Corner Engagement

Milling involves significant variations in cutting forces, resulting in ultra-conservative tool running parameters and premature tool wear. One difficult (and often suspect) area of this type of machining is when the cutting tool experiences an "inside corner" condition. This is where the tool's engagement angle significantly increases and poor performance may be experienced.

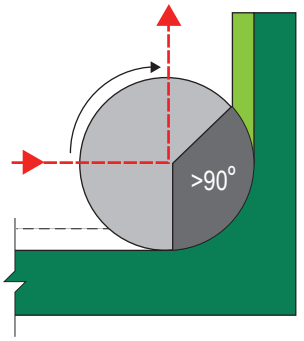
Evidence of this difficult to machine area is detected by:

- Chatter - visible in "poor" corner finish.
- Deflection - detected by unwanted "measured" wall taper.
- Cutting sound - tool squawking or chirping in the corners.
- Tool breakage/chipping - detrimental tool breakage or chipping, resulting in tool replacement.

Least Desirable Condition

Generating an inside part radius that matches the radius of the tool at a 90° direction change can make for a less than ideal machining condition. With the tool experiencing extra material to cut (light green), increased engagement angle and a direction change some of the common results will be chatter, tool deflection/ breakage and poor surface finish.

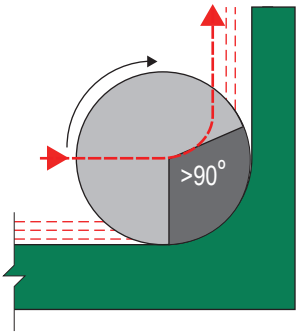
Feed rate may need to be lessened depending on the "tool radius-to-part radius ratio."



More Desirable Condition

Generating an inside part radius that matches the radius of the tool with a sweeping direction change creates a more acceptable machining condition. The smaller radial depths of cut in this example help to manage the angle of engagement, but at the final pass the tool will experience a very high engagement angle and again, a less than desireable machining condition. Some of the common results will be chatter, tool deflection/breakage and poor surface finish.

Feed rate may need to be reduced by 30-50% depending on the "tool radius-to-part radius ratio."



Most Desirable Condition

HIGH EFFICIENCY HEM MILLING

Generating an inside part radius with a smaller tool and a sweeping action creates a very desireable machining condition. The manageable radial depths of cut and smaller tool diameter allow management of the tool engagement angle, higher feed rates and better surface finishes. As the cutter reaches full radial depth its engagement angle will increase, but feed reduction should be much less than the other conditions listed above.

Feed rate may need to be heightened depending on the "tool-to-part ratio." Utilize tools that are smaller than the corner you are machining.