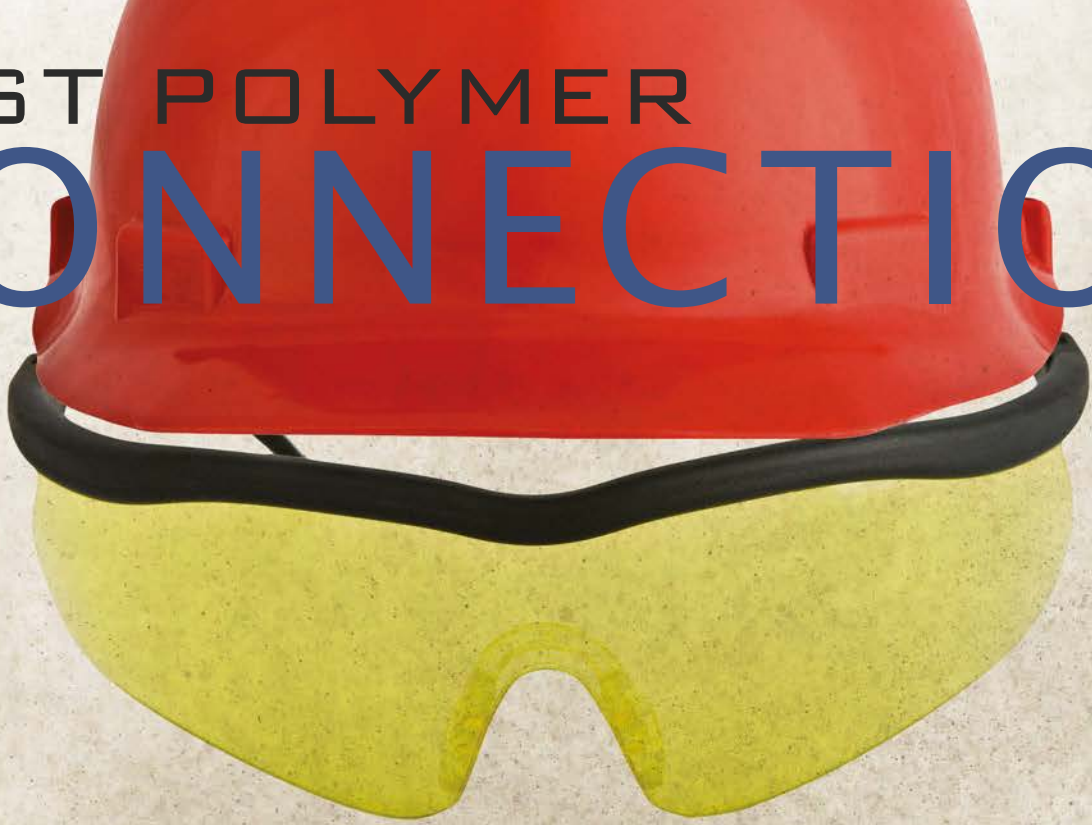


CAST POLYMER CONNECTION

Fall 2018



PROTECTING OUR COMPANIES AND WORKERS

- Developing safety programs
- The basics of respirators



ALSO:

- Robotics in manufacturing today
- What regulatory reports to file and when
- Reaching younger generations

**NEW ICPA SAFETY
PROGRAM**

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ON THE COVER: This issue is devoted to some of the issues the cast polymer industry faces in the regulatory field and to technological developments. The cover image represents a concern that's been around a long time: how to protect our employees from dust. A special feature talks about the different types of respirators and when they should be voluntary or mandatory. Photo: iStock by Getty Images

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GSP Publishing

Genilee Swope Parente,
Executive Editor
gsparente@verizon.net



4949 Old Brownsboro Rd.
Ste. 232
Louisville, KY 40222

Phone: 470-219-8139
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PRESIDENT'S LETTER

Sharing our knowledge



I'M EXCITED TO ANNOUNCE to our members that the board recently voted to set aside funding to develop a safety program to deal with respiratory dust. The funding is to pay for the testing needed to develop the program to protect our members, specifically for issues that surround inhalable dust. We voted to create a safety committee led by Matt Pullium, AGCO, Inc. and have asked ACS/Dorfner, The R.J. Marshall Company and Virginia Marble to serve on that team.

As an industry, we've been dealing with this issue for many years on the job site for installations and in our plants for finishing touches. We all have our safety methods, but developing a program as an association will allow us to take a close look into what we can do as a group to tackle the problem.

This kind of effort is a good illustration of why it's so important to belong to a trade association. Having the capability of ascertaining what other companies are doing in an area as important as respiratory protection and then working together on a solution is a value-added benefit to our membership. Safety programs are at the core of who we are, and by allowing us to work on the program together, ICPA is giving us yet another tool designed to help us keep our doors open and our employees happy and healthy.

The timing of this announcement is appropriate for this issue of **Cast Polymer Connection**, which is devoted to regulatory and technical developments. Government expert John Schweitzer explains why safety programs in general are important in his column. Kay Rowntree then goes on to give us a general picture of the different types of respirators in use today and where each can be used for either mandatory purposes or voluntarily. Kelly DeBusk provides us a detailed list of the reporting deadlines there are for a number of

issues and when we should be paying attention to needed updates.

As far as technology, one of the most discussed areas of automation today is robotics. Our industry is just now experimenting with the possibilities, but the manufacturing world

in general is rapidly adopting different levels of robotics, so paying attention to the trends listed in this issue is a must.

Developing safety and other company programs and paying attention to what's happening with our industry

is crucial in today's competitive marketplace, but it's also vital to who we are to work together. We've always leaned on each other in building up our individual businesses. We know that we must take the tribal knowledge we're gaining as an association and turn it into standard work that we can practice industrywide so we all improve our operations with time. In this era when many of our leaders are retiring, we have to find ways to retain the hard work and accomplishments they gave us and build upon that foundation. We need our members to volunteer their time and their thoughts in doing this.

There are many ways you can contribute. Contact Executive Director Jennifer Towner or me, and we can get you started. ■

Luke Haas
ICPA President

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One of the places where mobile robots are increasingly found is in warehouses.

Robotics for our plants: how close are we?

BY GENILEE SWOPE PARENTE

WHEN IT COMES TO TALKING ABOUT TECHNOLOGY today, one of the top

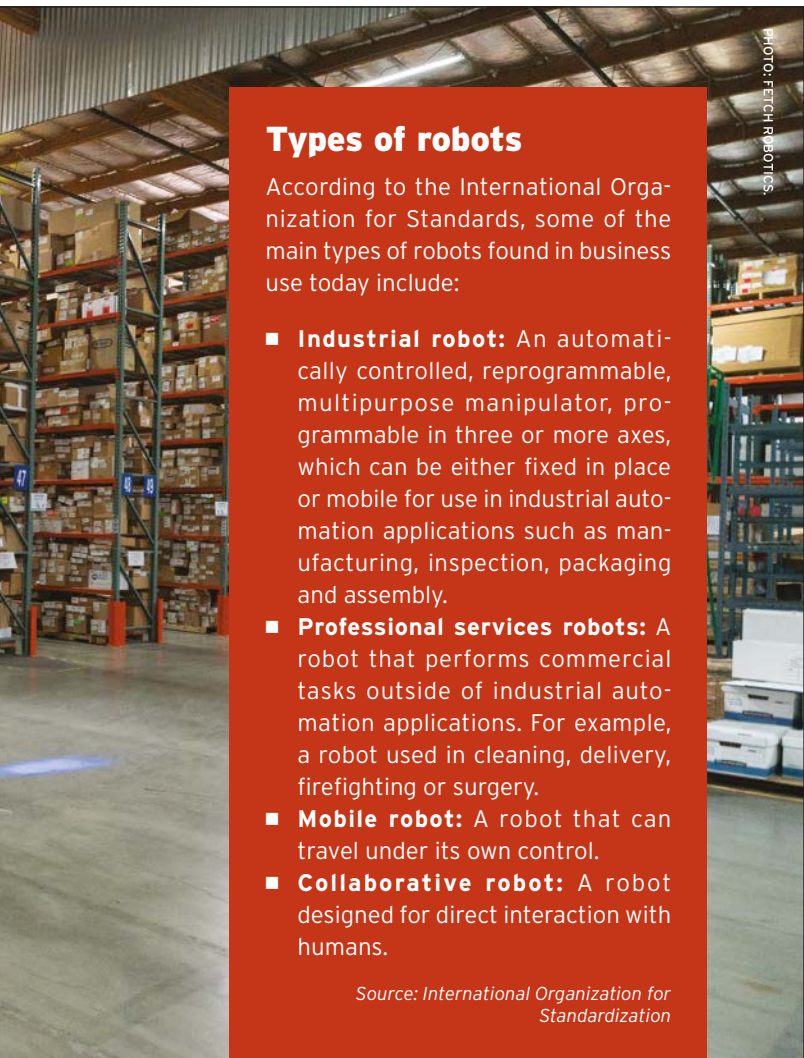
subjects that people in manufacturing bring up is robotics. The benefits that can be reaped are clear: the potential to produce better or more standardized products at faster production rates, less waste on the line and the possibility of processes that provide greater safety for workers. The concerns surrounding robotics remain the same as they've been for years: when will robots be affordable and will they replace humans?

But the million-dollar question for purposes of this article

is: what can automation processes such as robotics do for cast polymer production?

Most factory professionals in this country recognize that further automation of plant production lines is inevitable for companies that want to compete. The U.S. is already behind several other countries, including China, in developing and using robots (see Figure 1, page 6).

A few companies in surfaces manufacturing are currently experimenting with limited robotic operations in their factories. A robot arm that helps Marble Works cut stone products received a lot of attention at this year's POLYCON plant



Types of robots

According to the International Organization for Standards, some of the main types of robots found in business use today include:

- **Industrial robot:** An automatically controlled, reprogrammable, multipurpose manipulator, programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications such as manufacturing, inspection, packaging and assembly.
- **Professional services robots:** A robot that performs commercial tasks outside of industrial automation applications. For example, a robot used in cleaning, delivery, firefighting or surgery.
- **Mobile robot:** A robot that can travel under its own control.
- **Collaborative robot:** A robot designed for direct interaction with humans.

Source: International Organization for Standardization

demos even though the automation isn't directly related to making cast polymer products. And a breakout session on automation included mention by Carstin Brands of using a robot arm for spraying applications.

The cast polymer industry may still be on the fringes of the action, but events are occurring so rapidly today that most companies are on alert.

A new generation of industrial robots

In June 2018, Price Coopers Waterhouse (PwC) released a major report addressing the fact that in just a few short years, the range of what robots can do in a factory has greatly expanded.

"It's time to retire stock footage of an industrial robot as a fixed machine repeating a few moves to complete a task in time with a production line. Today's industrial robots have literally stepped out of the frame," the report begins. "They're going places where industrial workers cannot go, without great risk to safety, and doing things with great dexterity such as soldering microchips. As robots take on more, and promise more—and as adoption costs continue to decline—a

wealth of options for manufacturers are opening that did not exist even a few years ago."

The report and other sources cite these reasons for the great changes currently underway:

- **Cost incentives:** The 2017 overhaul of the U.S. tax code, which lowered statutory corporate income tax rates from 35% to 21%, should free up cash that is likely to be spent on technology, according to PwC. The reform also allows full expensing of equipment, though that reality is phasing down. Those two changes combined with the reality that the prices for robotics has fallen 40% in the last decade and is on course to fall another 65% by 2025 make robot technology more attractive, the report says.
- **Increased values recognized:** PwC reports that the nation is now seeing that the advantages of robotics have gone way beyond labor cost reductions. New technologies and systems such as 3D printing and the Industrial Internet of Things have created new ways to produce and design as well as new methods to track inventory and what's being made for how much cost.
- **Addressing labor shortages:** Robotics is also in the news nationwide these days as a possible counterweight for the increasingly troublesome shortage of technical skills and talent in this country. The National Association of Manufacturers says that over 3.5 million jobs will be opened up over the next decade, but that the skills gap means only about 2 million of them will be filled (see stories on pages 16 and 22). Meanwhile, another recent PwC study estimated that 45% of existing manufacturing jobs today could be supplanted by automation by the mid-2030s. Robotics is increasingly seen as a way for this nation to compete for needed labor and productivity gains.

What can the machines do today?

Because the idea of using robotics in cast polymer manufacturing is only just starting to take hold, exactly what robots can do for today's companies has not been fully addressed. However, it's clear there are many areas along the production line and in the warehouse where machines can help.

According to the American Society of Mechanical Engineers (ASME), the top five jobs for robots today are: drilling and fastening; conducting inspection of products and equipment; welding, painting and sealing; and what ASME calls collaborative assembly, which means working alongside humans to help assemble and to keep track of how the job is going. While not much welding goes on in the world of making cast polymer, all those other areas are possibilities for the industry.

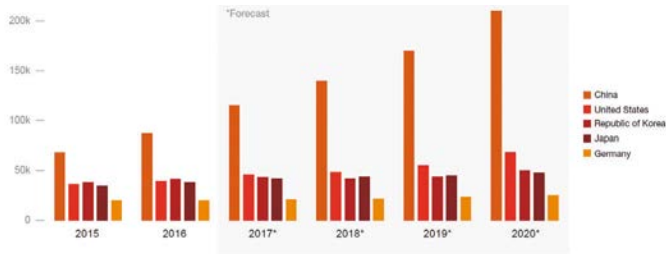


Figure 1. According to PwC, industrial robots now in use in the U.S. number about 230,000, which makes this country in seventh place as far as robot density (189 installed robots for every 10,000 employees).

*reported and estimated sales which could not be specified by territory. © 2018 PwC. All rights reserved. Source: Executive Summary World Robotics 2017 Industrial Robots, International Federation of Robotics, 2017. PwC refers to the US member firm or one of its subsidiaries or affiliates, and may sometimes refer to the PwC network. Each member firm is a separate legal entity. Please see www.pwc.com/structure for further details.

Automation specialist company Acieta (www.acieta.com), which lists general composites manufacturing as one of its industries, points out that robots are a good match in any industry that uses resins and solvents because robots don't have to worry about exposure to chemicals. They also offer many advantages in spraying—a six-axis robot today can spray gel coating or resin with consistency not possible by hand, the company's site proudly announces. Acieta also mentions that robots can be accurate and productive grinders and polishers, which reduces the exposure to dust that troubles human workers.

Much of what's talked about for plants today involves that last area listed by ASME though: collaborative assembly. Collaborative robots, which are nicknamed cobots, exist to make worker jobs easier, not to take over the human tasks. They take away some of repetition and help to keep track of what's happening on the assembly line. Many of these machines are designed to work in a certain space with their human counterparts. In auto assembly lines, for example, cobots are used for tasks such as tightening bolts, while their human partners are responsible for placing the proper tools in the cobots' reach so they can accomplish that task.

Small mobile machines can help speed up the assembly line.



PHOTO: FETCH ROBOTICS

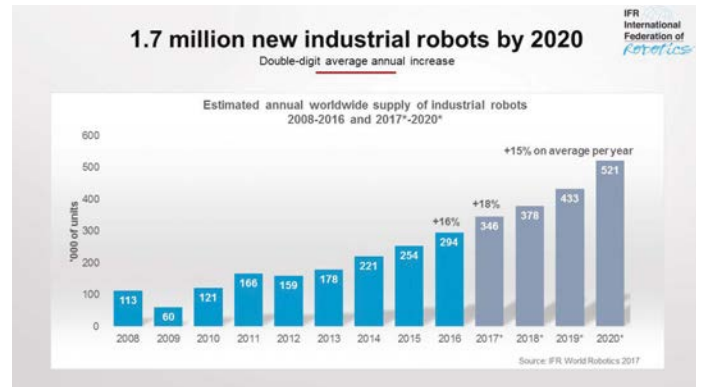


Figure 2. It's clear the robot industry is rapidly expanding.

Cobots and people

According to a Markets and Markets' research report "Collaborative Robots Market by Payload Capacity, Industry, Application, and Geography—Global Forecast to 2023," the collaborative robot market is expected to be worth \$4.28 billion by 2023.

The website MachineDesign (www.machinedesign.com) reports that cobots at work in factories today are accomplishing tasks such as manually picking out and placing an item on the plant line; tending to the operational needs of machines such as injection-molding equipment or computer numeric code machines; packaging the products; finishing the products (polishing/grinding) and other repetitive tasks.

The possibilities and acceptance of cobots for manufacturing has happened so quickly that discussions today talk about the need for cooperative standards among companies for their use with the aim of assuring workers are protected. The International Organization for Standardization has had technical standards in place for several years (ISO/TS 15066).

More recently, ABB Robotics, one of the world's largest providers of industrial automation, announced a joint agreement with Japanese giant Kawasaki Heavy Industries Ltd. both to promote the world of cobots and to develop "common industry approaches to safety, programming and communications" regarding the machines, according to a company press announcement.

But robotics is not just functioning on the plant floor. Robots are now also being used extensively in warehousing, as evidenced most prominently by Amazon and its operations. That company has built its entire distribution system around how it can automate the warehouse process. The robotics for Amazon come from a company it owns—Kiva Systems—and all of the machines are controlled by a central computer. They navigate the warehouses using markers on the ground.

While smaller companies won't ever need that level of sophistication, robots are being developed today for smaller



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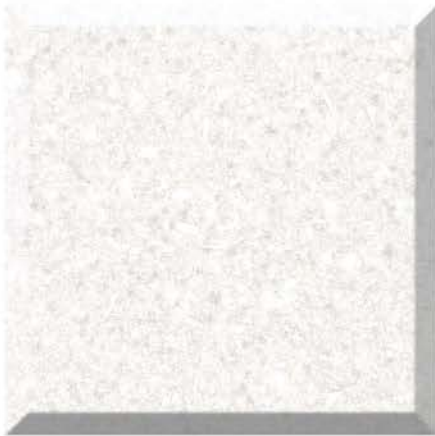
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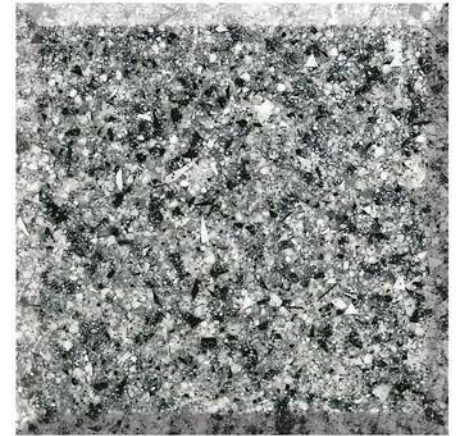
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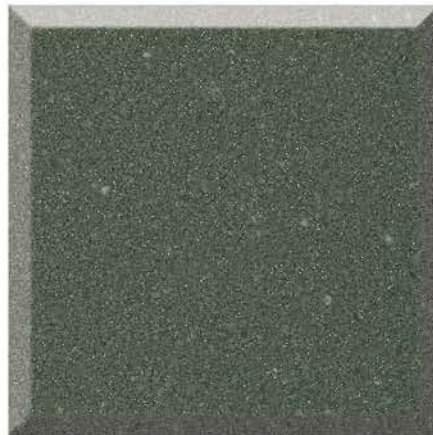
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Amazon's entire distribution system is being designed around automation.

jobs within the warehouse. A company called Fetch Robotics (<https://fetchrobotics.com>), has developed a line of singular, traveling robots that can be programmed by humans on the floor to retrieve specific items from a warehouse and deliver them to pre-programmed locations. The robots are designed to navigate the floor while avoiding collisions with people, aisles and dropped objects.

Will humans be left behind?

For plant workers, the fear is that robots will replace them on the production line, but many macroeconomic studies show that's not the case. In December of 2017, McKinsey Global Institute released an oft-quoted study addressing the issue.

According to that report, 60% of the occupations in the world today have at least 30% of constituent work activities that could be automated. However, the company points out that this will create new occupations that do not exist today, much as technology has created new types of positions in the past.

The report also said that while half of all work activities in the world today have the technical potential to be automated with current technology, the work that will actually be displaced by 2030 will be much lower because of technical, economic and social factors that get in the way of adoption. It estimated that the number could be more like a third of work activities by 2030.

"In many ways a big part of this story is about how more occupations will change than will be lost as machines affect portions of occupations and people increasingly work alongside them," the report concludes.

A big part of today's discussions on humans and robots doesn't center on losing jobs, however. It is based on what the advantages and disadvantages are when it comes to safety issues. According to a recent article on Safety+Health, a publication for the National Safety Council, robots hold promise of decreasing hazards on the job in areas such as repetitive motion injuries and injuries due to exposure to dangerous conditions such as certain chemicals, or traumatic injuries in processes that involve hazardous actions such as cutting.

But they also present new safety concerns as humans and machines increasingly work side by side, sometimes in close contact and conditions.

The issue is significant enough that the National Institute of Occupational Safety and Health formed a new office in 2017: the Center for Occupational Robotics Research (www.cdc.gov/niosh/topics/robotics/).

Conclusion

It may not be time for smaller plant owners to justify the investments that further automation require today, but costs for robotics are also dropping significantly. According to McKinsey & Company's website, robot costs have gone down over the past 30 years by half in real terms and when labor savings is taken into account, even more.

What's clear is that its time to pay attention and study the benefits, risks and possibilities.

PwC's report contains a list of strategies regarding robotics integration starting with building a business case for their price tags.

"Adopters of robotics ... need to be mindful of twin aims: 1) be agile and swift in acquiring automation solutions (because your competitors likely are) and 2) Be careful in deciding what needs to be automated and what technology is best to carry out those selected automation tasks," PwC's report concludes. ■

GENILEE SWOPE PARENTE is executive editor of **Cast Polymer Connection**. Send your comments and story ideas to gsparente@verizon.net.



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To report or not to report: When to file

BY KELLY
DeBUSK

TODAY'S REGULATORY WORLD HAS
AN ABUNDANCE OF REPORT-
ING AND MONITORING

REQUIREMENTS that can be confusing to navigate, making it easy to miss a deadline. Because each state has its own requirements and every facility has unique permit conditions, it's impossible to list all the deadlines that might be important. The following article is a list of a few reports that should be on the radar of all companies and some ideas on where to check for other reports that a facility may be required to file.



Environmental Protection Agency (EPA) online at <https://cdx.epa.gov/> and most states now work with the Central Data Exchange (CDX) website to exchange information. If a state does not participate, the CDX software will notify the certifier and supply additional information for state requirements.

P2 plan summary— Typically July 1

In addition to Form R requirements, some states also require a 5-year P2 Pollution Prevention Plan for each facility.

This report lists ways a facility can reduce emissions over a 5-year period such as converting to lower-HAP [Hazardous Air Pollutants] materials or implementing certain work practice standards. Each year a report must be provided to show the progress of emissions reductions. A new plan must be submitted every five years, and progress reports are submitted annually. Facilities should check with their state to verify the reporting deadlines and state-specific reporting requirements.

Tier II—March 1

Tier II is part of the Emergency Planning and Community-Right-to-Know Act, created in 1986 to help communities plan for chemical emergencies. The purpose of this report is to inform state and local officials as well as the public about the potential hazards of chemicals including the location and amounts of those chemicals onsite. Facilities with more than 10,000 pounds of any substance required to have a safety data sheet (SDS) must file a Tier II report. A standard Tier II inventory report can be found at www.epa.gov/epcra/tier-ii-forms-and-instructions, but be aware that some states have specific reporting requirements and electronic filing. Companies should check their individual state's requirements before submitting Tier II reports.

Toxic Release Inventory (TRI) Form R/Form A —July 1

The Toxic Release Inventory (TRI) Form R is also part of that act. This report provides information to the public about chemical releases and pollution prevention activities of facilities. Businesses that have 10 or more employees or that exceed the 20,000 annual employee-hour threshold and use 25,000 pounds or more of styrene are required to file a Form R. The report includes information about both stack and fugitive air emissions, water releases and accidental releases of chemicals. This report must be submitted to the U.S. Envi-

Annual emissions update—Varies by state

The Air Emissions Reporting Requirements mandate all state and local agencies collect and submit emissions data to EPA annually. If a facility has an air permit (and in today's regulatory world every facility should have a permit), then the facility's state will require it to file an emissions update annually. Each state has different methods of acquiring the data as well as different deadlines that can be dependent upon the size of the source. Facilities should check their permits for any conditions that might require an annual emissions update. If the requirement isn't listed in the permit, they should check with their state to see when the report is due and if there is a specific format requirement.

Semi-annual monitoring reports—Varies by state

Semi-annual monitoring reports are required by many states and are usually listed as a specific permit condition. This

report notifies the local agency about deviations or excess emissions from the issued permit requirements. Even those plants that have no deviations should file a report stating exactly that. Check the conditions of the facility permit for semi-annual monitoring requirements and deadlines.

Title V annual compliance certification—Varies by state

All “major sources” (A major source is defined as a facility that emits 10 tons or more of any one HAP or 25 tons or more of a combination of HAPs.) are required to file an annual compliance certification. The date of this report varies from state to state. An annual compliance certification requires verification of compliance for each permit condition and how that compliance was demonstrated or verification of non-compliance and the reasons for non-compliance as well as steps taken to correct the deviation. Many states now provide a site-specific form for each facility to make reporting easier. Facilities should check their permits for specific conditions and deadlines. If no condition is listed, they should check with their state to determine when the report is due and what format is required.

Semi-annual MACT report—Jan. 30 and July 30

Semi-annual MACT [Maximum Achievable Control Technology] reports are required for all major sources. Because there are different methods to comply with the MACT standards, no standard format exists for demonstrating compliance as part of the semi-annual MACT report. Companies using the averaging method need to provide the calculations to show that compliance with MACT was maintained during the six-month reporting period. For those that use all MACT-compliant materials, the report can be as simple as showing the MACT limits compared to the actual emissions factor for each material used. SDSs should be available to support the information contained in a report. Questions about the format of the report should be addressed at local environmental offices. Most of the staff there will be more than happy to work with a facility to come up with a solution that works for the company and also meets the report requirements.

Hazardous waste biennial reports—March 1

Large-quantity waste generators are required to file biennial hazardous waste reports every March 1 in even-numbered years. The reports should include the EPA identification number, the facility name and address, the quantity and nature of the waste generated, and whether the waste was sent for recycling, treatment, storage or disposal. Small-quantity generators and very-small-quantity generators are not required

to report by federal standards but may have to comply with state-specific requirements. Facilities should check with their local office to determine state-specific requirements.

OSHA 300 log submission—July 1

Facilities with 20–249 employees and a primary North American Industry Classification System code that begins with 32 (which is typical of facilities using styrenated resins in any process) or a facility that has 250 or more employees are required to submit an Occupational Safety and Health Administration (OSHA) 300 log each July 1. This report is in addition to maintaining an onsite log required for all work-related injuries. The OSHA 300 log must contain data of all fatal and serious injuries that occurred in the previous calendar year. The report must now be filed online at www.osha.gov/injuryreporting/ita/. The OSHA 300 log should match a plant’s onsite logs for work-related illnesses and injuries.

Conclusion

While this list is not all-inclusive, it’s a good starting point for knowing some crucial deadlines. In addition to knowing these deadlines, it is imperative to know the conditions of the facility operating permit. Most permits have conditions that list reporting requirements and deadlines. Also, most permits will require at least monthly emissions inventories to be kept onsite.

Some permits require these calculations to be submitted quarterly, usually due 30 days after the end of a quarter. Those with questions about any of the terms of the operating permit should contact the permit writer.

Keeping an open dialogue with local enforcement agencies can be beneficial. Communicating with permit writers and inspectors ensures records that are kept meet the expectations of those mandated to enforce compliance, making inspections less stressful and leading to fewer violations. Also, if there is open communication, state officials are more likely to remind a company of upcoming deadlines, and they tend to be more lenient if a deadline is accidentally missed.

In today’s busy world, it can be easy to miss a deadline either because a business isn’t aware of a required report or because management didn’t know or forgot the deadline for a report. By knowing these crucial reporting requirements, being familiar with the conditions of the facility operating permit and maintaining open communication with local enforcement agencies, deadlines are less likely to be overlooked. ■

KELLY DEBUSK is the owner of Composites Compliance, LLC (www.compositescompliance.com). She has over 20 years of experience in environmental and safety regulations governing the composites industry. She can be reached at k_debusk@compositescompliance.com.

Protecting employees with respirators

BY KAY ROWNTREE

RESPIRATORY PROTECTION CAN BE A CONFUSING TOPIC because there are so many misconceptions about what type to use where and what employers must do if employees wear respirators. Yet it's a vital topic. Year after year, one of the most cited standards in many industries, including cast polymer manufacturing, is the Occupational Safety and Health Administration's (OSHA) Respiratory Protection Standard (CFR 1910.134). This attention to the need to ensure proper protection shows how vital it is to understand how, why and when to use protective gear.

Types of respirators

A respirator is a protective device covering the nose and mouth and sometimes the entire face or head that protects the user from exposure to hazardous atmospheres. Two broad categories of respirators are used: air supplied and air purifying. Air-supplied respirators give the wearer a source of breathable air while offering protection against a broad range of contaminants. This breathable air comes from a compressor or from a tank worn by the employee. The units used offer a high degree of protection—so much so that certain types can be used in oxygen-deficient atmospheres such as confined spaces or in environments such as fires or chemical spills, situations called Immediately Dangerous to Life and Health (IDLH) by the National Institute for Occupational Safety and Health (NIOSH). Such protections are designed to be used over and over.

Air-purifying respirators remove contaminants from the air before the employee inhales it. In other words, no separate source of breathable air is provided. Units equipped with filters will remove particles such as dust or fumes. However, they cannot remove gases or vapors. For gas or vapor removal, a sorbent media, contained within a cartridge, is needed. As the wearer breathes in, the contaminant adsorbs to this media. These types of respirators may be reusable or designed for throwing away after a period of time. A few points about air-purifying respirators are:

- The ability of the filter or sorbent material to remove



the contaminant from the air is limited. These filters and materials must be replaced because the filters can clog up and the sorbent material will no longer adsorb the contaminant at some point.

- Because no breathable air is provided, none of these respirators can be used in oxygen-deficient or IDLH environments.
- For gas and vapor protection, it is important that the correct cartridge be used. Cartridges may offer protection against a limited group of chemicals (e.g. organic vapors) or they may offer protection for several groups of chemicals (e.g. organic vapors and acid gases).

- If exposure to particles or aerosols and gases or vapors will occur at the same time, respirators should have both a filter and a chemical cartridge. For example, when adhesives or coatings are sprayed, there likely will be exposure to aerosols that are essential particles as well as vapors from solvents.
- Many types of air-purifying respirators exist including loose-fitting and tight-fitting styles. Powered-air-purifying respirators have a fan that pushes purified air into a facepiece or hood.
- The amount of protection provided by the units depends on the facepiece style.

THE PURPOSE OF THE ASSESSMENT IS TO ENSURE THE PROPER TYPE OF RESPIRATOR IS SELECTED, A TYPE THAT OFFERS THE CORRECT LEVEL OF PROTECTION

exposure limits exist for some of these materials, but OSHA may not reference them. Some materials may have significant health effects, and in the absence of exposure limits, it still would be prudent to protect employees. Safety data sheets (SDSs) may not reference the PNOR PEL, implying that users don't need to be concerned about the dust exposure. However, failure to provide respirators if dust exposures exceed the PNOR PEL may result in OSHA citations.

Respirators should be selected based on reasonable estimates of exposure. Employers can be cited by OSHA if employees are required to wear a respirator, but no exposure assessment has been conducted. The purpose of the assessment is to ensure the proper type of respirator is selected, a type that offers the correct level of protection.

Misunderstood facts about respirators

Some commonly held beliefs about respirators are simply not true and many are not well understood. These include:

Dust masks are respirators. The term "dust mask" commonly describes disposable units used to protect employees from air-borne particles. The term infers that the unit is not a respirator, but that is not the case. OSHA calls these units "filtering facepiece respirators." Still, companies that use this type of respirator need to comply with certain parts of the OSHA respirator standard, depending on whether the use is required or voluntary. The terms "nuisance dust mask" or "comfort mask" may apply to single strap masks that do not carry a NIOSH approval. They are not designed to protect users from hazardous substances.

Respirators are a control. If overexposure to a substance occurs, OSHA requires employers to implement feasible engineering or work practice controls to reduce exposures below a permissible exposure limit (PEL). This approach to worker protection is called the hierarchy of controls. Personal protective equipment (PPE) is considered a last step taken after other measures have been implemented. OSHA requires employees to be protected with a respirator when overexposure exists, but employers can't stop there because they can be cited by OSHA for failure to implement controls even if the employee is wearing a respirator.

Employees exposed to "nuisance" dusts may need protection. Many dusts do not have PELs; however, if the dust has adverse health effects, the material would be covered under the Particles Not Otherwise Regulated (PNOR) PEL. This PEL can be used by OSHA to address many dust exposures from substances such as fiber glass, wood, pigments, polymers, fillers and other additives. Note that other

Required or voluntary use?

OSHA has different regulatory requirements depending on whether or not the respirator must be used or whether they are used voluntarily. Employers should determine which of these applies to the respirators used in their workplaces.

Required use

Respirators are required whenever there is exposure to a hazardous atmosphere. From OSHA's perspective, that means the exposure exceeds the PEL. A second required situation occurs when an employer decides to require a respirator even though an OSHA PEL is not exceeded. For example, an employer may follow other exposure limits that are more stringent than OSHA's PEL or there may be no exposure limit at all, but the substance under question still presents a health hazard. It is common to use respirators in spray finishing operations, for example, where there may be exposures to resins, accelerators or catalysts, none of which may have exposure limits.

Voluntary use

Sometimes employees want to wear respirators even though no hazard is identified as present (e.g. no exposure limit is exceeded). It may be that they don't like the odors of the process or they find exposure to dust annoying or unpleasant. As long as there is no hazard present, use of a respirator would be considered voluntary. Employers can decide not to allow employees to wear respirators on a voluntary basis, but there are fewer requirements that must be met when respirators are used voluntarily than are required if not voluntary.

Respiratory protection program elements

If employers require respirator use, specific elements need to be part of a company's safety program. These must be described in a written respiratory protection program, and a program administrator must be designated. The lack of a written program or creating a program that does not address all the necessary elements is one of the most frequently cited parts of the OSHA respiratory protection standard. It is also one of the documents OSHA is likely to ask for when they conduct an inspection.

Program elements for required-use respirators include:

Procedures for selecting respirators: This section should describe how a company selected the respirator. A reasonable estimate of exposure is required to ensure the correct respirator is chosen. The specific types of respirator the employer has required should be described. For required-use situations, only NIOSH-certified respirators can be used.

Medical evaluations: No matter what type of equipment is used, if the respirator is required, employers must provide a medical evaluation. This evaluation must be done before the employee is fit tested (if applicable) and before use of that equipment. The process starts with administering a questionnaire found in Appendix C of the OSHA standard. The questionnaire must be reviewed by a physician or other licensed health care professional (PLHCP, as defined by OSHA). The PLHCP requires a physical examination or a pulmonary function test, and employers must provide these at no cost to the employee. The written program should describe how this process will be implemented in the workplace.

Procedures for fit testing of tight-fitting respirators (if applicable): Tight-fitting respirators require a tight seal where the respirator comes into contact with the face. If the respirator does not fit tightly, leakage of contaminants into the facepiece can occur. Fit testing is the process that determines if a specific type and size of respirator seals tightly on the employee's face. This must be done with the specific respirator used by the employee before usage begins, then annually thereafter. Loose-fitting respirators such as hoods or helmets do not require fit testing since a tight seal around the face is not required for the respirator to work.

Procedures for proper use during routine and emergency situations: A company's program should describe how employees should use their respirators. Users cannot

TRAINING MUST BE PROVIDED TO RESPIRATOR USERS, AND IT MUST BE COMPREHENSIVE AND UNDERSTANDABLE. EMPLOYEES MUST BE ABLE TO DEMONSTRATE COMPETENCE IN THE SUBJECT OF PROPER RESPIRATORY PROTECTION.

have facial hair, jewelry or headgear around the part of the face that comes into contact with a tight-fitting respirator facepiece. User seal checks and inspection of the respirator should also be addressed in the program. If emergency respirators are provided, this section should discuss their use.

Procedures for cleaning, storing and disinfecting, and maintaining respirators: The methods used to keep respirators clean and in good condition should be described. If a respirator is used by more than one employee, it

must be disinfected between users. Respirators should not be stored out in the open. Employees should be provided with storage containers or lockers for storing their respirators when not in use. Methods for repairing respirators should be part of this section.

Procedures to ensure adequate air quality and flow for air-supplying respirators (if applicable): The quality of the breathing air for air-supplied respirators must meet Grade D breathing air requirements. Procedures for ensuring this is the case must be described. For example, compressor intakes must be located away from sources of contamination, and if the compressor is oil lubricated, a carbon monoxide alarm or high-temperature alarm is required. In-line filters should be changed according to manufacturers' instructions.

Training: Training must be provided to respirator users, and it must be comprehensive and understandable. Employees must be able to demonstrate competence in the subject of proper respiratory protection. A company's program should describe how employees will receive training. Training elements must include why respirators are necessary and how improper use may be harmful, the limitations and capabilities of the respirator, how to use the respirator, how to inspect it, put it on and check the seals, the procedures for maintenance and storage, how to recognize medical signs and symptoms that may limit or prevent effective use of a respirator and information about the OSHA standard. This training must be provided before initial use and annually thereafter.

Procedures for regularly evaluating the effectiveness of the program: The OSHA standard requires periodic review of a company's program to ensure its provisions are followed. The written program should describe how this will be done. Deficiencies should be corrected immediately upon discovery.

Recordkeeping: An employee's medical evaluation and fit-testing records must be made available to the employee.

The actual medical evaluations will normally be retained by the PLHCP since confidentiality must be maintained. At a minimum, fit-test records must be kept until the next test is administered.

Voluntary use program elements

Fewer requirements apply to the voluntary use of respirators; however, employers may choose to treat voluntary use the same as required use. A few thoughts:

Voluntary use of any respirator except for filtering facepiece styles: Included under this section of a program would be elastomeric facepiece respirators, power-air-purifying respirators or air-supplied respirators used voluntarily by employees. For these situations, the written respirator program should include a section on medical evaluations (the same as those outlined above because OSHA feels there could be potential adverse health effects from improper use), and another on procedures for respirator cleaning, maintenance and storage. Appendix D of the OSHA standard must also be shared with employees.

Voluntary use of filtering facepiece styles: No medical evaluations must be provided for these, and no formal written program is required. The only requirement from the standard is that Appendix D must be shared with employees.

Final thoughts

Companies that use temporary or contract employees should be sure to address who is responsible for what in the contracts they have with those employees' agencies. OSHA has cited both temporary agencies and host employers for violations of the respiratory protection standard. OSHA expects these employees to be treated the same as permanent employees. There are many resources available to help with respirator programs. The "Small Entity Guide for the Respirator Protection Standard" can be downloaded from OSHA's website. This great resource explains the standard, has checklists to help employers comply and a glossary of terms to help in understanding commonly used terms. The OSHA website also has links to training videos in English and Spanish, Spanish versions of the medical evaluation questionnaire and Appendix D, and links to enforcement documents.

Using these resources and finding out as much as possible will help any employer create and maintain a good program for keeping employees safe. ■

KAY ROWNTREE is owner of the industrial hygiene consulting firm Industrial Hygiene Sciences LLC (www.ihsciences.com). She has more than 38 years of experience in the field of industrial hygiene, conducting air and noise exposure assessments, helping employers comply with OSHA regulations and preparing SDSs. She can be reached at kayih@tds.net.

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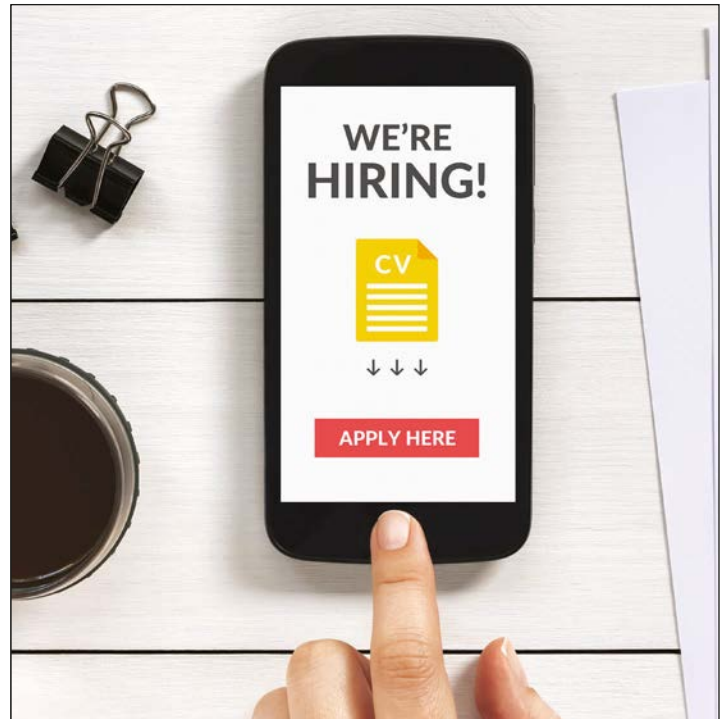
Not your grandfather's factory: Modernizing your approach to younger generations

WHY IS ENGAGEMENT SUCH A BIG DEAL IN MANUFACTURING AND THE SKILLED TRADES? It's because, according to a widely publicized report by the National Association of Manufacturers (NAM), for every four trade positions that workers retire from, the industry is producing only one replacement. Worse yet, it's predicted that in the next decade, 2 million out of the 3.5 million manufacturing jobs available will go unfilled because of the lack of available talent.

Many employers wonder why this is, given the reality that the nation has millions of jobless millennials who face an unemployment rate double the national rate. Why don't we have enough people to fill those positions? It's because of how young people view working in a plant. Until we change the image and perception of manufacturing—for both kids and their parents—finding the skills we need to make the best products will continue to be a problem for all industries that depend on factories.

Let's face it: today's plants are much different than our grandfather's world of industry. For the past two generations, young professionals haven't exactly been leaping at the chance to work in manufacturing. Part of the problem is the stigma: young people still think that plants involve working in an unclean environment run with outdated thinking and providing little room for them to grow. Add to that reality another, bigger issue: parents discourage their kids from attending trade or technical school and instead promote four-year academic degrees. According to NAM, only 3 in 10 parents would consider encouraging their child toward a manufacturing career. The perception has been that those who go into a trade are not "college material." Most parents want their kids to be "college material," even though our universities and schools are producing many graduates today

EDITOR'S NOTE: In honor of Manufacturing Day (see page 22), consultant Lisa Ryan, who will be this year's keynote speaker at POLYCON 2019 Kansas City, tackles the oft-asked question of why industry focuses so heavily today on getting employees involved in their company and why this involvement is critical to younger people.



no better qualified to make a good living than those who never get beyond high school.

How to modernize the image

So, how do you make manufacturing jobs more attractive and appealing to prospective employees today? A good place to start is by modernizing the company brand. Any company today stuck in an old, calcified way of doing business is going to have a hard time finding and keeping younger workers.

Today's young employees are digital natives, "wired" by technology in ways unlike any previous generations. They expect to continue that access in the workplace. That's why it's critical for manufacturers to promote the technology used in their production process. More than two-thirds of U.S. manufacturing companies today are adopting some form of 3D printing and more than half use robots (see page 4 for a story on robotics). But it doesn't need to be that level of sophistication to be part of who you are as a company.

There are ways to incorporate mobile devices, videos and virtual reality into the hiring process as well as throughout the plant. For example, millennials are used to watching videos to learn about new things, so why not use YouTube or another video website to give potential hires a realistic view of “a day in the life” of a worker at your facility? Remember to keep those videos to two to three minutes or less and to capitalize on the “wow” factors of the job. If you’re not sure what those wows are, ask your current team members what they enjoy most about their jobs. In fact, interviewing them and letting them share their stories about what they do in a video is a good and an inexpensive way to publicize that your company is in touch with today’s hiring practices. By letting current employees sell your company, you’re also letting job applicants know that working for your business is an opportunity. Videos are also widely used today for training purposes. Is there any reason you can’t use YouTube or video to also teach your employees the skills they need?

**ANY COMPANY TODAY
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CALCIFIED WAY OF
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KEEPING YOUNGER
WORKERS.**

You also need to take a look at your company website. The site is a great place to share with both employees and potential customers what your company is all about, but it needs to be “real” to attract today’s young people. They recognize too well mumbo-jumbo and marketing speak. Look at your site from a hiree’s perspective (as well as the younger people you’re trying to win over as customers) and see how

they might view what’s there. Where do they find what your company’s culture and mission are? Can you get a sense of what it’s like to work in your business? Does it demonstrate how your products and services serve a greater mission than simply making a profit? Take advantage of your online presence to show how your company makes a positive impact on society.

Next, check out your social media. I recognized that just the thought of social media makes many plant owners in your business shudder. But all of you know the social world is out there and you know your kids and your younger em-



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THE HUMAN FACTOR

employees are spending a good deal of their time in that world.

In attracting new employees, figure out where potential hires would hang out. Although Facebook used to be the place where this happened, that's simply not true anymore. Younger people are just as likely to be on Instagram, Twitter or LinkedIn. You may not be able to tackle the wider world of all possible channels, but it's important to make sure what you have already on social media is active and up-to-date. Again, look for ways to allow your own employees opportunities to share what's going on from their perspective and publicize what they say on social media. Post pictures from social events, charitable projects and other fun or worthwhile occasions. This allows younger generations to view your company as an enjoyable place to work. It also improves the public perception of your company. When you have an engaging online social media presence, it builds credibility with potential hires from the younger generations.

Finally, keep in mind that the younger generations stay connected. They look for one-on-one communication and immediate feedback from their mobile devices. They consider their managers and leaders their peers and want to have access to them as well. If the only time a boss gives

feedback is during the annual review process, the company's leaders are behind the times. There are lots of online tools, pulse-type surveys, and artificial intelligence programs that also can give feedback on demand or anonymously. Communicating frequently and keeping employees in the loop will do wonders for engagement and performance development.

Remember, too, that the digital nature of today's manufacturing will open up many new opportunities for skilled technical positions, transforming the manual nature of a factory job to a high-tech environment. According to Vicki Holt, president and CEO for Protolabs, "Digital manufacturing is revitalizing our industry and is igniting new opportunities. The skills gap presents a critical roadblock for all of us. But it's encouraging to see a renewed optimism from a new generation of workers and to hear that they understand this isn't their grandparents' manufacturing industry. Much work remains ahead of us, but this is a good start." ■

LISA RYAN is the founder of Grategy, is an award-winning speaker and is a best-selling author of ten books, including "Manufacturing Engagement: 98 Proven Strategies to Attract and Retain Your Industry's Top Talent." Learn more at www.LisaRyanSpeaks.com Ryan will be the keynote speaker at POLYCON 2019 Kansas City.

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Workplace safety and health: The benefits of a written plan

RESEARCH BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) and other organizations has found that developing and implementing a written safety plan will help employers promote safe, healthy and efficient workplaces.

Effective safety plans have a number of common elements:

They are developed internally. Plans developed at the facility by a team of employees at all levels are the most effective. It may be tempting to adopt a prepackaged plan or a plan developed by a consultant, but research shows that involving people throughout an organization in developing a plan results in much higher levels of buy-in, reliable implementation and effectiveness.

Comprehensive safety analysis is a good basis. A company's plan should include all the physical hazards and health risks at the workplace, typically based on a careful step-by-step review of the process including materials handling and storage and post-production activities. Each workplace has its own unusual or unique hazards that should be addressed in the plan.

The analysis and plan is based on the most up-to-date, comprehensive information. A good safety plan reflects the best available information today about hazards and risks. A member of the company's safety team should be responsible for collecting relevant information from current safety data sheets, suppliers, consultants, OSHA, industry associations and other external sources.

The plan addresses what responses to incidents should entail. The safety plan should describe a detailed process the facility will use to review and respond to safety incidents as well as near-misses. This process should specify procedures for reporting incidents or potential incidents, conducting investigations when something happens and implementing solutions.



Inspection procedures should be outlined. Plans should include what happens during regular safety inspections. That means specifying who will conduct them, how often inspections will occur and how identified problems will be addressed. In the inspections portion of the plans, special attention should be given to new or modified pro-

cesses or materials that may require new safety practices.

Training details should be included. The plan should describe how and when employees will receive safety training. A good practice is to ask all employees to help in providing training, including education of new workers. By involving everyone, safety becomes an integral part of training.

The plan should address an annual review. A company's safety plan should describe an annual process for reviewing and improving the comprehensiveness and effectiveness of the safety program. This annual review should be done by a team comprised of employees at all levels.

As with other aspects of running a business, including other areas of human resources, the most effective companies are those that have outlined and put down on paper what should happen and when. A safety and health plan can help a company not only avoid dangers, but have the best responses should something happen. They also can create buy-in from their own employees on how to keep the workplace free of hazards. ■

JOHN SCHWEITZER is senior advisor to the president of the American Composites Manufacturers Association (www.acmanet.org). He can be reached at jschweitzer@acmanet.org.

Resources:

1. OSHA's Safe and Sound program has information that employers can use to implement workplace safety programs, including written safety plans, at www.osha.gov/safeandsound/.
2. The American Composites Manufacturers Association (ACMA) also has resources on hazards in composites manufacturing operations, available to ICPA members at <https://myacma.acmanet.org/>.

Today's threats: what do workers and companies face?

Although businesses in the cast polymer field often talk about or read about exposure to styrene or to dust, their focus on workplace safety is much broader. The Occupational Health and Safety Administration (OSHA) monitors a wide range of what can happen in factories or in the field.

According to OSHA, in fiscal year 2017, the top standards violated and the top categories in which they were violated include:

- Fall protection, *construction*
- Hazard communication standard, *general industry*
- Scaffolding, general requirements, *construction*
- Respiratory protection, *general industry*
- Control of hazardous energy (lockout/tagout), *general industry*
- Ladders, *construction*
- Powered industrial trucks, *general industry*
- Machinery and machine guarding, *general requirements*
- Fall protection, *training requirements*
- Electrical, wiring methods, components and equipment, *general industry*

As this list illustrates, construction in this nation is one of the top places where injuries and fatalities occur. The Bureau of Labor Statistics (BLS) reports that, of 4,693 worker fatalities in the U.S. in the calendar year 2016, for example, 991 or 21.1% were in construction (2016 is the last date for which stats are available). That's one in five deaths. BLS attributes those fatalities to what it calls the "fatal four": falls, being struck by something, electrocution and caught-in-between (people killed by being caught in or compressed by equipment or objects).

Overall, BLS says there are about 2.9 million nonfatal workplace injuries or illnesses reported by private industry employers in

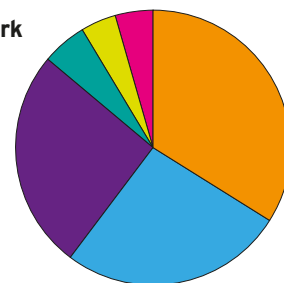
2016, but the numbers have decreased over the years. Injury rates in manufacturing, as well as in some other industries reported to BLS, have actually been decreasing over the last decade.

In all industries, falls and slips rank very high in the list of what happens, though injuries caused by people who strain themselves on the job is even higher.

The National Safety Council reports in its Injury Facts newsletter/website that the leading causes of injuries that cause people to lose work are overexertion on the job (almost a third of all injuries), contacts with objects (such as being struck by something) and falls or slips (Figure 1).

Figure 1. Nonfatal injuries involving days away from work

- Overexertion and bodily reaction: 33.67%
- Contact with objects and equipment: 26.11%
- Falls, slips, trips: 25.69%
- Transportation incidents: 5.23%
- Exposure to harmful substances or environments: 4.31%
- Violence and other injuries by persons or animals: 4.16%
- Nonclassifiable, fires and explosions



SOURCE: National Safety Council

INDUSTRY SPOTLIGHT



Safety award for Composites One

Great West Casualty Company presented Composites One LLC with a platinum award in the 2017 National Safety Awards Program. This is the 16th consecutive year the company has been named an award recipient and the 15th platinum award. The National Safety Awards Program recognizes carriers in similar operations with awards based on their year-end preventable accident results. Platinum is the top of four categories of awards. This past year, the program drew more than 800 participants from across the country.

AOC part of new company

AOC and Aliancys announced creation of a new combined company, which will be named **AOC Aliancys**. With the merger, the two established companies join forces to form a global supplier of polyester and vinyl ester resins, gel coats and other materials used in the composites industry.

According to the two companies, the merger will create a wide base of technical knowledge, a complementary global footprint and "a shared passion for quality and customer satisfaction," the official announcement read. Joe Salley, prior CEO of Milliken and formerly operating partner at Arsenal Capital, will be the CEO of AOC Aliancys. Fred Norman, previously CEO of AOC, will serve as CEO for the Americas. Bert Bakker, previously CEO of Aliancys, will serve as CEO for Europe and Asia.

"Our teams will remain committed to the quality, innovation, and service that propelled both companies to global leadership in our industry," Bakker commented. ■



Changes made to ICPA board

ICPA gained a new board position and a new member because of changes to the makeup of the association's governing body.

Board member Sean Jacobs will move to a manufacturer seat on the board now held by MPL Company. Meanwhile, Kay Rehberg, ACS International Products, a Dorfner Company, will fill Sean Jacobs seat as the newest supplier director.

Those two join the current members: President Luke Haas, Elite Marble Company; Secretary/Treasurer Dirk De Vuyst, International Marble Industries, Inc.; Immediate Past President Bill Sanders, Alamo Marble, Ltd.; Manufacturing Directors Mark Buss, Virginia Marble Manufacturers; ReBecca Erdmann, Sand & Swirl, Inc.; Bobby Medlin, Majestic Kitchen & Bath Creations; Matt Pulliam, AGCO, Inc.; Supplier Directors Larry Branam, The R.J. Marshall Company; Ken Legenza, Interplastic Corporation; Paul Henderson, Polynt-Reichhold.

Onyx tours offer excitement at POLYCON 2019

The Onyx Collection will open its doors to about 200 people at next year's POLYCON 2019 Kansas City for



tours of its facility in Belvue, KS. The tour will be open to ICPA members only. This year's POLYCON is April 10–12 at the convention center of the Sheraton Overland Park Hotel.

Onyx is one of ICPA's largest members. The business was started in 1985 as St. Mary's Marble, only casting bathroom sinks. It was later branded as "The Onyx Collection" and today is simply called Onyx by most of the 6,500 dealers who sell the products.

In 1991, the company started making shower bases, wall panels and shower accessories. In 2001, Onyx began delivering products coast to coast in the continental U.S. Those dealers include the big box stores, remodeling contractors, kitchen and bath designers, commercial and residential builders, other cast polymer manufacturers, plumbing wholesalers, cabinet shops and hardware stores.

The business has experienced a steady growth of about 15% annually over its history. It employs over 500 people and has annual gross revenues of more than \$100 million.

Information on how to register for a tour will be available this December.

Stay tuned to www.POLYCONevent.com for more information on this year's exciting POLYCON.

ICPA reaches another financial milestone

ICPA ended fiscal year 2018 on a high note by posting a modest operating profit.

"We balanced out our annual books with a small operating gain for the year, which brought us the final step to financial independence and gave us the needed funds to continue our growth," said Dirk De Vuyst, ICPA secretary/treasurer and owner of International Marble Industries, Inc.

"That's impressive for a young organization that is self-managed, relatively small and still puts on one major event a year (POLYCON). We now have the template to run our association profitably every year, and we plan to reinvest the dividends of our reserves into member-focused programs," he added.

A new safety program is born

ICPA's board of directors voted this summer to supply funds to start a new respiratory dust safety program for members.

The program funds will be used to support the testing

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needed to start the program, which is designed to protect members against inhalable dust issues. A new safety committee headed by board member Matt Pulliam, AGCO, Inc., has been created and members will be drawn from The R.J. Marshall Company, ACS International Products, Virginia Marble and more.

Join the ICPA forum page

The association is asking its members to contribute to a new area for member resources: the ICPA Group Forum page, "Talk ICPA."

Members received an invitation this summer to join the discussions currently taking place on the forum page. The page is designed as a place that members can go to connect with other members on troubleshooting issues, regulatory concerns, equipment buying and selling, and other areas of concern. Only manufacturer members can join the forum discussions, and they must sign up to do so. Members can contact Executive Director Jennifer Towner if they need assistance with logging onto the page.

What's in store for Manufacturing Day?

Companies in the business of making things in factories face challenges in bringing in new talent starting with misconceptions about job conditions and career opportunities. To set the record straight, manufacturer organizations created a national day of celebration called Manufacturing Day. This year's day is Oct. 5.

The celebration was created by founding partner Fabricators and Manufacturers Association International in 2012 but is supported by powerhouses such as the National Association of Manufacturers, the Manufacturing Institute and the National Institute of Standard and Technology's Hollings Manufacturing Extension Partnership.

Those organizations reach out to members and contacts to provide them resources for creating local events. One local event would be the tour of a company's facility, its offices, showroom, etc. to illustrate to young people that manufacturing is a profession that offers many opportunities and that plants today are modern, clean and efficient. Local companies also participate in partnerships with local schools for events such as job fairs, career days, plant product expositions and similar events.

The organizations supporting Manufacturing Day have created a host of resources that can help local companies plan and hold events such as a spreadsheet for planning the event, a kit that helps to promote the day, a host media

guide for soliciting media interest, a social media playbook, and flyers, posters, logos and other graphics that can be used for publicity and marketing.

As of press time, there were already 553 events planned for 2018.

To find out more or plan an event, go to www.mfgday.com.

CAMX coming in October

Planners for CAMX, the Composites and Advanced Materials Expo, are hoping for better luck with the weather this year: Hurricane Irma forced the planners to reschedule from early fall to December in 2017. This year's event is October 15-18 in Dallas's Kay Bailey Hutchison Convention Center.

The show, which is produced by the American Composites Manufacturers Association and the Society for the Advancement of Material and Process Engineering, had over 6,500 attendees last year, including 600 new attendees, despite the last-minute change in schedule.

CAMX includes three days of sessions on a wide range of composites manufacturing issues from recycling of composites materials to specific industries and the trends that occur. The show has eight tracks including additive manufacturing, materials advances, regulations and workforce development, design, sustainability, processing technologies, market applications, and evaluation and testing. Featured sessions delve into broad topics such as trends in new technologies and Composites 4.0. Educational sessions get into more specific and technical areas such as advancements in resins or Internet-of-Things technologies.

The large exhibit hall features innovations from a wide range of composites-making suppliers. This year, CAMX is co-locating with the Industrial Fabrics Association International for an even larger expo.

For information, go to www.thecamx.org

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