

When failure is not an option

Here's how key rack safety, maintenance steps help avoid system failures.



By Carlos Oliver

It's a business owner-operator's worst nightmare: a complete warehouse rack system failure causing extensive product breakage, equipment damage, lost productivity and -- far worse -- worker injury or death.

Unfortunately, warehouse rack collapses -- whether due to design and product inefficiencies or system misuse -- are on the rise. Contributing to this is the prevalence of taller systems, installation of used racking, rack damage, use of improper lift equipment, system overloading and insufficient forklift training.

Fortunately, you can prevent a catastrophic rack collapse by understanding the causes of rack failure and by practicing proper inspection and maintenance.

Understand the Causes

Warehouse operators need to thoroughly understand the causes of collapse as well as the primary sources of responsibility. This is important because major system errors can begin early in the project in the hands of systems designers, manufacturers or distributors.

Errors and inefficiencies can creep in when there's any miscommunication about the system parameters, improper system design and/or incorrect lift truck clearances.

It's particularly important in this early stage that operators not sacrifice rack capacity for price reduction. This frequent, undesirable practice removes material steel from the rack design

to simply cut costs. This approach not only results in an inferior design but also could lead to component failure.

Several of these same errors may occur at the rack manufacturing level -- whether it's improper system design or someone misinterpreting the design criteria. There also might be poor manufacturing practices -- involving insufficient welding practices, component fabrication or quality assurance measures.

Of course, warehouse owners and managers should shoulder a major responsibility for rack system success or failure. The nine most common failure issues include:

- 1. Rack damage** - Lift equipment abuse is the leading cause of rack system failure and collapse.
- 2. Incorrect load weight** - Overloading the rack systems beyond its engineered weight capacity can result in component failure and ultimate collapse.
- 3. Altered configuration** - Rack system configuration (shelf beam levels, bracing pattern, etc.) is carefully engineered to satisfy a customer's operational requirements. Changes in shelf elevation, for example, can reduce column capacity and lead to system failure.
- 4. Lack of driver training** - Improper lift equipment training is the leading cause of rack damage.
- 5. Change in operation** - Misuse often occurs when business requirements mandate a new operational procedure.
- 6. Incorrect equipment use or change** - Rack systems are designed for integration with specified lift equipment. An equipment change can result in unforeseen misuse and rack damage. For example, using standard fork trucks or pallet jacks in a Very Narrow Aisle (VNA) / wire-guided system will cause damage in areas where abuse-resistant measures don't exist.
- 7. Reduced rack capacity for cost savings** - Warehouse owners and managers may choose to understate actual capacity requirements in order to reduce rack equipment costs. This is a huge, dangerous mistake.
- 8. Used equipment** - Used equipment might save money but it also puts your storage operations at risk. There is no means for design and capacity verification and all prior damage is inherited.

9. Mixed components from various manufacturers - There's no assurance that a combination of manufacturers' components will perform to original system design specifications.

Take Responsibility, Control

If your storage rack system is in jeopardy of failure or collapse, there are four steps you can use to reduce risk and ensure rack safety.

The first step is to conduct a thorough rack safety audit. This means you'll need to locate initial design drawings and calculations, document current elevations and rack layout, determine if the current configuration is structurally sound, examine the full extent of existing rack damage and plan to repair or replace your racks.

It's important to keep a set of drawings reflecting your current rack configuration. This is a requirement of the Rack Manufacturer's Institute (RMI) as well as the Canadian Standards Association (CSA).

The next safety step requires that you develop a driver-training program with accountability written into that process. It's also recommended that you establish an on-going rack safety audit program and that you install and maintain rack capacity plaques in several obvious and clearly visible locations.

Ongoing Maintenance

The proper rack maintenance program not only reduces the risk of rack failure but also extends rack system life.

Operators start by simply developing a schedule for periodic rack inspections. Inspectors should report all damage to management. Likewise, it's important to develop repair criteria for damage. This means that your employees note the severity of damage and understand the required repair procedures.

It is highly recommended that operators not use repair kits other than those approved by the original rack manufacturer. A bracing system repair must be consistent with the original frame design.

Lastly, we recommend that warehouses develop a comprehensive forklift training program for all new operators.

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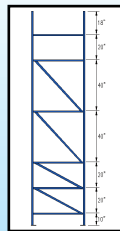
Rack Manufacturers Institute (RMI):

Formed in 1958, RMI represents all major U.S. rack system manufacturers. RMI's goal is to advance standards, quality and safety for the intended use of industrial steel storage rack systems and research rack structures through testing. In regard to rack safety, RMI has developed a specification for design, testing and utilization of industrial storage racks. This guideline addresses conditions unique to material handling environments that can affect rack stability (fork truck abuse, rack loading and unloading). The complete specification may be downloaded from RMI's website at www.mhia.org/industrygroups/rmi

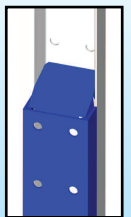
Starting from Scratch?

Here are seven ways operators can incorporate rack safety into a new system.

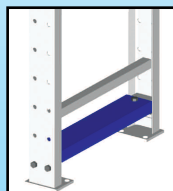
1. Thoroughly evaluate the most effective material handling system for your operational requirements.
2. For static rack applications, ensure that lift truck clearances are approved by the lift truck vendor.
3. Develop shelf elevations for all potential slotting configurations. This means anticipate future changes and account for all possibilities in design and capacity requirements.
4. Develop a set of concept drawings for owner / management review and approval.
5. Integrate fire protection, egress and lighting requirements into your design.
6. Consider appropriate clearances for safe and productive operations.
7. Develop an impact protection strategy by considering...



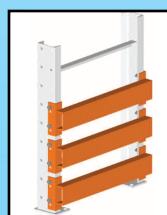
Horizontal spacing: Tighter horizontal spacing at the lower portions of the frame help prevent column failure.



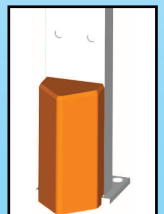
Boxed or Reinforced Columns: Boxing the front columns provides excellent fork truck impact resistance.



Rub Rails: Horizontal members that bolt into frames below the lowest horizontal. They protect the frame from damage by the fork truck or pallet in two ways; the rub rail helps distribute any impact forces to the rear column of the frame, and it prevents the column from rotating when hit



Post Protectors and Bull Noses: Protect the front column from damage by deflecting impact from pallets or fork trucks.



Row End Protectors: Provide protection against fork lift damage where it is needed most - at the end of the aisle.



Material: With reinforced channel corners and thicker steel columns, structural steel can withstand far greater impact and hold more pounds per foot than rolled steel. Even if damaged, structural steel maintains 80 percent to 90 percent of its load capacity and may be repaired on site.