

Technical Tip #32 – Reducing Vibration and Chatter in End Milling

When chatter occurs, it can be self-sustaining until the problem is corrected. Chatter causes poor finish on the part, and will damage and significantly reduce the life of end mills. Carbide end mills are particularly susceptible to damage.

Typical methods to reduce chatter include reducing cutting forces by:

1. Reducing the number of flutes.
2. Decreasing the chipload per tooth by reducing the feed or increasing the speed or RPM.
3. Reducing the axial or radial depth of cut.

Though these steps will reduce chatter, slowing down the cutting process is not always the best course of action, and reducing the chipload can be detrimental to the cutter.

Better first steps are to improve rigidity and stability:

1. Use a larger end mill with a larger core diameter.
2. Use end mills with reduced clearance or a small circular margin.
3. Use the shortest overhang from spindle nose to tip of tool.
4. Use stub length end mills where possible.
5. Use balanced tool holders.
6. Rework fixture to hold the workpiece more securely.
7. Reprogram the cutter path to shift cutting forces into stiffer portions of the workpiece.
8. Look for ways to improve spindle speeds then adjust feed accordingly.

Chatter is common when machining corners. As the end mill enters the corner, the percentage of engagement increases the number of teeth in the cut. This drastically increases the cutting forces, causing chatter.

To reduce chatter when machining corners, consider using circular interpolation to produce a bigger corner radius than indicated by the part print. Then remove the remaining stock with a smaller end mill using circular interpolation.