines, warehouses and other areas where dense flow storage of cartons, containers and other bulk items is necessary. These are especially popular in the automotive industry and manufacturing in general.

- Anything you can move on skatewheel conveyor, you can convey on skatewheel flow racks. Items such as bags or cartons with irregular bottoms aren't recommended for skatewheels
- Most loads require 10 wheels to flow without hangups
- Treat each level as a single shelf of "lane-free" product flow
- Skatewheel conveyor is stronger than flow rails, so it carries more weight, lasts longer and is virtually maintenance-free
- Strength, guaranteed rollability and high capacities for challenging carton & tote flow tasks
- Drop-together construction makes installation easy
- Skatewheel flow racks are suitable for many applications, including those requiring a heavier capacity, more flexibility, and smoother rollability. Not all loads are suitable for skatewheel conveyance



# ANGLED PICKING SHELVES

ELIMINATE PICKING OPERATION DEAD ZONES



## Increase picking rates

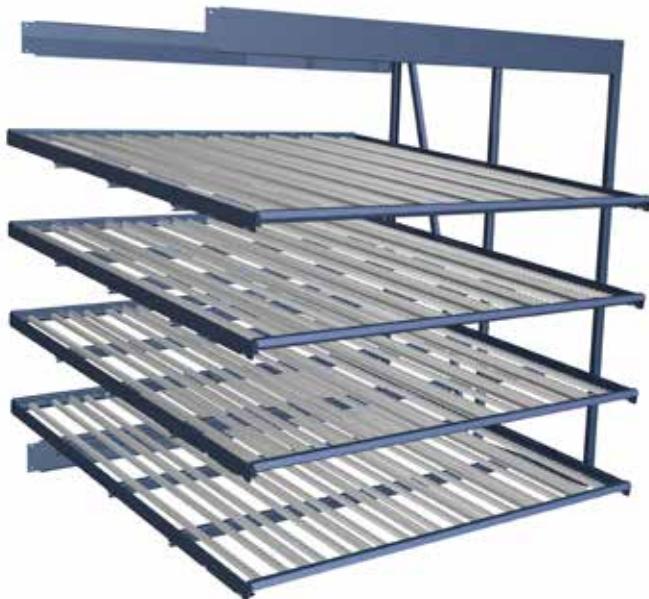
Easily-mounted pick shelves deliver products to pickers in a more ergonomic manner. They're angled to provide visibility and accessibility at the pick point. Use in racks, where adjustable shelves and pick trays provide the most durable and accessible pick points for workers.

## Specifications

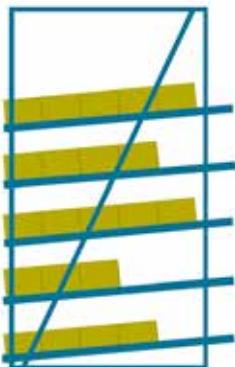
- Depths from 18" - 60"
- Widths from 30" - 120" (using multi-pane designs in shelf configurations). Maximum width for Flow Cell is 96"
- Galvanized steel construction. Wire mesh in 24" depths
- 50 pounds per square foot shelf capacity



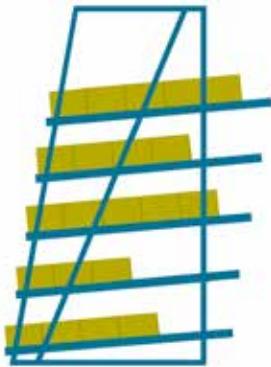
# FLOW RAIL TYPE RACKS



Standard carton flow systems consist of two main components: framework (vertical frames, shelf frames, sway braces) and roller tracks. Choose between straight or knuckled shelves and layback or no layback vertical frames, for a system that meets your needs. Ergonomic designs can be used as stand alone systems with conveyors or installed in pallet rack. Works for full case or split case applications with cardboard cartons or plastic totes. Roller tracks offer excellent flexibility, as they can be adjusted to accommodate various size cartons. Tracks can be installed on close centers so that all box widths can be used on the same shelf without profiling the lanes.



Straight (zero layback) configurations are best suited for full case picking and offer the densest use of floor space. Use when picking full cases such as canned goods or wine.



Layback configurations allow access into cartons for split case (each) picking. This requires an extra 1' floor space. Use these to pick from open cases that vary in size.

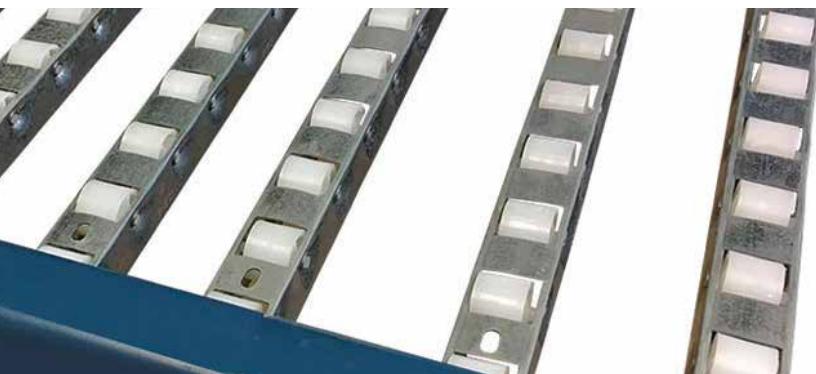


“Flow racks are ideal for full and split case picking. Use them

**shop talk**

for your everyday picks. For faster moving items, assign more than one lane or restock more often. Very high volume are suitable for bulk containers on pallet flow systems. Slow movers—5% of the total line—should be stored on static shelves.

—Carter, Employee Owner, Account Executive



# SPECIFY YOUR FLOW RACK



## About you

Name: \_\_\_\_\_  
Company: \_\_\_\_\_  
Phone: \_\_\_\_\_  
Email: \_\_\_\_\_

## Roller type:

- Full-width rollers  Wheel bed rollers  Skatewheel conveyors  
 Plastic wheel rails  Tilt shelving  Other (or not sure)

## Load definitions

- Cartons  Totes  Mixture  Other

Load dimensions (in inches; add separately if more space is needed)

Load Description	Width	Depth	Height	Weight

Describe your load: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Options

- Mobile (casters)  Knuckled ends  Infeed guides  Full lane guides  
 Tilt trays  End stops  Impact trays or zones  Keg flow

## Rack structure

- Pallet rack (see right)  Dedicated rack (see below)

## Rack factors—if using dedicated flow structure

Width of each shelf: \_\_\_\_\_ (in.) Width per lane: \_\_\_\_\_ (in.)

Rack height \_\_\_\_\_ (in.) Rack depth: \_\_\_\_\_ (in.)

Space between levels: \_\_\_\_\_

Total racks needed: \_\_\_\_\_

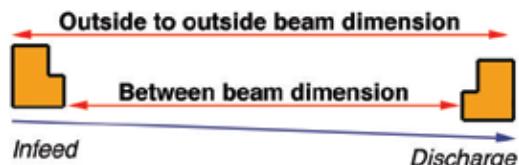
## Rack factors—if using pallet rack

Rack is:  New  Existing

Manufacturer & Model, if known: \_\_\_\_\_

## Pallet rack beams

Beam structure and design vary between rack manufacturers. Most common beam types will accommodate carton flow components and connections.



Outside-to-outside beams: \_\_\_\_\_ (in.) Between beams: \_\_\_\_\_ (in.)

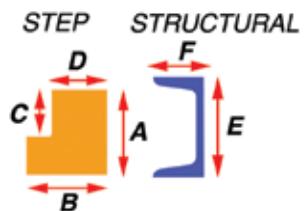
Roll-form beam size:  2.5"W  2.75"W  Not sure

Structural beam size:  3"W  4"W

## Beam dimensions

Step beam dimensions (inches):

A: \_\_\_\_\_ B: \_\_\_\_\_ C: \_\_\_\_\_ D: \_\_\_\_\_



Structural beam dimensions (inches):

E: \_\_\_\_\_ F: \_\_\_\_\_

## Rack dimensions

Front-to-back depth: \_\_\_\_\_ (in.) Bay width (side to side): \_\_\_\_\_ (in.)

Upright height: \_\_\_\_\_ (in.) Post width: \_\_\_\_\_ (in.)

Number of lanes per bay: \_\_\_\_\_ Pallets above flow?  Yes  No

Total number of flow bays: \_\_\_\_\_ #Levels per bay: \_\_\_\_\_

## Other application notes

---

---

---

---

---

---

# WHY CISCO-EAGLE?



Since all our employee-owners own shares and are empowered to make decisions that help our customers succeed, we go to lengths to take care of you!

—Missy, Employee-Owner Since 2013  
Web Sales & Service



## Dedicated to Partnership

You can count on us to put in the time and energy to become your trusted partner—the people you can trust to handle your business in such a way that you won't have to worry.

## Big-Company Resources, Small-Company Service

Most companies in this industry are either small, specialized local companies or large international manufacturers. As a mid-size company, Cisco-Eagle is uniquely positioned to combine deep resources and focused customer service.

## Exceptional Service by Employee-Owners

Our employees all own shares and consider each other partners. We have an owner mindset, which means we'll work to be sure you're satisfied. Our employees stay at Cisco-Eagle twice the national average, meaning we retain key players for your future needs.

## 50 Years of Experience and Stability

Companies come and go on economic tides. With 50 years of performance, you can count on Cisco-Eagle to deliver for you today, tomorrow and in a decade.

## Relentless Customer Service

Without working with a company, it's impossible to say whether it's good at service. We release our customer ratings so you can read what real customers say about us.

## Innovative Project & System Engineering

We maintain a fully-staffed systems integration team that handles simultaneous complex material handling projects.

## Field Services Teams

Our in-house conveyor and material handling technicians are available 24/7. Few of our competitors can combine the ability to design, sell and service projects in-house.

## Warehouse Safety Systems

We help companies utilize equipment, technology and processes to increase employee safety in industrial environments.

## Documented Safety Compliance

Modern companies demand documented safety procedures for their contractors, and we offer quick compliance. We can submit detailed safety plans to comply with third-party certification services such as ISNetworld.

## Strategic Manufacturing Partnerships

Few competitors can match our buying power or influence with key manufacturers or subcontractors who can make or break a project.

## A Website for Modern Needs

Most companies see their websites as nothing more than electronic lead generators, but we provide significant informational resources, tools, downloads, videos and more.

## QUICK FACTS

- Founded in 1970
- An atmosphere of individual initiative and creativity with a culture that nurtures the family lives of employee-owners.
- We are all partners in Cisco-Eagle. Every employee owns shares in the company.
- Multifaceted customer base in manufacturing and distribution, including most every industrial segment.
- Customers in every U.S. state and over 70 countries.
- Headquartered in Dallas; major offices and sales offices in multiple states.



[WWW.CISCO-EAGLE.COM/CARTONFLOW](http://WWW.CISCO-EAGLE.COM/CARTONFLOW)

888.877.3861 TOLL-FREE

EXCEPTIONAL SERVICE BY EMPLOYEE OWNERS