

# Happy Birthday

**WORKPLACE**  
Material Handling & Safety



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# EFFECTIVE SAFETY INSPECTION PROGRAM BASED ON TRAINING, OBSERVATION, INTERACTION

By: **Judie Smithers**, Editor, J. J. Keller & Associates

Managers and executives can show their commitment to safety by spending time with employees during periodic walk-around inspections.

During the inspections, managers and executives will see first-hand how hazards are found and fixed. They'll be able to ask employees about the safety measures they take for their jobs, and how they report hazards, near-misses and injuries. And, they can ask workers what they think about the training they've received.

A good safety inspection program includes planning, execution and follow-up.

## PLANNING

It's crucial for managers and executives to prepare for their walk-arounds. Planning will help the inspection



go smoothly, and it will help ensure they observe the procedures they want to see and ask the questions they want to ask.

To plan ahead, leaders should:

- Review past inspection reports to familiarize themselves with previously identified hazards and control measures.
- Use the inspection reports, along with injury and workers' compensation reports and incident and near-miss investigation reports, to identify the most hazardous operations in the facility.
- Consult with supervisors and safety committee representatives to find out current safety issues.
- Acquire and learn how to use the proper personal protective equipment (PPE) needed in the areas being inspected.
- Get the same training on how to identify hazards that supervisors and workers get.
- Review production schedules to ensure the inspection is conducted when they'll see the most hazardous operations.

## EXECUTION

During the walk-around, leaders should:

- Wear the appropriate PPE.
- Keep the inspection group small to facilitate communication.



- Talk to workers at their workstations. Workers are likely to know the most about the hazards and safety issues in their jobs. Inspectors can tap into that knowledge. They should put workers at ease and make them comfortable when they talk.
- Reassure workers that the inspection is being done to find and fix hazards, not to place blame.
- Encourage conversation by asking open-ended questions such as:
  - What is the most hazardous task in your job? What do you recommend to eliminate those hazards?
  - If you have been injured in your job, what was the injury and how did it happen? What was done to make your job safer?

- How would you report an injury, hazard or near-miss?
- Look for easily observable hazards first, such as:
  - Tripping hazards,
  - Blocked exits,
  - Frayed/exposed electrical wires,
  - Missing machine guards,
  - Poor housekeeping, and
  - Poorly maintained equipment.



- Look for property damage, such as walls or doors damaged by equipment or forklift traffic. Such damage may indicate a potential for future worker injuries.
- Seek out and talk to the most recently hired workers to get their fresh perspectives and insights on the safety program.
- Observe workers as they perform their job. For example, do they lift heavy objects? Do they stand/sit in awkward postures? Are they performing repetitive motions? If so, the inspectors should take notes and photos. If their job involves handling chemicals or exposure to excessive noise and/or heat, a more detailed evaluation by a safety professional may be in order.
- Brainstorm with workers to try to find solutions for hazards as they're identified during the inspection.
- Make and prioritize a list of hazards that must be addressed.

### FOLLOW-UP

Failure to follow up can often stifle worker participation and enthusiasm, which can be hard to regain.

Very soon after the inspection, the managers and executives should prepare an abatement plan containing:

- A list of the hazards found,
- Corrective actions needed,
- Assignments of personnel responsible for the corrective actions, and
- A reasonable timeline for implementation.

Some complex hazards may require further evaluation, study or engineering work to design and implement appropriate controls. Describe briefly how the hazards will be addressed and identify interim controls that will be used while more permanent measures are developed.

Share the abatement plan with managers, supervisors, safety committee members and workers. Track progress by sharing or posting periodic updates to the plan. Ensure all corrective actions are implemented in a timely fashion. **WMHS**



### ABOUT THE AUTHOR:

*Judie Smithers is an Editor at J.J. Keller & Associates, a nationally recognized compliance resource company that offers products and services to address the range of responsibilities held by business professionals. Smithers' subject matter expertise covers safety training, lockout/tagout, permit-required confined spaces, hearing conservation, exposure monitoring, personal protective equipment, asbestos, lead, radiation and illumination. She is an authorized OSHA General Industry Outreach Trainer. She is the author of J. J. Keller's 1910 OSHA Guide, OSHA for Transportation guidance manual, OSHA Safety Training Handbook, and OSHA Safety Training newsletter. Prior to her career at J. J. Keller, Smithers was the health and safety information coordinator for an industrial company, where she developed and implemented the firm's safety programs, oversaw workers' compensation claims, provided safety training, managed compliance with EPA's community right-to-know and hazardous waste disposal requirements, and advised on hazardous materials requirements. For more information, visit [www.jjkeller.com/osh](http://www.jjkeller.com/osh) and [www.jjkellerlibrary.com](http://www.jjkellerlibrary.com).*



# 2018 OSHA TOP 10

## OSHA COMPLIANCE TRAINING:

BEAT OSHA'S TOP 10  
VIOLATIONS WITH  
TRAINING FROM DUPONT  
SUSTAINABLE SOLUTIONS.

Is your OSHA standards training up to date?  
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each? Strengthen compliance initiatives with  
programs covering OSHA's ten most frequently  
violated standards.

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programs on OSHA compliance topics  
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1	FALL PROTECTION (1926.501) <b>7,270</b> VIOLATIONS		TRAINING COURSES OFFERED: > Safety Matters: Walking-Working Surfaces > Fall Protection: Case History > Personal Fall Protection: Your Lifelines
2	HAZARD COMMUNICATION (1910.1200) <b>4,552</b> VIOLATIONS		TRAINING COURSES OFFERED: > HazCom: Are You GHS-Ready? > HazCom: In Sync With GHS
3	SCAFFOLDING (1926.451) <b>3,336</b> VIOLATIONS		TRAINING COURSES OFFERED: > Scaffold Safety > Scaffolds: Safety At All Levels
4	RESPIRATORY PROTECTION (1910.134) <b>3,118</b> VIOLATIONS		TRAINING COURSES OFFERED: > Safety Matters: Respirator Safety > PPE: Inspect and Respect > Respirator Safety: A Sure Fit
5	LOCKOUT/TAGOUT (1910.147) <b>2,944</b> VIOLATIONS		TRAINING COURSES OFFERED: > Safety Matters: Lockout/Tagout > Lockout/Tagout Make No Mistake > Lockout/Tagout: No Escape
6	LADDERS (1926.1053) <b>2,812</b> VIOLATIONS		TRAINING COURSES OFFERED: > Safety Matters: Walking-Working Surfaces > Stairways & Ladders > Stairways And Ladders: A Safe Step
7	POWERED INDUSTRIAL TRUCKS (1910.178) <b>2,294</b> VIOLATIONS		TRAINING COURSES OFFERED: > Forklifts: Understanding the Risks! > Forklift Basics: Safe From The Start > Forklift Fundamentals: Get The Facts
8	FALL PROTECTION TRAINING REQUIREMENTS (1926.503) <b>1,982</b> VIOLATIONS		TRAINING COURSES OFFERED: > Safety Matters: Walking-Working Surfaces > Fall Protection: Case History > Personal Fall Protection: Your Lifelines
9	MACHINE GUARDING (1910.212) <b>1,972</b> VIOLATIONS		TRAINING COURSES OFFERED: > Safety Matters: Machine Guarding > Machine Guarding: Safeguard Your Future
10	EYE AND FACE PROTECTION (1926.102) <b>1,536</b> VIOLATIONS		TRAINING COURSES OFFERED: > Safety Matters: Personal Protective Equipment > PPE: Inspect & Respect

# Sorting Out Your Sortation Options:

## Guiding You Through the Process of Evaluating and Selecting the Right “Mission-critical” Sortation Solution

By: **Tim Kraus**, Director, Product Management, Honeywell Intelligrated; and Satyen Pathak, Global Product Manager, Honeywell Intelligrated

Whether from growth, consolidation of facilities, mainstreaming of processes, business acquisitions or simply a need to become more efficient, there are several reasons to consider automated sortation solutions. Even if you have a specific solution envisioned, it is beneficial to evaluate several significant factors to be considered when choosing the “mission-critical” solution for your sortation system.

The purpose of this white paper is to guide you through the process of evaluating and selecting the



Photo courtesy of Honeywell Intelligrated.

Here's an example of a warehouse using a typical sliding shoe sortation storage system.

Photo courtesy of Honeywell Intelligrated



right sortation solution for your facility. Several widely accepted sortation technologies will be examined on a number of aspects that you should consider before deciding on the right fit for your needs. This paper will walk through all of the important factors to consider as you “sort out your options” and ensure that you are making the right decisions for your facility’s needs — today and in the future.

### SORTING OUT YOUR APPLICATION

Most sorters can be grouped into one of two high-level classifications: line or loop sorters. Line sorters are configured in a straight line, with items entering the sorter at only one location. They typically need separate conveyors for items that cannot be successfully sorted on the first pass. By contrast, loop sorters are configured in a continuous circle, often with more than one induction point in which items are introduced to the sorter. They also have built-in recirculation, which can help provide more confident, reliable divert confirmation signals from the control system.

### SORTING OUT YOUR HANDLING REQUIREMENTS

One set of factors that have a significant influence on MHE technology selection are the physical features of the items to be sorted, including the types of items and their packaging. Items, for the purpose of this paper, are the individual products, units, cartons or totes that will be sorted. Not all sortation technology is ideal for all types of items.

Overall, there are several factors to consider, including:

### CASE STUDY EXAMPLE

Now that we have discussed several factors that go into choosing the right sortation technology, we can look at a real-world example to see how all the factors must be considered to make the right decisions.

A retailer has multiple regional distribution centers, handling mostly corrugated cardboard boxes, with the need to serve several thousand retail stores. In this particular situation, it made sense to install two types of sorters in each of its regional distribution centers—a tilt-tray sorter for order fulfillment and a sliding shoe sorter for routing cartons throughout the facility and shipping.

### FACTORS CONSIDERED IN THE SELECTION OF THE TILT-TRAY SORTER:

- Items would be consolidated as necessary to fulfill orders for retail stores.
- The sorter needed the ability to handle more than 20,000 items per hour in the future.
- The sorter needed to have a noise level under 80 DBA, because of the proximity to employees.
- The sorter needed to have the ability to gently handle boxes of product with loose lids.

(Cont., page 8)





Photo courtesy of Honeywell Intelligated

The push tray system is a multipurpose sorting machine with carriers, which can be released in various models.

1. Types of items to be sorted (corrugated carton, tote, polybags, bubble mailers, loose items, etc.)
2. Item packaging type (corrugate, shrink wrap case, bagged apparel, apparel on hangers, etc.)
3. Item diversity (50 % corrugated carton, 25 % bagged apparel, etc.)
4. Item structural integrity (the rigid and predictable the structure of the items)

Keeping in mind that most applications do not handle a single item type, it is important to recognize that a system must accommodate a wide range of item types. The more item types the system can handle, the fewer non-conveyables there will be—increasing facility efficiency and shortening the payback of the investment. Take into account your entire product mix for present and future needs when making your selection.

Aspects such as size, weight, balance or the shape of the product to be sorted may rule out certain sortation

technologies. Packaging integrity of the items, such as “perfect presentation” needs and durability concerns, (due to reproduced packaging) must also be considered.

**Note:** For complete definitions of the technologies mentioned in this article, please see the Glossary at the end of this article.

### SORTING OUT YOUR RATE

Another critical factor to consider is the rate requirement of the system. For the purpose of this paper, “rate” relates to the item throughput per hour or the rate at which the system must operate. In the material handling industry, this is also expressed in terms of cartons

per hour (cph) or pieces per hour (pph).

A common misunderstanding about rates is that “speed” (or how fast the equipment runs) is the same as throughput. However, concentration on speed alone can steer your selection in the wrong direction. Speed, without consideration of other factors, such as gapping, gentle handling and accuracy, can actually be an inefficient use of the technology.

Instead, as systems have been pushed to continually increase rates, MHE vendors have worked to increase throughput without increasing machine speed. This reduces wear, energy usage and noise, while extending equipment life. It also makes the machine control system much more critical on sliding shoe and pop-up wheel sorting

technologies. An increased rate at reduced speeds requires reducing gaps between items while maintaining divert accuracy.

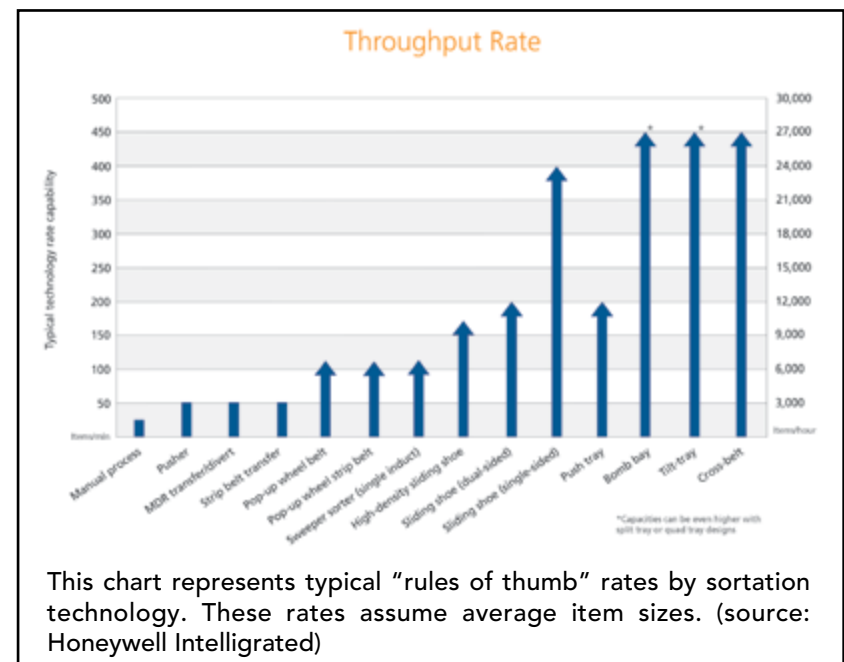
In sortation equipment, as rate and handling capability increase, so does the cost of the technology. System implementation payback must be carefully balanced with rate to meet an acceptable budget for any project.

Some rate requirements may immediately rule out certain sortation technologies. (Actual rates are highly dependent on a number of factors, but the chart titled “Throughput Rate” will help in learning the most common rates by technology.)

### SORTING OUT OTHER CONSIDERATIONS

In addition to handling, rate and application requirements, other factors can make a big impact on the technology decision.

**Floor space requirements** – Many facilities are looking to add e-commerce-focused solutions in



(Cont. from page 6)

- The sorter would be fed from two decasing areas where individual items would be removed from cartons and placed onto load belts. The two decasing areas were located half-way around the tilt-tray loop from each other in order to maximize sorter capacity.

**Solution:** For each regional distribution center, a tilt-tray sorter was used to sort orders to over 700 order filling destinations at a rate of more than 15,000 items per hour.

#### FACTORS CONSIDERED IN THE SELECTION OF THE SLIDING SHOE SORTER:

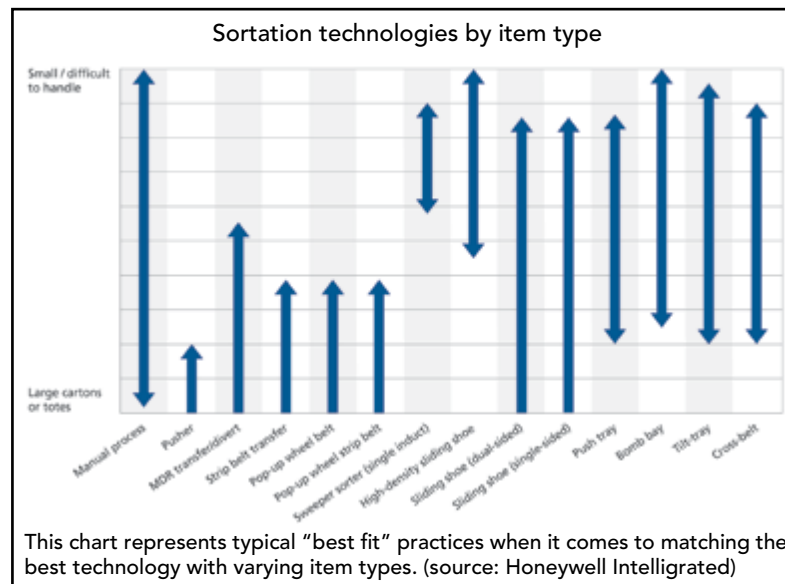
- The sorter needed to span over 600ft in total length and route product to shipping dock doors and other areas of the building.
- The sorter required the ability to handle more than 8,000 items per hour in the future with seven additional divert lanes.
- The sort locations needed the ability to buffer 50ft of orders as it is being hand-loaded into a truck.
- The sorter would be fed from six different areas of the facility.
- The sorter needed the ability to handle corrugated cartons with an average length of 27in and an average weight of 30lbs.

**Solution:** For each regional distribution center, sliding shoe sorters were used to sort

orders to 26 or more shipping destinations and four or more routing destinations at a rate of over 7,000 items per hour.

Using a tilt-tray sorter for order fulfillment and a sliding shoe sorter for shipping and routing items throughout the building allowed the retailer to achieve the following operational objectives:

- Improved associate productivity
- Increased order accuracy
- Compressed fulfillment cycle
- Improved store service levels
- Provided DC network redundancy
- Obtained and/or surpassed the projected ROI *WMHS*



existing buildings, sometimes even in the back room of retail stores. Some technologies are designed to maximize the number of destinations in a very small footprint.

**Operating noise levels** – Some sortation equipment operates at very low noise levels while maintaining very high rates, increasing ergonomic comfort, while still maintaining throughput.

**Investment level** – While some sortation systems require more substantial technologies and supporting sub-systems, they can better prepare the operation for future growth.

**Energy usage** – Energy usage is becoming an increasingly important aspect of the material handling system. If energy usage is an important factor in your enterprise, be sure to share this concern with your MHE vendor at the project outset, as energy usage can vary widely by technology and vendor.

**Maintenance and operator skill levels** – Both the daily operation and maintenance tasks can vary widely by technology and by MHE vendor. Consider how your personnel will interact with the equipment and how your current staff will be able to maintain the system.

**Future expansion** – If there is a possibility for future expansion, this should be taken under consideration at the project outset. The ability of future expansion, in terms of rate or divert locations, can be limited by the technology or by the initial system design.

**Divert accuracy** – Divert accuracy and propensity for jams, hang-ups and mechanical problems can often be dependent on the specific design details by the MHE vendor and the gapping requirements designed for the system.

**Divert confirmation** – Confirming a divert can be a necessary step in some sortation processes. The method for confirming a divert varies by the sortation technology and the machine control software used by the MHE vendor.





Photo courtesy of Honeywell Intelligated

An example of a bomb bay sortation system, which is a high-speed, continuous loop sorter. It is useful in facilities where space is at a premium.

**Depreciation schedule** – Some sortation technologies may have a longer expected life span, which will affect the depreciation schedule. This must be clearly understood before making the purchase, so project costs are properly distributed.

#### SUMMARY

This paper has discussed critical factors to evaluate during a typical automated sortation investigation—but there are also several details which can only be learned through experience. Before construction plans begin, be sure to talk to an MHE vendor with significant, unbiased experience in a wide variety of sortation technologies. This will ensure the best possible, cost-effective solution is developed prior to submitting a budget for capital approval. *WMHS*

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# Making Loading Dock Safety Automatic

By: **Aaron Conway**, *President, Mezzanine Safeti-Gates, Inc.*

Loading docks are often the busiest places in a facility. The operation at a loading dock traditionally consists of a tractor trailer backing up to an elevated section of the building, so material can be loaded/unloaded from the trailer, often multiple times a day. Working conditions can also be extreme if the docks are located outdoors, with material being moved in all kinds of weather—cold, heat, rain and even snow.

Even though dock height is commonly 4-5ft, that height is enough to pose a fall risk at unprotected ledges. Factors such as weather and repetitive movement of materials can fatigue employees working in loading dock operations, placing them at greater risk for falls from the elevated areas in the loading dock area.

OSHA regulation 1910.23 for Guarding Floor and Wall Openings and Holes states all working surfaces of 48in (4ft) or higher need fall protection. These standards apply to all working surfaces in a facility, even in the loading dock. ANSI standard MH 28.3-2009 section 6.4.3 requires fall protection at 36in (3ft) or higher at all times.

When it comes to choosing loading dock fall protection solutions, the best operate automatically, taking the responsibility for safety out of employees' hands. For example, guardrails and chains can be deemed suitable for loading dock fall protection, but they are often left open after the truck drives away, because they depend on employees to remember to physically move them into place.

Making employees accountable for their own safety is irresponsible. There are safety gates that operate automatically at the dock which provide necessary



Photo courtesy Mezzanine Safeti-Gates, Inc.

The best solution for fall protection on loading docks is a single-gate system the employee is able to raise and lock; one that opens only when the tractor trailer is in place and automatically closes once the truck drives away from the area.

fall protection and eliminate additional physical and mental strains of moving safety equipment in and out of place.

When you are evaluating fall protection solutions, seek out automatic capabilities and keep the following three points in mind:

### 1 ERGONOMIC EQUIPMENT IS A MUST

Make sure your safety equipment doesn't create new hazards while guarding against others, especially in the loading dock area where there are often many moving components. In this regard, the famous quote "First, do no harm" applies to material handling safety.

Workers in loading dock operations are often required to lift heavy items, move heavy loads, re-arrange items and more. These movements are often repeated throughout the day.

Repetitive motions can increase an employee's risk for injury; they can also contribute to fatigue, another factor for injury. Replacing manual fall protection systems, like chains or railings, just adds to the fatigue.

All safety equipment in the loading dock should be installed to reduce the effort and strain on these employees and to make the process as ergonomic as possible. Equipment with automatic opening and closing mechanisms are the most ergonomic option you can select. In addition to automatic features, seek out equipment with hydraulic assist mechanisms that allow for easy, ergonomic operation.

### 2 ALL SAFETY DEVICES ARE NOT EQUAL

While a dual-gate system is typically used to secure the ledges of elevated work platforms in most industrial facilities, the design interferes with the workflow of moving material through the loading dock, so it is not an option. Chains that are latched into place are also not an option, as they do not meet standards and can be easily tripped over, which can cause falls and injury. Neither of these solutions are automatic, either.

One solution is to install a single-gate system that rolls, slides or pivots closed. This is an improvement over having nothing or a single chain in place, but it is only of any value when the gate is closed. Because this type of system depends on someone to remember to make an effort to close the gate, the gate is often left open. When the trailer is in place, the elevated area remains safe, but once the trailer drives away there is an exposed ledge at the end of the elevated loading dock; the truck can drive away. The area is not secure if the gate is not closed immediately—if an employee backs up too much, they can fall right off the ledge. It's not very hard to forget something when you are tired, even if it's a procedure you do multiple times a day—like shutting a safety gate.

The best solution for fall protection on loading docks is a single-gate system that the employee is able to raise and lock; one that opens only when the tractor trailer is in place and automatically closes once the truck drives away from the area. This allows the operator to control when they want to open the gate, but makes sure the ledges remains secure when there is no truck in position.

### 3 LOOK AROUND—ELEVATED WORK SURFACES ON GROUND LEVELS TOO

The actual loading docks aren't the only elevated work platform in dock operations. Dock-lifts that are often used at the ground level also provide risks for falls when employees ride them with material and, when elevated, often reach heights of 4ft or more.

Safety gates for these lifts should feature automatically closing gates, which ensures fall protection for any worker on the lift. As the lift elevates, the gates should automatically close and lock into place. The gates should stay closed and locked until the lift goes back to ground level, providing fall protection while the lift is raised and the material is moved from the lift, truck and dock. There are designs that offer similar features without the automatic closing ability, but it's important to seek out those solutions when you are able to take that responsibility out of your employees' hands.

Secure the ledges of your loading docks, and make sure you take the responsibility of a safe environment out of the hands of your employees when possible. Be proactive: Have an automatic gate system installed before it is needed. If your employees are distracted, you will have the peace of mind knowing the safety will still be in place. **WMHS**

#### ABOUT THE AUTHOR

*Aaron Conway is President of Mezzanine Safeti-Gates, Inc., a manufacturer of safety gates that provide fall protection in industrial facilities.*



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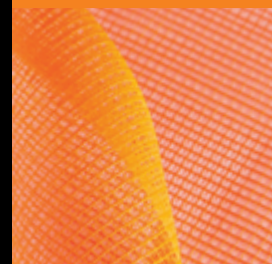
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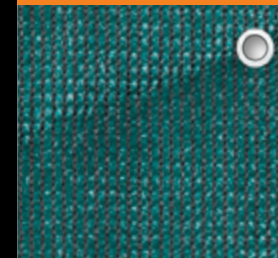
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# Breathe Easy: Here's a 10-Step Training Plan on Respiratory Protection

By: **Mark Stromme**, Editor, J. J. Keller & Associates, Inc.

Employees depend on a respirator to keep them safe and healthy when working in a hazardous atmosphere. Make sure they understand how to safely use the equipment.



Photo courtesy J.J. Keller & Associates, Inc.

Employees depend on respirators to keep them safe and healthy when working in hazardous atmospheres. Using the equipment properly is of paramount importance.

## OVERVIEW

Before you can require employees to wear respirators, the Occupational Safety and Health Administration

(OSHA) requires you to take steps to prevent the hazardous atmosphere from developing in the first place. Some of these control measures can include:

- Enclosing an operation,
- Substituting a less hazardous material,
- Providing improved general ventilation, and
- Installing local exhaust ventilation.

If these control measures aren't feasible or effective (or while the control measures are being put into place), employees must wear respiratory protection. Proper training is critical, because improper use of a respirator can lead to serious illness or death.

## SPECIFIC TRAINING ELEMENTS

Follow this 10-step approach to effectively train on respirator use. The rest of this article is written in a script-type format for you, the safety trainer, to deliver to company employees.

### 1 INTRODUCE THE TOPIC

Your employer takes steps to keep the air clean. You can help keep these control measures effective. There are several ways to go about doing so for an employer. For example, if a certain operation is set up so that a chemical is enclosed in tanks, piping or other containers, make sure you keep the equipment closed. If a job calls for using a certain chemical, don't substitute something else. When it comes time to turn on ventilation equipment to do a job, make sure you use the equipment; if said equipment isn't working properly, report the problem immediately.

Despite these control measures, sometimes the air still isn't safe to breathe. In this case, you'll have to wear a respirator while you work.

### 2 EXPLAIN AIR CONTAMINANTS

Air contaminant hazards can include dusts, aerosol mists, metal fumes, evaporated vapors, released gases or oxygen-deficient atmospheres. Some particulates can cause metal fume fever, silicosis or asbestosis. In the short term, some chemical vapors can cause dizziness or nausea; in the long term, some can cause liver damage or cancer. Some gases act as asphyxiants, and overexposure can cause death. Similarly, oxygen-deficient atmospheres can be deadly.

OSHA sets permissible exposure limits for many contaminants to help employers determine if employee exposures are at safe levels. If control measures don't reduce exposures to these safe levels, workers must wear respirators.

### 3 OUTLINE CAPABILITIES AND LIMITATIONS OF YOUR RESPIRATORS

There are basically two types of respirators: air-purifying respirators (including dust masks, gas masks, chemical cartridge respirators and powered air-purifying respirators) clean the air as you inhale, and atmosphere-supplying respirators supply you with a separate source of clean air (through a hose or a tank you carry on your back).

The capabilities of a respirator depend a lot on the type and amount of the air contaminant and the work being done. For example, a dust mask (an air-purifying respirator) is capable of filtering hazardous particulates from the air as you breathe, but it doesn't protect you from hazardous levels of solvent vapors.



An air-purifying respirator with organic vapor cartridges can protect you from certain levels of solvent vapors, but its protection stops when the vapor levels are very high. No air-purifying respirator can protect you when oxygen levels are too low; in this case, you must use an atmosphere-supplying respirator.

#### 4 DEMONSTRATE HOW TO INSPECT, PUT ON AND REMOVE, USE AND CHECK THE SEALS OF YOUR RESPIRATORS

Inspect the respirator before each time you use it. Inspect it again as you clean it. Self-contained breathing apparatus and respirators reserved for emergency use must be inspected monthly.

Each time you put on a respirator with a tight-fitting facepiece, you must perform two seal checks to be sure that the facepiece is properly seated and adjusted on your face. If you detect leaks during the seal checks, readjust the facepiece and repeat the checks.

#### 5 DESCRIBE WHAT TO DO IF A RESPIRATOR MALFUNCTIONS

It's a clear sign that something is wrong if you can smell or taste the contaminant while you work; or if your breathing becomes strained; or if you notice a respirator part isn't working properly. If your respirator stops working properly while you're in a hazardous atmosphere, immediately exit to a safe area. Don't remove the respirator until you've left the hazardous atmosphere.

#### 6 EXPLAIN HOW TO USE A RESPIRATOR IN CASE OF AN EMERGENCY

If there's a sudden release of a hazardous chemical while you're working in an area that has escape-only respirators available (for example, where ammonia or chlorine are stored), put on the emergency respirator as you exit.

Some employees may be trained and authorized to perform emergency responses that require respirator use. Examples would include confined space rescue, emergency response to chemical releases and interior

structural firefighting. If you aren't authorized for these emergency actions, evacuate to a safe area.

#### 7 OUTLINE PROCEDURES FOR PROPER RESPIRATOR MAINTENANCE AND STORAGE

Don't wear a dirty or damaged respirator. Using the wrong procedures to clean a respirator can damage it, so follow instructions. For example, never use paint thinner or other harsh solvents to clean a respirator.

Know how to report damage and get repairs. Only the manufacturer's replacement parts can be used to repair a respirator. Store respirators so they will stay clean and will not be damaged.

#### 8 DISCUSS SIGNS AND SYMPTOMS THAT COULD AFFECT EMPLOYEES' SAFE USE OF A RESPIRATOR

Even though you've passed a medical evaluation before you wear a respirator, remember that people can change. Medical changes can affect your ability to safely wear a respirator. Examples of these can include the development of shortness of breath, dizziness, coughing, wheezing, chest pain, chest injuries, lung diseases, cardiovascular conditions or heart conditions. Report these signs and symptoms right away.

#### 9 EMPHASIZE THE CONSEQUENCES OF IMPROPER RESPIRATOR USE

You have a big responsibility to use the respirator correctly. If you aren't using it properly, you're breathing unsafe air. Overexposures can lead to serious illness and even death.

There are many examples of improper respirator use to discuss. One example would be using the wrong type of filter or cartridge with an air-purifying respirator. Employees may also be wearing a tight-fitting facepiece too loosely, so contaminated air could

potentially leak in. Lastly, employees may not leave a contaminated area before removing the respirator.

Photo courtesy J.J. Keller & Associates, Inc.



OSHA sets permissible exposure limits for many contaminants to help determine if employee exposures are at safe levels. If control measures don't reduce exposures to these safe levels, workers must wear respirators.

#### 10 OUTLINE THE OTHER REQUIREMENTS IN OSHA'S RESPIRATORY PROTECTION STANDARD

OSHA's respirator standard does not begin and end with employee training. Some of OSHA's other requirements include the following:

- The employer must identify and evaluate the respiratory hazards in the workplace;
- Respirators are required when ventilation or other engineering controls aren't adequate to reduce exposures to safe levels;
- The employer must have a written respiratory protection program;

- The employer must provide employees with medical evaluations before they can use respirators;
- Employees who must use a respirator with a tight-fitting facepiece must be fit-tested before they can use the respirator;
- The employer must provide for cleaning, storing, inspecting and repairing respirators;
- Atmosphere-supplying respirators must use high-purity breathing gases; and
- Filters, cartridges and canisters must be properly identified. **WMHS**



#### ABOUT THE AUTHOR:

*Mark Stromme joined J. J. Keller & Associates, Inc. in 1994. With a background in monitoring OSHA, EPA and DOT regulations, he currently specializes in the OSHA 1926 construction and 1910 general industry regulations.*

*His focus is on oil and gas safety, construction safety, electrical safety, mobile cranes, scaffolding, excavations and fall protection. He is also an authorized OSHA Construction Outreach Trainer. Stromme is responsible for monitoring, analyzing and summarizing 1910 and 1926 regulations for various J. J. Keller guides, manuals and newsletters. He has also written numerous trade publication articles on related topics. For more information, visit [www.jjkeller.com/osh](http://www.jjkeller.com/osh) and [www.jjkellerlibrary.com](http://www.jjkellerlibrary.com).*

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Paul Satti is the technical director of projects and research at the Construction Safety Council with over 20 years of experience applying safety and health management systems. Paul holds a Master's Degree in Industrial Management from Northern Illinois University, is a Certified Safety Professional and Construction Health and Safety Technologist by the Board of Certified Safety Professionals and an authorized OSHA outreach trainer for construction. Paul has authored a number of student and technical manuals in construction safety and brings a wide scope of knowledge to the class.



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# Hear Ye, Hear Ye: Conservation Programs Mitigate Noise Exposure

By: **Barbara T. Nessinger**, Chief Editor



Photo courtesy: Eckel Noise Control Technologies

Eckel acoustic panels were installed on the ceilings and walls of this dewatering room in the Albuquerque wastewater treatment plant. They help to reduce noise and reverberation generated by the centrifuges.

The U.S. Occupational Safety and Health Administration (OSHA) estimates that approximately 22 million workers are exposed each year to potentially damaging noise. U.S. businesses have paid stiff penalties for not protecting workers from dangerous noise levels, as well. Injuries can include temporary or permanent hearing loss and can create physical and psychological stress; reduce productivity; and interfere with communication and concentration. These symptoms can also contribute to workplace accidents and injuries by making it difficult to hear warning signals.

OSHA regulates workplace noise by requiring companies to limit the exposure of their workers to high noise levels. In order to ensure that workers are protected in environments with high noise levels (those greater than OSHA-required levels), it is imperative for companies to have a hearing conservation program in place.

Noise and hearing conservation is addressed in specific standards for recordkeeping and general industry. Specifically, section 5(a)(1) of the OSH Act, often referred to as the General Duty Clause, requires employers to “furnish to each of his employees’ employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.” (This section also can be used to address hazards for which there are no specific standards, such as noise in agricultural operations.)

Occupational noise exposure is addressed specifically by OSHA’s Subpart G—Occupational health and environmental control-1910.95, Occupational noise exposure. Its directives include Enforcement Guidance for Personal Protective Equipment in General Industry; Hearing Conservation Program; and Occupational Noise Exposure; Hearing Conservation.

## TREATING HEARING LOSS

Marylyn Koble, M.S., CCC-A, is an Audiologist with Koble Hearing/Audiology Associates of Arlington, in Arlington, Texas. *Workplace Material Handling & Safety* sat down with Koble to discuss the importance of limiting workers’ exposure to hearing damage.

### ***In your work as an audiologist, what are the first warning signs of hearing loss due to noise exposure?***

Early signs of hearing loss, especially the high-frequency (high pitches) hearing loss commonly associated with noise exposure, tend to be subtle. Consonant sounds, such as /s/, /f/, /sh/, /ch/, may not be audible—leaving the individual with decreased speech clarity. The most common complaint is “I hear, but I don’t understand.”

This difficulty understanding is most pronounced in background noise, such as restaurants, parties and social settings. The high-frequency hearing loss commonly found in cases due to noise exposure makes female voices and small children’s voices challenging to understand, as well.

People with noise-induced hearing loss may also suffer from tinnitus, or ringing in the ears. This can vary from an occasional annoyance to debilitating.

### ***Does such exposure have to be constant—in other words, can hearing loss or damage occur with short-term excessive noise exposure?***

No, it does not have to be constant. There are several variables at work in noise-induced hearing loss: the loudness level of the sound source, as well as the length of exposure. For example, spending eight hours exposed to a sound source of 85dB can cause hearing loss. For every 3dB the

(Cont., page 19)



Photo courtesy: Eckel Noise Control Technologies

A Joa diaper-making line was enclosed in an Eckel industrial enclosure to mitigate the noise produced by the machinery.

Individual state standards exist, as well. There are 28 OSHA-approved State Plans that operate state-wide occupational safety and health programs. State Plans are required to have standards and enforcement programs that are at least as effective as OSHA's; some might have different or more stringent requirements.

### WHY HAVE A HEARING CONSERVATION PROGRAM?

Obviously, the purpose of any hearing conservation program is to prevent occupational hearing loss and comply with OSHA Standard CFR 1910.95—Occupational Noise Exposure Hearing Conservation Amendment. But it's also important to understand why this standard exists. To do that, one must explore the realities of what happens when human ears are

exposed to repeated, loud noise.

It's estimated that one in 10 Americans has a hearing loss that affects his or her ability to understand normal speech. Excessive noise exposure is the most common cause of such hearing loss. Some workers with long-term loss have developed ways of adapting to the gradual onset of the disease.

The effect of noise is real and can be devastating. Workers who also develop tinnitus (constant ringing in the ears) find this to be unbearable. The important thing to note is that, no matter what

a person's present level of hearing loss, it is never too late or too hard to prevent further damage. Workers who already have serious hearing loss have even greater reason for saving the hearing they have left.

*[See sidebar for an interview with Audiologist Marylyn Koble.]*

### HEARING PROTECTION

Often, employers ask if their employees can hear other people and/or machine problems if they are wearing personal hearing protection gear. The answer is yes. Just as sunglasses help vision in very bright light, so do hearing protectors enhance speech understanding in very noisy places. Even in a quiet setting, a person with normal hearing who is wearing

hearing protectors should be able to understand a regular conversation. Hearing protectors do slightly reduce the ability of those with damaged hearing or poor comprehension of language to understand normal conversation. However, it is essential that persons with impaired hearing wear earplugs or muffs to prevent further inner ear damage. It has been argued that hearing protectors might reduce a worker's ability to hear the noises that signify an improperly functioning machine. However, most workers readily adjust to the quieter sounds and can still detect such problems.

Hearing protection is more than simply providing workers with protective headgear. As stated above, a written hearing conservation program is required by OSHA "whenever employee noise exposures equal or exceed an 8-hour, time-weighted average sound level (TWA) of 85 decibels (dB) measured on the A scale (slow response) or, equivalently, a dose of 50 %." This 8-hour time-weighted average is known as an exposure action value.

The key elements of an organization's hearing conservation program should include:

- ▶ Noise exposure measurements
- ▶ High-exposure areas or jobs
- ▶ Audiometric testing and follow-up
- ▶ Employee education
- ▶ Engineering and administrative noise exposure control
- ▶ Personal hearing protection
- ▶ Recordkeeping

Many companies provide assistance to industries needing hearing/noise protection. Some are devoted to assessing a company's hearing protection needs;



they assist by performing tests and analyses to determine compliance with OSHA noise guidelines and implementing effective soundproofing to reduce exposure of employees to high noise levels. In some cases, it might be possible to reduce noise levels sufficiently to eliminate OSHA requirements for a hearing conservation program, thus improving productivity, ensuring employee health and resulting in significant savings.

In addition to devices for noise reduction, many companies produce acoustic panels that can be made for industrial use. These high-performance, durable and

versatile panels increase the intelligibility of speech; mitigate distracting, unpleasant and even intolerable auditory conditions; and can decrease the risk of harm from exposure to excessive noise. For example, Eckel's pre-engineered acoustic panels come in a range of sizes and styles and can be readily positioned within the host room to achieve optimal noise-reduction performance. Available in aluminum or steel, they can be customized and finished to fit and complement any architectural layout. Easy to install during new construction or as a retrofit item, acoustic panels can be an economical and effective means to controlling noise. *WMHS*



Photo courtesy: Eckel Noise Control Technologies

The blower room at a Columbus, Ohio, wastewater treatment plant was also enclosed to reduce noise.

(Cont. from page 17)

volume of the sound source increases the amount of time a person can be exposed without hearing damage decreases by one half.

So, a sound source of 88dB can cause damage to hearing after four hours, 91dB after two hours. Extremely loud sounds, such as fire crackers and fire arms, can damage hearing immediately. Most noise-induced hearing loss happens gradually over the course of many years; therefore, the individual may not attribute the hearing loss to noise exposure.

#### **What is the usual treatment for mild hearing loss?**

For most, mild sensorineural (permanent) hearing loss can be treated successfully with hearing aids.

#### **How common is tinnitus?**

Approximately 50 million Americans suffer from some degree of tinnitus. It is a mild irritation for most, but about 2 million are seriously disabled by it.

#### **Is it curable/treatable?**

It cannot be cured but can be treated. Most people with tinnitus also have hearing loss, and hearing aids are the MOST successful means of treating tinnitus. Some hearing aids have special features (low level white noise or music) to help treat tinnitus. Avoiding certain foods and medications may be necessary. Relaxation techniques, meditation and sound generators can be helpful. For the most severe cases, I refer individuals for Cognitive Behavioral Therapy.

#### **Do you see any work-related tinnitus in your work as an audiologist?**

Literally, most days I work. *WMHS*

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# HVLS Fans:

## HOW AIR QUALITY IMPACTS WORKPLACE HEALTH & YOUR BOTTOM LINE

By: **Jeff Chastain**

Do you have a high-volume, low-speed (HVLS) fan in your facility? If so, you are already a step ahead of the game. However, the question you now need to ask yourself is: Have you chosen the right fan for your facility?

For those who have not yet ventured into the realm of HVLS solutions, you're not alone. The industrial fan industry, as a whole, is less than 20 years old. Awareness has increased, because industrial fans provide cost-effective and energy-efficient solutions to major workplace environmental and quality-control challenges in a variety of industries. Whether you work in a dairy farm or a manufacturing facility, a brewery or a distribution center, HVLS fans are being recognized as effective tools in managing indoor air quality.

While there are a number of conventional options you can turn to—ranging from HVAC units and high-speed floor fans to swamp coolers—these traditional options often fail to provide comprehensive solutions. Conversely, HVLS fans are able to mobilize and de-stratify large volumes of air in a way that truly “clears the air” of any facility. This enables HVAC systems to operate more efficiently, while optimizing employee comfort and health in unconditioned environments.

### THE IMPORTANCE OF AIR QUALITY

Why is it important to manage indoor air quality in the first place? The term “indoor air quality” refers to the air quality within and around buildings and structures, particularly as it relates to the health

and comfort the building's occupants. Poor air quality can include an excess of hot or cold air, indoor pollutants and stagnant air, which can cause labored breathing and illness in employees, while also posing product quality control risks, such as spoilage. In fact, the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) reported, as part of their heat safety campaign, that dozens of employee fatalities occur each year, with thousands more workers falling ill due to working in extreme heat or humid conditions.

With proper air circulation, such air quality concerns can be eliminated. HVLS installations are particularly adept in this area due to their ability to move large volumes of air with minimal energy. By consistently providing large-scale airflow, HVLS fans regulate a facility's temperature, while preventing stagnant air and a dust-riddled environment.

High air turns also eliminate toxic airborne chemicals at a rapid pace. In addition to pollutants, HVLS fans can also control a facility's moisture; specifically where it relates to condensation, which can form on the floor in between two different climate-controlled environments and present a significant safety hazard. Proper indoor air movement quickly dries this



Photo courtesy: Hunter Fans

condensation to reduce fall risks, as well as pollutants and bacteria associated with unchecked moisture.

Under OSHA law, employers are responsible for eliminating these known safety hazards. This makes investments in environment-regulating solutions like HVLS fans not only a benefit, but also a mandate in professional settings.

One customer in the Southeast found themselves in this very scenario. The customer relied on pedestal fans to keep their workforce cool in their 55 x 100ft, un-air-conditioned warehouse during the brutal Tennessee summer. They found that the floor fans only provided relief to employees working within the fans' immediate vicinity. The facility's overall temperature continued to rise. As a result, a facility manager fell sick from the heat and was not able to return to work. The facility itself was forced to close its doors during the hottest portion of the summer, preventing them from serving the community during this time.

**The solution:** Two 14ft HVLS fans were installed, which generated a consistent breeze throughout the warehouse. The company's managers and team members took immediate notice of the differences in temperature. Since then, the warehouse has remained open all year long, with an uninterrupted rate of productivity. Moreover, workers say the warehouse can actually be a more enjoyable environment than other air-conditioned sectors of the facility.

### IMPROVING WORKPLACE HEALTH + BOTTOM LINE

This experience has been replicated across industries. As facilities adopt HVLS systems, it translates into healthier, more comfortable work environments, which lead to reduced employee complaints and absentee days. It also boosts overall productivity.

A 2014 study by the Indian Statistical Institute, entitled "The Impact of Temperature on Productivity and Labor Supply: Evidence from Indian Manufacturing," showed labor productivity decreases in high-temperature environments, with productivity reducing 3% per increase in one degree Celsius. The study also stated that "sustained heat may reduce worker attendance."

With this in mind, Hunter fans worked with a remanufacturing and logistics company who was able to improve workforce conditions and productivity levels after installing seven 24ft HVLS fans in their un-air-conditioned 300,000 sq ft warehouse with 36ft ceilings. Their previous cooling methods included pedestal and barrel fans, which proved ineffective in cooling down the entire workforce. This was coupled with the inconvenience of papers and mechanical parts blowing around because of the fans' sporadic air movement.

The company had also experimented with swamp coolers, but the resulting maintenance proved to be a headache. In the end, HVLS fans were able to provide increased workplace comfort across the seasons. They

ran the fans 24/7 to prevent the buildup of stagnant air and heat.

In the words of the company's Vice President of Supply Chain, "[HVLS] fans provide uniform comfort year-round for our nearly 230 employees, which has in turn increased worker productivity. After moving to our new facility and installing these industrial fans, we've received no employee complaints related to workplace comfort... They are essential in creating an optimal, healthy environment in our facility, from ceiling to floor."

In another instance, the Hunter team partnered with a leading global supply chain operator to provide an HVLS solution that would be low impact, in terms of energy and cost, but high impact in performance. The team installed more than 20 HVLS fans across the company's facilities, and the company noted improvements in air quality and employee comfort and satisfaction. One manager stated, "Establishing a comfortable environment in our facilities is a must, and air quality and control plays a large part in that." He also added, "A leading ROI has been straight up employee satisfaction with having a comfortable and healthy work environment... we've gained back the value invested in the fans both in the short-term and long-term."

### HVLS FANS VS. CONVENTIONAL OPTIONS

After discussing the need for and benefit of HVLS installations, it may still leave the question—what really sets HVLS fans apart from conventional options?

Not all fans are created equal. Some of the key differentiators between an HVLS fan vs. traditional high-speed fan options are the reduced noise; minimized energy consumption per sq ft; and the cost savings of about \$1 per day to operate. In addition, HVLS fans' cordless design allows for a safer working environment, eliminating trip hazards—an important factor considering many plant and facility managers identify cords as one of the top workplace hazards.

In fact, the overall direct interaction between an employee and a fan is virtually eliminated with many HVLS models. This feature is compounded by the maintenance-free aspect of those HVLS fans with direct drive motors, which also eliminate the risk of oil leaks and preventative maintenance posed by traditional gearbox motors.

Some HVLS fan models automatically switch off when a facility's sprinkler system turns on, to allow the system to operate as designed. But the primary distinguishers come down to enhanced coverage area and efficiency, effectively creating a 10-12-degree perceived temperature difference in the warmer summer months. Equally as important during the winter months, a quality HVLS solution will continually push warm air trapped at the ceiling level back down to the floor—evenly distributing warm air and allowing HVAC systems to work more efficiently. This can save up to 30% on heating costs.

### INVESTING IN A COMPREHENSIVE SOLUTION

Considering all these factors, HVLS fans are emerging as a comprehensive solution to improve energy savings, cost savings, and workforce health and safety conditions across the board and across industries. Regardless of the industry, a company's success is ultimately built off of the safety and health of its workforce. Safety is proven to be linked to the air employees breathe.

The importance of a facility's air circulation and air management can't be underestimated. Investments in the right HVLS solution for your facility can make radical transformations in a company's wellness standards, while boosting its bottom line. **WMHS**



**Jeff Chastain**  
Hunter Industrial  
Senior Vice President &  
General Manager





Many of today's most cut-resistant gloves look anything but—they're slim, form-fitting and able to help fend off cuts and lacerations in the most hazardous of occupations. But isn't that counterintuitive? You would expect better cut protection to come with a thicker, less dexterous glove and not the comfortable, fits-like-a-glove options available today.

#### WHAT'S THE SECRET?

In Medieval times, if you wanted to protect yourself from sharp edges (most notably, your enemy's sword), you would need to dress head-to-toe in chain mail—a cumbersome garment that could weigh at least 20lbs and made it extremely difficult to maneuver. Fast-forward 500 or so years, and cut protection has come a long way. You can still find chain mail gloves (typically in industries where the utmost cut protection is needed), but the options for thin, comfortable gloves also offering cut protection are boundless.

The secret is in the science. Instead of relying on one strong fiber, today's best cut-resistant gloves are made from yarns engineered to incorporate the benefits of two or more components. For instance, high-strength yarns, such as Kevlar®, Dyneema® and TenActiv™, can be combined with elements, like fiberglass or steel, to create an engineered yarn with unparalleled cut protection.

“Adding steel to a high-performance yarn is like reinforcing concrete with steel rebar,” said Tony Geng,

# The Secret to Form-Fitting, Cut-Resistant Gloves

By: **Corenne Taylor**, *Superior Glove*

President of Superior Glove. “It is making something that's already strong even stronger.”

There are four factors that influence the cut resistance of knitted gloves:

- **Strength:** Examples of high-strength yarns include TenActiv and Kevlar
- **Hardness (dulling):** An example of a hard yarn is stainless steel, which is a popular option in engineered yarns
- **Lubricity (slickness):** Yarns such as TenActiv are “slippery,” allowing a blade to slide over the surface without cutting through
- **Rolling action (knit construction):** Most knit gloves will allow the different yarns to roll as a sharp edge slides over, creating a “ball-bearing effect” where the sharp edge slides across without cutting through the material

Much like cookies n' cream and peanut butter and jelly, engineered yarn takes two things that are great on their own and combines them to form something even better. The more of the above-named four factors that can be engineered into a yarn, the more cut resistant it becomes.

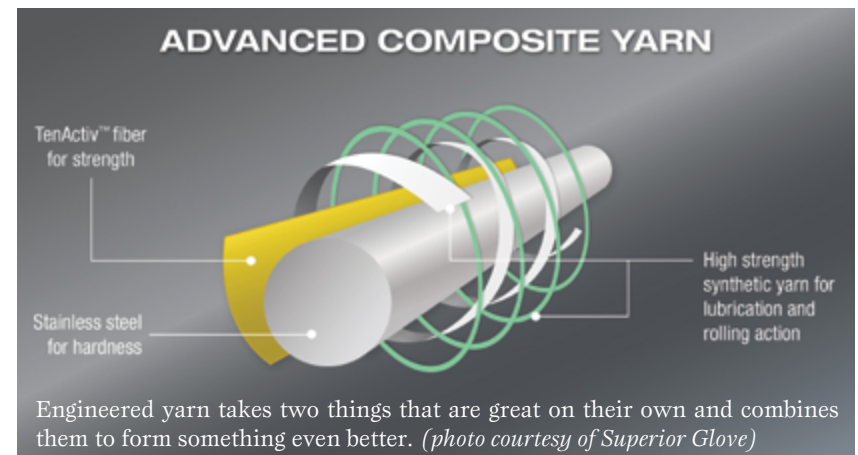
Hand injuries are the second most common workplace injury, right after back injuries. In almost 40% of cases, hand injuries were a result of cuts or lacerations; in 70%

of cases, a hand injury occurred because the person wasn't wearing gloves.

Gloves made from engineered yarns are perfect for industries such as pulp and paper and metal stamping, where both a high level of cut protection and dexterity are required. Many hand injuries occur when workers remove their gloves to perform a task required for their job that couldn't be performed wearing the gloves. This is where gloves made from engineered yarn truly outperform, as the dexterity and comfort of the gloves allow them to be worn through all tasks, all day long. Without the need to remove their gloves, workers will be better protected against injury.

There you have it: the “secret” to how form-fitting gloves can provide high levels of cut protection. It's not magic; it's simply science and a little ingenuity!

As a leader in cut-resistance innovation, check out Superior Glove's website ([www.superiorglove.com](http://www.superiorglove.com)) to view the vast selection of cut-resistant gloves and find your perfect pair. **WMHS**





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# OSHA's "Limited or Restricted Entry & Exit" Confined Space Definition

By: **Michelle Graveen**, ASP, SMS, editor, J. J. Keller & Associates



Photo courtesy: J.J. Keller & Associates

As a business or group leader, it's important to understand what is considered limited or restricted means of entry and exit, and how it affects your employees' safety. The Occupational Safety and Health Administration's General Industry standard at 29 CFR 1910.146 defines a confined space as meeting all of the following criteria:

1. Is large enough for an employee to bodily enter and work; and
2. Has limited or restricted means of entry and exit; and
3. Is not designed for continuous occupancy.

If the entrants may freely step into and out of the space, without having to step over a raised threshold or stoop under the door opening; and if equipment in the space or the travelling distance to the exit could not interfere with the entrants' ability to escape in an emergency, then there would be no limited means of entry or exit. If this is the case, then the space does not meet the definition of "confined space."

OSHA's compliance directive, CPL 2.100—Application of the Permit-Required Confined Spaces (PRCS) Standards, includes the following guidance in Section (b) of Appendix E:

## GET WORKERS INVOLVED IN YOUR PERMIT SPACE PROGRAM

You find two simple employee participation requirements at the end of OSHA's standard on permit-required confined spaces:

- "1910.146(l)(1) Employers shall consult with affected employees ... on the development and implementation of all aspects of the permit space program...."
- "(2) Employers shall make available to affected employees...all information required to be developed...."

The permit space program covers:

- Evaluating the workplace to identify permit spaces,
- Posting signs or otherwise informing employees of the danger of permit spaces,
- Taking measures to keep workers from entering permit spaces that are not to be entered,
- Developing a written permit space program (when workers will enter permit spaces),
- Following alternate entry procedures when appropriate,
- Reevaluating non-permit spaces when there are changes in the space's use or configuration,

(Cont., page 26)

### UNDER WHAT CIRCUMSTANCES WILL STAIRS OR LADDERS CONSTITUTE A LIMITED OR RESTRICTED MEANS OF EGRESS UNDER THE STANDARD?

Ladders and temporary, movable, spiral or articulated stairs will usually be considered a limited or restricted means of egress. Fixed industrial stairs that meet OSHA standards will be considered a limited or restricted means of egress when the conditions or physical characteristics of the space, in light of the hazards present in it, would interfere with the entrant's ability to exit or be rescued in a hazardous situation.

### DOES THE FACT THAT A SPACE HAS A DOOR MEAN THAT THE SPACE DOES NOT HAVE LIMITED OR RESTRICTED MEANS OF ENTRY OR EXIT AND, THEREFORE, IS NOT A CONFINED SPACE?

A space has limited or restricted means of entry or exit if an entrant's ability to escape in an emergency would be hindered. The dimensions of a door and its location are factors in determining whether an entrant can easily escape; however, the presence of a door does not in and of itself mean that the space is not a confined space.

For example, a space such as a bag house or crawl space that has a door leading into it, but also has pipes, conduits, ducts, or equipment or materials that an employee would be required to crawl over or under, or squeeze around in order to escape, has limited or restricted means of exit. A piece of equipment with an access door—such as a conveyor feed, a drying oven or a paint spray enclosure—will also be considered to have restricted means of entry or exit, if an employee has to crawl to gain access to his or her intended work location. Similarly, an access door or portal which is too small to allow an employee to walk upright and unimpeded through it will be considered to restrict an employee's ability to escape.

### WHAT ABOUT SMALL OPENINGS IN A CONFINED SPACE?

A space may be large enough inside for an employee to enter and work, but the portal to the space may be very small. A confined space (and a permit-required confined space) must have an entry port that is large enough to allow full-body entry. If the entrance is too small for a worker to completely enter, or if the space itself is too small for a worker to completely enter, then OSHA's confined spaces standard does not apply. However, that does not mean that the space cannot be hazardous or that other OSHA standards do not apply. **WMHS**



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(Cont. from page 25)



Photo courtesy: J.J. Keller & Associates

- Reclassifying permit spaces as non-permit spaces when appropriate, and
- Cooperating with contractors' entries into permit spaces.

You can use training sessions, task force committees, inspections, informal meetings, etc., to involve employees in these activities.

The second employee participation requirement doesn't require workers to have ready access to permit space information in their work areas, but you may want to consider using a company intranet to provide online access to the permit space program, cancelled entry permits, space reclassification documentation, etc. At a minimum, employees should know how to request permit-space program information. —**Michelle Graveen**





Westfalia's AS/RS in Breakthru Beverage's facility in Cicero, Ill.

# Managing Inventory with an Automated Storage and Retrieval System

By: **Dan Labell**, *President, Westfalia Technologies, Inc.*

To remain competitive and prepare for the future, warehouse operators are focused today on maximizing efficiencies and minimizing expenses by optimizing warehouse space, reducing labor costs and increasing order accuracy. In order to reap these benefits, operators need to turn to warehouse automation technology.

By integrating a high-density automated storage and retrieval system (AS/RS) with a warehouse execution system (WES), manufacturers can better manage their inventory to obtain accurate, real-time information on products moving throughout the warehouse to increase efficiency and decrease the time to market for its brands.

The WES includes a tightly integrated warehouse management system (WMS) and warehouse control system (WCS) to help manufacturers and distributors direct, control and optimize material flow and order fulfillment. This two-in-one solution performs the tasks of both systems through a single solution. Its modular design enables companies to use only the functions needed to handle their immediate warehousing needs—ranging from full traceability of inventory to fully automating the warehouse with an AS/RS.

Although many operators are already adopting warehouse automation solutions, some are still hesitant. Many companies presume that automation is too expensive or too large for their operations. Some companies put off the investment of automation as a way to achieve their short term goals and are more focused on a “quick fix” instead of a long-term solution. Regardless of the misconceptions of automated technology, investing in an AS/RS is essential to efficient

order fulfillment, labor reduction and maximizing storage capacity.

## IMPROVING ORDER FULFILLMENT

Due to the complexity of orders and ever-decreasing order turnaround times, order fulfillment has become a complicated task with no room for errors. To meet these demands, distributors, manufacturers and even retailers are often under pressure to fulfill orders within a short period of time while maintaining order accuracy.

The measurement of success for an order fulfillment process is heavily dependent upon the design of the warehouse and the efficiency of the picking process. Automated warehouse systems allow manufacturers to integrate efficient order fulfillment processes and workflows to enhance warehouse performance and minimize labor. By integrating an AS/RS with warehouse materials handling and management systems, picking processes can be drastically simplified and can significantly improve order fulfillment logistics. For greater efficiency, combine an AS/RS with a picking system to systematically pick products, layers and cases from the inventory to palletize and ship to the consumer. Today's advanced warehouse automation solutions are customizable to accommodate any order-picking strategy and establish efficient picking processes, routes and sequences for a better overall performance of the warehouse.

## REDUCING LABOR

Order picking is undoubtedly a laborious task, no matter where your operations are housed. Automating the picking process dramatically reduces labor requirements and travel times and reduces the risk of error—leading to cost savings in the long run.





Westfalia's AS/RS in Martin's Famous Pastry Shoppe, Inc.'s facility in Chambersburg, Pa.

The integration of warehouse material handling systems, with a high-density AS/RS, greatly simplifies the picking processes used to improve order fulfillment. For example, a worker is tasked with fulfilling an order containing a variety of SKUs, located all over the warehouse. The worker then walks through racks to find the products. If the warehouse is large or the products are far apart, it will significantly increase the travel time and increase labor costs.

Rather than having a person take time to travel between various locations to pick requested products for an order, an AS/RS could provide a "Goods to Person" approach to order picking. An efficient automated process might couple a high-density AS/RS with other technology to systematically pick full pallets, layers and cases from the inventory to fulfill a customer order. The system ensures that the necessary products are available to the picker as needed, often travelling over vast distances, moving both horizontally and vertically, in a short amount of time.

In addition to reducing manual labor costs, an AS/RS helps keep workers safe. There is no longer a need for repetitive lifting, and forklifts are not driving around in the same aisles as people. An AS/RS is especially beneficial for picking in cold and freezer environments where temperatures are often too harsh for the human body. Also, with an AS/RS there is no need to take pre-

cautions by closing an aisle or area of the warehouse to pick items from the top self, so operations are able to continue running smoothly and accidents are significantly reduced.

### MAXIMIZING STORAGE CAPACITY

A huge obstacle to optimizing warehouse efficiency and reducing the costs associated with demand-based replenishment is storage space. Finding alternatives to house thousands of SKUs within the least amount of real estate is a challenge facing many companies today. By implementing a high-density AS/RS, manufacturers will be able to store more product in the same amount of space and eliminate the need for new construction or off-site storage—costly options that produce little ROI. Including an AS/RS in new construction can minimize the overall building footprint by up to 50%, when compared to a conventional warehouse.

At the same time, the system will better-position a facility for growth, since the warehouse has the room to accommodate increased product quantities and SKUs. Since an AS/RS allows for better space utilization, companies can further cut costs by consolidating several smaller, disparate warehouse facilities. By combining operations from remote locations into a centralized warehouse, companies will reduce costs associated with additional labor, resources and energy consumption.

When pick tunnels are integrated in the high-density warehouse, companies can reduce the travel time; achieve better product availability; and maximize existing real estate. Not only is picking more efficient, but so is the overall use of warehouse space, generating savings for years. Plus, in cold storage facilities, automation can strictly control all picking movements and processes within the cold environment. Since workers no longer entering and exiting fridges and freezers, temperatures are more easily maintained with less energy—resulting in significant savings in energy consumption.

Every business has its own processes and solutions, so a "one-size-fits-all" system will not always work. A high-density AS/RS has the ability to simplify and execute different processes inside of the same building footprint. Combining different picking strategies, automated and manual order fulfillment technologies, and warehouse management software, such as a WES, often best sets the business up for success. **WMHS**



*Dan Labell is the President of York, Pennsylvania-based Westfalia Technologies. For 25+ years, Labell has been at the forefront of warehouse automation technologies and continues to lead Westfalia in advancing the modernization of automated material handling systems.*



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# Pallet Flow Rack Can Be a Warehouse Manager's Best Friend

By: **Ryan Wachsmuth**, *Dynamic Storage Sales Manager at Steel King Industries*



Photo Courtesy: Steel King

Compared to traditional fixed racking, a high-density pallet flow system can cut through required square footage for a warehouse in half.

When properly designed to meet the specific inventory and storage requirements, pallet flow racks maximize storage space and improve shipping logistics. Any warehouse or distribution center with limited floor space that needs high-density storage or automatic rotation of inventory on a first-in, first-out (FIFO) basis can benefit by implementing pallet flow storage racks.

However, achieving the full performance capabilities of this type of rack system requires careful planning and implementation. When this is done properly, pallet flow systems can be the warehouse manager's best friend; without it, the system may underperform expectations.

Simply defined, this type of racking system is designed so that when the pallet in front is removed by a forklift, the pallets behind gently "flow" forward to replace it. Inclined tracks, rollers and brakes—with an assist from gravity—are used to accomplish this task.

New inventory is then loaded at the back end of the rack, facilitating FIFO product rotation, which is particularly valuable for items with expiration dates.

In this type of "dynamic" racking approach, goods can be stored three, 10 or even 20 pallets deep and on multiple levels. This eliminates the need for wide aisles between every row of traditional "static" racks required for forklift access and maneuverability. By storing more palletized goods in less space, facility managers can dramatically increase

the amount of inventory in a specific warehouse footprint or, on the flip side, reduce the amount of space required for new warehouse construction.

Compared to traditional fixed racking, a high-density pallet flow system can essentially cut the required square footage for a warehouse in half. The savings can be significant in terms of reduced property and building costs.

There are substantial logistical benefits to using a dynamic rack system, as well. Pallet flow racks can drastically reduce the labor required to pick pallets, because a forklift is only needed for initial loading of the pallets, as well as final unloading. With static racks, forklifts must travel further down aisles and often must spend time rearranging inventory to access the correct items.

When a large number of pallets with a single product SKU are routinely loaded into trucks, locating the pallet flow rack near the loading dock can also minimize the distance that forklifts travel to as little as 20ft each way, which speeds material handling. Even pallets with varied SKUs being shipped to the same location can be located near each other to further speed truck loading.

## DESIGNING TO MEET SPECIFIC REQUIREMENTS

Although the concept of a pallet flow rack may seem straightforward, installing a system that optimally meets a specific warehouse's requirements takes some planning and collaboration with the vendor. Many



people think you can take pallet flow rack off the shelf and ship it out the door. But it must be designed to accommodate your specific requirements: pallet types, pallet weights, forklift capacity, facility layout and any other restrictions.

Some racking distributors are willing to supply a price quote without fully understanding the requirements of the application. Not every vendor asks questions to find out what the user needs.

The process ideally begins by understanding the facility's dimensions, obstructions, types of inventory and forklifts, as well as truck loading and shipping requirements. It is vital to build the flow rack to take advantage of your warehouse's full height, width, depth and floor plan. Obstructions, like low ceilings or the location of sprinklers, building columns, doors, lights and vents, must be taken into consideration.

It is also important to consider the brand, lift height and weight capacity of the forklifts used at the facility. In general, a forklift's lift and push/pull capabilities diminish as a pallet is raised higher.

A forklift can cost as much as \$100,000, so you want to be sure your new pallet flow racks work with the ones you have—or you might have to acquire new forklifts. In terms of tailoring a pallet flow system to an application, it is necessary to plan for efficient flow storage, loading/unloading and transport.

Forklift travel distance can be minimized with proper pallet flow planning. You don't have to travel hundreds of feet to pick a pallet. If you

install the pallet flow rack in the ideal location, you may only have to travel 20ft to pick a pallet. The next pallet is waiting upon your return. This minimizes labor and speeds up loading and unloading.

Similar planning should be applied to storage depth. Just because the system can be designed 20 pallets deep doesn't mean it should be. Instead, it should be designed and grouped to simplify loading/unloading, as well as optimal product rotation. Even some aspects that might seem like smaller details, such as the type of pallet, are important—because they affect how pallets “flow” in the system.

There are too many types of pallets with different dimensions today, and it could affect the type and cost of the pallet flow rack required. So, it's not enough to design on the assumption that a standard 40in or 48in pallet will be used. If the actual pallet has different dimensions, it could increase costs significantly.

With all the aspects that must be considered to get the best results from your flow rack, it can be helpful to work with a vendor that provides one point of contact for planning, coordination, answering questions, troubleshooting and resolving any issues. This is far simpler than interacting with a separate pallet flow manufacturer and rack manufacturer, as well as a dealer and installer.

Given sufficient planning and coordination, a pallet flow rack can be one of the most space-efficient and cost-effective forms of material handling for warehouses and distributors. **WMHS**

## ABOUT THE AUTHOR

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Photo Courtesy: Steel King

In this type of “dynamic” racking approach, goods can be stored three, 10 or even 20 pallets deep and on multiple levels.



# Up and Away: Vertical is the Way to Grow

By: **Barbara T. Nessinger**, Chief Editor

When it comes to storage, industrial shelving is often the Rodney Dangerfield of options for bulk products and packaged items—it may get little or no respect on a day-to-day basis, but it always does its job.

To make better use of existing warehouse and distribution center (DC) space and to accommodate the speed and velocity of omni-channel fulfillment (which relies on a seamless consumer experience), many companies look to rack, shelving and storage equipment manufacturers for assistance. Efficient storage systems can help improve efficiencies; keep workers safe; and comply with codes.

## SHELVING

Typically made of heavy-duty metal, industrial shelving is available in two general types: open units and closed units.

- **Open units:** This design allows for the easiest stocking and retrieval and works nicely for bulky or boxed items.
- **Closed units:** If containment/separation is key, then closed units are your best bet; closed options are also a good choice for use in office environments or other semi-public or public areas.

Both types of shelving are typically easy to install and usually adjustable to various heights to enable maximum storage options.

Particle board shelves and wire decking work well for lighter loads; heavy-duty industrial shelving often uses heavy-gauge steel shelves with powder-coated finishes for high-capacity storage.

Boltless design is also now in vogue. A boltless rivet design can provide for easy installation without nuts, bolts or shelf clips. Shelves are usually accessible from all four sides and can be adjusted. Boltless shelving is typically available with particle board, white laminated particle board or flat wire grid decking. A wide range of sizes are also available, which explains this particular solution's popularity.

## PALLET RACKS

Basically, a warehouse pallet rack is a material handling storage system designed to store products and materials on wood pallets in horizontal rows and vertical levels. Horizontal beams attach to vertical upright frames, creating industrial shelving to support pallets of material that can be accessed by forklifts.

Industrial pallet racks enable users to truly maximize warehouse space by stacking vertically and, of course, by storing pallet load by pallet load. Frames and beams are, again, high-gauge steel.

When deciding which type of pallet rack is best for your needs, here are some factors to consider:

- Cost
- Size of the facility
- Clear height of the facility's ceiling
- What type of product is being stored
- What size pallets are used



- What is the product turn-around
- What type of fork lift truck is being used

Roll-formed pallet racks are the most common type of construction. They are typically manufactured in the teardrop style; meaning the teardrop-shaped holes on the column of the uprights. They are cold-rolled and often have a rivet connection.

There are a few circumstances when roll-formed has a bolted connection. This type of pallet rack also tends to be less expensive; it is made up of less steel than structural. Roll-formed construction uses mounting clips that can easily be adjusted to different heights, according to load size. For warehouses that store a wide variety of product sizes, this can be a huge plus.

Structural pallet racks are hot-rolled. Their components are almost always bolted together (the main difference between spot structural vs. roll-formed pallet racks). The horizontal load beams connect to

the uprights with bolts, helping with weight capacities. Structural pallet racks are made of thicker steel c-channels, making them costlier, but more durable options. In warehouses where inventory has a quick turnover, durability becomes more important, especially when forklift traffic is a factor.

### LOOKING UP

One of the more interesting trends in material handling storage solutions is the multi-level storage structure. As companies incorporate these multi-level storage structures into their warehouses, many also want to go even higher—this can be achieved, mainly due to the evolution of wire-guided, man-aboard (or man-up) order-pickers.

The surge in e-commerce and omni-channel fulfillment is also driving the need for warehouses and DCs to have access to better space-utilization techniques. Thankfully, much of the new construction throughout the country accommodates these

multi-level systems. This makes vertical storage even more attainable.

One of the strategies employed frequently for companies wanting to use vertical space and gain efficiencies is to reduce the number of product “touches” that occur in any given warehouse. This depends a great deal upon an efficient warehouse management system, but it can also be positively affected by the right rack and storage strategies.

The distance an item travels per order and the total number of touches it receives can be improved. Structural speed-racking or using platforms and mezzanines—or a combination of them, along with pick- and flow-type modules and warehouse automation, can greatly improve any warehouse or DC operation’s rack, shelving and storage goals. These can, in turn, play a role in helping companies utilize space efficiently and contain costs, while increasing efficiency. **WMHS**

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