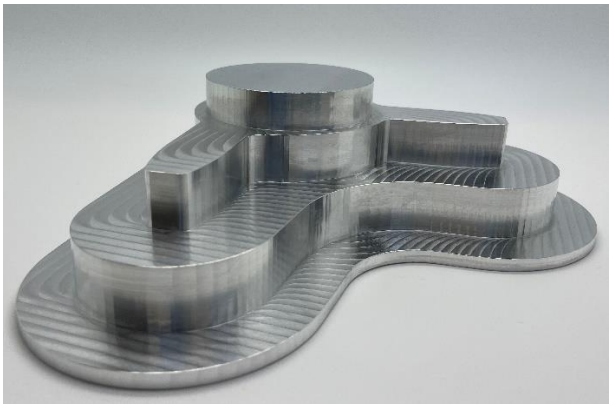
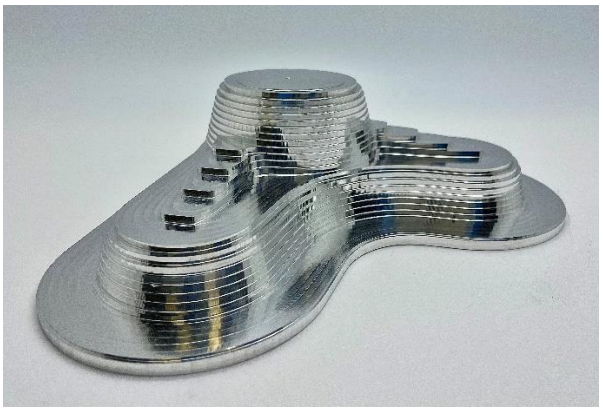
Adaptive Roughing in Siemens NX

It is often found when using traditional roughing patterns, the tool may engage the full diameter when removing stock, this will negatively affect tool life. Adaptive roughing can be used to avoid this condition. Adaptive roughing operations maintain a consistent cutter engagement with the material, rather than being based on a specific cut pattern or cut direction.



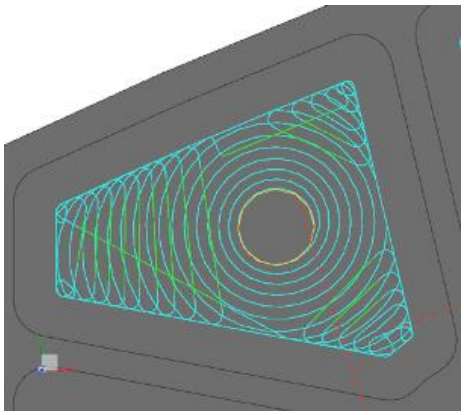
Bottom Up Cutting off



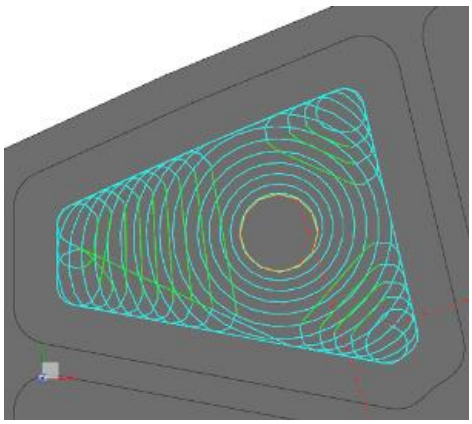
Bottom Up Cutting on

In an adaptive roughing operation, you define your cut levels to use as much of the flute length as possible. This will inevitably leave large steps of material that need to be removed. You can use the Bottom Up Cutting function to cut this stock between the predefined cut levels. Thus, reducing the stock left on steep walls.

When using adaptive roughing operations, you can use the Minimum Curvature Radius command to control the tool path in corners. Typically, you will get good results with a Minimum Curvature Radius set between 5% and 15%.



Curvature Radius = 5% of tool diameter



Curvature Radius = 20% of tool diameter

The larger you set the Minimum Curvature Radius, more stock will be left in the corners. However, the toolpath will be smoother and quicker resulting in extended tool life. You can always create a secondary rest milling operation with a smaller diameter tool to reduce the corner stock.

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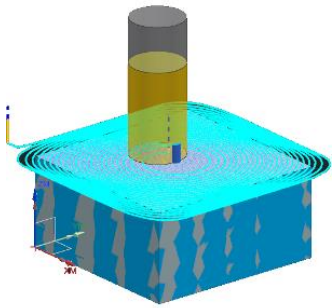
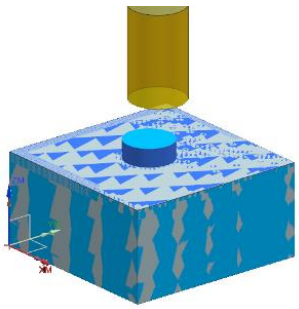
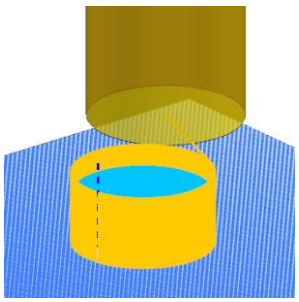
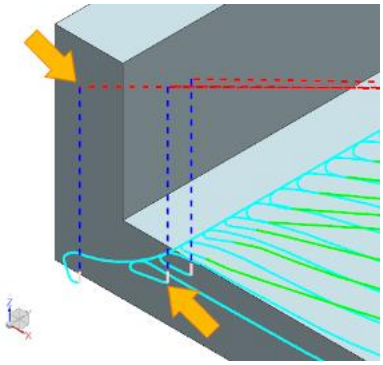
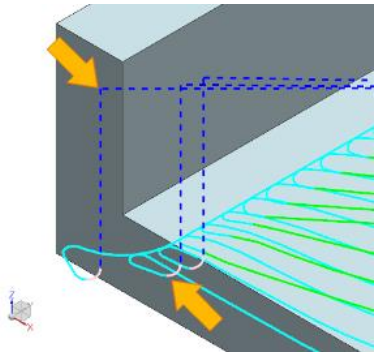
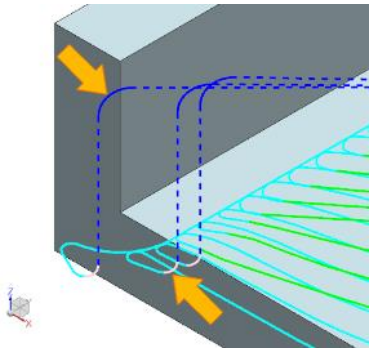
When machining open areas including features like islands and bosses you should use the Pillar Cutting option. This has parameters to better control the behaviour near the end of the tool path for open regions where you might traditionally expect a small pillar of material to “ping” off whilst cutting with the potential to damage the tool.

Something that is often overlooked when generating tool paths are the non-cutting moves. Adaptive roughing operations are all about smooth continuous cutting motion. By using the smooth corner options NX will also generate smooth transitions on the non-cutting moves where traditionally the toolpath would have sharp changes in directions.

No smoothing **Smooth corners only** **Smooth corners & transfer move corners**

All of these features can contribute to the Adaptive roughing strategy further improving the toolpath, creating a smooth pattern which maintains a consistent chip load allowing for high material removal rates and an extended, more predictable tool life.