



Employee Safety

Metalworking Fluids Safety Guide: How to Protect Workers

Matt Morgan | Sep 19, 2024

Metalworking fluids are an essential part of manufacturing operations, used in applications ranging from forming to cutting to grinding. As a result, millions of workers are exposed to these fluids every day.

Fluids often contain a variety of chemicals and additives, including emulsifiers, stabilizers, biocides, defoamers and dyes, to help these products be more effective.

When **metalworking fluids** are not managed properly, however, contact can result in skin problems, such as rashes; irritation of the eyes, nose and throat; and breathing difficulties, such as coughing and asthma.

Manufacturing businesses need to understand the risks that metalworking fluids pose to people, the regulations to comply with, and the steps to take to protect employees.

Understanding the Risks of Metalworking Fluids

There are four types of metalworking fluid exposure hazards. Dr. Michael Ewing, a health, safety, environment and carbon adviser for BP Lubricants, which makes **Castrol industrial lubricants and fluids**, lists the hazards from rarest to most common, along with an example scenario:

- **Injection:** A hydraulic line lets go or a cutting tool jet hits a worker and penetrates the skin.
- **Ingestion:** Most likely, a worker eats or drinks something while having metalworking fluid on their hands.
- **Absorption:** Coolant drips onto someone's hands while operating a machine, or they get splashed with metalworking fluid. (Ewing notes that rashes sometimes are from fines and other mechanical irritants in the fluid and not the fluid's chemistry.)
- **Inhalation:** A machinist breathes in a mist of metalworking fluid, possibly from performing sump cleanings or daily fluid top-offs.

Inhalation is "the one you see most frequently getting complaints about industry-wide," Ewing says. "Anytime you're machining, you generate a mist, a vapor, and you've got a risk of inhalation."

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Dr. Michael Ewing
BP Lubricants

The most common consequences of inhalation are discomfort, headache and stuffed sinuses, he says. A worker may have cold-like symptoms or generally not feel well. Factors affecting the lungs such as seasonal allergies in the spring or dry air in the winter can make it difficult to determine whether symptoms are from metalworking fluid exposure or something else.

Compliance with Metalworking Fluids Regulations

With inhalation being the most common metalworking fluid exposure hazard, the Occupational Safety and Health Administration’s toxic and hazardous substances standard for air contaminants (**29 CFR 1910.1000**) applies. The standard sets the limit at 5 milligrams per cubic meter of air in any eight-hour shift of a 40-hour workweek (8-hour time-weighted average).

Although, having that much metalworking fluid mist in the air is “exceedingly rare,” Ewing says. “It’s a visibly heavy, foggy condition. You’d have to walk into a plant, and it would be hard to see the other side of the plant to get to those levels.”

Read more: 4 Keys to Complying with OSHA’s New Hazard Communication Rule

Besides air contaminants, OSHA’s hazard communication standard (**29 CFR 1910.1200**) is the principal directive for manufacturers to ensure chemical safety on the job.

“The standard gives workers the rights to recognize and understand any hazards associated with chemicals in the workplace,” says Justin Geach, global director of marketing at **Master Fluid Solutions**. Employers provide this required information through product labels, safety data sheets and employee training.

Labels include the following information about a chemical product, some of which is also in SDSs:

- Product identifier, or the name of the chemical product
- Signal word, or the level of risk, such as “warning” or “danger”
- Hazard pictograms, to visually identify the type of hazard
- Hazard statements, to describe the nature and degree of the hazard
- Precautionary statements, to describe how to safely handle, store and dispose of the chemical
- Supplier information, to identify the manufacturer, along with contact information

Metalworking fluid manufacturers or distributors are required to provide safety data sheets for each chemical product, and the manufacturing employer must make sure that SDSs are readily available to employees. The sheets must include the following information about the chemical, divided into 16 sections:

- The identity and properties
- The potential health hazards
- Necessary protective measures
- Instructions for storing, handling and transporting

Ewing recognizes that safety data sheets can be difficult for employers to interpret. “The SDS is going to give you a lot of information,” he says. “You have to be able to parse through what the SDS really

says.”

A safety data sheet might state, for instance, that a product is nonhazardous per OSHA’s hazard communication standard, but the SDS might also explain that exposure to the product is reportable in states with lower limits, such as California.

He cites another example: “A lot of SDSs have a line that says: ‘If you don’t have adequate ventilation, you need to consider a respirator,’” he says. “‘Adequate ventilation’ is not a really great definition, and I’ve seen small and midsize companies struggle with some of those nuances.”

For help in navigating the complexities of SDSs, contact the people who are most knowledgeable about the products. “We’ll hop on a meeting, and I’ll go through it line by line,” Ewing says.

“Partnership is the name of the game moving forward,” he continues. “I believe that partnership and education are what’s going to keep employees safe.”

Metalworking Fluids Best Practices to Protect Workers

When the correct metalworking fluid is chosen and *well maintained*, and proper personal protective equipment is used, exposure should be a minimal concern for workers, Geach says.

Still, manufacturers have a responsibility to keep workers safe. The *hierarchy of controls* gives manufacturers a prioritization strategy for identifying and addressing workplace hazards.

Elimination. Fluids manufacturers have reformulated their products to remove or reduce the amount of harsh chemicals, such as chlorinated paraffins, free boric acid, biocides and pesticides. “Over the years, manufacturers have realized how to make the chemistry safer for employees,” Ewing says.

Substitution. Manufacturing companies can replace a dangerous product with something less so. “Can you move from a neat oil to a semisynthetic or a *water-based product*?” he says. “Those are generally safer.”

Read more: 5 Reasons to Try Bio-Based Lubricants and Cutting Fluids

Engineering controls. These actions keep people from the hazard. Geach says, “Mist collectors can greatly help reduce operators’ exposure to coolant mist within the machine envelope.”

But Geach and Ewing both say there are additional risks to be aware of and protect against. Although a cabinet may enclose a spinning cutting tool and contain spraying fluid, Ewing says there can be trouble when people open the cabinet right after a cycle, before the mist and drips have settled. Extending the interlock for another 20 or 30 seconds can reduce the chance of fluid exposure.

Administrative controls. Training employees in metalworking fluids safety is a smart start, but this measure relies on workers remembering the policies and procedures and not taking shortcuts around them. For this reason, Ewing cautions against relying too much on this control.

Safety managers can say not to eat or drink in the machining area, but it may not be a reasonable control if it’s hot and workers need to have drinks with them to stay hydrated. In this case, the employer should explain other ways to stay safe that better fit with the workflow.

Personal protective equipment. The last line of defense, PPE such as *a mask or a respirator* is more of a mitigation than a protective measure, Ewing says. “It only engages for the employee after everything else has gone wrong. I really push end users and customers to get those earlier barriers right. If you do that, you eliminate the need for PPE, or you’re going to put PPE on people and it will never have to do its job, hopefully.”

In terms of metalworking fluids safety, Geach says, “the most important thing is recommended coolant running parameters and proper maintenance procedures—things like keeping concentrations and pH in the recommended ranges and keeping the coolant healthy and free of fines, tramp oil and bacteria.”

Read more: [4 Tips to Optimize Machine Fluid Maintenance and Coolant Disposal](#)

Another best practice is to use the right fluid for the application. “For example,” Geach says, “if you don’t need a straight oil with heavy sulfur or chlorine, and we can use a water soluble, then that eliminates some potential risk.”

Similar to understanding SDSs, ask your metalworking fluids distributor or manufacturer to help you in your goal to protect workers, Ewing says.

“I would suggest starting with your distributor, and then they may get the fluid manufacturer involved for a more thorough analysis, or what we call a plant audit,” Geach says. “We would go on-site and review current state in the facility regarding metalworking fluids—what you’re doing right, potential areas for improvement—and make recommendations of where to start.”

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