



KONSTANT[®]

STORAGE SYSTEMS



PUSH BACK

RACK SYSTEMS

Innovative Solutions for Storage and Material Handling Systems

PUSH BACK OVERVIEW

Konstant® patented Push Pack rack system provides selectivity in the horizontal and vertical storage plane while maintaining multiple pallets stored in depth. This flexible system allows a customer to store from 2 to 6 pallets in depth. When properly implemented Push Back will provide a safe, durable high density storage solution, that can be counted on for years of trouble free service.

Konstant® Push Back carts are manufactured with a fully welded front, middle and rear cross member. The hardened steel wheels on the carts travel inside a structural steel “I” beam rail. This heavy duty system even ties the rails to all the support beams.

System Flexibility

Push Back is available in 2, 3, 4, 5, and 6 deep styles and can be arranged as back-to-back islands or stand alone bays. The number of levels high is restricted only by the lift truck reach height. Konstant® Push Back systems can be implemented into both structural and roll formed rack.

No special fork trucks are required. Push Back systems are fully operational in freezers, coolers and high temperature environments.

Push Back Durability

All carts, rails and support structure are produced from hot rolled or cold rolled structural steel components. The only mechanical parts in the system are the four wheels per cart.

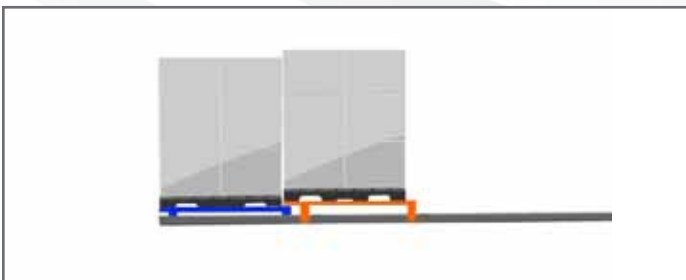
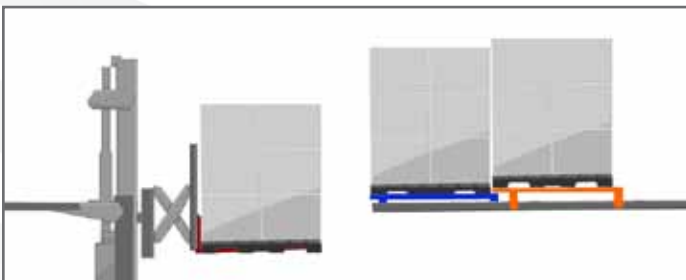
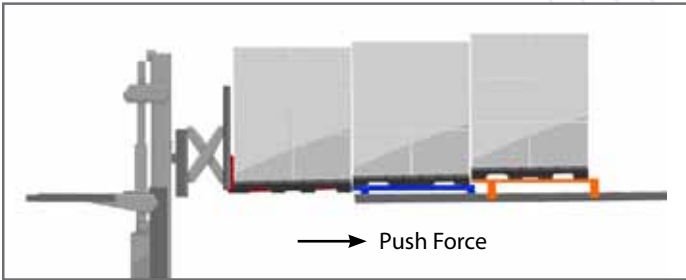
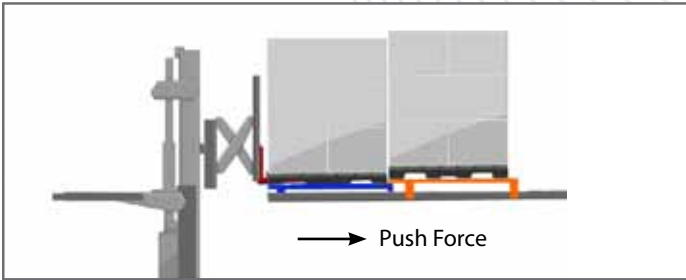
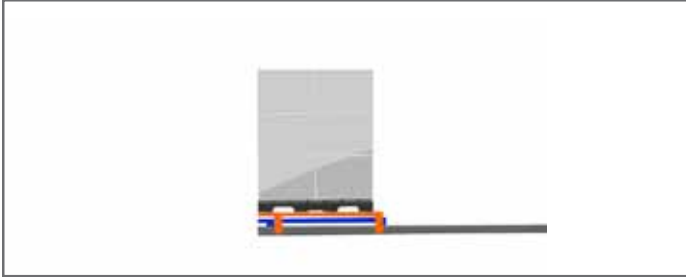
Push Back Support Structure

Our carts provide full support for each pallet in the system and as well the Konstant® Push Back system can provide a safety bar between the rails for the last pallet stored on the rails. If a safety bar is necessary, an open front lower cart is required.

Our versatile system allows for the frames to be arranged in a traditional straight line front-to-back or a staggered frame pattern. The patented staggered pattern reduces the column load which reduces loading on the floor. It also reduces the capacity required on the support beam thus reducing the height of the beam and increasing the available vertical storage height.



PUSH BACK - HOW IT WORKS



Example: Loading and unloading a 3-Deep Push Back System

Step 1.

Each lane is equipped with a pair of inclined rails and a series of color-coded nested carts. Here, the first pallet has been placed by the lift truck on the top of and flush with the front of the orange cart.

Step 2.

The second pallet is loaded by pushing back the first load and placing it on the next exposed cart - the blue cart.

Step 3.

Pallet three is loaded similarly although this time 2 pallet loads are being pushed back which exposes the rails at the front.

Step 4.

The last pallet is placed directly on the rails, allowing (in this example) for a total storage depth of 3 pallets.

Step 5.

When removing product, the lift truck starts by lifting the front pallet high enough to clear the stops or cart. Then the lift truck begins slowly withdrawing the load and regulating the flow of the remaining carts and loads towards the aisle.

Step 6.

The remaining pallets are removed similarly. As each is removed, the loads in behind roll toward the aisle.

PUSH BACK APPLICATIONS

When does Push Back apply?

When the average number of pallets per product (SKU) exceeds five, a Push Back system is easily justified. The higher the number, the deeper the lane is feasible (usually 3 lanes per product minimum). These multiple lanes allow rotation to achieve FIFO stock rotation (First-in / First-out).

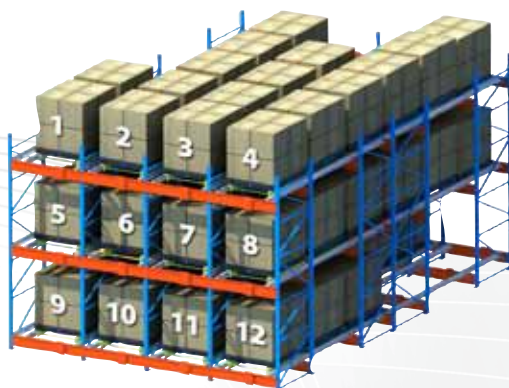
Push Back systems can be configured to attain up to 100% more pallets stored than standard pallet racking and equal or greater increases over poorly occupied drive-in and on floor bulk stack storage configurations.

Increased Density

Today's challenge in warehousing is to store an ever increasing number of pallets, with an ever increasing number of products (SKU's) in a fixed storage space.

These two factors pull in opposite directions. Push Back storage increases the pallet count, while offering many more pick faces than other traditional high density storage systems.

PUSH BACK

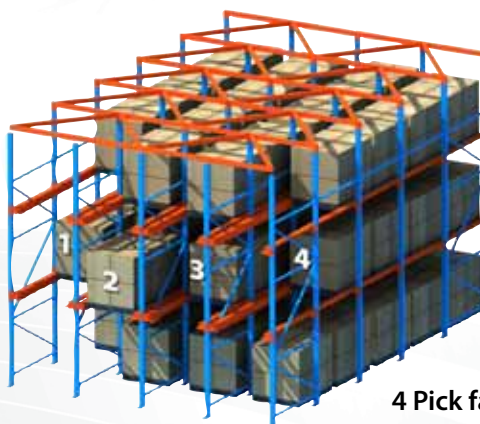


12 Pick faces

All 12 lanes and pallets are accessible from the aisle... All the time!

90%
utilization of
pallet positions

DRIVE-IN



4 Pick faces

Individual SKU accessibility is limited to each of the 4 pick faces or tunnels.

60%
utilization of
pallet positions

How Does Push Back Stack-Up?	Push Back	Drive-In
Typical occupancy	85-95%	50-60%
Handling costs	Low	Medium
Number of pick faces per tower	# Levels	One
Random storage all levels	Yes	No
Stock rotation	Rotate lanes	Rotate Tunnels
Potential for Rack & Product Damage	Low	High
Number of products (SKU's) applicable	Many	Few
Efficient bottom level case pick	Yes	No

Please Note: Depending on your product mix, other storage configurations such as, Drive-In, Pallet Flow, Selective Rack or a combination of these systems may be a better option. Let one of our representatives help you determine which storage system works best for your facility.

PUSH BACK DETERMINATION

1. First-In First-Out Stock Rotation
2. High Occupancy
3. Random Storage

These three objectives can easily be implemented by following the four simple rules outlined below.

Rule 1

Select products to be stored that have at least 3 times the lane depth in average pallets in inventory. Most storage facilities have products (SKU's) that range from one pallet per item up to many pallets per item. The average amount of storage per item should be used to select optimum lane length.

The table shown below will yield occupancy rates of 80% - 90%. The higher the numbers of lanes per product (SKU) the higher the occupancy rate.

Rule 2

Never replenish a partially filled lane with a new lot code code of the existing product or a different product. As a result of Rule 1 there is a minimum of three to five lanes available for any one product. Therefore, when a new lot code is introduced, a new lane is selected so as to not block access to an existing lot code.

Pallets per product (SKU)	Lane Depth
1 - 4	Standard rack
5 - 8	2 Deep Push Back
9 - 12	2 - 3 Deep Push Back
13 - 16	3 - 4 Deep Push Back
17 - 20	4 - 5 Deep Push Back
Over 20	5 -6 Deep Push Back

Rule 3

When retrieving loads for shipping or for use within the company, be sure to pick from the oldest part lane first.

Picking from the oldest part lane, will automatically rotate your stock while freeing up empty lanes for general availability. This will result in no more than one part lane, per lot code. This procedure will ensure FIFO Stock Rotation (First in - First Out).

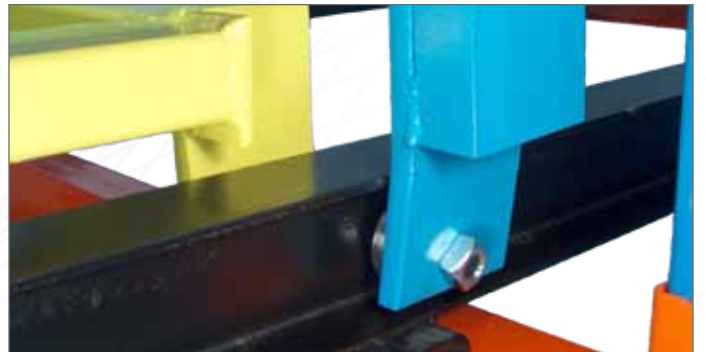
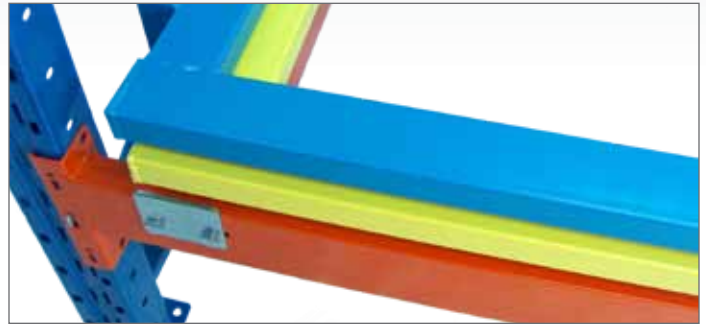
Rule 4

Use random storage to minimize honeycombing. This will enable you to maximize your storage facility. Random storage in any of the lanes that become available will allow the storage requirement for any item to grow and shrink as necessary. Fixed locations would require storage to be present for every item at it's peak. Exceptions could be made for bottom level case picking with fixed locations.



PUSH BACK STRUCTURAL CART

- Carts are made from hot rolled structural steel angle and cold rolled hollow structural steel tube sections.
- Carts are fully welded with a front, middle and rear structural tie, which gives better support for weaker or damaged pallets. This results in years of trouble free operation – a hallmark of Konstant® Push Back.
- Konstant® Push Back handles abuse better than other Push Back systems during loading and unloading of the system. It can take the bumps and knocks that happen too often.
- Unlike other Push Back designs – all carts in each lane are full size – not progressively smaller. This provides a consistent loading platform for each pallet loaded into the system, which helps the operator load the system quickly and safely!
- The galvanized pallet stops on the beam also act as guides - helping the operator center the pallet in the lane.
- Upper carts are visible from the aisle. Loading the system is much easier when the carts can be seen by the operator. These multi-colored carts provide a great guide for the lift truck operators.
- The carts are color coded. The color of the carts visible from the front of the aisle enable staff to know – at a glance – how many pallets are in each lane – perfect for counting inventory.
- The cart's legs are positioned so that the wheels run flat on the surface of the rail.
- Better wheel surface contact requires less force to turn the wheel which results in less force to push the pallet.* This means far less wear and tear on the lift truck mast and a much smaller draw in power!



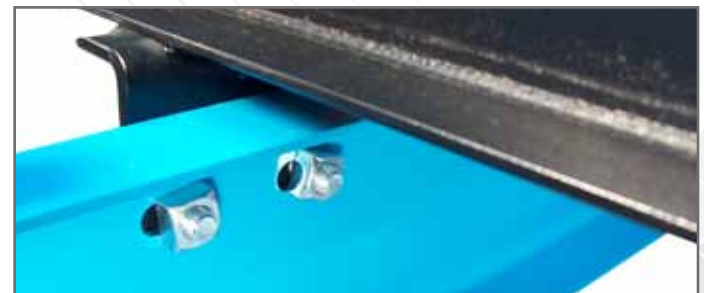
*Konstant "Push Force" Chart

The push force required for the Konstant Push Back system is two percent of the weight of the pallets that are being pushed back.
For example: a Five Deep Pushback with 2,000 lb. pallets would require a push force of: 2% x 2,000 lbs. x 4 Pallets = 160 lbs.

Pallet Weight	Push Force				
	2 Deep	3 Deep	4 Deep	5 Deep	6 Deep
1,000 lbs.	20 lbs.	40 lbs.	60 lbs.	80 lbs.	100 lbs.
2,000 lbs.	40 lbs.	80 lbs.	120 lbs.	160 lbs.	200 lbs.
3,000 lbs.	60 lbs.	120 lbs.	180 lbs.	240 lbs.	300 lbs.

PRECISION WHEEL BEARING

- Precision ground inner and outer race with eight precision ground and hardened balls uniformly spaced by a steel retaining ring.
- Balls do not make contact with each other, reducing internal friction – which results in a longer life for the bearing. Precision bearing allows for a reduced rail slope (3/16" per foot). Much less lateral force is applied on the mast of the fork truck and much less lift truck battery power is required to operate the system.
- Capacity per wheel is 2,200 lbs. Konstant® Push Back can easily handle pallets weighing up to 4,000 lbs.
- Wheels are covered with a dust cover and treated with a dry rust inhibitor.
- In typical applications dirt cannot collect in the wheel. This results in the system requiring no lubrication OR maintenance for the life of the system.
- Wheels are bolted to the cart on site.
- Field installation of the wheels eliminates any possibility of damage to the wheel during shipping.



STRUCTURAL "I" BEAM RAILS

- Standard lanes use a heavy duty hot rolled structural steel 'I' beam rail 3" high @ 5.7 lbs. per foot.
- This stronger rail allows for fewer frames and beams which results in a more efficient and economical overall system.
- All wheels run on the lower flange of the 'I' Beam while the upper flange of the rail provides protection from falling debris.
- Internal rubber bumpers cushion the return of the carts as pallet loads are removed from the lane



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