

The Positive Side of Respirators

Having trouble selling management and employees on the value of respiratory protection? Why not try a positive approach that emphasizes the health and business benefits of protecting workers' breathing?

by Ken Scheel

Traditional health and safety practice has emphasized the primary role of personal protective equipment in providing worker protection and achieving OSHA compliance. Increasingly, however, safety and health professionals are engaging plant managers and production supervisors in discussion of a new paradigm: How respiratory protection systems can actually increase worker productivity, comfort and morale, which can lead to reduced manufacturing costs.

In particular, positive-pressure respirators (notably, supplied-air respirators with loose-fitting face pieces, hoods or helmets and powered air-purifying respirators – see “Definitions You Need to Know”) are moving well beyond the established compliance-driven role of protecting workers' breathing and becoming valuable workplace productivity tools.

This is welcome news for safety and health professionals, who need management support and employee acceptance to make their respiratory protection programs work. In fact, so certain is the impact that some plant managers and supervisors are leading the charge for positive-pressure systems, and their employees are eager to try them and use them regularly.

In addition to protecting workers from airborne contaminants, the equipment can be used to protect the eyes, head and face, and to guard against heat stress, when combined with a Vortex cooling system. There are also productivity, product quality, employee

comfort and morale benefits that are causing entire industries to rethink how they implement respirator protection programs.

“Employers are just beginning to see the business case for positive-pressure respirators [PPR],” according to Tom Nelson, CIH, former corporate health and safety manager for DuPont and now an industrial hygiene consultant. “A well-designed respirator program and the appropriate PPR system en-

ables companies to increase paint shop productivity, be more efficient in maintenance and repair operations, or do more grinding, cutting and welding.”

“There are a lot of operations where positive-pressure respirators are beneficial, even when engineering controls prevent overexposures,” said Wes Norton, CIH, CSP, who has more than 20 years of industrial experience. “When you offer workers a choice between a half-face piece, negative-pressure respirator and a supplied-air respirator with a loose-fitting hood or helmet, they choose the supplied-air system because of the comfort benefits. Once they try supplied air, they never want to give it up, and they don't complain about using it.”

For example, in paint shops, Norton has seen employee turnover and absenteeism significantly reduced due to a well-implemented, supplied-air respirator program. “Conditions in paint booths are not the first choice of most employees,” Norton said. “Good, skilled painters are hard to find and important to keep happy. When they are provided comfortable respiratory pro-



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tection, the quality of work is higher and absenteeism is reduced.”

Respirator programs that use positive-pressure systems with loose-fitting helmets and hoods are easier to administer, according to Jerry Guillems, a Boeing Co. senior industrial hygienist and safety specialist. These types of respirators, he pointed out, do not require fit testing, and users need not be clean-shaven. “Right there, you have eliminated two significant aspects of worker resistance,” said Guillems, who works for Boeing’s Military Aircraft and Missile Systems Group in St. Louis.

Quality Paint Job at Piper Aircraft

New Piper Aircraft Inc. manufactures single-engine airplanes for private, commercial and flight school use. At its 1,200-employee facility in Vero Beach, Fla., New Piper Aircraft operates a state-of-the-art paint shop for applying multiple coats of paint on the planes. It is a demanding, high-precision job. To protect workers from paint overspray, the company had been using full-face, negative-pressure respirators. Unfortunately, paint overspray and incompatibility with prescription eyewear were affecting employees’ clear vision, which was hurting the quality of the paint job.

The solution was to switch to a supplied-air respirator with a loose-fitting helmet and a peel-off face shield, which protects the primary lens and can be replaced when vision becomes obstructed by paint spray. The company also uses 3M’s Vortex cooling system, which enables employees to regulate the temperature of their breathing air by cooling it as much as 50 degrees – an important health precaution and comfort benefit in hot, humid Florida.

“This is the best thing we’ve done in years,” said Dave Youmans, safety coordinator at the Piper Aircraft plant. “There is absolutely no trade-off among production, protection and comfort. We found a solution that is easy for management, employees, and safety and health people to support. We don’t have to force this issue at all because the quality issues are so important. At

Definitions You Need to Know

- **Atmosphere-supplying respirator:** A respirator that supplies the user with breathing air from a source independent of the ambient atmosphere, including supplied-air respirators (SARs) and self-contained breathing apparatus units.
- **Supplied-air respirator:** An atmosphere-supplying respirator for which the independent source of breathing air is not designed to be carried by the user. This includes continuous-flow and pressure-demand systems. It’s also known as an airline respirator.
- **Powered air-purifying respirator:** An air-purifying respirator that uses a blower to force ambient air through air-purifying elements to the respiratory inlet covering.
- **Positive-pressure respirator:** A respirator in which the pressure inside the respiratory inlet covering normally exceeds the ambient air pressure outside the respirator. This includes continuous-flow and pressure-demand SARs and powered-air purifying respirators.
- **Negative-pressure respirator (tight-fitting):** A respirator in which the air pressure inside the face piece is negative during inhalation, compared with the ambient air outside the respirator.
- **Helmet:** A rigid respiratory inlet covering that also provides head protection against impact and penetration.
- **Hood:** A respiratory inlet covering that covers the head and neck, and may also cover portions of the shoulders and torso.
- **Loose-fitting face piece:** A respiratory inlet covering that is designed to form a partial seal with the face.
- **Tight-fitting face piece:** A respiratory inlet covering that forms a complete seal with the face.

Source: OSHA Respirator Standard (29 CFR 1910.134) and ANSI Z88.2-1992

Piper, the paint shop supervisor pushed for this solution, and the director of manufacturing paid for it out of his budget.”

The success in the paint shop has led to the maintenance department’s interest in supplied-air respirators. Despite the short-term, scattered nature of maintenance work, Youmans said, a supplied-air program can be made feasible for maintenance workers by stationing high-pressure, supplied-air sources throughout the plant.

As for the paint shop workers, Youmans said, “There’s no way those guys would let me take away those supplied-air helmets. Everybody could see the benefits early on. Once the program got going, it became easy. Now, they’re true believers, and the benefits are real.”

Safety and Health Benefits

How is it possible for these systems to have such a broad impact on worker protection, OSHA compliance, productivity, quality, comfort and morale? Here are some issues to consider:

Respiratory protection. Positive-pressure respirators are ideal for protecting workers against a wide range of gases, vapors and particulates. Pos-

itive-pressure respirators are particularly useful in industrial paint shops, chemical and pharmaceutical processing operations, maintenance, foundries, the utility industry, and welding and grinding work.

The health benefits can also be seen in assigned protection factors (APFs) for these systems, which define how much protection a respirator offers against air contaminants. The typical negative-pressure, half-face piece respirator has an APF of 10 (in other words, it is protective against concentrations up to 10 times a substance’s permissible exposure limit). Positive-pressure APFs are generally 25 to 1,000.

Eye, head and face protection. Most positive-pressure respirator systems can be equipped with helmets, hoods or loose-fitting face pieces to protect the eyes, head and face. For example, one employer’s 10-year study found that eye injuries in grinding and chipping operations were reduced by 90 percent when employees wore helmets that covered the whole head, which eliminated the need for separate goggles and face shields.

In another case, a truck manufacturer introduced supplied-air systems with hoods to protect employees’ eyes

during grinding of galvanized metal in truck cabs. The plant all but eliminated serious eye injuries in those jobs despite record productivity on its truck lines.

OSHA compliance. Selection of the appropriate PPR system and accessories can significantly reduce the compliance burden. For example, supplied-air, loose-fitting hoods and helmets do not require fit testing and, when used for protection against gases and vapors, eliminate the need for establishing chemical cartridge change-out schedules. Furthermore, employees do not have to shave beards and mustaches because PPR systems employing helmets or hoods don't require a tight face seal, as do respirators with half or full face pieces.

Business Benefits

The economics of positive-pressure systems include analysis of manufacturing productivity and quality, as well as employee comfort, morale and job satisfaction.

For example, it costs employers about \$1,000 to outfit a worker with a supplied-air system, plus the cost of tapping into plant compressed-air sources. While that initial cost appears high, those expenses must be compared with the very real, but hidden, costs of productivity down time, poor quality, absenteeism and employee turnover. At New Piper Aircraft, for example, the company could not tolerate poor-quality paint jobs associated with negative-pressure respirators in use at the time. The respirator solution became fundamental to the company's success.

Some workers in foundries and with industrial ovens take a 10-minute break for every 30 minutes of work due to the intense heat. However, having a Vortex cooling unit as part of the respirator system can cool the breathing air by as much as 50 degrees, which enables workers to stay on the job longer. This provides obvious productivity benefits for employers and gives employees on piecework a reason to embrace respiratory protection. Vortex systems, which workers regulate individually, can also

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— Steve Adams

be used to provide warm air for cold-weather work.

"The ability to individually control the climate is an important benefit," said Norton, the industrial hygienist. "When employees can control the temperature to their own comfort zone, they are more likely to view their working conditions favorably."

Employee Involvement

Boeing's Guilliams said the key to his successful respiratory protection program was having employees test the supplied-air systems and compare them with negative-pressure, full-face and half-mask respirators. Even in work areas with ventilation systems that reduce contaminant concentrations below the permissible exposure limit, employees in the paint shop, chemical processing and maintenance departments in the St. Louis complex chose the supplied-air respirator systems with eye and head protection accessories and the Vortex air-cooling unit.

The Boeing complex in St. Louis includes three major facilities and employs 12,000 people in the manufacture of F-15s and other military aircraft and missile systems. More than 600 workers wear loose-fitting, supplied-air respirators. To keep track of OSHA compliance obligations, the employees have bar-coded badges to ensure that respirator wearers have the medical clearance and training to wear the equipment safely.

"Involving employees in the selection and providing them with the most flexible, comfortable equipment has been a huge boost to morale and job satisfaction," Guilliams said. "At a time when some companies are still focusing on OSHA compliance and motivating reluctant employees, we have made a strong business case for respirators

based on the protection, productivity, comfort and morale benefits. With the tight labor market and the need for highly skilled workers, it is more important than ever for our people to be comfortable and happy."

A Winning Combination

The notion that safety equipment is a hindrance to productivity and comfort has been around for a long time, but is not necessarily true. For example, aside from the regulatory controversy surrounding ergonomics, many employers have found that lift-assist devices and redesigned hand tools can improve productivity and quality, in addition to potential reductions in back injuries and cumulative trauma disorders.

Now, a similar mindset is coming to respiratory protection. "Many respirators are sold and many programs are implemented in order to meet regulatory requirements," Nelson pointed out. "Forward-looking employers realize that respirators offer some real business benefits, and they focus on these positive benefits to make their safety programs more effective. Even OSHA compliance officers quietly use this positive approach to get the attention of some employers."

"Employee attitudes about respiratory protection are changing, as well," said Steve Adams, a 25-year safety veteran based in the Midwest. "Employees know more about the importance of protection. If we can also offer them some good news about productivity and comfort, we can improve employee compliance with the respirator program." **OH**

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