



# Truck Restraints: The Key to Loading Dock Safety

Selecting the best vehicle restraint for your loading needs to prevent trailer creep, forklift falls, premature departures and other hazards

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## Introduction

Preventing human error at the loading dock isn't always easy, especially when workers are trying to meet productivity goals and stick to tight shipping deadlines or trucking schedules. High-traffic loading docks quickly become congested with truck arrivals and departures, forklifts, pallet jacks and pedestrians. With such a crowded, high-speed environment, it's no surprise that 25% of all industrial accidents occur at loading docks, and for each incident that occurs, there are hundreds of near misses.<sup>1</sup> In these types of demanding industrial environments, effective communication can easily break down between dock attendants and truck drivers, and the resulting hazards can lead to life-threatening injuries and accidents.

One of the most dangerous and often fatal accidents that occur at loading docks is when a forklift falls from the dock during loading or unloading. This can be due to trailer creep or dock walk, premature departure and even sloppy parking. Whenever a gap is able to form between the trailer and the dock leveler, forklifts are at risk of falling through. Oftentimes, operators are thrown from the forklift as it falls or are crushed underneath them. Using the proper equipment to restrain trucks is paramount to eliminating gaps between trailers and levelers to ensure forklift safety.

In this white paper, you'll gain a better understanding of what circumstances at the loading dock can lead to forklift fall-through and other dangerous loading dock accidents and what your facility can do to protect workers while increasing dock efficiency. We will address the severity of forklift accidents and falls from loading docks in the material handling industry and examine what factors can aid in their prevention. We'll also evaluate the most popular styles of vehicle restraints on the market and discuss the economics of a safer, more secure loading dock. Then, we'll take a look at several best-in-class restraint options from a leading manufacturer in loading dock equipment.



## Loading Dock Accidents and Forklift Falls

Keeping workers safe at the loading dock requires employers and facility managers to understand all of the different hazards that are present and how best to avoid them. Forklifts are undoubtedly equal parts necessity for loading and unloading and dangerous. The reality of these accidents can be seen in the statistics gathered by the National Safety Council, which found that forklifts were the source of 79 work-related deaths and 8,140 nonfatal injuries involving days away from work in 2019. Out of those reported accidents, 65% occurred in manufacturing, transportation and material handling occupations. While most on-the-job injuries required an average of 8 days off work, recovery from forklift-related injuries are more severe and on average required 16 days away from work.<sup>2</sup> Due to their critical role in material handling, it is no surprise that OSHA lists loading docks as the primary locations for workers to most likely be injured by a forklift. The most common causes of forklift accidents at the dock involve lift trucks being inadvertently driven off loading docks or forklifts falling between the loading dock and an unsecured trailer.<sup>3</sup>

Most of the OSHA incident reports involving forklift fall-through at the loading dock are due to premature departure or sudden trailer creep. For instance, on March 11, 2019, an employee in California was unloading pallets from a trailer using a forklift. As he unloaded the last pallet, the truck driver believed unloading was complete and pulled forward to close his trailer doors. The forklift was still inside the trailer and fell between the dock and the trailer, where the employee sustained fractures to his leg in three places.<sup>4</sup> On April 16, 2019, an employee was loading pallets into a semi-trailer when the truck suddenly pulled forward. Neither of the truck wheels nor the trailer wheels were chocked. There was no vehicle restraint system installed on the dock and there was no method to communicate with the driver other than face-to-face. The forklift began to fall between the trailer and the dock, but the employee was able to jump off and landed on the ground. He suffered three broken ribs and a separated shoulder.<sup>5</sup> In both of these cases, each employee sustained serious but nonfatal injuries. However, most cases of forklift fall-through result in the forklift tipping onto the employee and crushing them. Approximately 42% of forklift fatalities are caused by the operator trying to jump from a tipping vehicle. Unfortunately, the operator usually lands on the ground directly in the path of the forklift's overhead guard and receives a fatal crushing injury to the head, neck or back.<sup>6</sup>

Beyond the physical and emotional impact accidents have on employees, the average cost of a worker accident to the employer is approximately \$189,000. In total, loading dock accidents cost companies an estimated \$675 million every year.<sup>7</sup> Fortunately, OSHA found that 70% of forklift accidents in the US could have been prevented with the proper equipment, safety protocols or training. Likewise, the accidents above may have been avoided if the docks were equipped with communication systems and vehicle restraints rated to prevent trailer creep and premature departure.

## Methods of Securing Trucks and Trailers

The regulations for restraining trucks and trailers at the loading dock are surprisingly lax. OSHA regulation 1910.178(k)(1) states that the brakes of highway trucks shall be set and wheel chocks placed under the rear wheels to prevent the trucks from rolling while they are boarded with industrial power trucks.<sup>8</sup> While the presence of wheel chocks at loading docks may meet OSHA regulations, they do not offer adequate protection to stop trucks from leaving prematurely and do not perform well in wet, icy or gravelly conditions. If firmly and strategically placed against the closest set of wheels to the dock, wheel chocks may offer mild protection against trailer creep or dock walk, but unfortunately, they are ineffective against premature departure, as most semi-trucks can either push the chocks aside as they pull forward or roll over them.<sup>7</sup>

In the cases we discussed in the last section, both forklift fall-through accidents were the result of the trailers not being restrained properly and lack of communication methods between the truck drivers and dock attendants. The drivers assumed that loading and unloading was complete, even though the forklifts were still actively moving into and out of the trailer. This same kind of precarious assumption can be made about wheel chocks. The OSHA regulation listed above does not specify if the dock attendant or truck driver is responsible for placing the wheel chocks and it would be easy for either party to assume that the other had done it, resulting in the chocks not being used at all. Because there is no communication system, if a dock attendant wanted to confirm that the wheels were secured, they would have to leave the building and travel to the exterior of the dock, further delaying the loading or unloading process.

Unlike wheel chocks that require time-consuming placement and manual inspection, most mechanical and powered vehicle restraints include control boxes and full communication systems that relay the status of the restraint quickly to dock attendants and truck drivers. Two-way loading dock communication systems include an exterior light, one exterior regular and one reversible instruction sign and an interior control panel with signs indicating to the operator to load or unload on the green light only. The easy-to-understand red and green LED control box lights and exterior stop-and-go lights relay the status of the restraint, indicate when loading or unloading is in progress and signal when it is safe for trailers to pull away from the dock. These simple communication systems are paramount for maintaining safety at the loading dock, as they simultaneously inform workers on the inside and outside on the dock's operational status.



*Exterior LED light display for vehicle drivers*



*Interior LED light display for dock personnel*



*Caution signs for inside and outside the dock*

Restraint Barrier Position	Outside Communication Light	Inside Communication Light
Stored	Green	Red
Engaged	Red	Green

*Communication Light Table*

Communication systems are only one reason why vehicle restraints are preferred over wheel chocks. Unlike wheel chocks that can be displaced or rolled over as a truck attempts to leave the dock prematurely, vehicle restraints are mounted to either the driveway or dock wall and capture or block the trailer's rear impact guard (RIG), securing the trailer to the loading dock until the restraint is released by the dock attendant. Restraints are built to withstand a tremendous amount of pull-away force to prevent early or accidental separation, with some models built to handle other hazards, like landing gear collapse or trailer pop-up. While it is still important to keep wheel chocks at each dock location, they should not be the primary restraint method and only be used as either supplemental help or as an emergency backup.

In the next section, we'll discuss some popular restraint designs commonly used throughout the material handling industry and which vehicles, situations and dock types they are best suited for and the various accidents they are designed to prevent. Understanding the options available, costs involved and various factors for selection criteria can help you make an informed decision when choosing the best restraint for your loading area.

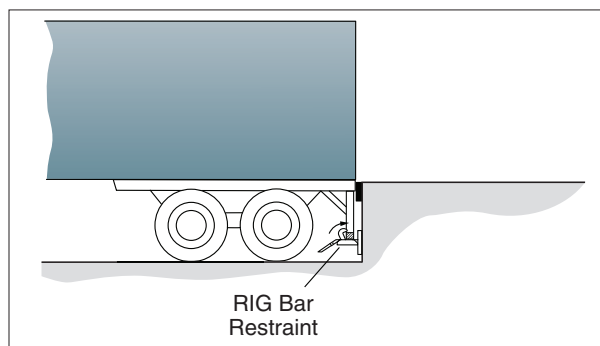
## Vehicle Restraint Selection Guide

There are a variety of truck restraint designs available from numerous loading dock equipment manufacturers, but not all are created equal or intended for the same applications. Factors including the grade of approach, types of vehicles loaded and unloaded at your dock, driveway material (concrete, gravel, asphalt, etc.) and the

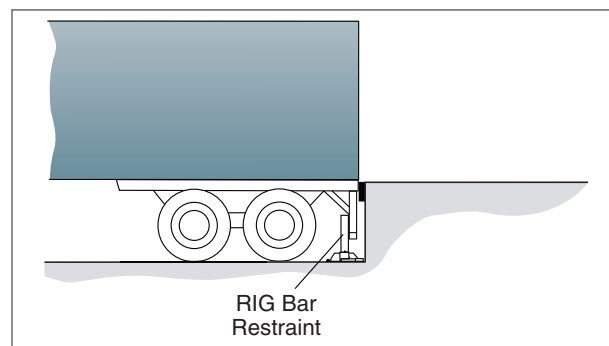
condition of the dock wall should all be analyzed in order to select the truck restraint best suited for your application. In this section, we will discuss several types of restraint designs, evaluative standards and how to assess which model is right for your loading needs. Aspects to consider include:

- Installation Requirements
- Versatility and Design
- Function and Performance
- Operation, Maintenance and Ownership

Restraints can be mounted to the dock wall or embedded into the dock approach. Embedding a restraint into the drive helps prevent damage to the building wall and is well-suited for applications with steep declines, while restraints that install onto the face of the dock mount above ground level to stay clear of precipitation and debris and often feature a spring-loaded carriage that lowers with truck contact. Oftentimes, the condition of the building wall or restrictions on core drilling into the dock approach can determine what installation method works best for each application.



*Dock Wall Installation*



*Dock Approach Installation*

The design of the restraint mechanism will correlate with its versatility. Vehicles commonly used in the material handling industry are standard trailers, vehicles with RIG bars, liftgate trucks and intermodal container chassis. Loading docks that service a wide variety of these vehicles will need a restraint that can secure all of them, while some facilities may only use standard trailers and only require a restraint that can secure a RIG bar. Standard trailers and RIG bars can be secured by a wall-mounted restraint with a rotating hook. However, if the trailers have a cover plate or other obstructions that could block the hook from securely wrapping around the bar, then a vertical ram-style barrier should be used instead. Liftgate trucks and other vehicles that require additional clearance for platforms to lower are incompatible with wall-mounted restraints and instead need a low-profile restraint that is close to ground level. Regardless of the vehicle types they are designed to secure, all restraints should either automatically



adjust with trailer float or remain unaffected by the up-and-down movement of the trailer during loading and unloading.

While most restraints are designed to prevent hazards associated while the tractor is still attached to the trailer, such as premature departure, trailer creep, dock walk and other instances of accidental separation, only some are designed to protect against hazards with dropped trailers when the tractor is detached. Accidents like landing gear collapse, trailer upending and trailer pop-up occur when trailers are unhooked from semi-trucks and use landing gear or stabilizer stands to stay level during loading and unloading. Without the support and counterweight from the semi-truck, landing gear must be able to withstand the changes in momentum as forklifts enter and leave the trailer. Weak or damaged landing gear is unable to handle the movement and weight of a forklift and often fails, falling forward or sideways and usually collapses with the forklift still inside. Similarly, trailer upending occurs when the weight of the forklift forces the front of the trailer down, causing the back to move up and away from the dock. Trailer pop-up happens when an entering forklift causes the rear of the trailer to lower, simultaneously raising the nose and can shift freight towards the forklift on the lowered end of the trailer.

DECISION CRITERIA	NOVA Truck Lock™	NOVA Lock & Load™	NOVA Lock-Up™
<b>VERSATILITY</b>			
Restrain liftgate trucks	✓		
Restrain intermodal container chassis	✓		✓
Restrain standard trailers	✓	✓	✓
Restrain any vehicle with RIG bar	✓	✓	✓
<b>FUNCTION &amp; PERFORMANCE</b>			
Prevents trailer creep or dock walk	✓	✓	✓
Prevents early departure	✓	✓	✓
Prevents landing gear collapse	✓	✓	✓
Helps prevent trailer pop-up and upending		✓	✓
Over 30,000 lbs. of restraining force	✓	✓	✓
<b>INSTALLATION &amp; OWNERSHIP</b>			
Requires little to no maintenance	✓		
Attaches to dock approach to prevent building damage	✓		
Reduced energy consumption	✓	✓	✓
Concrete drive/approach	✓	✓	✓
Asphalt drive/approach	✓ (with provisions)	✓	✓
Well-suited for steep decline on dock approach	✓ (Low profile series)		
Core drilling in driveway/approach prohibited		✓	✓
Push-button operation	✓	✓	✓
Manual operation and zero electricity options available	✓		



Regardless if facilities live load or have dropped trailers at the dock, safety is an investment and having the right restraint can prevent life-threatening injuries and accidents. As we discussed earlier, each nonfatal accident at the loading dock can cost approximately \$189,000. In contrast, the overall cost for a vehicle restraint and installation costs less than \$10,000 and there are even several features to help make equipment more cost-effective and lower the lifetime cost of ownership. Restraints with few moving parts require little to no maintenance and routine care can be performed by internal staff. To lower costs further, restraints that only utilize electricity while engaging or disengaging can help lower energy costs and manual restraints save even more by requiring zero electricity to operate. Warranties also offer peace of mind when purchasing new dock equipment, so it is important to consider manufacturer coverage on vehicle restraints to ensure that your investment is protected against structural issues and other defects.

## Key Takeaways

The costs of a loading dock accident can be detrimental for any business. Facilities are turning away from outdated wheel chocks and are instead investing in employee safety with truck restraints engineered for enhanced protection and efficiency. At a fraction of the cost of a single accident and far more dependable than wheel chocks, truck restraints are also designed to protect against a wide variety of hazards at the dock and include easy-to-understand communication systems that relay the safety status to truck drivers and dock attendants.

- In this white paper, you learned:
- The dangers of forklift fall-through
- Causes of accidental separation during loading or unloading
- Why wheel chocks fail to offer adequate dock protection
- How communication systems are paramount to employee safety
- Various factors to assess when choosing truck restraints

There are many different factors to consider when selecting the proper vehicle restraint for your needs, but all should prioritize safety, ease of use, strength and clear communication between truck drivers and dock attendants. Truck restraints provide enhanced protection against premature departure, trailer creep, landing gear collapse and various other hazards that can lead to forklift falls and other life-threatening injuries. Investing in vehicle restraints allows businesses to protect employees, streamline dock operations and prevent costly accidents.

## About NOVA Technology

NOVA Technology is an international manufacturer and distributor of loading dock equipment and accessories. We offer a variety of truck restraints and can provide a solution for nearly any application. All of our restraints include structural warranties, full communication packages and are tested and certified to meet and exceed ANSI MH30.3. Our product line includes the Truck Lock™, Lock & Load™ and Lock-Up™, and below you'll find an overview of each product to see which design might best suit your needs.

**Truck Lock™** - available in four models and two installation methods with either manual or powered operations, this is the most versatile restraint on the market. The Low Profile design has the lowest stored height available in the industry, measuring only 7-1/2 inches tall, or is available in a taller 350 Series with a stored height of 10 inches. The Truck Lock™ avoids building damage by installing directly into the driveway with either a Cast-In style that embeds into the dock approach or a Flange Style that bolts into place. It features a vertical barrier-style ram bar with a no-contact design that remains unaffected by trailer float and can withstand over 30,000 pounds of pull-away force. It prevents trailer creep, dock walk, early departure and landing gear collapse, and is ideal for docks that use liftgate trucks, intermodal container chassis, standard trailers or any vehicle with a RIG bar. The Truck Lock™ includes an industry-leading Lifetime Warranty and requires little to no maintenance, and service can be performed by internal staff for the lowest total cost of ownership for any restraint.



*NOVA Truck Lock™ Vehicle Restraint*

**Lock & Load™** - this wall-mounted restraint has a spring-loaded carriage that lowers with truck contact, automatically adjusts to trailer float and has an engagement range of 9 to 31 inches. Its large rotating hook secures standard trailers and any vehicle with a RIG bar and can withstand over 38,000 pounds of pull-away force. The Lock & Load™ prevents trailer creep, dock walk, early departure and landing gear collapse, and can also help prevent trailer pop-up and trailer upending.



*NOVA Lock & Load™ Vehicle Restraint*

**Lock-Up™** - this wall-mounted restraint has a spring-loaded carriage that lowers with truck contact, automatically adjusts to trailer float and has an engagement range of 9 to 31 inches. Its vertical barrier secures intermodal container chassis, standard trailers and any RIG configuration, even if cover plates or other obstructions are present. The Lock-Up™ prevents trailer creep, dock walk, early departure and landing gear collapse, and can also help prevent trailer pop-up.



*NOVA Lock-Up™ Vehicle Restraint*

For over 30 years, NOVA has provided the innovation, reliability and resources needed for our customers to handle the continuously evolving needs of the material handling industry. We offer a variety of dock levelers, seals and shelters, vehicle restraints, light communication systems, dock lifts, safety barrier products and a selection of aftermarket parts and accessories. All of our products are designed to maximize safety, productivity, security and environmental control at loading docks and throughout commercial facilities. Call us today at 1-800-236-7325 or send an email to [sales@novalocks.com](mailto:sales@novalocks.com) for more information or to find a dealer in your area.

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<sup>1</sup> Capstone Logistics. (2017, August 17). *Stay Safe: 8 Tips to Ensure Loading Dock Safety*. Capstone Logistics. <https://www.capstonelogistics.com/blog/stay-safe-8-tips-to-ensure-loading-dock-safety/>

<sup>2</sup> National Safety Council. (2021). *Safety Topics – Forklifts*. Injury Facts. <https://injuryfacts.nsc.org/work/safety-topics/forklifts/>

<sup>3</sup> Occupational Safety and Health Administration. (2019). *Powered Industrial Trucks – Forklifts*. US Department of Labor. <https://www.osha.gov/powered-industrial-trucks>

<sup>4</sup> Occupational Safety and Health Administration. (2019, March 11). *Inspection Detail – 114345.015*. United States Department of Labor. [https://www.osha.gov/pls/imis/accidentsearch.accident\\_detail?id=114345.015](https://www.osha.gov/pls/imis/accidentsearch.accident_detail?id=114345.015)

<sup>5</sup> Occupational Safety and Health Administration. (2019, April 16). *Inspection Detail – 115441.015*. United States Department of Labor. [https://www.osha.gov/pls/imis/accidentsearch.accident\\_detail?id=115441.015](https://www.osha.gov/pls/imis/accidentsearch.accident_detail?id=115441.015)

<sup>6</sup> OSHA Safety Manual. (2019, April 14). *Forklift Fatalities*. OSM. <https://www.safetymannualosha.com/forklift-fatalities/>

<sup>7</sup> Artz, J. (2019, August 20). *Why Every Loading Dock Should Have a Vehicle Restraint*. EHS Today. <https://www.ehstoday.com/safety/article/21920305/why-every-loading-dock-should-have-a-vehicle-restraint>

<sup>8</sup> Occupational Safety and Health Administration (2016, November 18). *1920.178 Standard Requirements*. US Department of Labor. <https://www.osha.gov/laws-reg/regulations/standardnumber/1910/1910.178>