

Managing Risk: support for business

Machinery running unattended

Machine fires can inflict substantial damage on a machine shop, even a complete loss of the entire facility. Left undetected, a machine fire can quickly spread to neighbouring equipment or to the building's structure. And even if the building sprinkler system activates, the machine, and often much more, is destroyed.

Most milling, turning and grinding equipment is designed to be safe. However, many machines use large amounts of oil-based coolants, making them susceptible to fire risk. Excessive heat, programming mistakes, tool failures, or other causes can lead to a hazardous situation. A drop in oil level or other anomaly can result in fires in electrical discharge machining (EDM) equipment. And a single spark can cause a flash fire in any machining operation where there's coolant oil or oil vapour present.

The risk of a fire can be greater when running lights-out or when a machine is left unattended. A small fire, quickly detected and extinguished may cause minor damage and unscheduled downtime, but left unchecked or undiscovered for even a short time, the same fire can destroy equipment, ruin a building, and endanger lives.

A supplementary fire suppression system can guard against machine fires causing a catastrophe. In fact, they represent a small percentage of the cost of investment in a modern CNC machines, and a fraction of the cost of repairing major fire damage.

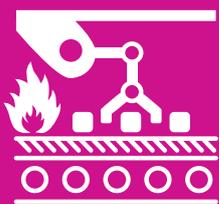
Oil-based fluids: necessary but risky

Many serious fires start when an oil-based fluid ignites. So why use these combustible oil-based fluids?

Straight oils, for example, are typically composed of petroleum or mineral oil (and sometimes wetting and pressure additives). They provide excellent lubrication between the cutting tool and workpiece, improving surface finishes and helping increase tool life.

However, while many drilling, broaching, tapping, grinding and honing operations prefer straight oils, they are combustible. They also have a relatively low flash point (about 400° F) and dissipate heat poorly, increasing the risk of fire. Straight oil vapours can flash instantly, which partially explains why they're typically used in low-temperature and low-speed operations.





Flash fires in machines using oil-based fluids require fast action. Yet tight schedules and slim margins have forced many plant managers to run some machines unattended, greatly increasing the danger from undetected fires. However, a flash fire can completely engulf a machine in seconds, even if an operator is there.

Many shop owners expect employees to control the fire using portable extinguishers. This is unrealistic, as a machine fire can unnerve even the coolest operator. Plus, any fire large enough to damage a machine can jeopardise worker safety.

Sprinklers aren't always enough

Many machine shops assume sprinkler systems are adequate to protect buildings and machines from a fire.

However, while water sprinkler systems do provide reliable fire suppression, they're not designed to protect individual machines. In most cases, a fire would have to completely engulf a CNC machine before it activated a sprinkler system. The likely result is severe damage or total destruction of the machine and surrounding area.

Therefore many machine shop owners have also invested in supplementary fire suppression systems to protect their CNC and EDM machines. While they're not designed to replace sprinklers, they will extinguish a fire at source before it can grow large enough to trigger the overhead sprinkler system.

Supplementary fire suppression systems

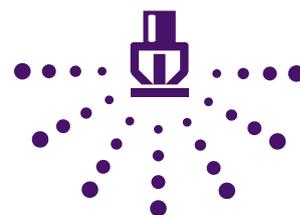
Systems designed to put out machine fires can provide a level of protection external systems, such as overhead sprinklers, can't.

A typical installation involves mounting a pressurised cylinder containing a fire suppression agent and routing the fire detection tubing to the work zone inside the machine. The cylinder is usually located on the side or rear of the machine out of the way. The fire detection tubing from the cylinder is snaked unobtrusively through areas of the work zone where the fire suppression agent will be most effective.

Some systems in the machine's enclosure release an extinguishing agent if they detect a fire. The cost of these varies depending on the detection and control system's complexity.

Some supplementary fire suppression systems use foam, dry chemicals, or water to extinguish fires. Others use 'clean' agents such as CO₂, FM-200 and 3M Novec 1230, which are ideal for using with machine tool operations as they leave no hard-to-clean residue, are electrically non-conductive and non-corrosive, and don't damage equipment.

Dispersed as a gas, clean agents permeate virtually all areas inside a CNC machine, protecting the electronics inside the equipment. These gaseous agents are effective on fires in inaccessible areas, often extinguishing a fire before it can be seen. Clean agents work on Class A, B, and C fires (ordinary combustibles, flammable liquids/gases and electrical, respectively). They're not toxic to people or the environment.



A note about titanium fires

If hot enough, fine chips of titanium can ignite creating a fire hazard for machines. Fires sparked by titanium and other types of metals are classified as Class D fires. They represent a severe hazard because they burn at very high temperatures and react violently to water and certain chemicals.

Statistically, a small percentage of machine fires are sparked by titanium, which is fairly difficult to ignite. Most fires involving titanium start in the coolant oils, which have a flash point less than half of titanium. Such fires can grow until they become hot enough to ignite the titanium.

The key to preventing most titanium fires is to detect and suppress oil fires quickly at their source, before the heat can build to ignite the titanium. There are commercially available dry chemical powder agents to control titanium fires. For maximum safety, shops machining titanium should have a dry chemical extinguisher on hand or install a supplementary fire suppression system. Never apply water directly to a titanium fire due to the risk of an explosive reaction. For this reason, sprinkler systems may not be enough if your shop machines titanium.

Have a plan

Make sure you have a plan to prevent fires. Studies show 43% of businesses closed by a significant fire never reopen. Another 29% fail within three years after reopening. So make preventing fires a priority concern for your shop, especially if you run machines unattended. We highly recommend safeguarding equipment using supplementary fire suppression systems.

However, supplementary fire suppression systems aren't designed to replace sprinklers, but to provide additional fire protection. If you've seen the damage done by a machine fire you'll probably regard this protection as necessary rather than optional.

