WARNING

WAREHOUSE SAFETY FIRST

Keeping employees safe is every warehouse operator's responsibility. Collision-avoidance systems, wearable solutions to improve ergonomic safety, and virtual reality training programs help reduce the risks.

by Merrill Douglas

Despite managers' best intentions, a warehouse can be a perilous place. Roughly 95,000 employees are injured each year while operating forklifts, according to the U.S. Occupational Safety and Health Administration (OSHA). Workers also have dangerous encounters with other material handling equipment, while manual processes—lifting, bending, and repetitive motions—can take a toll as well.

These days, heavy turnover in the workforce increases the chance of warehouse injuries. "New workers are just not familiar with the facility," says Jimmy Helms, sales and marketing director at SynTech, producer of the Hit-Not forklift safety system in Huntsville, Alabama.

High turnover can also make safety training less efficient. Consider what happens when an employee who has just finished a training program quits, and the person who takes over that job now needs the same education, says Sean Petterson, founder and CEO of Brooklyn-based StrongArm Technology, which develops systems to reduce workplace strains and sprains.

Besides training associates to do their work safely, warehouse operators might encourage physical warm-ups such as stretching at the start of a shift. "But stretching is usually voluntary," says Heather Chapman, U.S. account manager at Soter Analytics, a London-based firm that focuses on ergonomic safety. "You might see only 10% of the workforce stretching."

SAFETY STRATEGIES

Warehouse operators deploy many other safety strategies—for instance, segregating vehicular and foot traffic, providing high-visibility clothing, or posting reminders about safety rules. Newer solutions use advanced technology to avert problems in real time and enhance safety over the longer term.

Several of those newer solutions focus on collision avoidance. SynTech's No-Hit Proximity Alert System, for example, places a magnetic field generator on a forklift—or any other mobile machine—to create an invisible bubble around the vehicle. That field contains two sections, a warning zone and a danger zone.

Each pedestrian on the warehouse floor wears a personal alarm device. If a pedestrian steps too close to the forklift, both driver and walker receive audible and visible alerts.

"The two zones have different alerts," Helms explains. "The warning zone is three beeps with a flashing LED light. If workers continue into the danger zone, then the LED light and sounder become continuous."

Users can also get alerts to warn of imminent collisions between two forklifts, or between a forklift and a fixed structure. "Many companies say, 'We have this one column that everyone hits.' We can put a device there that will provide an alert for that column as well," Helms says.

Pittsburgh-based ARIN Technologies also offers a collision avoidance system for forklifts, but instead of a magnetic field it uses ultra-wideband (UWB) technology to establish communications between onboard and wearable units. It also puts its own spin on danger alerts.

Soter Analytics offers small and lightweight wearable solutions that monitor and understand an individual's risk of injury. The devices can be worn on the back, shoulder, and/or helmet and headset to help prevent musculoskeletal disorders in the warehouse.

BODY OF KNOWLEDGE

A solution from Soter Analytics helps managers redesign processes to make employees even safer. Soter Task uses video and artificial intelligence (AI) to visualize the risk to various points in the body that a person incurs while working.

Imagine an associate palletizing product on the floor. "I would take a video of that person performing the task," says Heather Chapman, U.S. account manager at Soter Analytics.

The software processes the video to create a schematic-figure-in-motion, color coded to show areas of no risk (green), moderate risk (yellow) and high risk (red). "You can quickly show the associate that they put their back at high risk when they bend to the floor," she says.

Management then brings in a load leveler to raise the height of the pallet, films the worker doing the same task, and studies the processed image. "They can see by implementing the use of a load leveler that they've reduced the chance of injury by, say, 65%," Chapman says. That evidence would justify the cost of the load leveler.

Managers might also bring Soter Task to a warehouse that has few injuries to help figure out what workers there are doing right. "Then make that a best practice at other sites," Chapman says. "Workers at the site that are doing well can coach and mentor those who need help."

The forklift operator's alert is designed like a traffic light, something that drivers respond to out of habit even when they're not looking straight at it. "Subconsciously, when the light turns from green to yellow, people just slow down," says Vivek Kulkarni, ARIN's founder and CEO. "And when it turns red, they stop."

The wearable unit provides an audible signal and also vibrates. For companies that don't want to use wearables, ARIN offers a device for pedestrians called an area monitor, which also behaves like a traffic signal.

"It lets pedestrians know when a forklift is approaching and when it's safe to cross," Kulkarni says.

PEDESTRIAN CROSSING

VIA Technologies, a Taiwanese firm with an office in Fremont, California, takes a third approach. It mounts three cameras on a forklift truck and uses image processing and artificial intelligence (AI) to detect approaching pedestrians.

Usually, the driver relies on an audio alert to know when danger is imminent. Some companies also opt for an onboard screen that displays feeds from all three cameras.

By using cameras for detection, VIA eliminates the need to give pedestrians wearable devices or other accessories. The video also helps a company document any incidents that do occur. "For example, if there's a legal claim or an insurance claim, the camera has it recorded," says Richard Brown, VIA's vice president of marketing.

VIA's technology can detect other safety hazards, too. For instance, its optional Driver Safety System (DSS) points a camera at the forklift operator. "The camera monitors whether the driver is tired by tracking eye blinks, or is smoking, or using a phone," Brown explains.

Some companies opt for a speed sensor, which triggers an alarm if the vehicle goes too fast. "We're adding a seat belt sensor early in 2023," he notes.

As they prevent imminent injury, collision avoidance systems also gather and analyze data about alerts, helping companies improve warehouse safety in the future. For instance, SynTech's data dashboard might reveal that a certain pedestrian worker often crosses the warning zone into the danger zone. That information offers a chance for a discussion.

"Managers can ask, 'Why is this happening and what can we do to make it a safer environment where you don't have to interact as much?'" Helms says.

ASSESSING RISK

ARIN's dashboard can identify the employees most likely to get into accidents and which parts of the building pose the greatest risk due to their layout. Managers can also use it to investigate, for instance, why one facility has 500 risky interactions each week while another has only 100.

"Managers start asking those questions to understand what Facility 2 is doing differently than Facility 1 to make it a safer place, especially if productivity is the same," Kulkarni says.

Workers using StrongArm's SafeWork System get real-time vibrational alerts that prompt them to modify behavior before an injury occurs. Actionable reports give management a benchmark for interventions.

Companies often take a reactive approach to safety. "An accident happens and you write a report," Brown says.

A system like VIA's lets a company assemble a lot of previously unavailable data. "If an alarm is triggered, that goes into the cloud," Brown says. "If the DSS detects that someone is tired, that goes into the cloud." The system also tracks details such as the distance each operator travels per day. This fresh intelligence helps warehouse operators develop more proactive safety strategies.

ARIN Technologies' forklift collision avoidance system alerts operators to the presence of pedestrians, other forklifts, and valuable equipment in the vicinity. The alerts improve worker awareness and lower the risk of forklift accidents.

REDUCING SPRAINS AND STRAINS

While wearables technology plays a role in some anti-collision solutions, other strap-on devices can help reduce sprains and strains in the warehouse. StrongArm's SafeWork System is one of those. The system uses wearable sensors to monitor how employees bend, reach, and lift.

"The system calculates all sorts of movements and inertia that can impact the chance of getting an injury, and measure that at 12 times per second," Petterson says.

When the sensors detect dangerous activity, the wearable device delivers a quick physical buzz. "It's like a tap on the shoulder that says, 'Slow down. You're about to hurt yourself,'" Petterson says.

The SafeWork System collects data from all the wearable devices in a facility and uses that to develop a safety score. Warehouse operators can use that score to inform their decisions as they make staffing plans.

For instance, the data might help managers decide whether to bring on more people for a high-demand shift, or to dial back how much work they expect employees to accomplish. "That's a hard decision for an operator to make," Petterson says. "But we can change that, because we give them the right tools."

Injuries are costly, triggering worker compensation claims and other expenses. Data from SafeWork can help managers build a financial case for adding extra staff or slowing the pace of work.

"In the long run, companies are more profitable if they do the right thing and treat employees with the same level of insight and analytics that they do demand planning operations," Petterson says.

Soter Analytics also uses a wearable device—the Soter Coach—to measure workers' movements and prompt them to follow safer practices.

COACHING WORKERS

"Wearable technology can act like an athletic trainer at a person's side," says Chapman. "Every time a person makes a high-risk movement, like bending at the back instead of squatting, the device gives them real-time feedback through a beep and a vibration."

With help from wearable electronic trainers, a company can coach many people at once. "They can scale their effort and make a big impact on changing body mechanic behavior, as opposed to just asking people to change, which generally doesn't net decent results," Chapman says.

Soter also provides a dashboard where managers can view data drawn from all the Soter Coach units. It can show them, for example, how often employees are bending or twisting, or which jobs or departments incur the most risk.

"The data gives managers insights into where they should focus efforts on changing behaviors or processes," Chapman says.

With tools to guide employees and refine management strategies, warehouse operators who work hard at safety will reach an even higher level of success. ■

STRIVING FOR PERFECTION

Like pilots who use flight simulators to hone their skills, some warehouse workers these days use virtual reality (VR) technology to learn to do their jobs correctly and safely.

"Traditional training methods can be time-consuming, costly, and often dangerous to operations, given the tasks and types of materials that are typically housed in warehouses," says Derek Belch, founder and CEO of Strivr, a Palo Alto, California, developer of VR-based training solutions. VR puts employees in immersive situations that look like the real world, letting them practice their jobs with no danger of hurting themselves or others if they make mistakes.

Strivr helps companies develop content for the VR systems, using either 360-degree video or computer-generated imagery (CGI) to create a simulated environment. Through a VR headset, the software then prompts a trainee through a task, such as the safest procedure for stacking boxes.

The software can also give quizzes. "In the headset, employees could be prompted to spot a certain number of hazards or mistakes in the environment and receive feedback immediately following their choice," Belch says. "The Strivr portal also can collect and share data from eye-tracking or recorded audio responses with the customer's learning and development teams, so they get an aggregate view of how employees are doing in their training session. They can also use the data to provide individual feedback."

For example, by tracking head movements, the software might detect that a worker is looking in the wrong place during training. "If left undetected—which often happens with traditional training methods—these types of behaviors may be taken to the warehouse floor and lead to safety incidents," Belch says. "With VR, training can help to identify these risks before it really matters and allow trainees to learn safe behaviors and apply them when it counts."