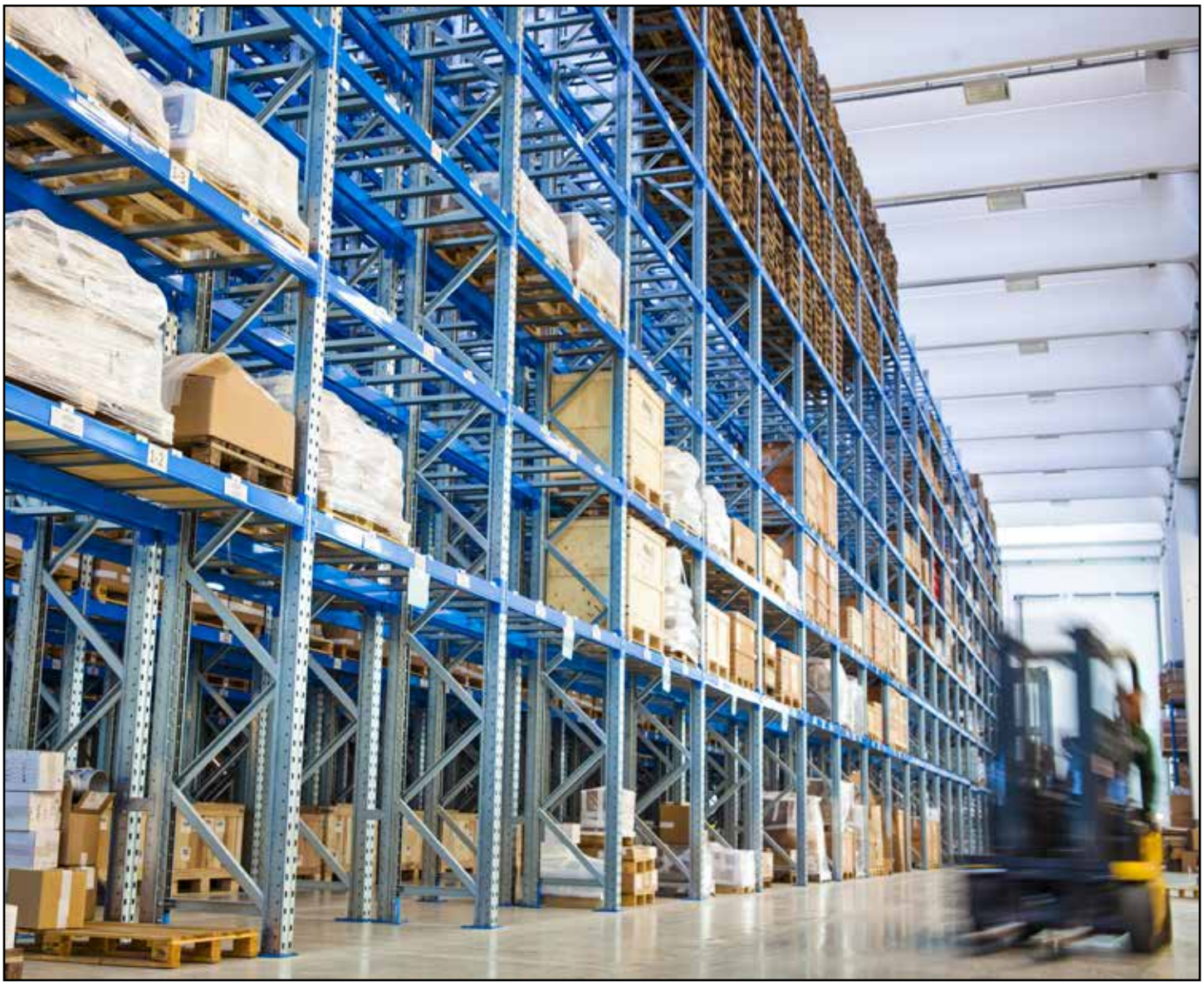
A CISCO-EAGLE WHITE PAPER:

SHARED SPACE IS A DANGEROUS PLACE WHEN IT COMES TO FORKLIFTS AND PEDESTRIANS



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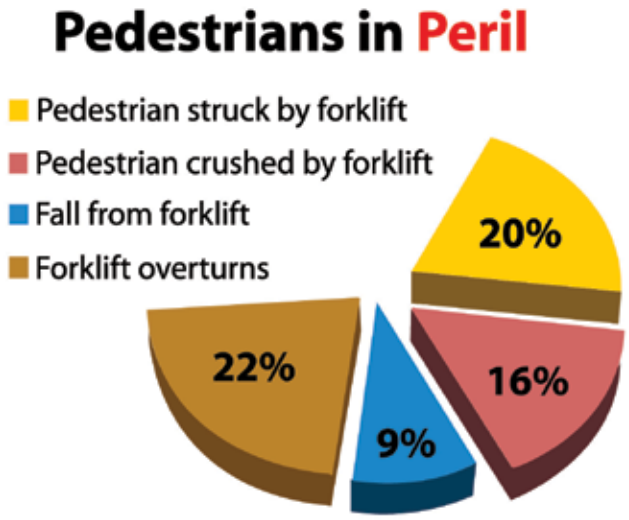
PEDESTRIANS ARE NEVER TRULY SAFE NEAR FORKLIFTS

Pedestrians suffer 26% of all forklift related injuries—often serious or fatalities

Pedestrians working near forklifts may be struck or crushed by the machine or the load. In fact, the odds are against people who work on foot near industrial traffic—unless you do something about it.

Industry statistics cite a **90% probability** of a forklift being involved in a **serious injury or fatality accident** over its useful lifetime. The Occupational Safety & Health Administration estimates that forklifts account for 61,800 minor injuries, 34,900 serious injuries, and 85 forklift related deaths every year. With almost 900,000 forklifts in operation in the United States, those numbers amount to a 1 in 10 chance that each forklift working in your facility will be involved in an accident this year.



Those aren't great odds – And over the long haul, the chances of an incident only increase.

Many pedestrians are injured when they are struck by a lift truck, crushed between a forklift and another object, struck by objects forklifts collide with, or hit by objects falling from a forklift – and most injuries are preventable. When you consider the sheer mass of a forklift fully loaded, even at low speeds a pedestrian can be caught by the forks and carried under the fork truck or crushed between the load and an obstacle before a driver can stop the truck. Visibility issues compound the problem with tall, wide loads, blind corners, and pedestrians suddenly crossing in front of the oncoming forklift.

Most often, it simply comes down to a lack of awareness and failure to follow safe procedures. From investigations of forklift-related deaths by the National Institute for Occupational Safety & Health (NIOSH), we learn that many workers and employers:

- May not be aware of the risks of operating or working near forklifts
- Do not follow procedures set forth in OSHA standards, consensus standards, or equipment manufacturer's guidelines

Beyond injury or fatality, many incidents also involve damage to racking, building structures, dock doors, machinery, and overhead obstacles, resulting in property insurance claims from structural damage and losses from damaged product. Incorrect forklift operation, failure to follow safety rules and poorly maintained equipment all lead to serious accidents, and the only way to reduce that 90% probability for serious forklift incidents is through providing forklift safety rules that are focused on the safety of pedestrians in your facility.

In the following pages, you will find specific guidelines and suggestions that will help you assess your current safety level, create a plan for improving safety and traffic management, and implement best practices through training, processes, products, and devices.

PEDESTRIAN SAFETY STARTS WITH TRAINING FOR EVERYONE

Visitors should receive pedestrian safety training if admitted into any forklift area

This concept should be a basic principle within your company culture. If there are forklifts present, everyone receives safety training about working in the forklift environment. That means your line workers, your managers, your office workers, visitors, vendors, service personnel and others. Anyone who sits foot in an area where there are forklifts should receive training before allowed on the floor.

Require safety course work for all employees and all visitors

As an employer, safety officer or manager, make sure your workers are trained in the company rules for traffic rights-of-way in your facility. All workers, including office staff, should be educated in the risks of working with and around forklifts. They should clearly understand the reasons for traffic lanes and designated pedestrian crossings. Above all, educate all workers that ONLY certified and authorized individuals are to operate forklifts and that severe penalties will be incurred for not observing that rule.

Safety training should include awareness precautions such as understanding forklift traffic

Pedestrian Killed

At 2:41 p.m. on June 22, 2007, a worker was assigned to band packages of annealed glass for automotive applications. Her work area consisted of a work station for handling packages of glass and banding material. The worker had left her work station to retrieve a new pair of safety footwear. The lift truck involved was traveling forward with a load of four boxes which obscured the operator's view to the front. The worker tried to cross an aisle way for powered industrial truck traffic. She was struck by the right front fork, forced under the load, and was dragged on the floor for approx. 382 feet before coworkers were able to stop the truck. The worker was killed. (OSHA Incident Report)

patterns in your facility and dangerous intersections where special precautions should be taken – especially if you do not have warning sensors or gates installed. Safety training should also include understanding forklift driver visibility and hearing distance limitations.

Pedestrian Struck By Forklift

Employee #1, a clerk assigned to the marine terminal, was walking on the wharf alongside a container top lift machine. A forklift truck, with a squeeze attachment carrying two rolls of paper, was traveling in the same direction as employee #1. The forklift truck continued forward and apparently the load (which was approximately 11 inches higher than the steering wheel) obstructed the driver's forward view. He struck and crushed employee #1 beneath the load. (OSHA Incident Report)

All visitors to your facility should be provided a safety training session before being allowed into a warehouse or forklift area. If a forklift travels through an area, consider it off-limits to all visitors without a sign-off on training.

Forklift drivers must be certified

Only those with proper training and certification should operate a forklift or fork truck. Develop and enforce a written safety training program that includes worker training, operator license, and a periodic review timetable for revisions. Forklift driver safety training is the single most important way you can prevent lethal forklift accidents.

Operator training should include education on:

- Stability & visibility factors
- Safe driver responses in tip-over situations with different types of forklifts

Use operator restraint systems appropriately:

- The importance of reporting any damage or problems with a forklift during each shift
- Proper lift & lower and start & stop operation procedures, including parking brake use
- Hazards to workers in aisles, at doorways, on docks, or in crosswalks
- Enforcement of "No Passenger" rules, including raising someone on the forks or on a pallet on the forks
- Safe speeds with due regard for traffic and conditions

Establish clear rules

- **Inspections & maintenance** to include daily inspections of battery charge and fuel levels, engine fluid levels, leaks, tire condition, steering controls, brake and clutch operation, and onboard safety devices properly working. If there is any evidence of faulty operation or unusual engine sounds, take the truck out of use. Regular scheduled maintenance should also be done
- **Avoiding distractions** like having food or beverages onboard the forklift. No phones, music devices, headphones, or other diversions that may keep an operator from hearing alarms or worker's shouts
- **Stay focused on the task at hand** rather than thinking about personal stressors or joining in horseplay of any kind

Manage and enforce forklift speed limits to help increase worker safety

Here is a quick guide to the maximum speeds you should allow. Modify these by your situation and facility issues.

Per OSHA: "Forklifts shall be operated at a safe speed with due regard for traffic and conditions." Recommended maximum speeds for various situations:

- Interior rack aisles: 3 mph
- Inside buildings: 5 mph
- Exterior work areas: 7 mph
- On roads: 10 mph

CLUTTER CAUSES ACCIDENTS

REMOVING OBSTACLES REDUCES DANGERS

Eliminate clutter so forklifts and pedestrians stay in their own lanes

Stacks of pallets, trash, excess inventory, cardboard boxes and cartons are hazardous in forklift environments.

Drivers may swerve to avoid these obstacles, while pedestrians may walk into traffic lanes. In either situation, the **danger of injury or fatality increases.** Workers may assume forklift drivers see them in or near the cluttered area and step into the path of an oncoming forklift unexpectedly. Clutter creates unpredictability in the forklift traffic lane, **making the environment more dangerous** for pedestrians.

Reducing clutter related danger:

- Inspect regularly to identify hazardous obstructions in the aisle, blind corners and intersections, and locations where forklifts come too close to workers on foot
- Remove any hazards or and clearly mark hazardous locations in your facility
- Install workstations, control panels and equipment away from the aisle
- Prohibit storage areas for bins, racks, and other materials, at corners and intersections or other locations that create an obstruction to the visibility of operators or workers in the area
- Prohibiting forklifts from entering aisles where orders are being picked

Five essentials for safety near forklifts

- **Knowledge –** Know the nature of the equipment being used including operational hazards and related safety measures
- **Alertness –** Stay focused on the job, avoid distractions and pay attention to safety alerts like motion detection systems, traffic lights, wide-angle mirrors and pedestrian crossing gates
- **Foresight –** Think ahead by checking load distribution before moving a load; consider safety hazards along the route
- **Judgment –** Assess situations accurately, consider viable options, use wisdom in selecting a solution
- **Skill –** Correctly operate the equipment each and every time to develop a habit of safety

LOW LIGHT AND NOISE ENDANGER DRIVERS & PEDESTRIANS

HELP FORKLIFTS & WORKERS SEE EACH OTHER

Pedestrian safety means more than simple, "adequate lighting"

How well-lit are your rack aisles? What about areas around pedestrian access points that cross or enter forklift traffic? These are dangers many operations don't consider in safety plans. There should be bright lighting anywhere pedestrians and forklifts cross paths. Make sure that all pedestrian crossing points are well lit, especially entry points in secluded areas of your facility such as long passageways within or between buildings. If your forklifts are equipped with onboard light systems, make sure they illuminate far enough ahead to allow them to stop in time if a pedestrian steps into their path.

Enhance visibility at blind corners

By installing wide angle mirrors you enable forklift drivers and others to see traffic around the corner. Mirrors are an inexpensive safety investment – especially considering the disastrous results of a forklift colliding with workers as it rounds a corner into a rack aisle or at a dock.

Can workers hear oncoming forklifts?

Does machinery or other noise cover up forklift reverse motion beepers? Can workers hear oncoming forklift traffic before they see it? Can forklift drivers hear shouts from other workers? If not, consider utilizing audible alarm systems with motion sensors to keep workers aware of forklift proximity.

ERECT BARRIERS TO SEPARATE FORKLIFTS & PEDESTRIANS

IT'S EASY TO STEP OVER FLOOR MARKINGS—NOT PHYSICAL BARRIERS

Tape markings are a good way to set traffic rules and should be used, but people tend to ignore them when convenient

Keeping foot and forklift traffic separated is **one of the best ways to prevent devastating forklift accidents**. It can be as simple as creating traffic lanes using floor taping to indicate where workers should walk in moving through a facility.

In critical high-danger, high-value areas, you may need a solid physical barrier

To better ensure forklift and foot traffic don't mix, **install rails** along those traffic demarcations to prevent a forklift from entering into the pedestrian lane and to keep pedestrians within confined boundaries and access points.

Dealing with dangerous, high traffic crossings

To further protect workers, **install gates at all crossing points**. This helps workers to stop, look, and listen for forklift traffic before crossing a forklift traffic lane. Install barriers where work stations and forklift traffic are in close proximity so that work stations are isolated from forklift traffic lanes. Restrict forklift traffic near and around time clocks, break rooms, cafeterias and primary exits – reroute forklift patterns if needed, as these are locations where workers congregate and forklift awareness is lowered as they rush to and from these locations.

Finally, install rack corner guards and protective barriers at rack ends to prevent forklifts from hitting storage racks and potentially taking down an entire row of racking. Such incidents happen frequently enough that you should give careful thought to protecting the dollar value of products and parts stored on those racks.

INSTALL GATE & ALARM SYSTEMS FOR IMPROVED AWARENESS

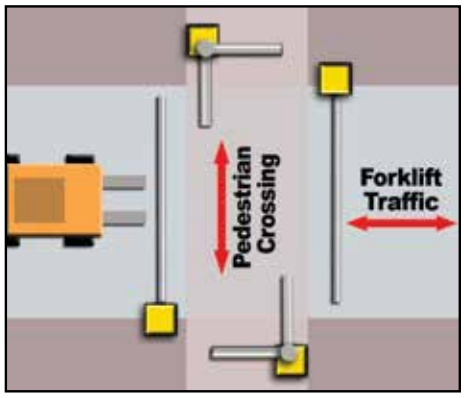
MANAGE TRAFFIC WITH INTELLIGENT DEVICES

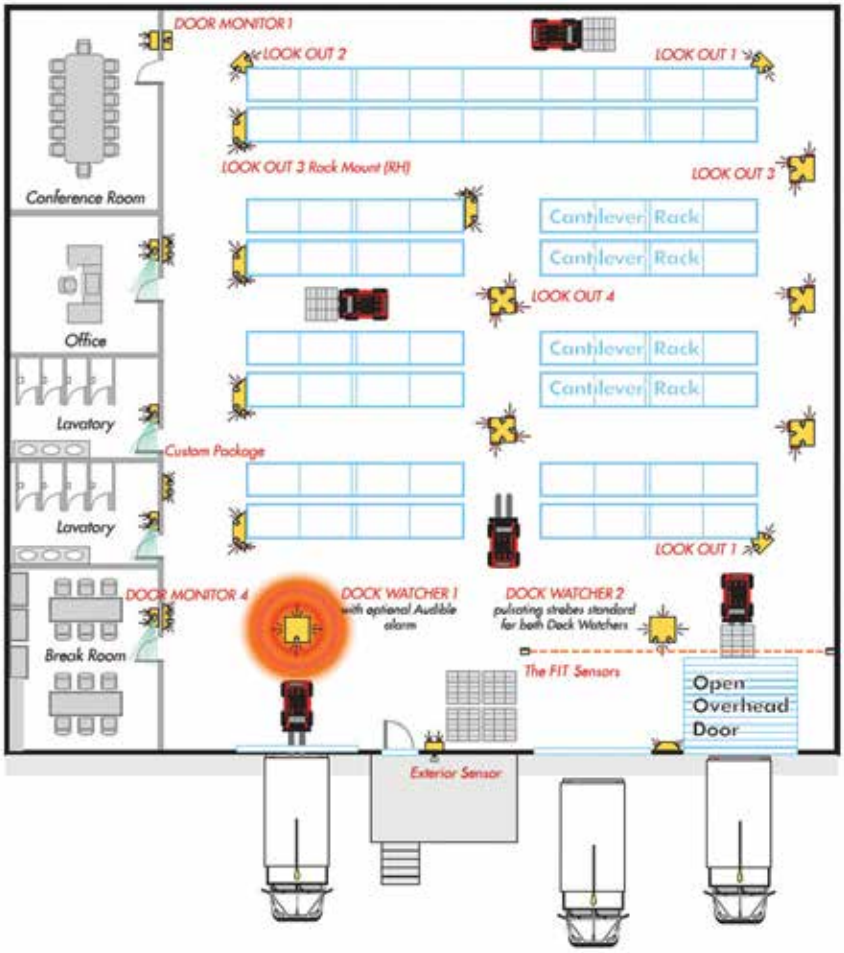
An excellent way to protect pedestrians in a facility that has forklifts is to use automated warning and alarm systems. These systems alert both forklift drivers and pedestrians to each other's presence, and are an **inexpensive, easily implemented** way to help deter potentially fatal forklift-pedestrian collisions.

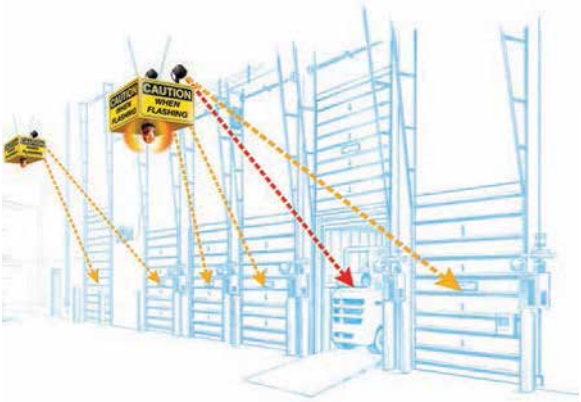
Automated gate systems for higher risk, lower visibility and heavy traffic areas

In high-risk or high-traffic areas consider **automated gate systems that utilize motion detection and intelligent controls**.

These systems open or close based on logic to help prevent workers from crossing forklift lanes when a forklift is present by detecting the forklift and allowing foot traffic gates to open only when the forklift has passed and the lane is clear (or vice-versa). The gates close across the forklift lane and allow foot traffic to safely cross, waiting until the crossing is clear before opening the gates in the forklift lane. By creating well defined and safe crossing points, you take the guess work out of the worker's hands and help limit the tendency for risk-taking behavior by pedestrians and forklift operators.







Automated warning lights and alarms

These systems utilize motion detection to trigger flashing lights and horns, or other audible alarms that alert workers to the potential for a forklift collision. Motion detection sensors can be placed in various configurations to scan specific aisles, traffic lanes or broad sections of a facility. They are the ideal way to enhance safety in dangerous work zones like shipping & receiving docks, order picking, and blind corners.

When ambient noise levels are high, motion detection systems with flashing lights are especially helpful in warning workers of other oncoming traffic.

These systems help forklift drivers and pedestrians become aware of each other, increasing attention to precautions such as slowing down and entering a rack aisle cautiously, or stopping and visually spotting oncoming traffic before proceeding.

Other automated methods

- Devices installed on forklifts that help monitor driver behaviors, control speeds and manage the vehicles
- Automated signs that are controlled by motion detection and intelligent controls. These can be deployed to monitor a point of egress, a crossing area, a work cell, an aisle or other areas
- Onboard systems that tag both pedestrians and forklifts to help notify both parties of each others' presence

DEVELOP A SAFE AND EFFECTIVE TRAFFIC MANAGEMENT PLAN

Protecting pedestrians helps reduce liability

Some companies approach traffic management from an ROI perspective. That can be short sighed, as the costs of prevention are considerably less than the risks associated with personal injury lawsuits and workers' compensation claims, as well as the impact on worker morale. Employees and facility managers may not like a fully realized traffic management plan, but it's essential for a healthy and safer business operation.

Having no traffic management plan is like a street without stop signs

Carefully consider how and where foot and forklift traffic flows through your facility and then **map out specific flow patterns** to design a pedestrian safe traffic management plan. When your traffic management system is completed, you gain benefits beyond safety. You will enjoy:

- Increased productivity through well thought out materials movement
- Greater employee satisfaction with their work environment
- Improved return on investment through lower incident expenses and potential insurance savings
- Peace of mind that you have done all you can to prevent injury or even fatality in your work place:
- Safety training for all employees and visitors alike
- Proper forklift maintenance
- Good housekeeping standards to remove clutter and debris from forklift lanes
- Barriers and rails to separate pedestrian and forklift traffic and to protect rack and structural objects
- Forklift warning and alarm systems, and traffic management systems which control pedestrian access to forklift traffic areas

FORKLIFT SAFETY RESOURCES

ARTICLES, TRAFFIC MANAGEMENT, DOCUMENTS & MORE

Articles:

- Forklifts: Mass x Velocity = Accidents
- Forklift Safety – Who's Responsible?
- Make Yourself Visible Around Fork Trucks
- Avoiding Distractions Behind the Wheel
- But, I'm No Forklift Driver!
- Pop Quiz: Forklift Accident Reduction
- Can Warehouse Safety be Automated?
- Seeing Around Corners in the Warehouse
- Pedestrians: Help Them See You

Equipment and systems to support forklift/ pedestrian safety:

- Forklift Safety Training Kits
- Guard Rail Systems
- Safety Sensors
- AisleCop® Automated Safety Gate Systems
- AisleAlert™ Floor Projection Systems
- AisleAlert™ Automated Warehouse Traffic Lights
- Safety & Visibility Mirrors
- Lighting Systems

OSHA Links:

- Sample Forklift Safety Training Program Outline [PDF - 7 KB]
- Operator Training [PPT - 2.0 MB]
- FAQs Powered Industrial Truck Operator Training [PDF - 118 KB]
- Loading and Unloading
- Working with Hazardous Materials
- Sample Performance Test [PDF - 8 KB]
- Vehicle Maintenance
- Powered industrial trucks must not be placed into service, or must be removed from service, when any condition exists that adversely affects the safety of the vehicle (2004, September 13)
- Evaluation of what is considered a safe speed to operate powered industrial trucks (forklifts)
- Selected Forklift Fatalities Summary [PDF - 13 KB]
- Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts. National Institute for Occupational Safety and Health (NIOSH) Publication No. 2001-109 (Alert), (2001, June). Includes forklift fatality data, current standards, case reports, recommendations, and safety instructions.

Forklift operating links

Safely operating a forklift requires preparation, anticipation and careful attention in order to maintain control of the vehicle at all times.

- Pre-Operation: Forklift inspection, pre-flight
- Traveling and Maneuvering: Use good operating practices to prevent accidents
- Load Handling: Identify hazards and recommended practices for each step in the load handling process (including an in-depth discussion on Load Composition)

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