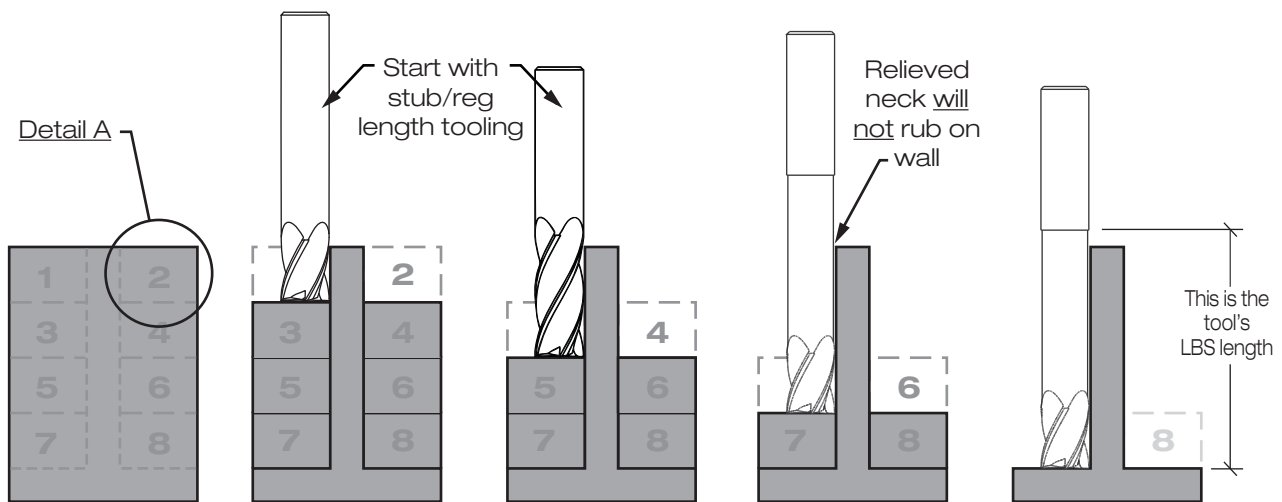# Thin Wall Milling

Milling part features with thin wall characteristics while maintaining dimensional accuracy and straightness can be difficult at best. Although multiple factors contribute, some key components are discussed below and can help turn these types of applications around.

▲ Proper tooling
A long length tool, combined with a long length of cut, can spell trouble in situations like this due to deflection, chatter and breakage (see pg. 105 for further information). It is essential to keep the tool as strong as possible while maintaining the ability to reach to the desired depth. It is essential to look at necked-down tooling when reaching > 3x dia. depths.

▲ Axial Depth of Cut (ADOC)
Keeping a wide cross-section behind the wall for support on the way down is vital. Below, we recommend producing a "stepped down" approach dividing the total wall height to manageable depths while working each side of the wall (see fig. 1). The ADOC dimension can/will vary depending on the material (and its hardness) being cut.

Detail A

Start with stub/reg length tooling

Relieved neck will not rub on wall

This is the tool's LBS length

▲ RDOC
A progressive radial depth of cut (RDOC) strategy is of equal importance as wall height is being established. Reducing tool pressure while support stock is disappearing is equally important to keep wall stable.

- Fig.1 represents a 5-step progressive radial approach. The number of passes will depend upon your particular application, material/hardness & final wall thickness/height.

- This approach helps to keep the pressure off the wall as you make your way towards it. Additionally, it is recommended to alternate sides when using this depth of cut (RDOC) strategy.

- 4th/5th RDOC passes could turn out to be very light, keeping wall vibration to a minimum and part finish maximized.
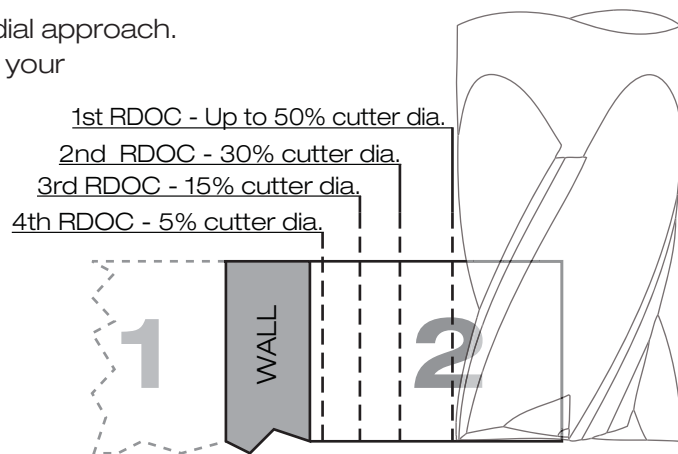
1st RDOC - Up to 50% cutter dia.
2nd RDOC - 30% cutter dia.
3rd RDOC - 15% cutter dia.
4th RDOC - 5% cutter dia.

WALL

Fig. 1

▲ Other ideas...
- Climb milling will help to keep tool pressure to a minimum.
- Vibration dampening/wall stabilization can be achieved in "hard to fixture thin wall situations" by using thermoplastic compounds or wax - which can be removed (thermally).
- The use of ultra-high performance tool paths (i.e. VoluMill) can optimize tool performance, work with lighter depths of cut and offer less tool cutting pressure (see pg. 51).