SAFETY INNOVATIONS FOR CONSTANTLY EVOLVING OPERATIONS

Safety is critical in the materials handling industry. Industry statistics estimate that approximately one out of every 10 forklifts is involved in an accident in the United States each year, which can lead to serious injuries and deaths.

However, OSHA also estimates that approximately 70 percent of these accidents could be avoided through better adherence to standardized training and safety procedures. That significant reduction in accidents can, in turn, help decrease occupational injuries and associated costs.

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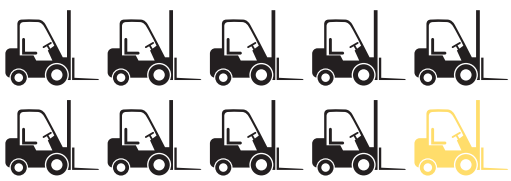

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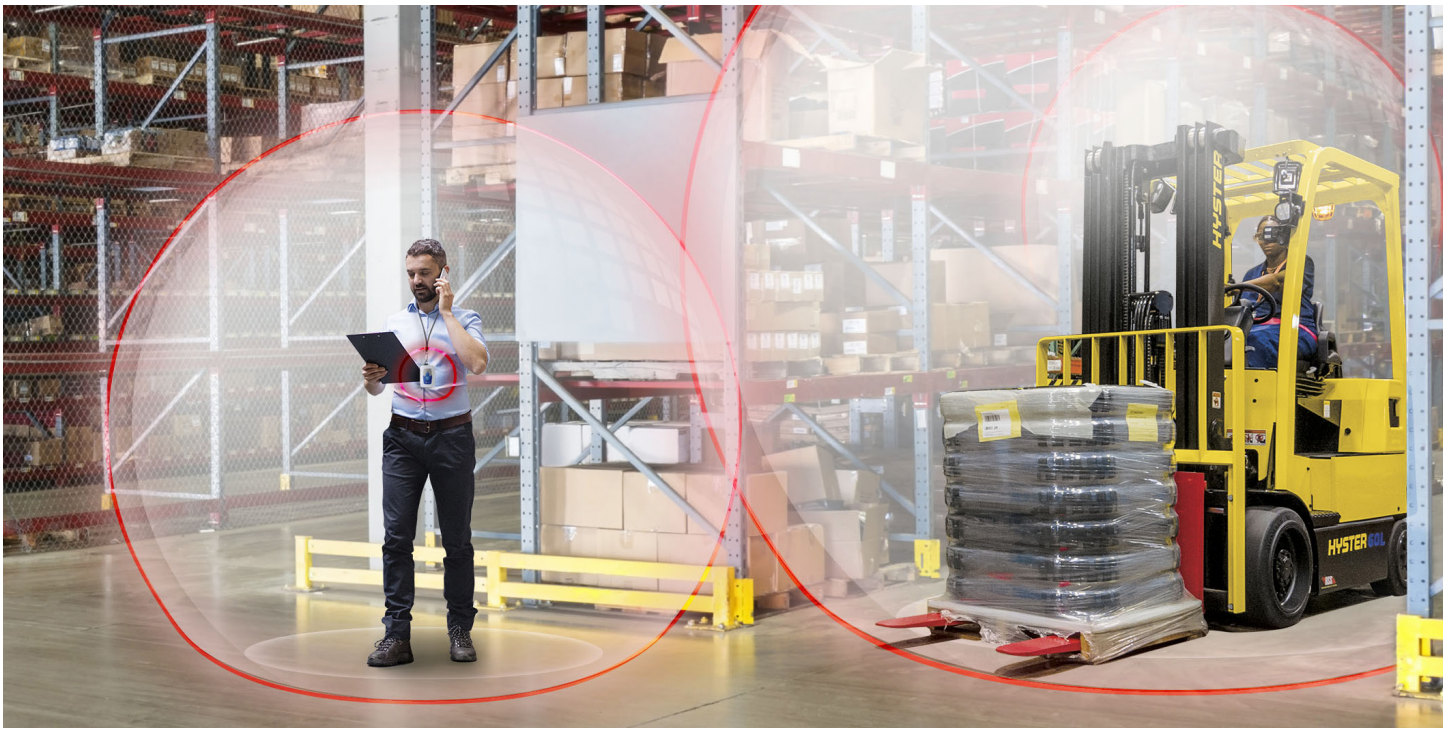


Safety requires constant focus and attention from lift truck operators, pedestrians and supervisors alike as operating environments continue to evolve at a rapid pace. Rising demand and just-in-time strategies rely on lean, finely-tuned supply chains operating quickly and precisely. Even in the case of reshoring and nearshoring, operations need to be extremely efficient, building in resilience to accommodate fluctuating conditions without creating waste. As a result, operators face intense pressure to perform at their peak and increase throughput. They work in environments with new, high-performing technologies – including some that reinforce operating best practices.

- **Robotics**, particularly automated vehicles, can help identify and avoid people and objects in safety zones, thereby helping reduce the risk of accidents and collisions.
- **Power sources**, including lithium-ion batteries and hydrogen fuel cells, allow for a one-to-one power source to lift truck ratio – no need to store extra power units and burden personnel with the task of swapping out lead-acid battery packs.
- **Virtual reality simulators** enable lift truck operators to obtain additional training exposure in an immersive environment without using actual equipment.
- **Telemetry systems** track lift truck performance and can isolate data pertaining to specific operators, helping to boost accountability and identify those in need of additional training.
- **Operator assist systems** alert operators and reinforce proper lift truck operation through automatic truck performance adjustment based on real-time equipment status, location and operating conditions.
- **Lights and alarms**, including work lights, directional spotlights and audible alerts, can help support site safety initiatives in certain work environments.

// ROBOTICS: CONSISTENTLY FOLLOW SAFETY PROTOCOLS

In 2020, labor turnover in key supply chain sectors reached five-year highs, including U.S.-based manufacturing, which reported a 44.3% turnover rate, according to the Bureau of Labor Statistics. Acquiring—and then retaining—labor is no easy task. The higher the turnover, the larger the training burden businesses face as they constantly bring in new operators. And with inexperience, comes increased risk. Due to advances in robotic technology, lift truck operators can now concentrate on more complex, value-added tasks, leaving robotic lift trucks to handle repetitive tasks like horizontal transportation, vertical put-away and towing.

Robotic solutions are programmed to adhere to direction provided by the management software, reducing the opportunity for human error. They are also programmed to move around physical structures in facilities, and accelerate and travel at controlled speeds. In addition to avoiding permanent structures, robotic lift trucks can also adapt to changes in the operating layout. They move through complex footprints, avoiding columns, racks and walls, and can even cross pedestrian paths.

Robotics are also engineered according to specific safety standards, such as ANSI/ITSDF B56.5. They are programmed to maintain a specific distance from pedestrians and structural features. This ability to detect and avoid objects comes from the on-board laser detection and guidance systems.

Everyone in the facility should be trained on how to properly interact with mobile robotics. The “rules of the road” are different from the guidelines for traditional equipment with human operators, and they must be clearly defined. While robots have sensors and systems designed to prevent impacts, workers, supervisors and guests can be unpredictable, which makes clear explanation and enforcement of rules all the more important.

// POWER SOURCES: REDUCE INJURY RISK AND EMISSIONS

The lift truck power market is more robust than ever, with new technologies maturing to join the ranks of traditional options like lead-acid batteries and internal combustion engines.

Extremely durable, the internal combustion engine (ICE) provides consistent power and can offer fast, low-effort refueling. However, ICE models that use liquified petroleum gas have fuel tanks that must be switched out when depleted, which can require lifting and twisting by operators, subjecting their bodies to physical musculoskeletal strain. What's more, ICE trucks can produce potentially harmful emissions that must be accounted for inside facilities and as part of operational planning. As such, internal combustion engines are most commonly used in outdoor or well-ventilated indoor applications.

Lead-acid batteries were the first electrification option for lift trucks, with relatively low startup costs and no emissions while in operation – making them ideal for indoor applications. However, with battery packs being very heavy, and in some applications needing extraction using a hoist or magnetic arm at least once per shift, this can introduce additional risk to and strain on operators. Another potential issue is that the corrosive materials in the batteries themselves can be harmful, especially if they come into contact with a person's eyes or skin.

More operations are turning to lithium-ion batteries as an electrification alternative. Compared to lead-acid batteries, lithium-ion batteries have a key difference that exists in the charging process. Rather than requiring removal and replacement to charge, operators can simply plug in lithium-ion batteries directly from the equipment – no lifting and twisting to remove tanks or batteries manually or with tools.

Like lead-acid and lithium-ion batteries, hydrogen fuel cells do not produce any harmful emissions. What's more, hydrogen-powered forklifts can be refueled in as quick as three minutes in a process similar to fueling an ICE-powered lift truck. This process does not require removal or replacement of heavy components, which decreases the risk of musculoskeletal injuries associated with changing out lead-acid batteries and can get operators back to work sooner.

DESIGNING AROUND NEW POWER SOURCES

Rather than using existing truck designs and outfitting them with new power options via battery box replacements, Hyster has introduced a lift truck designed around the form factor of a lithium-ion battery pack. This approach enables several ergonomic enhancements that can keep operators more comfortable and alert all shift long, and ultimately help contribute to operational safety. For example, a low seat and floor plate can make entry and exit easier, while extra space underneath the seat allows for a more comfortable operating position. Other advantages include a lower center of gravity for greater stability and maneuverability.

// VIRTUAL REALITY: SUPPLEMENTAL TRAINING WITH REDUCED RISK

Operator training is a foundational element of forklift safety, as is complementary pedestrian training. And just as technology advancements like robotics and power options have been applied to address operational challenges, virtual reality technology is being applied as an operator training tool.

Although it is not a replacement for on-truck training, virtual reality simulators enable operators to practice lift truck operation in an immersive environment. This approach offers valuable experience that can help operators prepare to execute tasks and share environments with pedestrians without taking an actual lift truck out of service or risking damage to equipment, facility infrastructure or oneself. By participating in realistic 3D environments and using actual controls and responses of real lift trucks, operators can:

- Enhance skills in controlled environments
- Reduce potential on-the-job training incidents
- Receive automated, real-time feedback

Even before employees are hired and training begins, virtual reality simulators can be used as a candidate screening tool for employers trying to fill vacant lift truck operator positions. Once onboard, virtual reality simulation can offer a primer that helps decrease the learning curve for new hires and help improve the consistency of lift truck training between locations. While there may be some variability in the instruction between trainers, the simulator is consistent.

// TELEMETRY: IMPROVE SAFETY THROUGH VISIBILITY

Lift truck telemetry systems can track many aspects of lift trucks, from equipment diagnostics and utilization analysis to operator performance and more. Management can access all of this information in real-time via desktops, laptops and mobile devices to make informed fleet management decisions and safety-related calls.

One important feature of telemetry is the ability to restrict truck access to only operators with proper certification for that truck type. Every operator must swipe an individual access card with certification information encoded, or else they cannot start the equipment. The system also provides notifications when operators have certifications expected to expire shortly.

Tracking truck information by the specific operator provides visibility to their travel locations, idle time and impact alerts. Managers receive notifications when and where impacts happen and who was operating the truck – helping identify high performers who deserve recognition and those who may require more training. Additionally, employers can utilize the telemetry system to limit truck performance based on operator experience and skill level. For example, new hires might have their trucks capped at slower speeds to help reduce potential risk while more experienced operators can still operate the same truck at levels that allow maximum performance.

// OPERATOR ASSIST TECHNOLOGY: REINFORCE BEST PRACTICES

Operations can also leverage new operator assist technologies that proactively monitor real-time equipment status, location and operating conditions to instantly alert the operator and reduce truck performance to help reinforce proper lift truck operation. Hyster Reaction™, for instance, offers multiple detection systems and can apply a broad range of equipment controls to support operator awareness and reinforce best practices, such as:

- **Automatic slow-down** automatically limits speed when approaching pedestrians and equipment or in accordance with location-specific rules, such as when lift trucks approach a four-way cross, reach the end of an aisle or a designated pedestrian zone.
- **Load stability** controls hydraulic functions, including lift, lower and tilt, to help reduce the risk of tipping and load pitching, including an overload arrest function to prevent operators from moving loads that exceed specified weight thresholds.
- **Dynamic alerts** keep operators informed with dashboard alerts triggered based on load status and the presence of a pedestrian or obstacle in close proximity or path of travel.

AUTOMATIC SLOW-DOWN

LOAD STABILITY

DYNAMIC ALERTS

// LIGHTS AND ALARMS: INCREASE CONFIDENCE, BOOST AWARENESS

Whether navigating dark trailers or dim storage areas, lift truck operators can encounter poorly lit environments. To help increase visibility so operators can perform at their peak, operations can take advantage of truck-mounted lighting solutions.

- **Dome/compartment lights** brighten operator compartments so controls and paperwork are more visible.
- **Rear work lights** provide additional lighting for travel in dark areas, such as truck unloading, and automatically activate during reverse travel.
- **Work lights** illuminate poorly lit areas and can be installed on masts or trucks.

In addition, the following types of lights can help aid pedestrian awareness in certain environments.

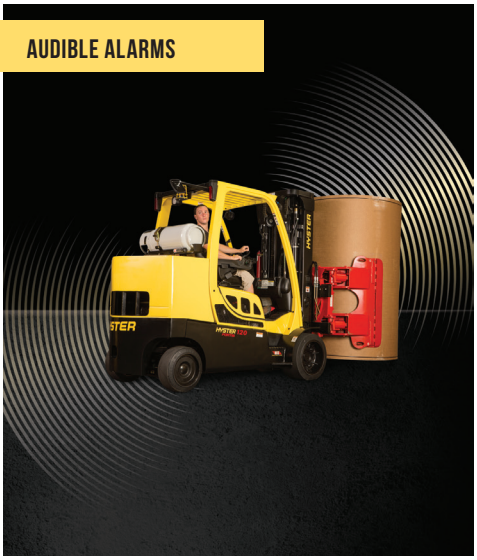
- **Blue LED spotlights** are cast in front or behind the directional paths of lift trucks, providing an additional alert to pedestrians and other mobile equipment of approaching trucks.
- **Red zone lights** are projected onto the ground level, forming a curtain around the sides of the truck to remind pedestrians to avoid the lift truck's operating area.
- **Strobe lights** flash bright amber on top of trucks to notify pedestrians and other mobile equipment of a lift truck's presence.

Audible alarms help notify pedestrians and other lift truck operators of equipment in close or immediate proximity. They even automatically self-adjust to five decibels louder than surrounding ambient noise, eliminating the need for constant manual adjustments.

OPERATOR LIGHTING

PEDESTRIAN AWARENESS

AUDIBLE ALARMS



// A TRUE TEAM EFFORT

Intensive industries are more advanced now than ever before. And although some technologies are developed to meet performance targets and respond to labor challenges, they may still have an impact on operating a forklift safely. Managers must carefully evaluate the technologies available to determine which are most suitable for their operations, lift trucks and employees. After all, safety is a true team effort.

To learn more, visit **Hyster.com**.