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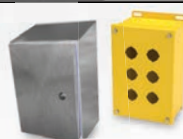
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Warehouse Material Handling & Safety (WMHS) has an especially robust issue for you this time around. Having said that, next month's issue is my favorite each year. I'll tell you why the December edition of WMHS has that special status for me – and it has nothing to do with the holidays.

But back to *this* issue. As you know, WMHS has a dual editorial focus, and the article about autonomous guided vehicles (AGVs) encompasses both of them. The advantages of AGVs – which include increased productivity and fewer errors – are making them increasingly popular, but

safely introducing them into your facility requires training, path marking and other steps— which are explored in the article.

Are slips, trips and falls a problem in your facility? Depending upon the circumstances, slip-resistant footwear can be a solution, but only if you choose the right kind for the conditions in which wearers will be working. Our article on how to select slip-resistant footwear will help you pair kinds for the hazards that workers will be likely to encounter. You'll learn about flexible soles, tread patterns and ice-biting spikes, as well as different types of materials, soles and treads. The article will also help you decipher the various testing codes for footwear.

Hand safety also comes into focus in this issue. Cuts and lacerations are among the dangers these hardworking appendages are exposed to, which make cut-resistant gloves vital in certain applications. However, do the very qualities that protect hands make this form of hand protection uncomfortable and rigid? Do they make them less likely to be worn by workers, some of whom must perform tasks that require them to use fine motor skills? The glove article in this issue discusses how research has produced innovative materials that are used to manufacture comfortable and *breathable* cut-resistant gloves that give users maximum dexterity and can be worn for long periods of time.

These are just a few of the articles you'll find in this issue of WMHS. You'll also find the latest on mobile robots, industrial batteries, protective guarding, first aid and hearing protection, written about by people who are subject matter experts in their fields. As always, we are grateful to our contributors. They enable us to bring high-quality content to you, our readers. Please consider checking out the companies who make these experts available to us (links to their websites follow the articles).

And now, about that December issue. In a way, I've been working on it all year. Our end-of-the-year issue traditionally features a Product Innovations of the Year section, and putting it together is always a challenge. It's *not* because I can't find enough products to include. It's because of the wealth of ingenious, cutting-edge inventions and next level improvements of existing products that are brought to our attention throughout the year. If only there was an unlimited number of pages in WMHS, we could run them all! Unfortunately, publishing, like all other industries, has its limitations. Reviewing all of the information we get and figuring out which products to highlight is difficult, because of the many that must, by necessity, be left out. However, there is good news. You can find *all* of it on our website! Just go to www.workplacepub.com and either use the search box to look for items of interest to you, or navigate using menu offerings like Material Handling, Safety and PPE.

Thanks for being a WMHS reader. There is an entire staff that puts this magazine together – one that is dedicated to bringing you the best, latest, most helpful information possible. If you have any suggestions for how we can do that even better, please feel free to email me at: maureenp@rdgmedia.net.

Maureen Paraventi
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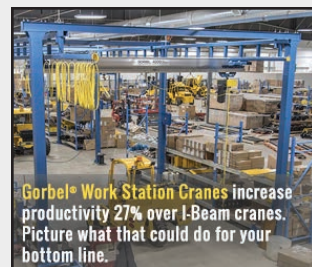
From free standing to wall

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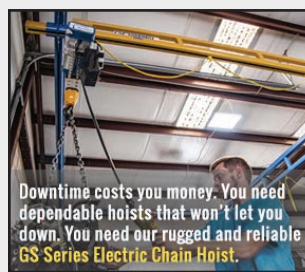
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About Us

Westfalia is your complete resource for planning, designing, manufacturing and installing automated material handling solutions.



It's time we all take a collective deep breath. The past several years have seen high-stress disruptions and unforeseen challenges—from a fractured supply chain, to labor and driver shortages, to idling freight causing delays. While stressful, these challenges present a unique opportunity to implement long term, innovative solutions. For warehouses to overcome current and future disruptions, they need the right technology and team to get them there.

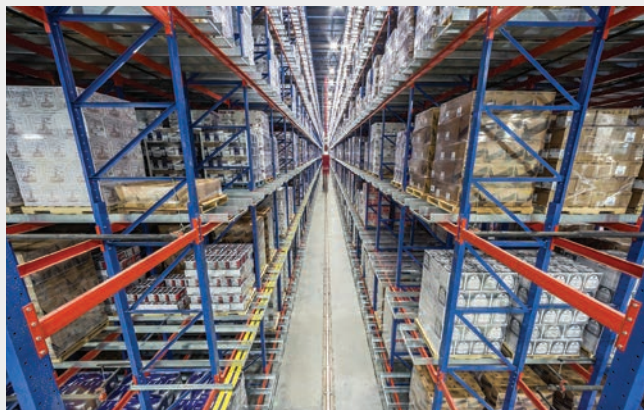
Designing for peace of mind

Automation is the secret to creating the flexibility and reliability needed to accommodate the demands of the supply chain now and into the future. Automated storage/retrieval systems (AS/RS) are an ideal solution, maximizing storage density and optimizing throughput in warehouses across industries.

Westfalia's automated systems:

- Maximize available storage space in existing structures
- Minimize overall building footprint up to 50 % versus conventional warehouses
- Reduce energy use, labor and product damage costs
- Increase inventory accuracy and customer service

AS/RS combined with a warehouse execution system (WES), like Savanna.NET®, help to better control material flow and order fulfillment processes, providing accurate, real-time views of



inventory and order management. AS/RS and WES are designed to be scalable, as demand and number of SKUs grow for companies of all sizes. In fact, designing the right solution should begin with raw order data, to establish peak performance requirements and projections for future growth plans. Westfalia's comprehensive data analyses prior to design provide an in-depth, fresh look into how a business operates. These analyses include 3D simulations or models and SKU churn visualizations to find the practical solutions that will actually solve material handling challenges.

With the right plan, team, software, and technology in place, AS/RS typically has a less than five-year payback period and a 25-year lifespan—the ideal future-proof solution.

The right team

There may seem to be an overwhelming number of options when evaluating automation solutions, but choosing a trusted partner can make it easy. Westfalia believes in solving challenges for our customers through proven quality and

simple solutions. While the capabilities of AS/RS are complex, the system design doesn't have to be. Westfalia's experts guide customers every step of the way, from the planning and design stages all the way through installation and training. Building the right system from the start will reduce today's maintenance costs while accommodating for future growth.

In addition, Westfalia proudly designs, manufactures, and services our automated systems in the U.S., with support from a customer-focused team concentrated in key regions. Our Aftermarket Service team is available to provide the knowledge warehouses need to stay ahead of challenges when moving to and maintaining AS/RS.

Investment in Westfalia's automated systems is a venture into long term peace of mind. When your warehouse is ready to take the leap into automation, Westfalia's team of experts is prepared to take you there. So take a deep breath, and let's dive in.



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Gamber-Johnson is the global leader in equipment mounting products. The company manufactures components and systems for every mounting solution, meticulously designed to be **rugged, reliable and responsive**. Gamber-Johnson is a trusted name in the industry; the go-to partner for rugged computer OEMs, such as Dell, Getac, Panasonic, Samsung, and Zebra.

The company combines personalized service with innovatively designed rugged and reliable commercial docking and mounting for the material handling industry. Built-to-last solutions enhance user efficiency, reduce installation time, and improve overall workplace safety and ergonomics in all work environments. Products are designed and tested for long term durability and performance.

more than 40 countries, with installations in thousands of fleets worldwide.

Gamber-Johnson mounting solutions for every lift vehicle

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Zirkona Mounting Solutions



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Leaders in MATERIAL HANDLING

2022

Combilift USA

About Us

With a manufacturing facility and company HQ based in Monaghan, Ireland, Combilift exports its ever-growing range of handling solutions to over 85 countries. Established in 1998, Combilift offers the most extensive range of multidirectional and specialist customized handling solutions on offer from any one single manufacture and is now acknowledged as the global leader in the supply of innovative and award winning solutions for handling long and bulky loads, oversized products as well as palletized goods.

Established in 1998 in Monaghan, Ireland, materials handling specialist Combilift launched the world's first IC engine powered, all-wheel drive multidirectional forklift onto the market. The company has since gone on to develop the most extensive range of multidirectional and specialist customized handling solutions on offer from any one single manufacture and is now acknowledged as the global leader in the supply of innovative and award-winning solutions for handling long and bulky loads, oversized products as well as palletized goods.

Combilift's wide range is designed for safe, space saving and productive handling in diverse industries such as the construction, pharmaceutical, lumber, metals, and manufacturing sectors. Exporting to over 85 countries, Combilift works with a network of dealerships all chosen for their local expertise and market experience.



Continual 7% of annual revenue investment in R&D keeps the company at the forefront of innovation and taking feedback from its extensive customer base on board also ensures that products are 100% suited to operational requirements,



wherever in the world they are operating.

Products range from pedestrian stacker trucks with capacities up to 4,400lbs, through to the Combi-SC Straddle Carrier and Mobile Gantry ranges which can lift loads of 300,000lbs and over. In between are dozens of models such as those from the multidirectional C-Series, the Combi-CB range, 2 and 4 directional side loaders, and stand-on forklifts. These are all available with various load capacities and options of electric, LP Gas or diesel power, and are designed to be no nonsense, robust workhorses for operation inside and out and in all weather conditions.

For warehousing operations looking to maximize every inch of available space the Aisle Master VNA articulated trucks fit the bill perfectly. These work in aisle widths as narrow as 6ft, enabling more racking to be installed for a potential doubling of pallet density. With impressive lift heights of 49ft they also ensure optimum use of all vertical space too. The ability to operate indoors and out removes the need for double handling, resulting in a forklift truck that provides safer,

faster load cycles and truck to rack operations.



As well as supplying innovative forklifts to a global market, Combilift also offers a service that represents excellent added value in the form of a free and no obligation warehouse layout and material flow analyses. CEO and Co-founder Martin McVicar: "Space is one of the most valuable assets our customers possess, and we can supply detailed diagrams and 3D simulations to show them how to optimize this. Given the continued demand for warehouse space coupled with ever rising business costs, this is now more important than ever."



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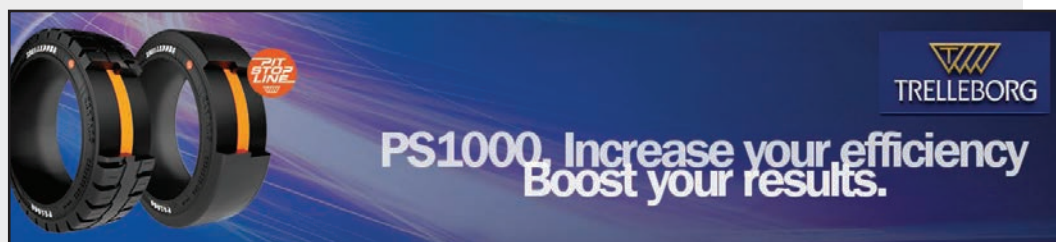




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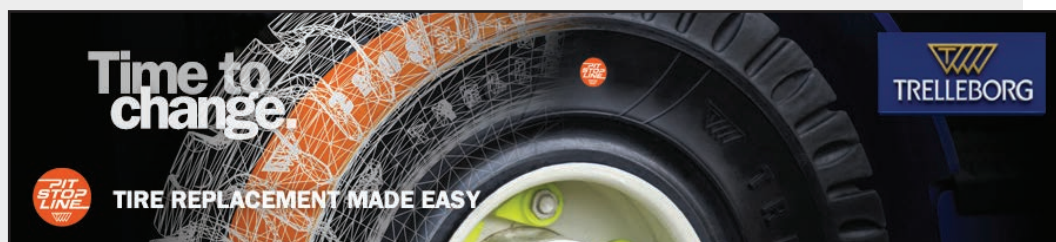


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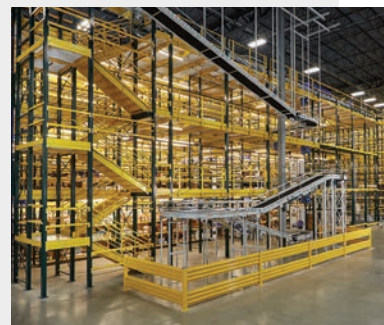
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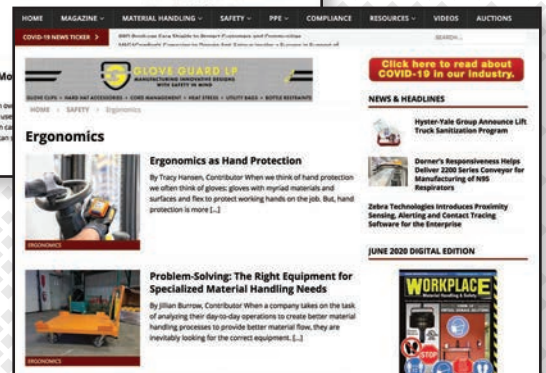
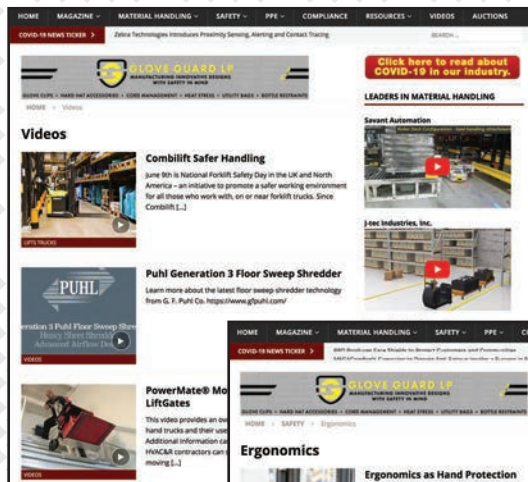


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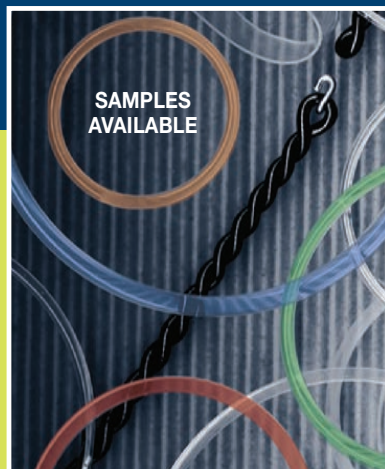
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Providing a Safe Automated Vehicle Operation

For all the advantages of automated vehicles, you must create a safe environment for their operation.

Contributed by: **MHI's Mobile Automation Group (MAG)**

Gone are the days when warehouses were operated only at the hands of employees. While there are still plenty of places where humans play significant roles, they are now commonly assisted by mobile automation, such as automated mobile robots (AMRs), automated guided vehicles (AGVs) and the like. Amazingly, automated vehicles are flexible, scalable and can drastically speed up productivity while lowering labor costs.

Other benefits of automated vehicles include reduced errors, easy integration into your existing operations and enhanced efficiency. In addition, the cost to purchase automated vehicles is at the same time becoming more affordable, so when added to the productivity gains, the ROI comes faster than ever before. Despite all their features, however, deploying mobile vehicles in your facility requires careful attention to safety.



Automated vehicles can speed up productivity, lower labor costs and reduce errors. Image courtesy of Mobile Automation Group (MAG).

“Automated vehicles are popping up everywhere, but they still must be rooted in safety,” says Brian Keiger, Director of Business Development and Marketing with stow robotics US. “Just because they are safe devices, doesn’t mean they can operate safely if the proper guidelines aren’t in place.” There are several steps to put in place before AGV deployment to ensure their safety.

Training—First and foremost, before you let automated vehicles loose in your facility, you must ensure all your personnel are aware of them and appropriately trained.

“Anyone who might interact with an automated vehicle should be trained,” says Keiger. “That means anyone on your floor, even if they work in a different part of the building.”

Training should include a basic understanding of what the robots do, where they travel, and what to look for when working near them. Everyone should also be well aware of pinch points in the facility, because bots like AMRs operate without a pre-defined path and could trap someone. “If someone backs up against a wall to get out and doesn’t realize it’s a pinch point, that could create a dangerous situation,” says Keiger. “You should also put up signage that identifies these spots.”

You can train your personnel through a variety of methods, even layering them to provide adequate safety. There are videos that demonstrate what bots do and where they operate, and you can also partner with your bot manufacturer to provide in-person classes that complement the videos.

Mark the paths—While AGVs have plenty of freedom in a facility, it is important to mark their general paths. An AGV cannot stop quickly enough if an unexpected object suddenly appears in its path. This means you should mark all turns and parking locations, and identify all hazardous and restricted areas, too. This will help your personnel know where to expect the bots as they go about their daily workload. While not required, adding ambient lighting can enhance bots’ visibility as they move around.



Identify a safety champion—If you are deploying automated vehicles, select someone in your facility which can serve as the project’s safety champion. “This should be someone who is up to date on all the latest regulations and safety training,” says Keiger. “They can then oversee training, signage and path markings to increase the likelihood of accident avoidance.”

Partner with the right provider—The list of automated vehicle suppliers grows daily, but it’s important to find a reputable, experienced provider to partner with as you consider adding mobile robots to your facility. These providers will be well versed in all the proper safety standards (ANSI, RIA, et al) surrounding automated vehicles and will work with you to make your facility as safe as

possible. Consulting with the MHI's Mobile Automation Group (MAG) is an excellent place to start your provider search.).



As warehouses continue their rapid adoption of mobile robots, the vehicles themselves will become more advanced, and at the same time, increasingly safer. The ultimate safety stop, however, is the training provided by companies deploying the technology. "The manufacturers are looking constantly at the safety aspects and trying to improve them," says Keiger. "Make sure you have a partner who provides guidelines and works to ensure a safe operating environment." **WMHS**

MHI's Mobile Automation Group's (MAG) members are the industry's leading automatic guided vehicle systems suppliers. They supply systems worldwide and in virtually every major manufacturing and distribution sector. MAG programs include the development of educational and training materials, a voice in the development and maintenance of national standards and the confidential exchange of market statistics and publication of industry data to the public. Plus, the communication of the benefits of MAG solutions via trade shows, educational forums, and other national and regional seminars. Find out more at: www.mhi.org/mag

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Trying to Reduce Forklift Battery Maintenance and Ownership Costs?

Lithium-ion and Thin Plate Pure Lead Offer Powerful Options

By: **Harold Vanasse**, Contributor

The material handling industry has been buzzing about the benefits of Lithium-ion (Li-ion) forklift batteries for some time, and it's for several good reasons. Li-ion batteries enable forklift equipment managers to leave the restrictive watering, charging and maintenance of traditional flooded lead acid batteries behind. With Li-ion battery technology, there's no ongoing need to change, water or clean batteries and no risk of hazardous spills.

But the intended benefit of Li-ion batteries for forklifts is actually the high density of energy it provides for demanding, long and intense applications – like those running 24/7 or with added attachments. But many equipment and maintenance managers who don't need that much power still pay a premium price for Li-ion batteries because they believe it's the only option for eliminating cumbersome forklift battery maintenance regimens.

However, there is another option that offers the same maintenance characteristics as Li-ion batteries, but without their extra energy density and cost. Thin Plate Pure Lead (TPPL) forklift batteries deliver nearly the same low upkeep/fast-charging benefits of Li-ion forklift batteries noted above. But as many people are surprised to learn, TPPL batteries can often deliver a lower Total Cost of Ownership (TCO) power solution than Li-ion forklift battery technology.

APPLICATION DATA DRIVES YOUR OPTIMAL SOLUTION

Evaluating your options using traditional methods like hand calculations or a spreadsheet is limiting and can even be misleading. The proliferation of new technologies,

operational data and fluctuating throughput demands simply creates too many variables to accurately consider using conventional methods. So even the most elaborate spreadsheet amounts to little more than a “best guess” on a very large and crucial decision.

But utilizing special software can help by applying a facility's own lift equipment power data as it compares to different battery and charger options to find the solution that achieves throughput demands with minimum ownership costs. These simulations often indicate TPPL battery technology provides the necessary throughput at a lower TCO than Li-ion technology – including that sought-after reduction in maintenance.

TPPL AND TCO

Based solely on power throughput, TPPL battery technology is extremely well suited for Class I, II and III forklifts in light- to medium-duty applications across multi-shift operations – that is, a wide range of lift truck and pallet truck models handling 10-16-hour workdays. Factoring in battery maintenance costs within these operations, TPPL forklift batteries often provide the lowest TCO option versus flooded lead acid batteries.

Developed for mission-critical military applications, TPPL battery technology uses a sealed, Absorbed Glass Mat (AGM) design, but one featuring uniquely engineered, pure lead plates. The sealed design eliminates watering requirements and the risk of spills, helping to trim labor costs.

The proprietary TPPL design features three times more plates than traditional flooded lead acid batteries for 10 % greater energy density. Higher energy density means higher energy throughput, which allows the batteries to be fast-charged in as little as two hours, or opportunity charged in 15-minute increments.



LI-ION

TPPL battery technology is well suited a wide range of lift truck and pallet truck models handling 10-16-hour workdays. © Vector DSGNR - stock.adobe.com

WHEN LI-ION MAKES MORE SENSE

While TPPL forklift batteries address cumbersome maintenance practices and provide more power than traditional flooded lead acid batteries, they can't match the sheer energy density of Li-ion battery technology. Designed especially for stringent, high-demand lift truck applications, Li-ion forklift batteries offer longer run times at peak power, making them ideally suited for heavy-duty, 24/7 operations or forklift applications running special attachments.

While TPPL technology is generally the lowest TCO power choice for light- to medium-duty applications, Li-ion technology is usually best for heavy-duty applications. But quite often, equipment usage patterns and power demand levels can vary – even within the same facility.

Even if they work in the same area, a reach truck repeatedly picking 3-4 positions high has very different power demands versus an end rider pallet jack used to load outbound semi-trailers. In addition, due to staffing, operational requirements, or the nature of the operation itself, we often find facilities varying shift profiles between different departments - meaning identical forklifts can even have different power requirements, based on assigned areas.

While modeling such workload differences is skillfully accomplished with modeling software, actually meeting them takes a comprehensive portfolio of battery and charger options to truly optimize a given power system.

Ultimately, an operation's lowest-TCO solution should be based on their specific power and shift requirements. Of course, effectively assessing those requirements, then comparing how cost-effectively different battery and charger options can meet them, is not something that every manufacturer or distributor can do. But at EnerSys®, our proprietary modeling software lets us quantify power requirements and compare options, then our comprehensive product portfolio allows us to provide the lowest TCO solution.

Or in other words, if your operation is looking at Li-ion battery technology just to reduce maintenance, there may be better options available. **WMHS**

Harold Vanasse is Senior Director of Marketing, Motive Power Global for EnerSys, the global leader in stored energy solutions for industrial applications. EnerSys manufactures and distributes energy systems solutions and motive power batteries, specialty batteries, battery chargers, power equipment, battery accessories and outdoor equipment enclosure solutions to customers worldwide (www.enerSys.com).

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Leverage Machine Guarding for Safety And Productivity

By: **Erin Reilly**, *Contributor*

Moving parts and machinery are part and parcel of the manufacturing industry. Without them, nothing would be fabricated, extruded, drilled or assembled. But the caveat is that every machine has hazards, which are mechanical and non-mechanical. While machine automation has come a long way, manufacturing still requires people to operate and maintain these machines. Essential to the checklist in maintaining workers' health and safety is machine guarding.

Machine guarding is the primary barrier between workers and machine hazards such as nip points, ejected material, rotating pieces, sparks, etc. The guarding requirements for something like a conveyor will differ from a saw or a press, and there are different kinds of guarding to consider as well. Some guarding can be unobtrusive, such as a laser scanner that will stop machinery if the beam is interrupted. Light curtains are a type of guarding that uses a soft physical layer as a barrier. This article focuses on hard machine guarding, which puts a rigid physical layer between the moving parts and the operator.

MACHINE GUARDING TYPES

For example, a conveyor system has nip points where the rollers converge or where a conveyor belt wraps around a roller. These can be guarded by having rigid material around the conveyor's edge to prevent anyone from accidentally reaching into the moving area.

Another type of effective machine guarding is a cage made from a frame and wire mesh material or a clear panel material with openings. Workers use the openings to reach in and manipulate the equipment while avoiding hazards. This type of guard is typically used for items like saws and presses. Wire mesh may be the best solution if the machine might eject flying debris or if the machine must be separated from the surrounding work area while retaining control access. The downside to wire mesh is that visibility of the machine is significantly reduced.

If visibility is required, a clear panel like acrylic or polycarbonate may be used. There are advantages and disadvantages to each of these materials too. While acrylic has higher clarity than polycarbonate, polycarbonate is stronger and does not crack as easily, making it easier to drill holes near the edges without a plastic-specific drill



Smooth extruded aluminum and clear panel material act as a protective guard for this mechanized equipment.

bit. Acrylic is less expensive than polycarbonate but has lower chemical resistance. Polycarbonate is not typically affected by oils or acids. A prime example of this material type would be a visor around a drill press for tapping screw holes or drilling through another material to make an access hole. The clear material lets the operator see what they are doing and where the end of the drill is so they can accurately perform their work.

MACHINE GUARDING BENEFITS—SAFETY AND BEYOND

Proper guarding around any moving part is necessary to prevent company losses from both workforce and monetary standpoints. Because amputations represent some of the most catastrophic workplace injuries employees can experience, placing proper guarding around equipment reduces the likelihood of a worker suffering one of these events. The company will need to handle the time and cost for the injured employee's days away from work plus workers' comp reimbursement and disability, but first and foremost is to protect the employee from experiencing a traumatizing incident like an amputation.

In addition, machine guarding can improve workplace efficiency by giving workers the confidence to work more productively. Suppose there is an extra layer of safety—in the form of guards—between a press operator and the material they are drilling. The workers are more likely to perform the task in a timely fashion because they also have the visor and safety goggles for protection. An individual's personal protective equipment, such as goggles, gloves and protective footwear, is always the last line of defense against a hazard. The more that machine guarding can help safeguard the individual, the better.

USE WITH CARE

On the same note, any guarding must not impede the usual function or operation of the equipment. Sometimes, without trying, employees are engines of efficiency and will want to do things in the simplest way possible. If the guarding is too complex or inconveniences the worker, they might circumvent the protective measures to accomplish

what they feel is a more important task, thereby placing themselves at risk.

When used properly, machine guarding prevents injury and increases productivity. It creates a safer work environment for employees, improving their confidence and allowing for efficient completion of tasks involving automated and hand-operated machinery with moving parts. Some manufacturers make dedicated machine guarding, but for best results, consider a business specializing in framing and panel products that customizes machine guarding to the customer's requirements. Anyone looking to secure their workers against injuries would benefit from seeking expertise in installing guards for their machinery. **WMHS**



Erin Reilly is a buyer at Motion Ai, a business unit of Motion focused on providing automation solutions. Since 2018, she has quoted and ordered industrial aluminum framing for safety, manufacturing and recreational applications. Erin also manages safety for her branch.

For more information, visit ai.motion.com or motionind.biz/AiMachineGuarding22.

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Racking 101

By: **Maureen Paraventi**

What is made of steel, able to handle 1,000-pound loads and is an essential fixture in warehouses and distribution centers? Racking, of course. Racking may seem basic – especially when compared to the robotics, automated storage and retrieval systems (ASRS) and multitude of forklifts, cranes and shuttle carts found in these facilities. However, racking's seeming simplicity may obscure the fact that it is not a one-size-fits-all proposition. There are a number of different types of racking, and choosing the wrong kind for your particular facility and applications could be costly in terms of the time it takes to move products around and the space being utilized. Here are some of the racking options available:

Selective racking is one pallet deep, so it provides easy access to every pallet. That makes it ideal for low turn-over/high differentiation products. It is low cost, but has the lowest overall storage capacity. (The aisle width and type of pallet handling vehicles used will help determine the actual storage capacity.) Selective racking is useful for SKUs with a short shelf life because it enables First In First Out (FIFO) inventory management. It is not a good fit for high volume applications and involves increased loading and unloading times.

As their name suggests, **drive-through racks** enable forklifts to drive through them - from either direction - in order to deliver or retrieve pallets. This makes managing material through the FIFO process a good choice, especially when material doesn't have to be moved frequently or the order of delivery is important. Because they have aisles at both ends that take up floor space, drive-through racks don't use space quite as efficiently as drive-in racks.

Drive-in racking maximizes both space and height, but it is mainly good for the storage of pallets holding the same item or similar items. Forklift operators can enter from one side only. Some warehouses and distribution centers that reconfigure their space to accommodate drive-in racking systems find their storage density increases significantly.

Pushback racking is used in industries with large numbers of pallets and moderate SKU counts, like food and beverage, cold storage and grocery. A pallet is loaded from the front and then *pushed back* when a second pallet is

loaded in front of it - up to a total of six pallets per lane. The process is reversed when pallets are removed.

Gravity is the key ingredient in **pallet flow racking**. Gravity roller tracks create a gravity flow lane that moves pallets from the in-feed side (rear) to the pick side (front). The speed of movement is controlled by dynamic brakes. Pallet flow racking is a high-storage solution for facilities with limited space. It is another FIFO inventory control system and works well for products that need to be moved quickly, like perishable items.

Carton flow racking is also a gravity-driven, FIFO system, and a fit for applications involving many SKUs. Full case and split case cartons that are loaded at the back of the rack *flow* to the front. Carton flow racking is relatively affordable and uses considerably less floor space than standard pallet racks. Cold storage, grocery and food and beverage applications are good candidates for carton flow racking.

Shuttle racking has a self-powered shuttle that runs on rails and facilitates the loading and unloading of pallets, as directed by a forklift driver using a remote control. Shuttle racking can handle whole pallets and operate as either FIFO or LIFO. In warehouses with workforce shortages, shuttle racking can be an invaluable assist to productivity.



The right type of racking can increase productivity and maximize space. © Petinovs - stock.adobe.com

Cantilever racking is heavy duty enough to store large, heavy and bulky items like boats, iron, PVC, steel or plumbing pipes; wire coils, sheet rock, wood and furniture. It is also known as lumber racking or industrial pipe racking. There are three main kinds of cantilever racking:

1. Light duty, for soft goods
2. I-Beam, for easy accessibility
3. Structural, which is durable, strong and versatile enough to handle medium to extra heavy loads.

Whatever type of pallet rack system you use, making sure that it is and remains in sound condition - especially if alterations or reconfigurations are made - is important to the welfare of the personnel who perform tasks near it. ANSI/RMI 16.1 applies to the safety and repair of industrial pallet rack systems, steel stacker racks and movable shelf racks, but not to drive-in or drive-through racks, cantilever racks or portable racks. This standard calls for a qualified rack design engineer to oversee any repairs that are made. It also requires owners to conduct regular inspections of the columns, beams and other structural components, to ensure structural integrity. It is also a good idea to check for damage to horizontal and diagonal struts, footplates, beams and anchors. **WMHS**

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Five Steps to a Successful Automated Mobile Robot Project

By: **Brian Betts**, Contributor

Autonomous mobile robots (AMRs) are one of the fastest growing segments in automation today, allowing companies to quickly, easily and cost-effectively manage internal logistics while freeing up employees to perform higher-value tasks. This is especially relevant as ongoing labor shortages across myriad industries and disrupted supply chains make these dull, dirty and dangerous tasks difficult to fill. In fact, according to recent analyst reports, revenue from AMR sales reached nearly \$3 billion in 2021, and those numbers are expected to rise substantially in the years ahead.

Early adopters of AMRs already know the value they offer and are now ready to double down and expand to further future-proof their operations. No matter how experienced the user may be after testing out single robots within their facilities, deploying multiple systems across multiple facilities and seamlessly integrating them into current operations can quickly become a more complicated task.

The task can be even more daunting for those just starting out with AMRs. Whether they've hesitated due to financial concerns or simply not knowing how to start, many now see that taking the plunge will help them compete.

No matter where YOU are in the AMR journey, here is a five-step guide to successfully managing a deployment project:

1. APPLICATION REVIEW

You may have an idea of which applications you want to automate but sitting down with your vendor or a certified system integrator (or both) to discuss and confirm what can be done is a critical first step in the process. Once initial applications for the AMR are discussed and outlined, they will likely be sent to the vendor's application development team for review. During this stage, the development team can be expected to make recommendations on best practices to optimize the outcome of the project which may include cutting out aspects of the project that won't work or don't support the intended goals of the specific project. This ensures that the scope of any project remains on target and reduces wasted resources. The results of this process are then consolidated into a design report that can go on for review between the CSI partner and the customer.

A design review form should include the pace of the deployment process and the layout of the facility, including routes the robots can travel on the floor, with tracks where they may interact with other robots or other human workers.



A design review form should include routes the robots can travel and tracks where they may interact with other robots or other human workers. Image courtesy of MiR.

Keeping track of the customer's inventory within the facility, such as other pre-existing robots, conveyors, forklifts, Wi-Fi, ERP, warehouse management software (WMS) and manufacturing execution systems (MES), is also important. The vendor will then evaluate that information against the specs of the robots they offer and any top modules appropriate for the application to find the right solution for the customer.

At this stage of the process, you will also work with your vendor or CSI to establish ideal routes for robots. For example, if the robot needs two meters of space for driving, and the customer only has 1.5 meters, they will suggest looking for other ways to get the route completed such as alternative paths or limiting the aisle way to one-way traffic instead of bi-directional. They will also evaluate whether their network infrastructure, operating environment and other non-AMR traffic to determine how the robots can work around those devices.

2. KICK-OFF MEETING

After the review phase is complete and you have agreed with any suggested adjustments, it is time for your team to meet with the CSI partner to discuss the design review. A project manager from the CSI, as well as an application engineer from the vendor, will review the project requirements for deployment and address any other technical questions. They will also establish the schedule for key milestones of the deployment project and make sure you have everything you need to meet the deadlines, including access to support resources.

3. PROJECT MEETINGS

Implementing complex deployment plans requires good communication. The purpose of these meetings is to discuss the progress of the project to ensure it stays on schedule and provides the opportunity to follow up with any adjustments. This helps maintain alignment across the project team and can be held remotely for convenience, if necessary.

4. ACTUAL IMPLEMENTATION

Even when recruiting the advice of outside counsel, it is typical for the CSI partner to be responsible for the actual implementation phase. As a result, you should expect to establish the milestones you expect from your partner and encourage them to keep to the schedule. Many customers choose to take advantage of downtimes or slow seasons to implement new infrastructure, but this creates more of a demand on your partners and should be planned in advance.

On some of the more complex projects that involve multiple robots across multiple facilities, the partner's deployment team will expand to help meet these needs. These teams provide essential support for you to navigate the adoption of new technology and also helps to align internal stakeholders such as IT or operations.

5. SERVICE AND SUPPORT

Once the deployment is complete and you sign off on it, the final phase is to transition to long-term support. Planning for future maintenance will help prevent unnecessary downtime. Given the cost of the initial implementation, it only makes sense to finance a strong customer support system with expertise in AMRs to protect the initial investment. **WMHS**

Brian Betts is an application project manager for Mobile Industrial

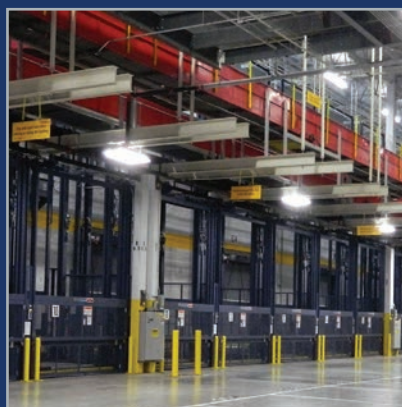


Long-term customer support will help prevent unnecessary downtime and protect the initial investment. Image courtesy of MiR.

Robots (MiR) with more than 25 years delivering value to clients and stakeholders. His experience across an array of industries and applications has enabled him to become skilled in all aspects of the art and science of project management. For more details on how to get started on your AMR project, visit www.mobile-industrial-robots.com/insights/get-started-with-amrs.

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Visual Communication Compliance and an IIPP Reduce the Need for First Aid

By: **James Strohecker**, Contributor

First aid emergencies can happen to anyone, anywhere, at any time.

- In 2020, there were nearly three million nonfatal workplace injuries.
- More than 4,600 workers were killed on the job.
- Emergency Medical Services (EMS) in the U.S. respond to 37 million 911 calls every year.
- The average EMS urban response time is seven to eight minutes.
- Chances of survival are doubled if first aid/CPR help is provided within four minutes.

The combination of an injury and illness prevention program (IIPP), first aid knowledge, visual communication, and awareness of the location of first aid supplies, can both reduce incident severity and provide effective care for the ill or injured until EMS personnel arrive on the scene. This combination can significantly reduce workplace incidents and lower the effect of incidents on an operation's workforce morale, absentee rate and productivity.

transformed work culture that can lead to higher productivity, reduced turnover and improved employee job satisfaction.¹

Your Injury and Illness Prevention Program must be a written plan that includes procedures and is put into practice. These elements are required:

1. A person (or persons) with authority and responsibility for implementing the program is identified.
2. A system for ensuring employees comply with safe and health work practices.
3. A system for communicating with employees in a form readily understandable by all affected.
4. Procedures for identifying and evaluating work place hazards.
5. Procedures to investigate occupational injury or illness.
6. Procedures for correcting unsafe or unhealthy conditions, work practices and procedures.
7. Provide employee training and instruction.
8. Procedures to allow employee access to the program.
9. Record keeping and documentation.

When your operation combines visual communication with your IIPP, you can seamlessly increase compliance, knowledge and awareness around your facility. Properly utilized visually communicated messages deliver required informative directions in any environment and under all types of conditions. Visual communication can also have a strong impact on reducing workplace incidents.

Effective visual communication simply and affordably raises awareness of workplace hazards to reduce risks and promote safety:

- Warns employees about hazards and informs them about required personal protective equipment (PPE).
- Reminds workers to immediately report any new hazards.
- Guides employees to first aid and eyewash stations when immediate response is needed.
- **Reduces workplace incidents, because** workers recognize when to take certain precautions, stay out of restricted areas, wear required PPE and minimize risks.
- **Increases knowledge and efficiency for workers, which helps drive productivity.**
- **Promotes a culture of safety; one that** demonstrates to employees (and OSHA) your commitment to a safe work environment.



Reminding workers to immediately report any incidents or new hazards helps improve workplace safety. Image courtesy of Graphic Products.

CREATE AN EFFECTIVE INJURY AND ILLNESS PREVENTION PROGRAM (IIPP) WITH VISUAL COMMUNICATION

An IIPP is a vital component to any workplace efficiency and productivity program. Workplace IIPPs create a

¹ <https://www.osha.gov/sites/default/files/OSHAwhite-paper-january2012sm.pdf>

- Delivers clear medical and first aid awareness and well-marked.

Visual communication notifications are important components of an IIPP safe work environment. Customized or site-specific messages can alert workers to hazards, promote safe behavior and reduce workplace incidents.

- OSHA requires safety signs at locations where a present (or potentially present) hazard threatens the safety of a worker.
- OSHA 1910.145(f)(4) maintains that the sign's signal word must be readable from at least five feet away

WHEN SHOULD YOU USE VISUAL COMMUNICATION WITH YOUR IIPP

Use visual communication and floor marking whenever hazards are present — or whenever they *may* be present — in your facility.

OSHA and ANSI have established three primary severity classifications for visual communication and Safety Signs. These types of warnings correspond to the severity of hazards present, and can be used to guide your facility's decision-making process:

- **Danger:** Danger signs alert workers to the most serious hazards, where special precautions are required. The “DANGER” signal word is printed in white letters on a red background and is preceded by the safety alert symbol.
- **Warning:** These describe a hazard that could result in death or serious injury if not avoided. The “WARNING” signal word is printed in black on an orange background and is preceded by the safety alert symbol.
- **Caution:** Caution alerts indicate that potential hazards may exist and could result in minor or moderate injuries. On these signs, the “CAUTION” signal word is printed in black on a yellow background header and is preceded by the safety alert symbol.
- **Notice:** A visual communication notice provides information relevant to a building, area, machine or equipment. These signs address practices and precautions, such as procedures, instructions, maintenance information, rules and directions.
- **General safety:** These are important for workplace safety because they provide notices of general facility rules and location of health, first aid and medical equipment, sanitation and housekeeping supplies and procedures.
- **Admittance:** Admittance visual communication explain the risks of entering a restricted area, don't have a defined hazard category and may use elements of other categories.
- **Fire safety:** Important fire safety alerts notify workers about location of emergency firefighting equipment.

Ask these questions to determine where to place visual communication in your facility:

1. Are hazards present?
2. Will the worker see the sign(s)?
3. Does the location give employees ample opportunity to avoid the hazard?
4. Is there clear direction to safety and fire equipment?
5. Is redirection necessary?
6. Is maintenance performed in this area?
7. Is it a high-traffic area?



Visual communication can alert workers to the location of emergency medical supplies, so that effective care can be provided until EMS personnel arrive. Image courtesy of Graphic Products.

An injury and illness prevention program (IIPP) and visual communication help safety managers seamlessly increase compliance and awareness and reduce incidents and their severity on a worksite or in a facility.

Together, an IIPP and visual communication can alert workers to properly identified workplace hazards, promote safe behavior, and – in the event of an incident -- provide faster, more cohesive access to emergency medical supplies to provide effective care until EMS personnel arrive. **WMHS**

ABOUT THE AUTHOR

James Strohecker is the Director of Marketing Innovation at Graphic Products + DuraLabel (www.graphicproducts.com). Graphic Products is a leader in delivering innovative design software, industrial sign and label printers, all-purpose floor marking, multi-language signs and labels, and colored pipe markers for any facility's compliance and safety requirements. Graphic Products' Best Practice Guide to OSHA Safety Sign breaks down all the requirements, from text size to color and graphics.

Bringing Comfort, Dexterity & Durability to Cut Protection

By: **Wekasinghe Dushan**, Contributor

The industrial worker faces several daunting challenges every day, and having the right tools is always critical for their success. However, the most essential tools are their hands. In challenging industrial environments, hands are the most exposed part of the body for injury. In fact, the U.S. Bureau of Labor Statistics (2019) reported that of all industrial occupational injuries resulting in medical leave, hand injuries are the second most common. Hand injuries account for 45 % of the injuries that occur in upper extremity, which include the shoulder, arm, hand and wrist. There is a critical need in demanding industrial environments for proper hand protection to prevent injury and ensure worker productivity.

There is a plethora of cut-resistant gloves in the market, and they are typically made of synthetic fibers, which determine their cut protection level. While these gloves offer higher levels of cut protection, they have achieved this at the expense of worker comfort, hand dexterity and durability. Many gloves for industrial applications are made with lower quality materials, resulting in discomfort, increased hand fatigue, and loss of cut-resistant performance over time. Many industrial workers are faced with the choice between comfort or proper cut protection and must settle for an option that only meets one of these needs, which often leads to injury.

THE CHALLENGE

The challenge with mechanical hand protection has always been to provide workers with comfortable products, while effectively meeting the occupational risks involved. The safety officer's dilemma is to ensure that employees will wear proper hand protection with desired ANSI/ISEA 105 cut protection ratings to prevent hand injuries. Recognizing this need, research and development engineers explore new methods and materials to address the battle between comfort vs. cut protection. The aim is to enable hand protection with enhanced wearer comfort at higher cut and abrasion resistance levels. It is not just the comfort, the dexterity of the design is also an important factor to keep in mind without limiting the flexibility of the natural hand anatomy (otherwise it would create fatigue in prolonged use of the product due to the design and construction failures of the product). It doesn't stop there; the durability is also an important aspect of these products, especially given the cost of these reusable gloves. Since these are frequently used for prolonged applications, the construction of the lining must be made with durable materials without compromising on the original protection that they claimed. Therefore, the

right selection of materials and product structure governs the comfort, dexterity, durability and performance that the product is supposed to deliver throughout its life in use.

COMFORT

Comfort is mainly composed of the fit and feel. One of the main aspects of feel is the breathability of the glove that allows the entrapped sweat to ease out of the glove and fresh air to come in. Commonly used glove materials like glass-fiber, Kevlar and polyester can be abrasive, non-porous and even leave residue on the skin, making the wearer feel uncomfortable. Also, poor fitting gloves with loose- or tight-fitting fingertips and finger crotches will lead to poor dexterity and excessive hand fatigue. Without proper fit and feel, wearing gloves for extended periods of times can lead to heating, sweating and irritations, leading to utter discomfort. These unique elements of fit and feel will provide the comfort required for demanding jobs while improving user experience and efficiencies. The longer-lasting comfort of gloves made with improved and selective fiber construction guarantees that users will wear the gloves at work without compromising their safety for comfort.



Improved materials and advanced knitting technologies by some manufacturers have led to safety gloves that protect hands without sacrificing comfort. Image courtesy of SW Safety Solutions, Inc.

DEXTERITY

In addition to cut resistance and comfort, it is equally important to consider the level of dexterity offered by the hand protection. Cut-resistant gloves are generally made with materials like Kevlar and glass fiber, which tend to

have higher material density. Though these materials provide significant mechanical protection, gloves made with these fibers tend to be stiffer and bulkier—leading to increased hand fatigue. The abrasive nature of these materials over prolonged periods of use may cause pinching, discomfort and roughness against the skin. However, improved fiber combination with selective yarns and knitting structure designs create a dexterous lining for gloves with lighter weight. As a result, such gloves made with these selections dramatically reduce hand fatigue, stress and irritation. In general, higher gauge of knitting (18-gauge & 21-gauge) results in better dexterity than lower knitting gauges (10-gauge and 13-gauge).

DURABILITY

One of the disadvantages of typical fibers used in mechanical protective gloves is the loss of cut protection over time. Materials that are inert and less sensitive to the mechanical challenges prevents the ‘loss of integrity’ of the product and ensures durability in most demanding environments and contexts, such as heavy use of machinery and in oily conditions. Studies have shown that lining made with engineered fiber/yarn composites offers more endurance within cut resistance and abrasion resistance than gloves with traditional fiber constructions. Unlike conventional fibers, the engineered composite fibers/yarns stay robust under frequent washing—even with alkaline-based

detergents. Also, unique knitting technologies by manufacturers ensure the integrity of the liner structure leading to uncompromised protection and comfort.

SOLUTION

A protective glove that delivers higher cut and abrasion resistance levels while maintaining comfort, dexterity and durability is long overdue. Improved and engineered fiber/yarn materials and advanced knitting technologies used for glove liners addresses the array of challenges present in complex work environments, offering lightweight structures with enduring uncompromised protection, thus assisting safety managers to meet the most pressing needs in workers safety and well-being. Thanks to these advances and improvements, workers don’t have to sacrifice comfort, dexterity and durability to achieve optimum safety. **WMHS**

Wekasinghe Dushan is the Senior Manager of Technology at SW Safety Solutions Inc., a leader in glove manufacturing and sustainable solutions. SW has always been committed to creative innovation and outstanding customer service, revolutionizing the healthcare and industrial products industry. SW supplies a unique portfolio of products to meet the growing hand protection needs of workers worldwide. The company is headquartered in Union City, CA, and is a woman-owned business (www.swsafety.com).

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Hearing Aid Use in the Workplace

By: **Robert M. Traynor, Ed.D., MBA, FNAP** and **Garry G. Gordon, M.S.**

The World Health Organization estimates that 1.5 billion people (nearly 20 % of the global population) live with some degree of recordable hearing impairment.¹ For 700 million of these individuals, their degree of hearing impairment is considered a disability. Hearing loss in the U.S. is the third most common chronic physical condition among adults, affecting 14 % of the population - as many as 46 million individuals.² The National Institute for Occupational Safety and Health (NIOSH) indicates that about 12 % of the U.S. working population - or 26 million workers - are hearing impaired, with 24 % caused by occupational noise exposure.³

For industrial employees with normal hearing or a mild hearing loss, the options for protection from hazardous occupational noise exposure are numerous. While there are no specific regulations that apply to the hearing impaired, workers are subject to the same occupational hearing conservation requirements as workers with normal hearing. If the worker has a moderate to severe hearing loss, hearing aid use is generally not allowed. These rules seriously restrict hearing-impaired workers for specific jobs and, ultimately, promotion and tenure within the company.

THE PROBLEM

The hearing impairment that causes problems at home follows the individual into the workplace. There is no specific guidance regarding the use of hearing aids in the workplace from OSHA, the Mine Safety and Health Administration (MSHA) or Federal Railroad Administration (FRA). Most corporate hearing conservation programs (HCP), however,

do not allow the use of hearing aids in hazardous noise areas. To comply with federal regulations, solid or foam earplugs and/or earmuffs are used as hearing protection devices (HPDs). Typically, these are designed to provide uniform attenuation (reduction) of sound at all frequencies and reduce more energy for high frequency sounds, the exact area where speech resides. The use of this uniform reduction of the sound attenuation only complicates the problem for workers with moderate to severe hearing loss. The use of these devices with uniform sound attenuation provides an increased hearing loss to those who are hearing impaired.



Attempts to use hearing aids have also been hampered in that most devices are coupled into the ear canal with an earmold that has an opening into the atmosphere, called a vent, and even more commonly, fit with a tip called an open dome (allows for no plugging or occlusion of the ear). Both vents and open domes couple the hearing aid to the ear canal, minimizing the echoing issues caused by plugging the ear. Unfortunately, these hearing aid fittings allow sound into the canal through the venting or open dome and do not provide protective plugging of the ear canal unless worn under an earmuff.

In most corporate HCPs, concerns about the use of hearing aids in these hazardous noise areas have been due to the poor performance of traditional hearing aids:

- Difficulty understanding speech or discerning environmental sounds increase when the ambient (background) noise level has a similar pitch to the sounds of speech
- Difficulty in hearing instructions clearly, perceiving alarm signals or locating the source of the sound
- Difficulty detecting changes in machinery noise that will indicate either normal operation or a malfunction



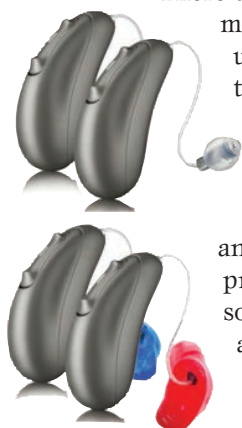
The hearing impairment that causes problems at home follows the individual into the workplace. © Andrey Popov - stock.adobe.com

- Hearing aids are designed to maximize speech perception generally in semi-quiet environments, specifically focusing on to speech directed to the individual from the front rather than from all around them.
- Echoes may cause problems determining the direction and distance of sounds.
- Overamplification of specific frequencies (pitches) that may aggravate the hearing loss and create an even more hazardous situation.

For these reasons, restrictions on the use of older technology hearing aids were likely well founded. Thus, the proverbial Catch 22 dilemma: the worker has a hearing loss and cannot use traditional hearing protection devices (HPDs), but OSHA⁴, MSHA⁵ and FRA⁶ mandate HPDs anytime the noise levels reach a time weighted average (TWA) of 90 dBA or higher or a TWA of 85 dBA if the worker has experienced a standard threshold shift (worsening of their hearing). Consequently, hearing aids are removed and HPDs are inserted when hearing impaired workers are in hazardous noise areas, compromising the safety of the worker and others in the hazardous noise environment.

Today's technology offers dual purpose hearing aids that can be programmed to amplify specific hearing losses as well as provide hearing protection to the individual user. For example, a worker may now have a hearing program for normal situations in Memory 1 while simultaneously having a hazardous noise exposure program in Memory 2. The use of computerized multi-memories and programming have totally changed the scheme for how to use hearing aids in the workplace. While the worker may need to change to a solid coupling to the ear, the device will compensate with protection for the hazardous noise. A contemporary hearing aid may be beneficial for both general environments and the workplace.

NEW EXPANDED TECHNOLOGY FOR WORKPLACE & RECREATION



There are products that meet the programmability and memory requirements for use in the workplace, include Behind-the-Ear Multi-Functional devices such as the new E.A.R. Quick Fit. When used as a HPD, either the earmold or open dome is replaced with a solid custom silicone mold and Memory 2 is programmed to suppress both impact and continuous sound to levels below the 85 dB OSHA acceptable limits while providing an acceptable NRR of approximately 30-31 dB. Local audiologists can reprogram or upgrade the EAR Quick

Fit, if needed. Other less adaptable custom products are also available as HPDs.

FUTURE OF MULTIFUNCTION HEARING AIDS

It is difficult to understand why most major hearing aid manufacturers have not become involved in industrial and recreational markets. While clinical markets are their main customers, the technical viability of their products for provision of hearing protection in these markets would benefit to an unserved population. The advancement of hearing aid technology has progressed substantially in just a few short years. For workers with hearing loss, using their hearing aids on the job allows:

- Better communication among the workers and supervisory personnel, facilitating a more efficient workplace.
- Improved safety because workers are more aware of alarms and warning signals
- Monitoring of equipment and/or the workplace environment for changes in the manufacturing processes or possible breakdowns

Once commonplace, multifunction hearing aids can now be provided by various third-party insurance provider networks as part of the current insurance programs now offered by companies. The benefits of a third-party provided multifunction hearing device include improved safety, better situational awareness and much happier cadre of hearing-impaired employees. **WMHS**

ABOUT THE AUTHORS















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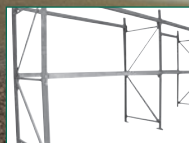
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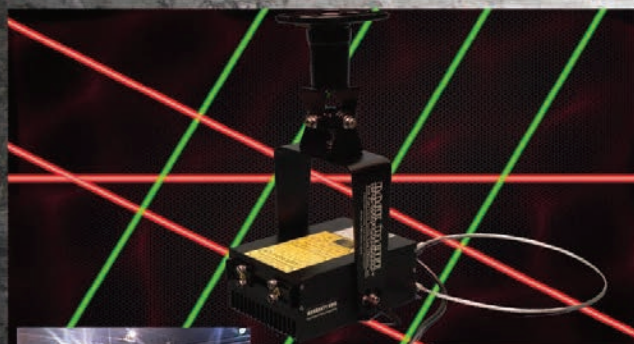
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