



Safety

Safety Tips for CNC Machinists: 5 Must-Know Rules for the Workplace

Holly B. Martin | Oct 22, 2020

CNC machining is dangerous, even for the most experienced metalworking professionals. That's why safety managers and industrial hygienists should fully understand the nuances of CNC machine operations and the appropriate safety precautions to keep workers protected.

Just because CNC machines are programmable doesn't mean they can't hurt an operator, cause damage to your plant, or hurt workers standing nearby.

If a part is not programmed correctly, the machine may crash, damaging the part, tools, spindles and other equipment inside the hood. Modern **CNC machines** protect operators and bystanders from flying metal chips or broken tools with safety interlocks that don't allow the door to be opened until all motion has stopped.

However, on older CNC machines you can manually override the locks when the machine is still running, says Frank Quarato, president of the **Center for Safety & Environmental Management**.

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"If you open the door while the machine's running, you'll have all the physical hazards that you can think of," Quarato adds. "The machines don't slow down—they don't even know you're there."

OSHA Requirements for Safeguarding Workers

The Occupational Safety and Health Administration **requires** employers to keep the workplace free of serious hazards, such as exposure to moving machine parts that could crush or amputate fingers or hands or cause burns or blindness.

Safeguards—ranging from guards and guard devices to personal protective equipment (PPE)—are "essential for protecting workers from these preventable injuries," OSHA says. When the operation of a machine, or accidental contact, injures the operator or others in the vicinity, the hazards must be eliminated or controlled. OSHA offers information on the various hazards of mechanical motion and techniques for protecting workers **here**.

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Frank Quarato

President, Center for Safety & Environmental Management

But unfortunately, accidents do happen. In 2018, 58 percent of workplace amputations (3,580 cases) involved some type of machinery, according to *recent data from the U.S. Bureau of Labor Statistics*. Parts and materials were involved in 15 percent of the amputations, while tools, instruments and equipment—including powered and unpowered hand tools—were involved in 7 percent of the incidents.

These work-related amputations resulted in 6,200 cases with days away from work in 2018, according to the BLS, or about 0.5 percent of all the cases resulting in days away from work.

Here are five tips to keep your workers safe when working with these machines.

Tip No. 1: Keep the Doors Closed

Machine controls may include safety interlocks, but if the equipment does not come with them, other protections must be put in place. This protection could include temporary barriers and warning signs, along with operator training.

“Catastrophic accidents can happen to inexperienced CNC machine operators who don’t understand the danger of opening the hood before the machine has completely stopped, as well as to those who purposefully break the rules,” Quarato says.

For example, operators should never place any body part into the machine or near the spindle while attempting a power-up mode.

“Don’t put one hand on the emergency stop button and reach in with the other hand to start turning machine parts,” Quarato warns. “By the time you slap that stop button, the centrifugal force alone could suck you in the machine.”

How does an operator know when a cycle is complete and it is safe to open the compartment?

“Every CNC machine has a home position where it returns before starting another cycle, and operators need to learn what that is,” Quarato says. Always allow the machine to return home and power off before reaching into it, or into any of the actionable areas, he adds.

Some operators who have received safety training still think it’s acceptable to keep the machine door open to watch the part while the machine is running, thinking it’s better for quality assurance, but “nothing could be further from the truth,” Quarato says.

“Even if the part doesn’t fall off the spindle onto your foot, you may very well get hit with a chip from a tool, or the stock itself,” he says.

For true quality control, Quarato says, operators should review and dry run all-new programming—without stock or tooling.

“In some cases, CNC machines have graphic displays that illuminate the toolpath so you know where that tool’s going to go and you can predict it because you’ve seen it run once already,” he says.

Tip No. 2: Don't Alter Your Tools

Cutting tools can be very expensive, and operators know that if they use a cheaper tool they can save a little money, Quarato says. But CNC user manuals warn against altering the tooling or working outside the programmatic functions of the machine, he notes, and with good reason.

"Alterations of any kind can cause incredible energy to be released if hardened steel tooling collides with other equipment, and it can literally cause tools to break through the enclosures, creating a safety hazard," Quarato says.

Only qualified operators should be operating a CNC machine, Quarato adds, but too much automation allows employers to hire minimally skilled workers to perform the most difficult tasks. The bigger the gap between what the machine can do and the operator's knowledge, the more likely that the operator can get himself and those around him in trouble.

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Tip No. 3: Clean Machines Reduce Cuts and Burns

Most employers know that having a clean machine will not only protect and extend the life of the machine, but also produce higher-quality parts. At the same time, housekeeping and total clean machine policies are mandatory for safe operations of CNC machines, according to Quarato.

"The machines have sprayers that spray the part down with lubricants during operations, and if chips build up and block that spray pattern, it can cause the tempered tools to get hot and changes their chipmaking abilities," he says. "This can cause your turnings and chips to get so hot, they can cut and burn you."

Tip No. 4: Disinfect to Minimize COVID-19 Spread

Aside from the fact that they are powerful enough to cut solid metal, CNC machines are dangerous in the sense that their surfaces can potentially harbor the coronavirus.

As the COVID-19 crisis continues to disrupt manufacturing operations, workplace cleanliness and the health and safety of workers is paramount. The Centers for Disease Control and Prevention (CDC) has issued *detailed recommendations* for the cleaning and disinfection of work areas aimed at minimizing the survival of the virus on work surfaces. The recommendations include:

- Using EPA-approved disinfectants to reduce the risk of the virus spreading. This includes frequent disinfection of surfaces and objects touched by multiple people.
- Develop a cleaning plan. Most surfaces and objects will just need normal routine cleaning. Frequently touched surfaces and objects like switches and doorknobs will need to be cleaned and then disinfected to further reduce the risk of germs on surfaces and objects.

Tip No. 5: Use the Proper PPE for Eyes, Ears, Hands, Feet and Faces

In addition to specific safety training for CNC machines, employers are required to provide equipment and training to meet the OSHA standard for noise protection and other personal protective equipment,

including eye and face, foot and hand protection.

“While most CNC machines have good enclosure, wearing safety glasses, hearing protection and appropriate foot protection is always recommended to protect from things that might fly out or be dropped out of the machine once the part is done,” Quarato says.

“Technology is changing all the time and older operators already know the most basic machining skills, such as waiting until the machine stops spinning and returns to home position, but younger ones don’t,” Quarato adds.

“Too often today’s employees think that the machine knows what it’s doing, so if it looks like it’s done, even if it hasn’t returned home, they reach in there when the machine still has a couple of operations left,” he says. “It’s like reaching into a washing machine when you thought the spin cycle was done, but it had one more cycle to go.”

For more on how to safely operate a CNC machine while maximizing output and reducing waste, see the ***ANSI B11 series of standards*** on mitigating the risk of injuries when handling machinery in various industrial settings.

How do you ensure your team is properly trained on CNC machine safety? Share your thoughts in the comments below.

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