



LOADING DOCK EQUIPMENT MANUFACTURERS

A Product Section of Material Handling Industry of America

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# More Information

At the time this resource document was published, LODEM consisted of the following member companies:

4Front Entrematic Blue Giant Equipment Corporation Bluff Manufacturing, Inc. Durable Corporation Ideal Warehouse Innovations, Inc. NOVA Technology Perma Tech Inc Phoenix Lighting Rite-Hite Corporation Systems, LLC Tri Lite, Inc.

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# Introduction

Loading docks are an integral part of many commercial and industrial operations. They are a critical part of the facility where inventory is loaded and unloaded. Selecting proper equipment in the loading dock can be key to the successful operation of any facility.

The Loading Dock Equipment Manufacturers (LODEM), an Industry Group of MHI, is comprised of companies that innovate, design, and manufacture loading dock and accessory equipment used in North America.

This document is one in a series of documents published by LODEM and outlines the considerations and capabilities of various accessory products that can be deployed in a loading dock environment to help improve safety, operational efficiency, and asset protection.

Refer also to "Dock Planning 101," a document prepared by LODEM that outlines terms and definitions of loading dock equipment, summarizes industry regulations and standards, outlines design configurations, and provides details about equipment such as dock levelers, dockboards, and vehicle restraints.

LODEM is also the publisher of three American National Standards for loading dock equipment:

- ANSI MH30.1, Performance and Testing Requirements for Dock Leveling Devices
- ANSI MH30.2, Performance and Testing Requirements for Portable Dock Leveling Devices
- ANSI MH30.3, Performance and Testing Requirements for Vehicle Restraining Devices

Refer to www.mhi.org/lodem for the latest versions of these documents and additional information.

# Leveler Pit Construction Forms

The permanent concrete pit form is a 3-sided steel form complete with a front and back curbs angles and formed sides. The steel permanent concrete pit form is not part of a leveler. The leveler requires separate installation with by the manufacturer's instructions to ensure proper operation with the necessary adjustments.

Benefits of a permanent concrete pit form include:

- A clean and neat appearance of pit.
- Front and back curb angle set included.
- Creates a correctly sized pit which eliminates costly measurement mistakes.
- Eliminates the need and expense of building wooden forms with no return to job site for removal.
- Ease in installing a dock leveler; with the ability to purchase and place the leveler in the pit at a later date.
- Ease in removing a dock leveler from the pit (i.e.: relocation or major repair), compared to removing the pour–in type levelers.



Diagram of a typical permanent concrete pit form for a dock leveler

# Dock Impact Protection

Dock bumpers are installed on loading dock foundations to protect the building and dock equipment from impacts by docking trucks and from abrasion caused by trailer movement during loading/unloading. When properly applied, they will prevent costly damage to the building foundation and dock equipment, plus avoid expensive down time. They can also be used for projecting above low docks, as rub rails at the sides of truck wells, and in any material handling operation where maximum protection is required.

Bumpers are typically constructed of molded or laminated rubber and can include steel reinforcement. Bumpers typically have steel frames for mounting and support. They come in a variety of sizes and thicknesses to accommodate different applications.

Molded -Rubber Loading Dock Bumpers are typically used in applications with relatively light traffic.

Laminated Rubber Bumpers, made from reclaimed tires or conveyor belting, are used in applications with moderate to heavy dock traffic.

Steel-Faced Bumpers, made with a rubber core, reclaimed tires or conveyor belting, and a floating, extra-protective steel face or cap, are best equipped to handle the abrasion by trailers shifting during loading/unloading and are used in applications with heavy dock traffic.

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# Dock Impact Protection

 Extra-Thick Dock Bumpers are used in applications such as declined approaches where additional "stand-out" distance from the loading dock is required. They can be used with steep ramps, canopied docks, overhangs, or other architectural features. Extra-thick dock bumpers typically have special construction features to accommodate unusual anchoring conditions.



• Extra-Length Dock Bumpers are used on loading docks with dock seals, open dock areas, or where environmental control is needed. The loading dock bumper and the dock seal interact to completely seal the truck to the dock.

No two loading docks are the same and problems with inadequate dock protection can often be resolved by combining a dock bumper with a customized bracket to stop the truck exactly where it needs to be for the most efficient access and damage prevention. Some examples of dock bumper bracketing include:



**Riser Brackets** Where above dock protection is required



Build-Out Brackets Extends the dock bumper projection from wall in extreme applications



Mounting Plates To install a new bumper around damaged concrete

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# Dock Fall Protection

# Loading Dock Barrier Systems

Industrial facilities can pose a variety of hazards and use a variety of barriers to prevent people, products, and property from entering potentially hazardous areas. At a facility's loading docks, barriers can be applied to prevent material handling equipment from damaging other equipment, to prevent collisions with pedestrians, or to prevent a fall from an open door without a truck present.

**Protective Barriers** are designed to prevent damage to the overhead door, door track, dock control boxes, or other dock equipment. When the overhead door at a loading dock is closed, protective barriers such as gates, rails, or metal arms can be installed in front of the door to prevent material handling equipment from coming in contact with the door.



Example of protective barriers installed to protect door tracks

**Safety Barriers** are often applied at the edge of loading docks to restrict pedestrian or material handling equipment access to the edge of the loading dock. As required in the United States by 29 CFR 1910.28(b)(1), elevated work platforms, such as a loading dock with an open or uninstalled overhead door, must have some form of a safety barrier in place to prevent pedestrians or material handling equipment from falling off the edge.

Installing safety barriers can be a cost effective investment that can help prevent accidents, injuries, and damage to people, products, or equipment. Barriers such as a rail or gate can be equipped at the dock door opening. These can remain in place until a truck trailer is safely in position and dock personnel are ready to load/unload the trailer.





Examples of safety barriers intended to prevent personnel or equipment from passing through an open entryway

# Dock Fall Protection







Examples of safety barriers intended to prevent personnel or equipment from passing through an open entryway

There are several considerations facility managers should keep in mind when considering safety barrier applications:

- What are the maximum gross loads and speeds of the material handling equipment expected to impact the barriers?
- Is there sufficient space to allow the barrier to sustain maximum deflection when impacted?
- Is repair or replacement acceptable after a barrier impact creates permanent deformation?
- Are barriers permanently installed or do they need to be removed on a regular basis?

The impact rating of a barrier is often difficult to define. Although fall protection systems and falling object protection regulations (29 CFR 1910.29) define requirements for pedestrian guardrail systems, it does not address barriers designed to stop heavier loads than the 200-lb. standard it uses.

# **Overhead Door Track Guard** Protection

Track guard products are designed to shield overhead door tracks from impact by material handling equipment, preventing costly damage and downtime. Track guards can be made from steel or composite materials and are anchored to the building wall, floor and/or the door track. They come in a variety of sizes and grades to offer varying degrees of protection.

The door tracks at docks and inside facilities are often subjected to impacts from wide or off-center loads. While some of these impacts are just 'bumps', they can also be damaging 'hard hits' depending on the load and speed hitting them. With severe enough track damage, overhead doors can be put out of commission, leading to potential risks with security, safety, energy loss and contamination. This type of damage often requires costly, emergency repairs.

Choosing the right track protection product will take the following into consideration:

- Will door tracks be struck by manually or power-operated equipment? Manual operated equipment usually carries less damage risk and a lighter duty track guard will often suffice whereas with powered equipment a more heavy-duty product is preferred.
- Where are door tracks likely to be impacted? Track guards come in different heights and some wrap around the tracks better than others. Choosing the right height of guard will be important and if impacts can occur from different angles (not just head on) a guard that wraps the track would be more appropriate.

Properly applied and installed track protection is a small cost compared to the potential cost of downtime and repairs to a door that has been taken out of commission.



Example of a track door guards

# Environmental Control

# Sealing Around the Overhead Door

An obvious point of air flow is the overhead door. When closed, it is ideal to have every edge of the door sealed off. Brush seals can be installed along the sides of the door to allow a smooth operation, while also reducing air flow. The bottom of the overhead door can be equipped with rubber/foam seals that can not only run along the concrete floor, but also fill in the gaps on the edges of the dock leveler.

# Sealing Around the Dock Leveler

Example of bottom edge door seal

While a dock leveler is fit into the concrete floor, outside air can still flow into the dock pit under the leveler and up through any

gaps or open edges. Brush or rubber seal accessories can be inserted into those open areas to reduce air flow. Additionally, adhesive or magnetic strips can be applied to the top of the leveler's edges.



Examples of dock leveler seals

For vertical storing dock levelers installed with a continuous pit, air can easily infiltrate the facility under the leveler while deployed on a trailer. Therefore, these types of levelers can be equipped with large vinyl and foam pads mounted to the underside of the dock board to help seal that area off and reduce air flow.





Examples of vertical storing dock leveler underside seals

# Environmental Control

## **Door Canopies**

Door canopies can be installed over loading docks to provide weather protection. When combined with dock seals and shelters, canopies offer a high degree of shade and protection against precipitation. Door canopies can be constructed with fabric or metal.

Fabric Canopy or Awnings: A sheet of canvas, vinyl, or other material stretched on a frame and used for protection against the sun or rain. Fabric canopies may be used on loading docks in some applications, but do not carry a snow load rating.

Metal Hoods: Constructed completely of heavy gauge steel and welded, bolted, or riveted together as a steel component. Metal hoods are typically galvanized, powder coated galvannealed, or painted, and most commonly used on industrial buildings over loading docks. Unlike fabric canopies, metal hoods provide the added protection of being snow load rated.

Use of one or a combination of door canopies, dock seals, or dock shelters are recommended for loading dock openings at facilities with potentially harsh climates.



Canopy over dock entrance



Metal hoods over dock door, railcar door, and MRI inflatable seal

# Environmental Control

## **Strip Curtains**

Some facilities may also want to reduce air flow, dust, or humidity entering through the door opening itself. This can be done with strip curtains, which are a series of flexible PVC strips that overlap each other and hang over the door opening. Sizes can vary based on applications.



Illustration of strip curtains

### **Air Curtains**

In addition to physical seals, another way to help control the environment at a loading dock is with air curtains. These units can be installed along the top of the door opening and will blow controlled air down across the opening, creating an air seal that helps keep separation between the exterior and interior climates.

Loading docks with proper environmental control accessories will ultimately keep the facility energy costs down and provide a more comfortable working environment for dock personnel.



Example of air curtain

# Ventilation and Air Circulation



Examples of fans designed for loading dock applications

Loading dock fans provide ventilation and cooling solutions for the dock, trailer, and/or warehouse. Fans are typically mounted on a double-strut dock light arm along with the loading dock light fixture. Dock fans are used to move hot air, cold air, or gas/odor filled air and most dock light fans have three speed options: low, medium, and high. Things to consider when looking for the right loading dock fan are air flow needs, speed levels, wattage, weight, noise levels and adjustability.



Examples of fans installed at loading docks

# Pest Control

# Roll-up Screens for Pest Control

Industrial roll-up screen doors are manufactured to be a bug blocking screen as an add-on to exterior doorways. These door products are plastic coated mesh screens that allow fresh breezes and sunlight into the building but block out insect/animal invasions. The roll-up screen door is designed for easy doorway access and can be either a window shade/spring-assist design for manually pulling up and down, power operated for busy ground level doorways, or manual sliding for doorways with low traffic levels.

Advantages of a roll-up insect barrier door:

- · Creates barrier to help eliminate insects and other pests;
- Easy to install at dock doors and warehouse opening;
- Choice of compact tubular motor or manual cables;
- Help meet FDA/AIB Requirements for inspection.



### Schematic diagram of a roll-up screen

### Roll Up Screen:

The roll up insect screen door comes with a mesh PVC coated fabric that is mildew and rot resistant. It offers high visibility and ventilation. Screens are available in various colors.

### Safety:

Operating this lightweight door can reduce the risk of work-place injury. This allows you to keep your loading dock door open for the day while maintaining a barrier for the outside world. Increased visibility will provide a safer workplace

# Loading Dock Illumination

Loading docks are enclosed areas located on or below the ground floor of a building which allows for very little natural lighting. The same hazard exists within trailers and containers.

To rectify this hazard, dock lights should be used to illuminate the work area by shining into a parked freight trailer/container while dock personnel load or unload cargo. The Illuminating Engineering Society (IES) recommends loading dock areas have lighting levels of 10-20 footcandles. One foot-candle is defined as

enough light to saturate a one-foot square with one lumen of light. Given the same level of activity within a trailer as on a loading dock, it is desirable to have the same lighting levels within the trailer. The addition of dock lights can create a safer work environment and reduce accidental cargo damage.

Due to the movement of freight and equipment, loading dock lights are often subject to damage from impact. Many dock lights are designed for rugged use to survive the damage caused if hit by a lift truck or other moving equipment often used on a loading dock. To aid in durability, a dock light is composed of two parts: a lamp head



Proper lighting within a trailer can prevent visibility concerns

and an arm. The lamp head attaches to the end of the light arm. The arm is usually articulated in one or two segments, allowing a range of motion for the head to enter the trailer. The arm is affixed to the wall near the dock door opening. When mounted at this location, the lamp head can be easily pulled into place when needed or collapsed and put aside when not in use.

# Safety

For maximum safety and proper illumination levels within a trailer, a dock light should have a beam angle/ pattern that evenly distributes the light throughout the entire trailer without wasting light on the walls/ceiling.

An important consideration is the various loading conditions and obstacles that exist as well as the different trailer sizes. Properly designed optics within an LED dock light can direct the light throughout the entire trailer and minimize shadows during loading or unloading conditions.



## Components of a Dock Light System

There are three main components of a loading dock lighting system. These three are:

- 1. Lamp Head
- 2. Arms
- 3. Accessories

There are important considerations within each component to ensure a reliable and safe system.

- **1.** Lamp heads are available in different materials. Common options include rugged cast aluminum and polycarbonate.
  - A polycarbonate lamp head is lighter weight and will resist impacts. It often has additional electrical sockets or connection points that could be susceptible to impact damage.
  - A metal lamp head integrates the light source into the metal casting which provides the ability to
    withstand multiple impacts. A critical design advantage of the metal head is the ability to dissipate the
    heat generated by the LED light source. Properly designed castings will protect the light source from
    impact damage and efficiently dissipate heat to extend the life of the lightbulb.

# **Light Sources**

As a light source, a loading dock light may use a screw-in incandescent lamp, screw-in LED lamps or an LED module that is integrated within the head.

Historically, dock lights utilized a fragile incandescent lightbulb. They are made of glass and do not stand up to physical contact from equipment or personnel. These are quickly falling out of favor within the lighting industry and are becoming more difficult to source, because of their fragility and susceptibility of breakage.

In the absence of incandescent lamps, users have a choice between an LED lamp or a dock light with an integrated LED module. LED lamps are more expensive than incandescent lamps and may last longer if not damaged prematurely from an impact.

A common alternative to an LED lamp is to select a dock light with an integrated LED module light source. This design delivers an anticipated lifetime upwards of 100,000 hours and exhibits high resistance to vibration and shock.





Dock light arms used to support lamp heads come in multiple variations and may be chosen with the head
assembled to the arm or selected separately. A designer or user has the option to select the appropriate
arm based on site-specific conditions.

Fixed arms are most common and are available in a Single Strut or Double Strut model. Double Strut models are most often selected when strength is required to mount a light and fan onto the arm. It is important to consider any requirements of weight and durability when selecting the arm as well as the mounting used to attach the arm to the wall.



Examples of double strut and single strut dock light arms

Flexible arms are also available and provide the flexibility to bend and aim the light exactly where desired. An important consideration in selection of a flexible arm is the durability of the arm and strength to avoid sagging or loosening over time. Manufacturer test data should be available to assist in determining the quality of design and ruggedness of the arm.



Examples of flexible arms



### 3. Accessories

### Wire Guards

Incandescent lamps can be more susceptible to breakage when hit by material handling equipment and other loading dock equipment. Lamp guards can help to minimize those occurrences.



An example of a wire guard for an incandescent lamp

# Dock Communication Systems

Loading dock communication systems are designed to provide communication between loading dock personnel and truck drivers. Light communications, audible/visual alerts, and alarms provide internal and external notifications to identify the status of both loading dock equipment and trailer to avoid accidents or damages. When equipment is interlocked with communication systems, operators and drivers can perform their jobs safely and efficiently.

The interior traffic light communication system provides visual and audible notifications to the dock operator that the trailer is properly restrained and safe for loading and unloading, while exterior lights give direction to the driver to stop or go. Interlocking the dock leveler, overhead door, seal, restraint, and wheel chock with additional safety equipment such as dock lights, will ensure the highest level of safety, and allow the workflow to continue seamlessly.

Typical communication systems include the following devices:

- Exterior "Stop & Go" Lights, red and green signals indicating to the driver of vehicle when it is clear to approach or depart and when not to move;
- Interior "Stop & Go" Lights, red and green signals indicating to the dock area material handling personnel when it is safe to proceed with loading/unloading, and warns when conditions are unsafe;
- Signage, exterior

### "Stop & Go" Lights

Universal red and green traffic light units signal "Stop" or "Go." Units are attached to each side of a loading dock wall, both on the inside and outside of the dock door. The units are paired together through an electric communication cord and are used as opposing stopgo signals. When a truck driver is parked securely and properly restrained in a loading dock bay, a red light is displayed on the outside of the building, indicating that the truck should not move. Meanwhile, the light on the inside is green, indicating to warehouse personnel that it is safe to enter the truck's trailer for the loading and unloading of cargo. When the warehouse personnel have finished, the inside light is switched to red, communicating to all in the area that it is no longer safe to enter the back of the truck's trailer. This action simultaneously changes the light on the outside to green, indicating that it is safe for the truck driver to pull away.



A flashing double red light (inside and outside) indicates danger if any piece of equipment is out of sequence and not properly engaged. A properly interlocked communication system creates a safer environment, protecting people, building, and equipment.

# Dock Communication Systems

### Signage

Short phrases or instructions are made into metal or vinyl signage and can be used in conjunction with loading dock communication lights to clarify the visual meaning of the light. These signs are placed near the lights for the best visibility. Signs that are placed inside the warehouse are meant for loading dock personnel to read, while signs that are placed outside of the warehouse are meant for truck drivers. Exterior signs are frequently written in reverse for drivers to read in their rear-view mirrors.



Examples of interior and exterior signage commonly used around loading docks

Loading dock safety signs are high-contrast and highly visible for the safety of warehouse personnel. Signs are intended to conform to ANSI Z535.



Wheel Chocks are triangular-shaped blocks, in most cases manually placed underneath tires to prevent movement of a parked trailer. There are numerous styles, shapes, and materials available.

Unlike a typical parked vehicle, a truck or trailer at a loading dock can be in constant motion while being loaded and unloaded. Even when brakes are applied, this pitching and rolling motion can make the trailer move away from the loading dock (known as trailer creep), potentially creating a dangerous gap between the dock and the trailer. Furthermore, missed communication signals can have a truck to prematurely pull away from the dock while the material handling equipment operator is still inside the trailer.

A way to address these risky situations is to use a vehicle restraint system on a trailer's RIG bar or rear wheel (see Vehicle Restraints 101 or ANSI MH30.3), a quality communication system and good training procedures. When used in conjunction with a vehicle restraint system, an additional measure of safety can be gained by placing wheel chocks underneath trailer tires. When used as the primary trailer creep prevention device, wheel chocks can be combined with signage, security chains, wall mounting brackets and manual communication lighting systems to create a safer loading environment.

Wheel chocks function best when momentum is limited by placing the leading edge centered, square and snugly underneath the tire tread in the direction of



Example of a wheel chock placed under a truck wheel

movement. This reduces the chance of the dynamic force of a moving trailer rolling over the chock. In the case of loading docks, this usually means placing them in front of the rear tires. It is highly recommended to use a chock on each side of the trailer as it divides the weight of support.

Considerations for choosing the right wheel chock include:

- **Diameter** A vehicle's tire diameter should closely match the chock's diameter for best effectiveness.
- **Construction** The construction of the chock will affect product longevity and cost. Common materials are rubber, steel/aluminum, and urethane. Molded rubber tends to be the least costly, steel is the most effective and urethane is lighter weight and has non-conductive properties.
- **Surface** Concrete, asphalt, and gravel can be typical surfaces where the right wheel chock needs to 'bite' into. If snow and ice are a concern, the chock style should have properties best suited for this environment.
- Gross Vehicle Operating Weight Make sure the chock can handle the load.

Wheel chocks can be an inexpensive way to make loading docks safer and help meet OSHA regulation 29 CFR 1910.178(k)(1): 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 powered industrial trucks

# Trailer Collapse Prevention

When 'spotted' on landing gear, for loading and unloading, transport trailers present a critical safety risk. Stressed by the combined weight of cargo and material handling equipment, trailers can up-end, or landing gear can collapse, creating potentially devastating situations for workers caught within.

Trailer stability is affected by a complex relationship involving number of axles, trailer weight, landing gear placement, weight & placement of cargo, weight & position of material handling equipment and more.

When the cab disengages from the trailer, the trailer is at risk of collapse unless a secondary support system is utilized. For strength and support, trailer stands can be efficiently and easily placed under a trailer's front end to help prevent mishap and tragedy.

Beyond the acute risk of injury, there are other critical business consequences that accompany trailer failure such as:

- Dock disruption
- Material handling equipment, trailer, and equipment damage prevention
- Lost cargo prevention
- Legal cost avoidance

There are several different types of trailer stands to choose from, depending on loading dock traffic (high, low, or moderate) and level of safety and efficiency desired.

- 1. <u>Pin-Style Post Trailer Stands</u> employs a small contact plate and would normally be recommended only to be used in pairs.
- 2. <u>Trailer Stands Crank Style</u> uses a wide top and base to better distribute weight. Additionally, many trailer stands have large tires, making them easier to maneuver in weather and difficult conditions.
- 3. <u>Trailer Stands Automatic Rising</u> crank-less trailer stands are made with internal gas shocks that allow the top plate to automatically rise to the underside of the trailer and engage safely with a pin/lever combination.
- 4. <u>Trailer Stands Extra-Wide</u> at more than double the width of the above trailer stands, extra-wide stands are designed to offer better side-to-side support with quicker deployment in extra heavy-duty loading docks.
- 5. <u>Shunt Truck-Positioned Trailer Stands</u> put into position by a shunt truck, the shunt truck-positioned trailer stand creates a completely hands-off alternative for deployment, offering the safest possible positioning and removal.

**TRAILER JACK ALERT** - It is a dangerously common practice to use a trailer maintenance jack in lieu of a trailer stand. Because a trailer jack can be lowered even if trailer landing gear has failed, the dock worker is at deadly risk from trailer tip over. Jacks should only be used for the maintenance/tire change operations for which they are designed and should never be used in place of a trailer stand.



# Industry Support

### LODEM (Loading Dock Equipment Manufacturers)

The Loading Dock Equipment Manufacturers (LODEM) members are the Industry's leading suppliers of loading dock equipment. They supply solutions worldwide and in virtually every major manufacturing and distribution sector.

Loading dock equipment is used to make the loading dock area of a facility more accessible and to provide safe movement of goods in that dock area. Loading dock equipment includes elevating docks, dock levelers, dock boards, dock lights, bumpers, seals, shelters, vehicle restraints and traffic doors.

LODEM members meet regularly to review, discuss, and revise guidance for design, performance, and proper operation of loading dock equipment. LODEM programs Include:

- The development and promotion of standard nomenclature.
- The development and promotion of guides and training materials for equipment operations, personnel safety, etc.
- The collection and dissemination of reliable industry statistics.
- The preparation and distribution of educational and promotional materials as to the benefits of LODEM solutions.
- The establishment of liaison and cooperation with private and governmental groups establishing standards and/or safety codes which are pertinent to this technology.

### Mission

To promote market growth and safe use through the development of standards, best practices, and market intelligence, consistent with the best interest of the user in the loading dock and accessory products industry.

### Vision

To be the recognized independent authority for loading dock equipment and safety best practices.

### MHI – The Industry That Makes Supply Chains Work

MHI is the nation's largest material handling, logistics and supply chain association. MHI offers education, networking, and solution sourcing for members, their customers and the industry as a whole through programming and events.

### Mission

Deliver member value every day.

### Vision

To be the authoritative resource for the material handling industry.

### MHI Snapshot

- 800 members including: material handling and logistics equipment companies; systems and software manufacturers; consultants; systems integrators and simulators; and third-party logistics providers and publishers.
- 17 MHI Industry Groups representing the leading providers in several key equipment and system solution categories.
- Sponsor of the industry leading ProMat and MODEX events.
- MHI provides educational development, networking, and solution sourcing opportunities.





# LOADING DOCK EQUIPMENT MANUFACTURERS

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