



Employee Safety

4 Essential Workplace Safety Tips for CNC Machinists

Holly B. Martin | Nov 15, 2017

What You Need to Know:

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

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

Tooling or other machine alterations of any kind can cause incredible energy to be released if hardened steel tooling collides with other equipment.

Clean machines mean safer CNC machining operations.

Less experienced machinists need to make sure they fully understand CNC machine cycles and do not reach in when they think it is done. Always make sure a machine has fully completed its cycle.

It's easy to overlook safety operations for CNC machines, but safety managers and industrial hygienists should better understand the nuances of their operations and maintenance to keep workers protected.

Just because computer numerical control machines are programmable doesn't mean they cannot hurt an operator or cause damage to your plant or other people standing nearby.

For one thing, 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.

"Unfortunately, on some of the older machines, you can manually override the locks with the machine still running," says Frank Quarato, president of the **Center for Safety & Environmental Management**. "If you open the door while the machine's running, you'll have all the physical hazards that you can think of ... The machines don't slow down—they don't even know you're there."

OSHA Regulation: CNC Machine Safety Requirements

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. In 2013, manufacturers reported 2,000 workers suffered amputations. The rate of amputations in the manufacturing sector was more than twice as much (1.7 per 10,000 full-time employees) as that of all private industry (0.7), according to Bureau of Labor Statistics data *reported by OSHA* when the regulatory body updated its National Emphasis Program on Amputations.

According to OSHA, “any machine part, function, or process that may cause injury must be safeguarded.” These safeguards could come in the form of engineering controls, which are designed as an integral part of the machine and don’t depend on employee decision-making or behavior.



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Tip #1: Workplace Safety vs. Quality Assurance: Keep CNC Machine 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,” he says. “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 it to return home and power off before reaching into the machine or into any of the actionable areas.”

Even with safety training, “some operators feel if they can keep the door open to watch the part while the machine is running, that would be 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.

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Frank Quarato

President, Center for Safety & Environmental Management

Tip #2: Employee Safety vs. Tooling Costs: Don't Alter CNC Machine Tools

"Some cutting tools are very expensive, and operators know that if they use a cheaper tool, they can save a little money," Quarato says.

"But all CNC operator's manuals warn against altering the tooling or working outside the programmatic functions of the machine," he says. "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."

Only qualified operators should be operating a CNC machine, Quarato says, 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.

Tip #3: Clean and Maintain Your CNC Machines to Reduce Cuts and Burns

Most employers know 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 #4: 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 says.

"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 report *"ANSI B11.TR7-2007 (R2017) Designing for Safety and Lean Manufacturing"* (purchase required).

How do you ensure your team is properly trained on CNC machine safety?

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