

# CNC turning machine

Computer numerically controlled (CNC) machining centers cut and shape an assortment of precision products from automobile parts to general machine parts. Operating in either horizontal or vertical positions, CNC machinery includes machining tools such as lathes, multi-axis spindles, and milling and boring machines; the functions formerly performed by human operators are performed by a computer-control module. CNC machinery is either hand loaded or automatically fed.

Most CNC machinery is partially or totally enclosed by metal enclosures equipped with thermoplastic vision panels, most commonly polycarbonate.



*Stanley Hydraulic Tools*

## Hazard

Two primary hazards arise from CNC turning operations: Entanglement and the ejection of parts. Serious lacerations, fractures, amputations, or even death can occur if an operator contacts or becomes entangled in or between the tooling or rotating work piece. Similar injuries or death can also occur from being struck by ejected parts (e.g., cutters or other tools, chucks, or the work piece).

Although the risk of injury from ejected parts is lessened due to the interlocked enclosure of CNC machinery, recent research has shown that polycarbonate materials used in the unit's vision panels can degrade after exposure to the metalworking fluids and lubricants used in the machining process. Over time, vision panels may not be able to contain ejected parts. Most ejections at CNC turning machines are caused by a setup error or failing to properly maintain work-holding devices.

Unexpected movement or startup caused by faults in the control system can also cause serious injury.

## Solution

To prevent access into the point of operation area, ensure the CNC machine is fully enclosed and equipped with an interlocked guard (door). The cutting tools should not start unless the door is in position and should stop when the door is opened. Many machines lock the guard in position during operation and can only be opened when the tooling stops. If access into the point of operation is infrequent, install a fixed enclosure that can be removed only for maintenance activities.

Automatic loading and unloading methods and automatic tool changing further reduce the exposure to the point of operation.

To prevent injury from ejected parts, make sure the polycarbonate vision panels are strong enough to contain ejected parts. Also, verify the appropriate rotational speed for the particular work piece and inspect the chuck jaw assemblies, work piece clamps, and all component parts of the turning fixtures.

## References

### ■ General Industry

*Oregon OSHA Division 2/Subdivision O 29 CFR 1910.212 — General Requirements for All Machines*

*Oregon OSHA Division 2/Subdivision J 29 CFR 1910.147 — The Control of Hazardous Energy (Lockout/Tagout)*

- HSE Engineering Information Sheet #33 “CNC turning machines: Controlling risks from ejected parts”
- ANSI B11.22 *Safety Requirements for Turning Center and Automatic Numerically Controlled Turning Machines*
- ANSI B11.23 *Safety Requirements for Machining Centers and Automatic Numerically Controlled Milling, Drilling and Boring Machines*
- OSHA Safety Hazard Information Bulletin 00-06-23 “*Potential Hazards Associated with the Use of Replacement Materials for Machine Guarding*” (June 23, 2000)



Determine if the polycarbonate vision panels are strong enough to contain ejected parts.