# Mill Chatter Troubleshooting

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## Excessive Tool Wear

If your tool has excessive wear, the cutting forces generated by the cut will increase. These increased cutting forces can lead to chatter during the cut.

Inspect your tool and replace it if necessary.

It is normal for tools to wear over time. In a stable machining process the tool wear is predictable. This will allow you to use the Tool Life Management systems that come standard in your Haas control. The tool life information can be input in to the Haas control to alert the operator to replace the tool before it negatively affects your machining process.

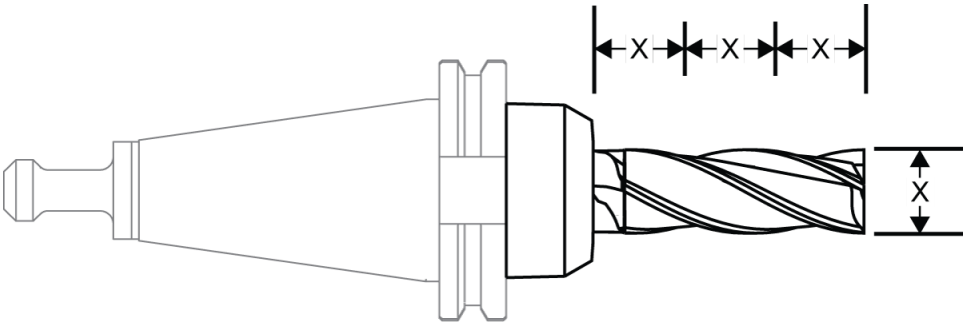
Refer to the Tool Life Management section for details on how to use these systems.

## The Tool or Tool Holder May be Too Long for the Application.

Longer tools are less stable than shorter tools. Always use the shortest tool possible, and remember that a 10% reduction in the length-to-diameter ratio results in a 25% increase in tool stiffness.

If the cut chatters and reducing the tool length is practical, reduce the tool length to use the shortest tool and tool holder possible for your application.

Unless absolutely necessary, the tool's stick-out from the holder should not be more than 3 times longer than its diameter.




In some cases it may be necessary to use an extended tool, machining a deep pocket for instance. In these scenarios you must reduce the load on the tool by reducing the depth-of-cut, width-of-cut, RPM or feedrate to maintain a stable cut.

## Chip Load too Light - Mill

If the RPM is too high or the feedrate is too low the chip load on the tool will be too small to properly load the tool. This causes the tool to resonate during the cut leaving a chattered surface finish.

Reduce the spindle speed or increase the feedrate to stablize the cut. Refer to the tooling manufacturer's instructions for guidance as

to the best speeds and feeds to use for the tooling and workpiece material. Test-run your application and use spindle speed and feed overrides to find a speed/feed combination that does not chatter.

## Too Many Flutes Engaged in the Cut

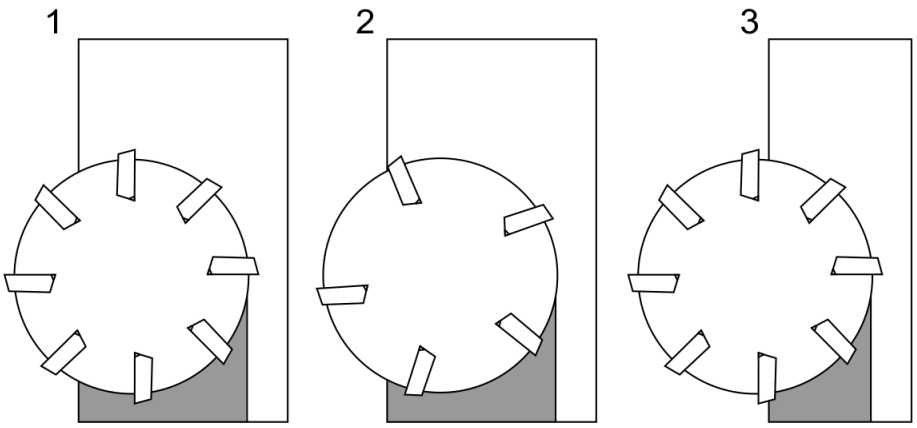
When too many flutes are engaged in the cut [1], increased cutting forces can make the tool unstable. The unstable tool can then begin to resonate the machine tool, resulting in a chattered surface finish.

**Corrective Action:**

Select a cutting tool with fewer flutes [2]. Adjust the feedrate as necessary to compensate.

**Or**

Reduce the radial width-of-cut to engage fewer flutes in the cut [3].




## Toolpath Type

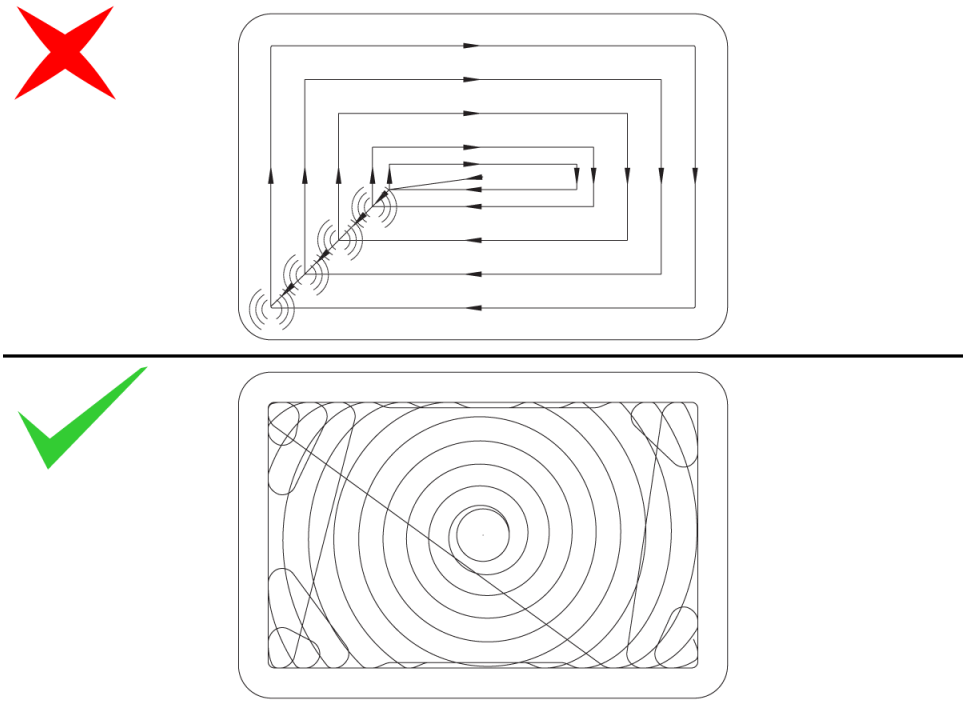
With conventional pocketing and contour toolpaths, the cutting forces spike up because the tool engagement increases during direction changes. These spikes in cutting forces can cause the machine to resonate and leave chatter in the machined surface.

**Corrective Action:**

Reduce the cutting forces by decreasing the depth of cut and/or the radial width of cut.

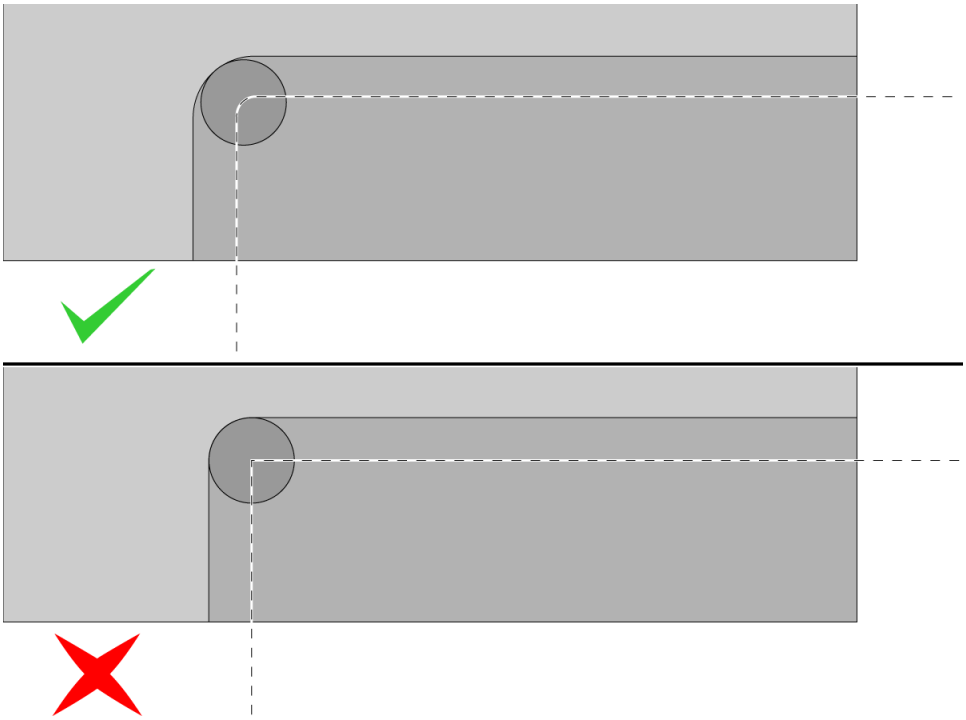
**Or**

Use a constant engagement toolpath. These toolpaths keep the cutting forces constant throughout the cut, eliminating the spikes in tool load that generate chatter. Constant engagement also lets you increase the programmed feedrates and spindle speed, since it eliminates spikes in the load that may cause the tool to break.



## The Tool Diameter is Incorrect for a Corner

For corners, be sure to use an endmill with a small enough diameter to cut through a corner radius without excess tool engagement. For example, do not use an 0.5" diameter to cut a 0.25" radius inside corner. The excess tool engagement can cause chatter. Instead, consider using a smaller tool, for example, a 0.375" diameter endmill, to interpolate a smooth corner.



## Coolant Issues

Incorrectly aimed coolant nozzles or obstructions in the stream can prevent coolant from reaching the cutting area. Adjust your coolant nozzles to deliver coolant to the cutting area.

Be sure to use the recommended coolant mixture concentration in your applications. If your concentration is too lean, the reduced lubricity can negatively affect your tool life and surface finish.
There are many different coolants for different applications and materials. Contact your coolant dealer for advice.

Refer to the Machine Tool Coolant Series page for videos and articles about maintaining your coolant system.

## Insufficient Drawbar Hold Force

The drawbar is a spindle component that holds the tool in place with spring force. Over time, the springs can wear and reduce the drawbar hold force.

**Corrective Action:**

Measure the machine's drawbar hold force. Refer to the Drawbar Force Reference Chart for the drawbar force range for your spindle.

If it is insufficient, order a replacement drawbar from parts.haascnc.com.

## Inadequate Foundation

The machine must sit on a solid and stable foundation. Refer to Pre-Installation Information for a full description of the foundation requirements.

If the foundation is badly cracked, move the machine to a location with a solid foundation, or repair the foundation.

The machine should sit on one continuous slab of reinforced concrete. If the machine straddles more than one slab, you may need to move the machine to a single, continuous slab.

Example of a Machine Set Across Multiple Concrete Slabs