Die Manufacturing Extension in Fusion 360

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Agenda

- Vorstellung
- Was ist die Manufacturing Extension?
- Steep & Shallow Bearbeitung
- Automatisierte Bohrungserkennung
- Oberflächeninspektion & Probing
- Additive Fertigung

Wer bin ich?

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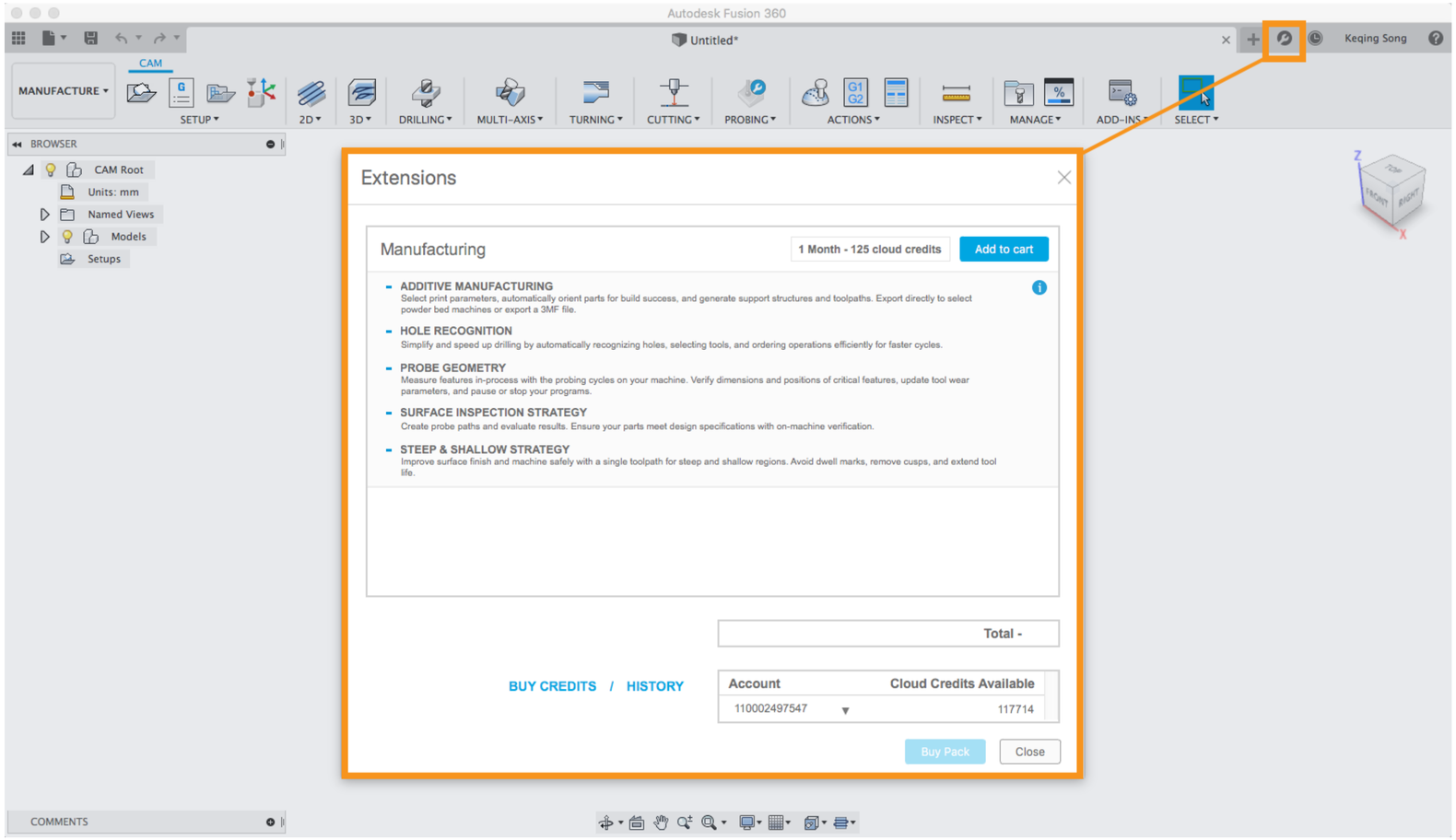
Seit 2016 bei Autodesk

M.Sc. Wirtschaftsingenieurwesen, zwei Jahre im Projektmanagement tätig

Produktfokus ist die Fusion 360 Plattform

Manufacturing Extension

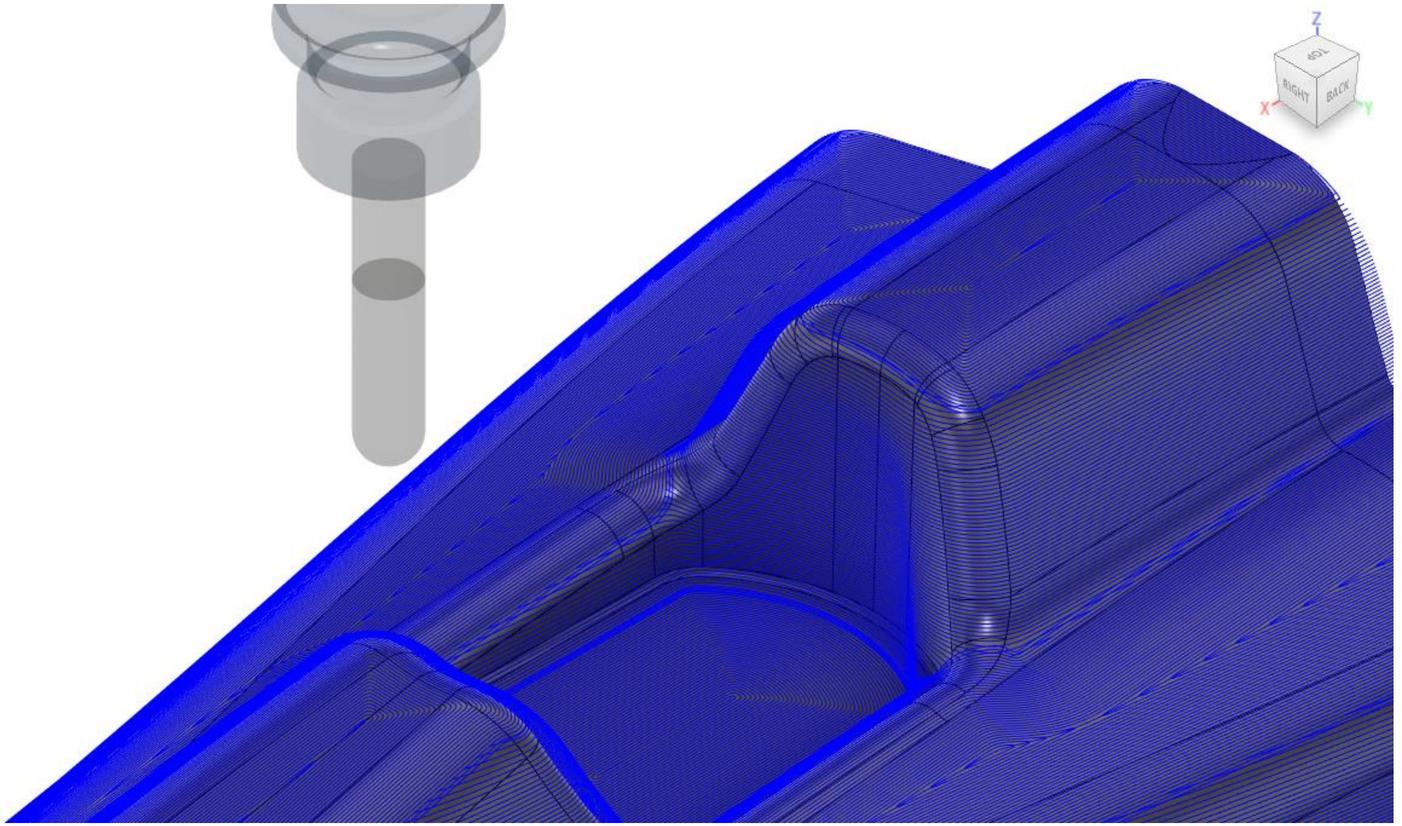
- High level functionality to improve your manufacturing processes
- Purchased inside software
- 125 cloud credits
- 30 day access to extra features



Steep and Shallow

What?

- A single toolpath that machines all the surfaces on complex 3D forms
- Used for both semi-finishing and finishing toolpaths
- Machines steeper and shallower areas with a single compounded toolpath
  - Combination of scallop/parallel and contour



Facts & Numbers

5th
MOST USED

5th Most used PowerMill toolpath

3rd
MOST USED

3rd. Most used finishing strategy

TOP
STRATEGY

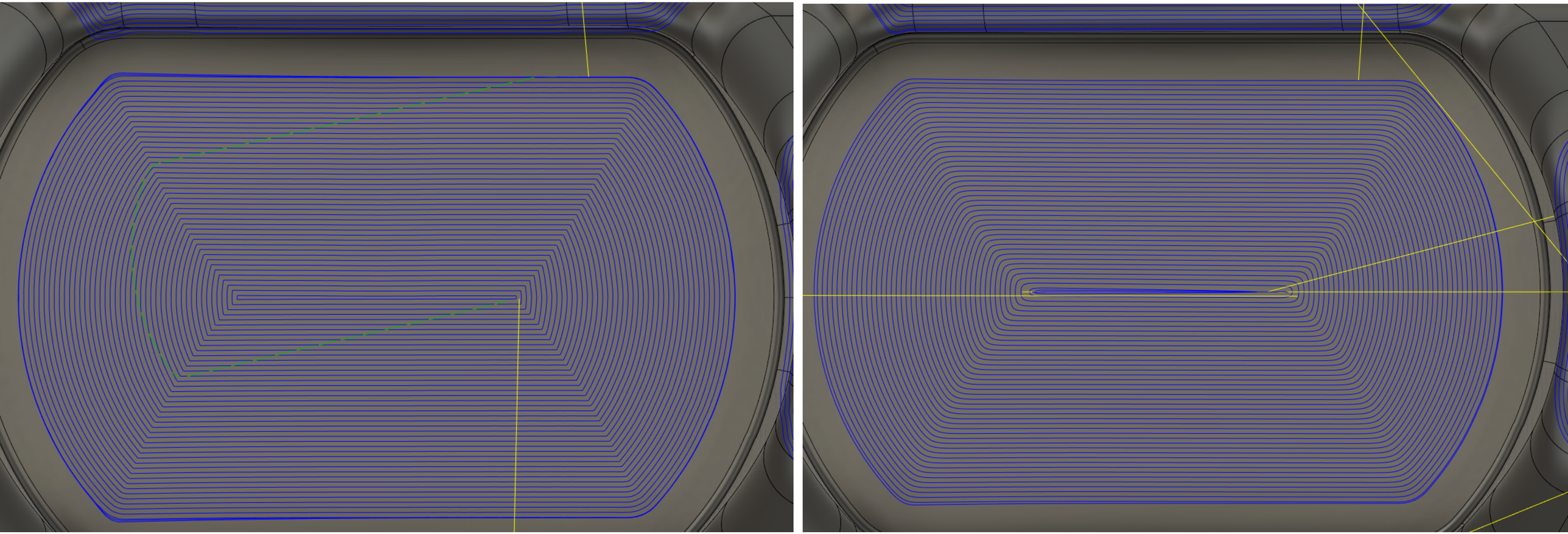
Top strategy from PowerMill where there was no like-like comparison

DMK
KERNEL

Porting the toolpath over meant utilizing the DMK Kernel within Fusion360 .

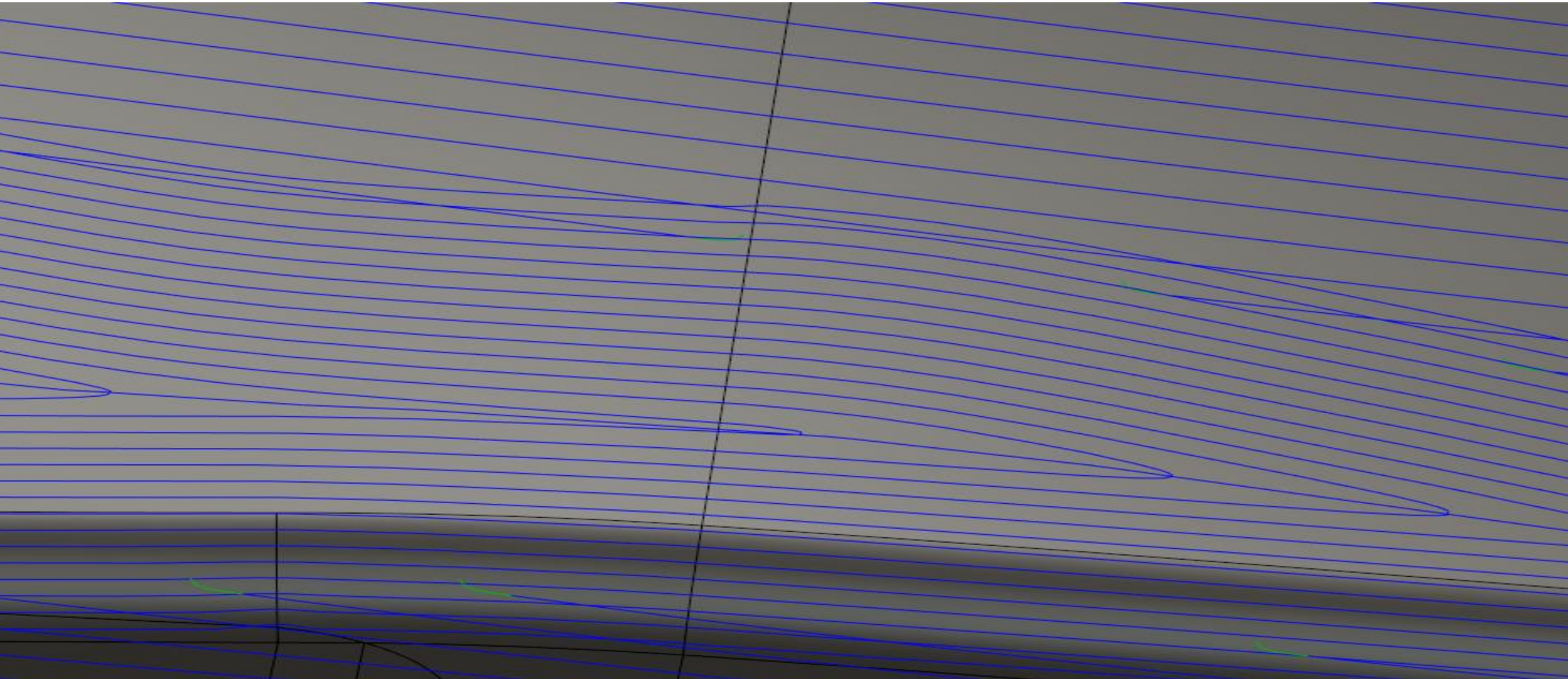
Benefit 3: Continuous Spiral for an improved surface finish

Reduces marks on the part between steep and shallow regions



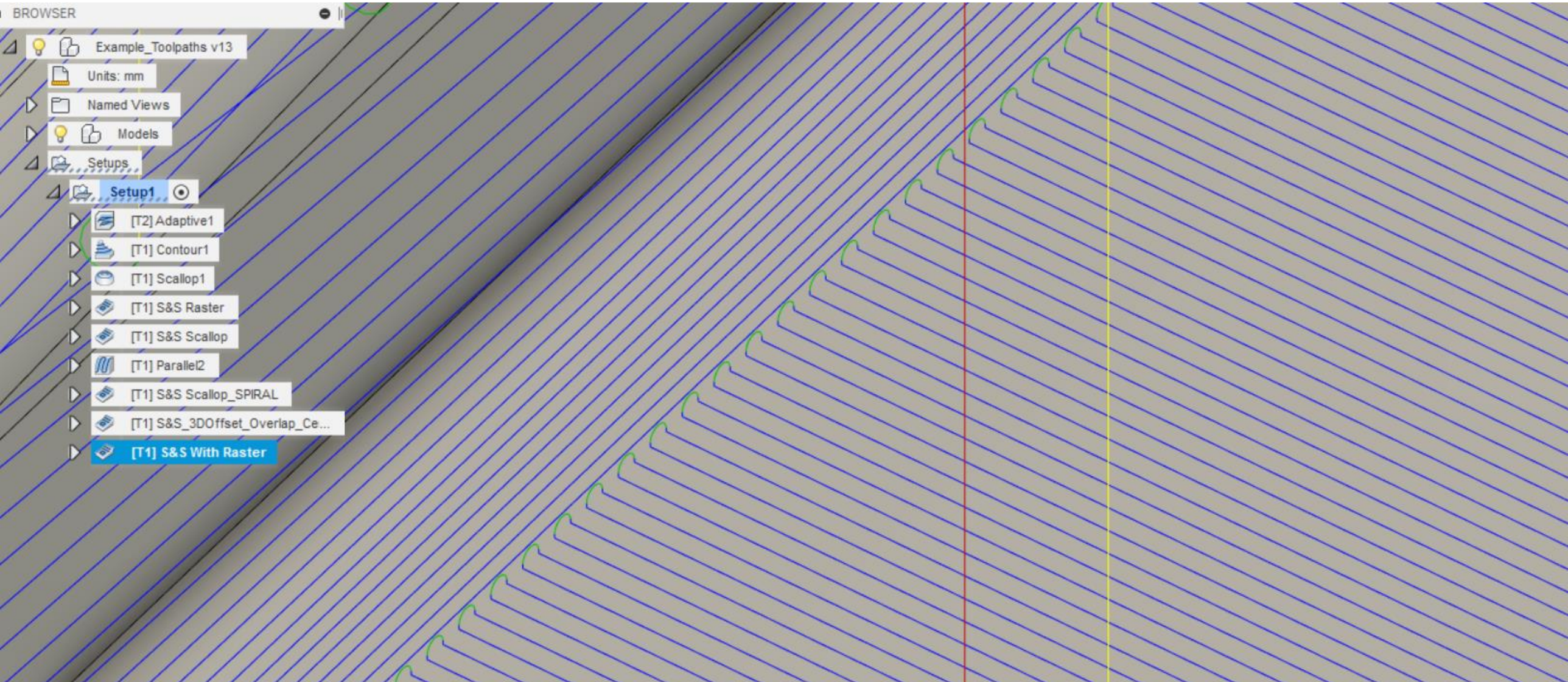
Benefit 4: Constant Overlap between Steep and Shallow regions

Reduces marks on the part between steep and shallow regions



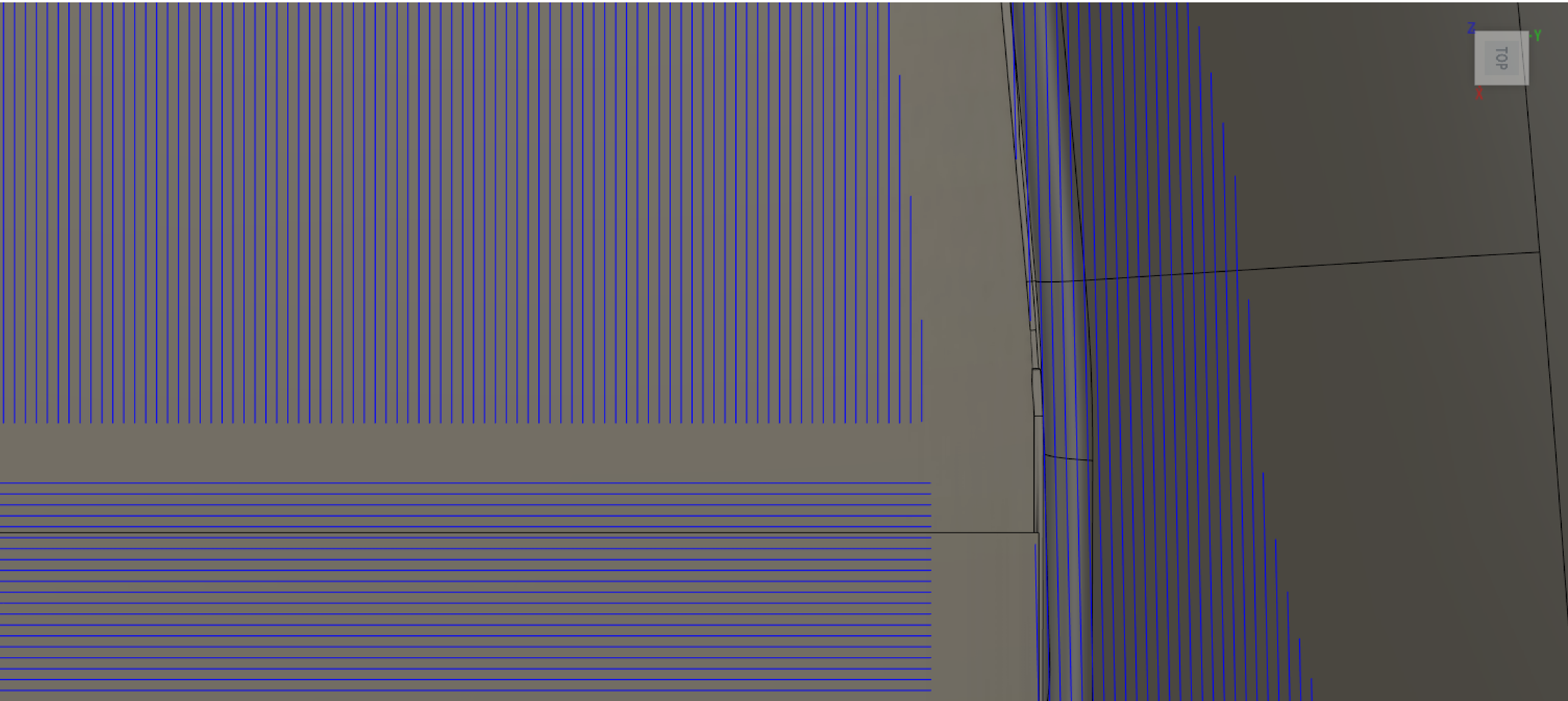
Benefit 5: Wall Clearance with Parallel

Stops tool touching steep regions and marking the wall



Benefit 6: Automatic Parallel Angle

The angle of cut is optimized for each region reducing the cycle time on the machine.

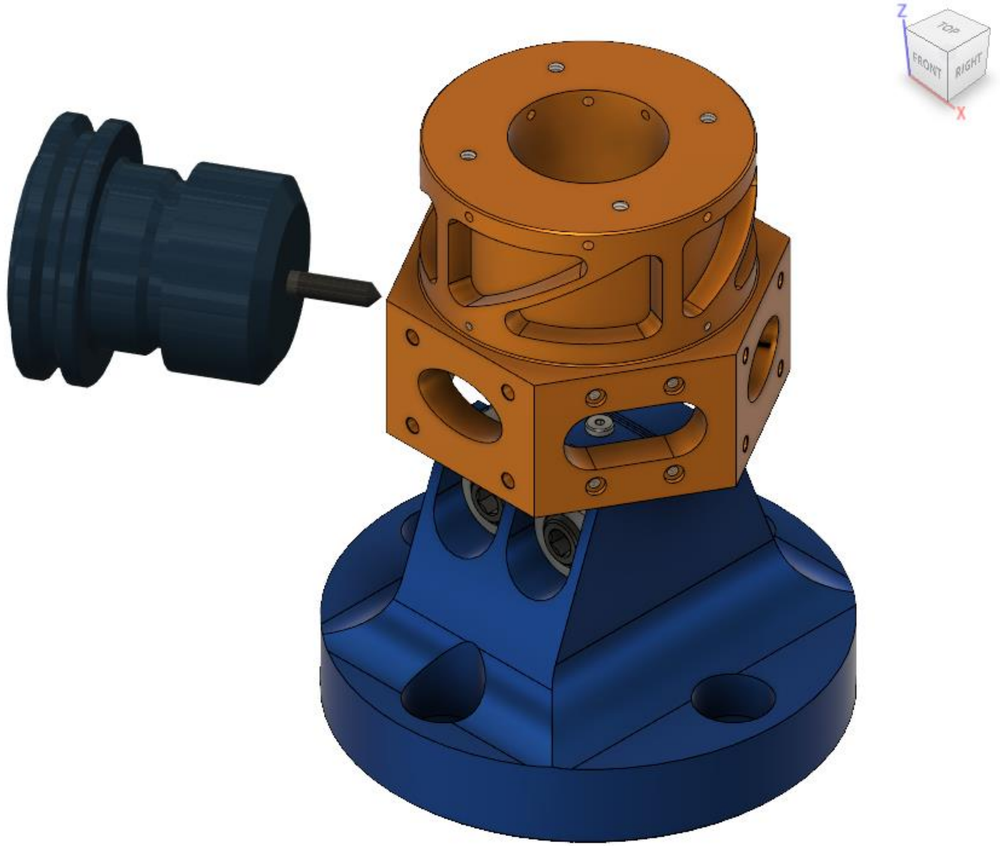


Automatic Hole Recognition

What?

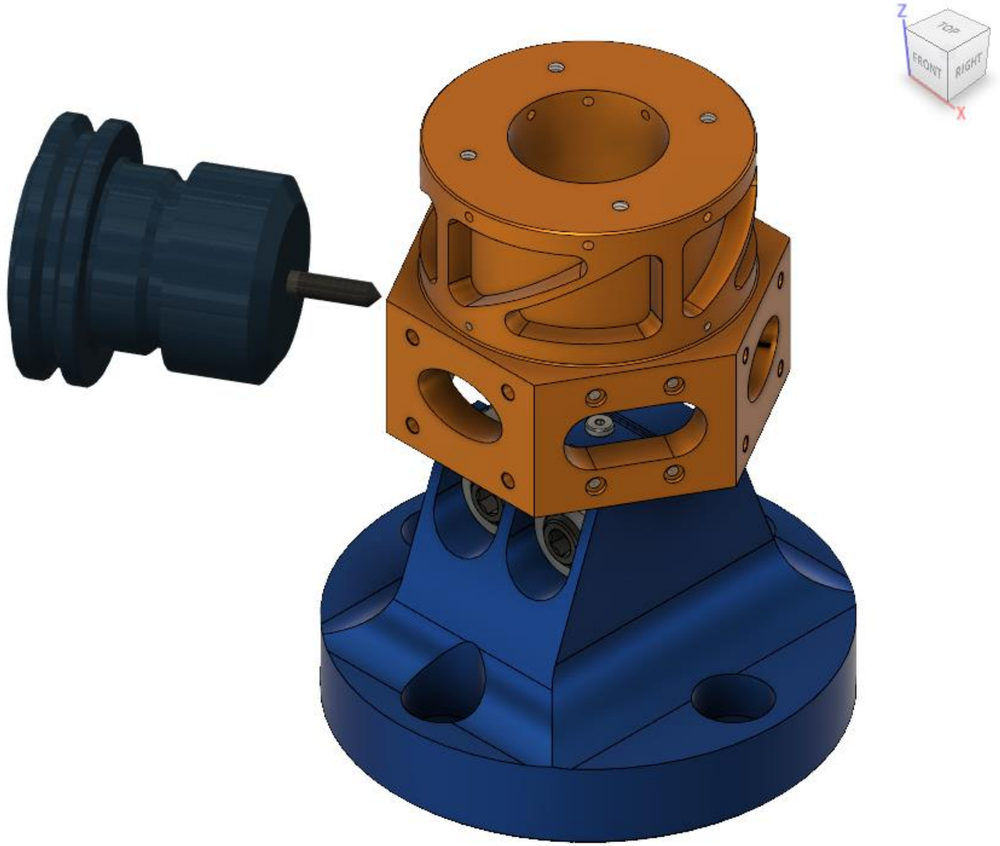
- Automatic recognition of all holes on a part
  - Size
  - Thread
  - Counterbores/sinks
  - Orientation

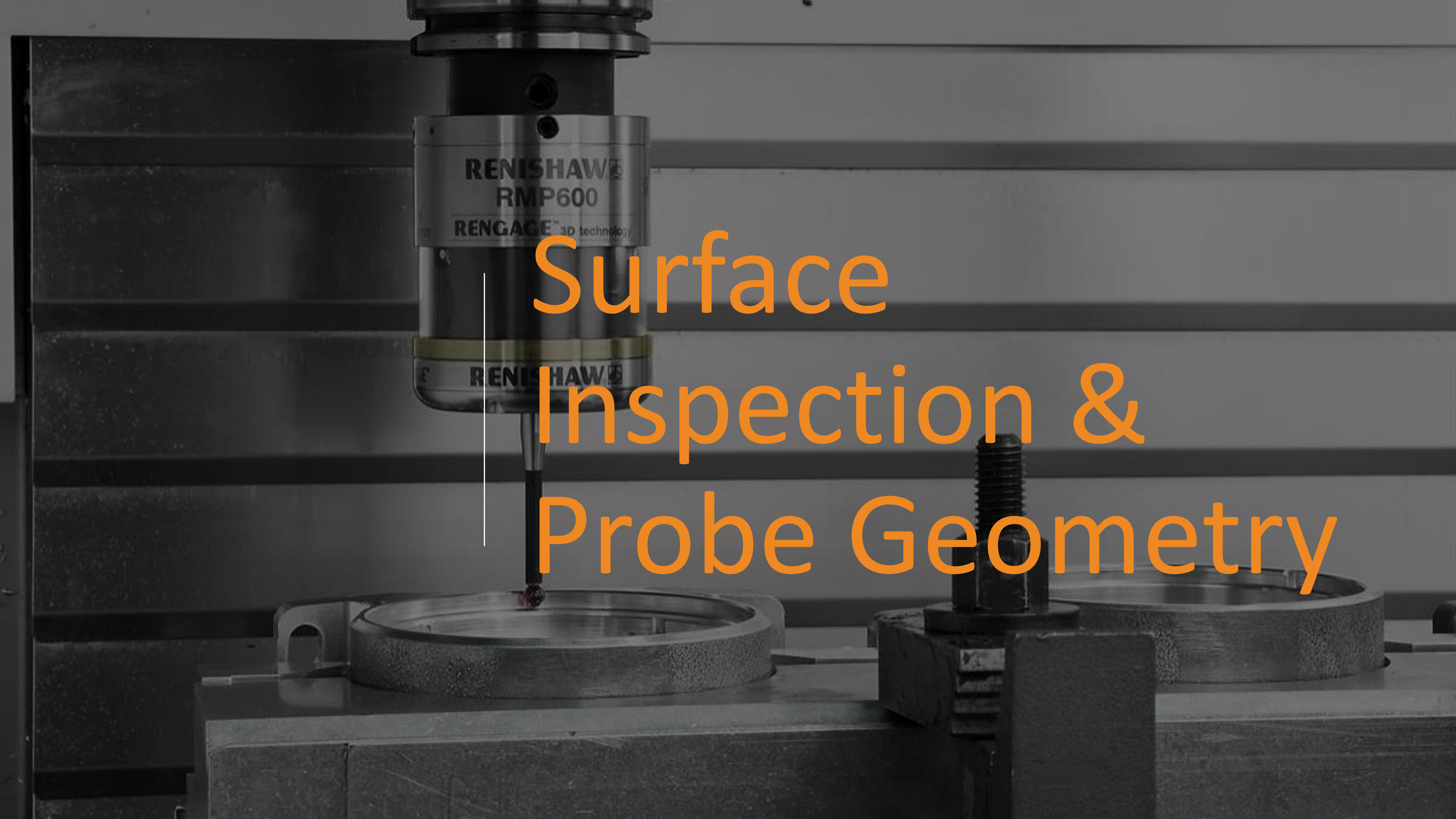
- Step closer to fully automated part manufacture
- Functionality taken from FeatureCAM, featured based programming software – tried and tested



Why?

- Continuity between multiple projects when programming holes – reduces risk of human error – missing holes
- Parts with hundred of holes – different sizes – fixturing
- Condensing tool library
- Repeatability & efficiency





Surface Inspection & Probe Geometry

Context to the “Why”?

- Used to measure manufactured part
- Types of inspection
- In process measurement
- Verification
  - Stock – Size and Location
  - Model – Tool Wear

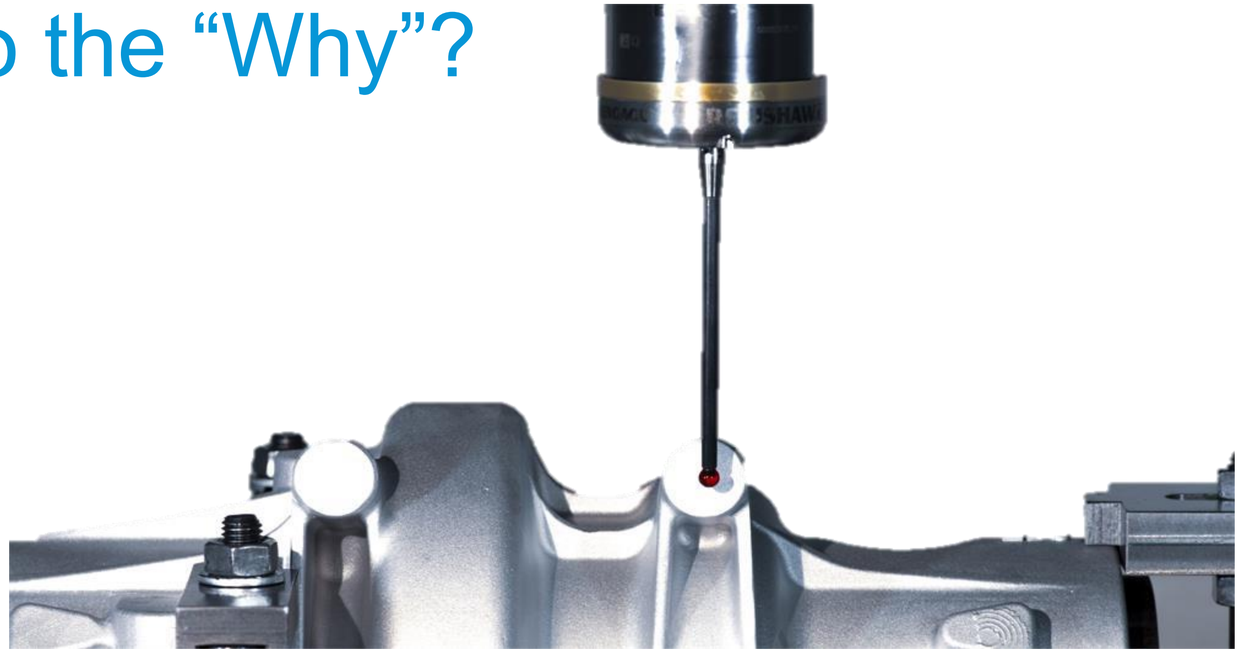


Image courtesy of Renishaw.co.uk

Image courtesy of IMIRP Rapid Prototyping Ltd

Image courtesy of Zeiss.com

Image courtesy of Leica.com

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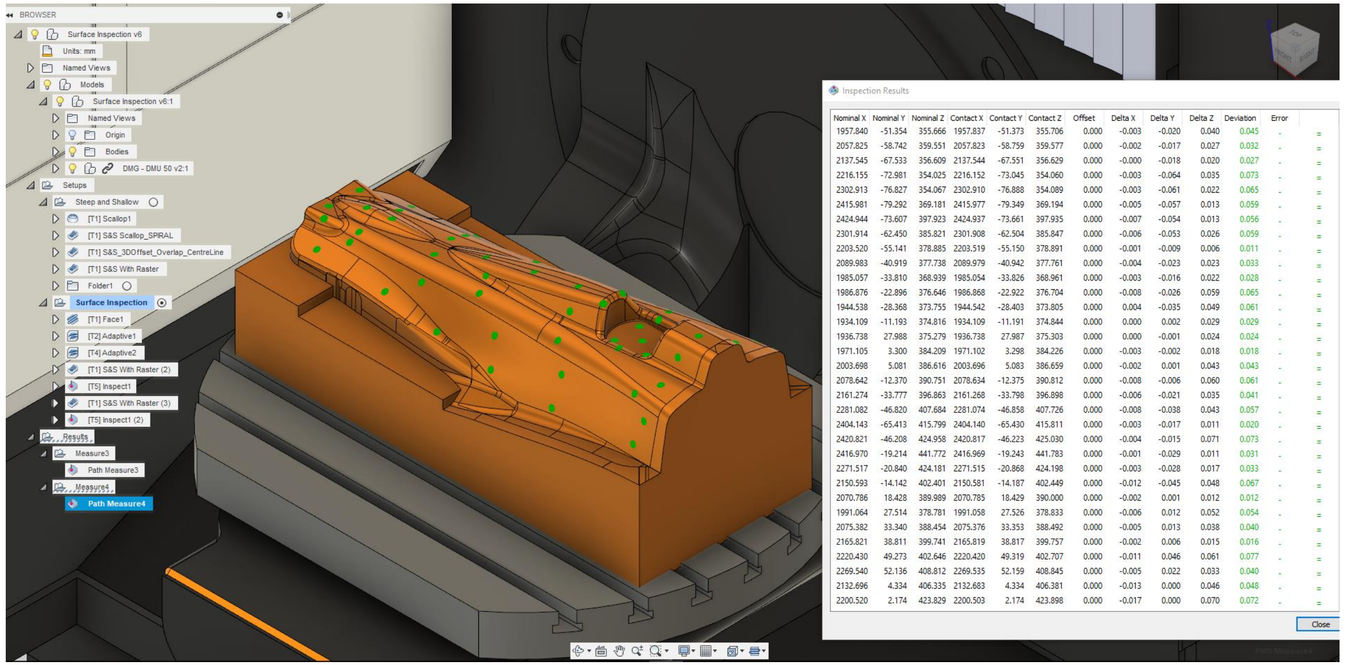
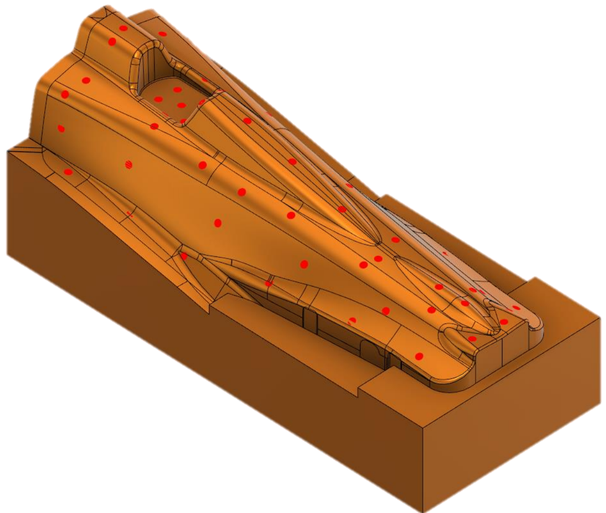
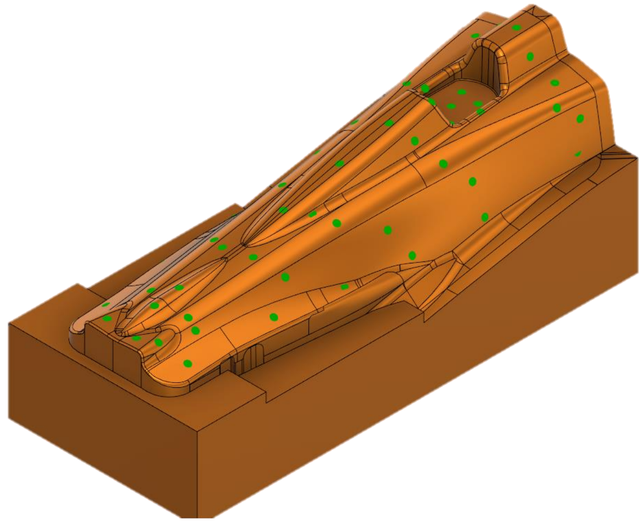
Why?

- Promote repeatability
- Understanding how accurately parts are manufactured
  - In-process
  - Post manufacturing
- Model rework
- Sharing Knowledge







Autodesk Fusion 360

Probe Geometry v9 v2*

1 E - 2 W

Kieran Gill

CAM

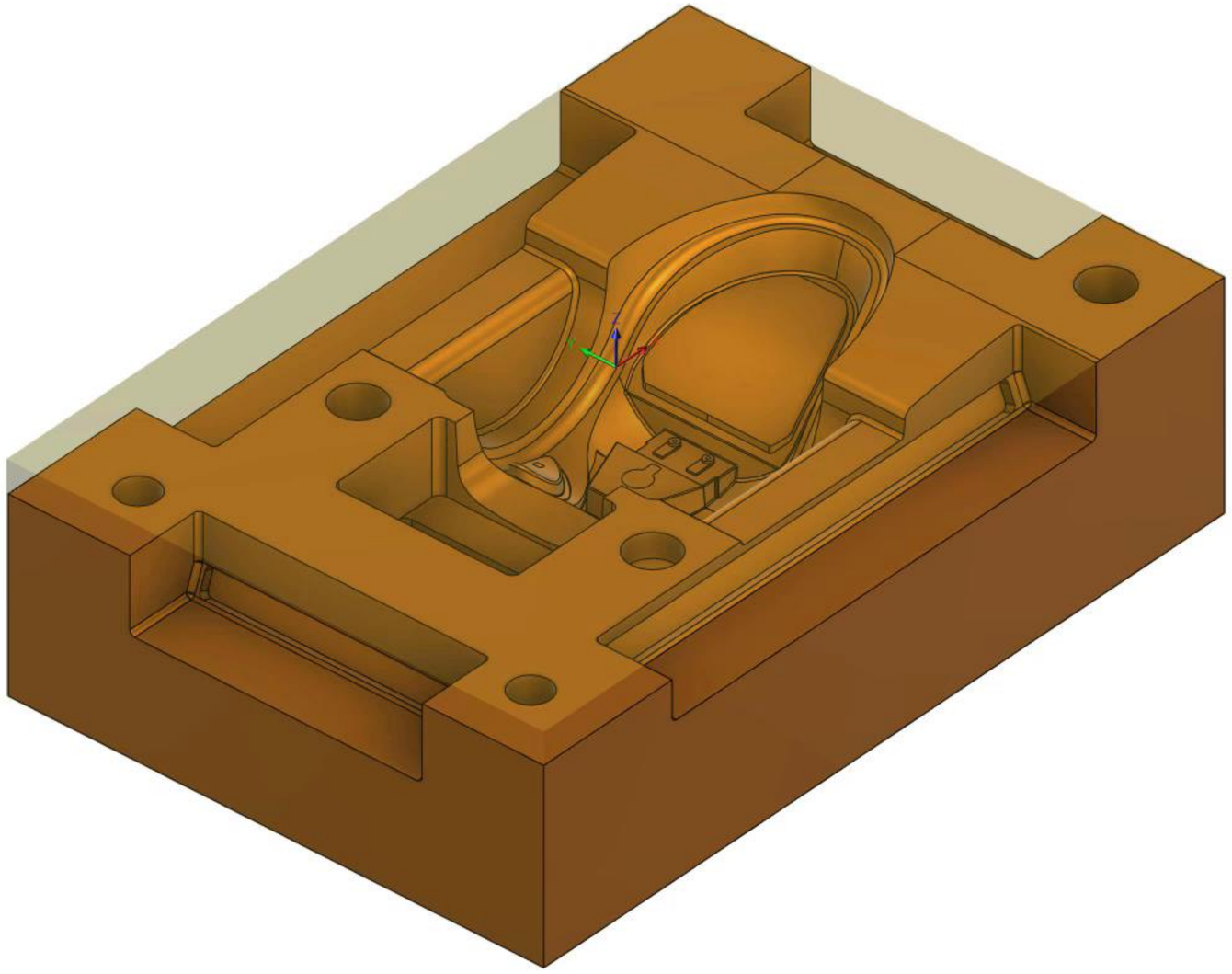
MANUFACTURE

SETUP | 2D | 3D | DRILLING | MULTI-AXIS | PROBING | ACTIONS | INSPECT | MANAGE | ADD-INS | SELECT

BROWSER

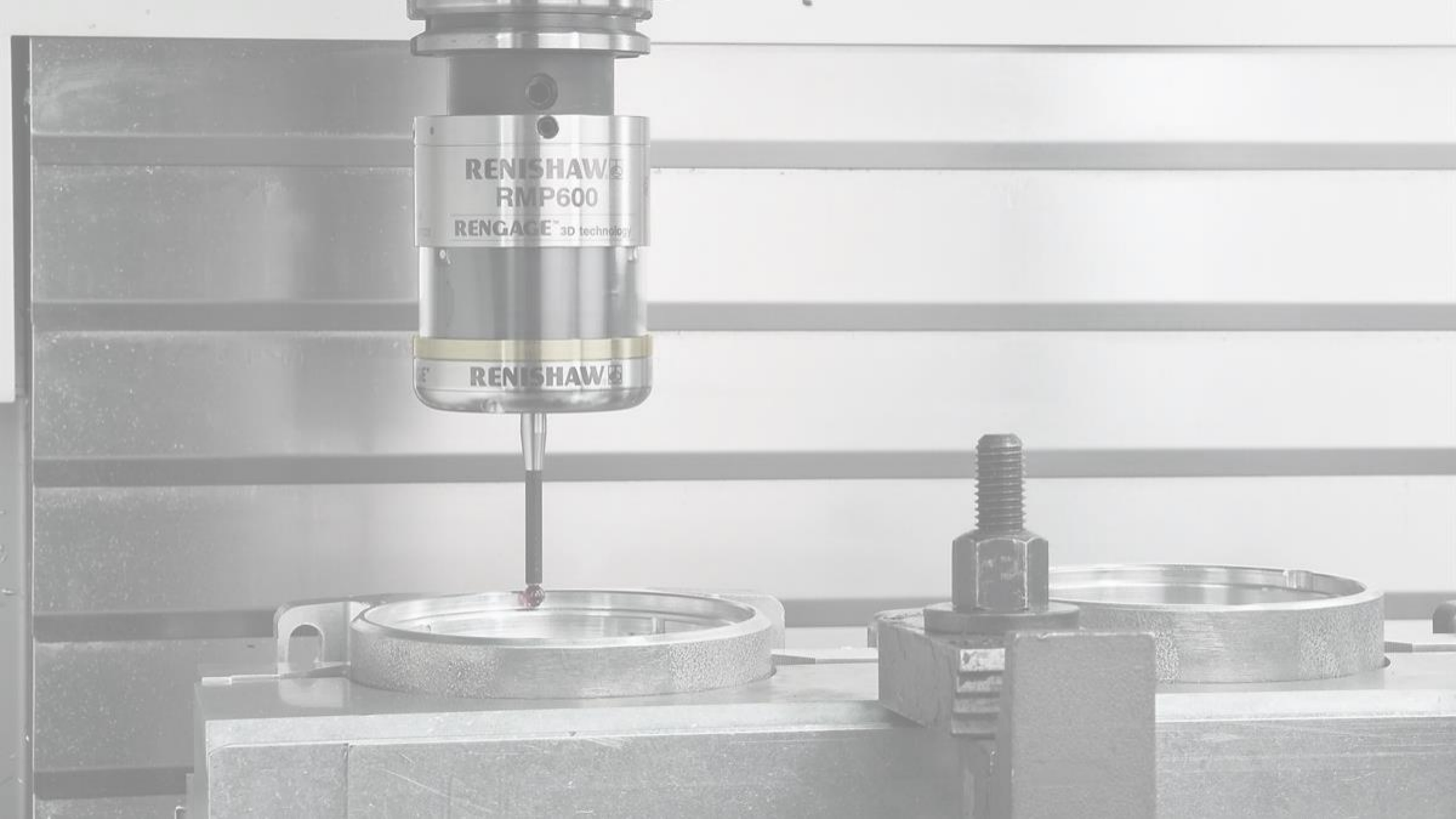
- Probe Geometry v9 v2
  - Units: mm
  - Named Views
  - Models
    - Probe Geometry v9 v2:1
      - Named Views
      - Origin
      - Bodies
        - Body1
      - Sketches
      - Construction
  - Setups
    - Setup1
    - Setup2

Setup2



Setup5

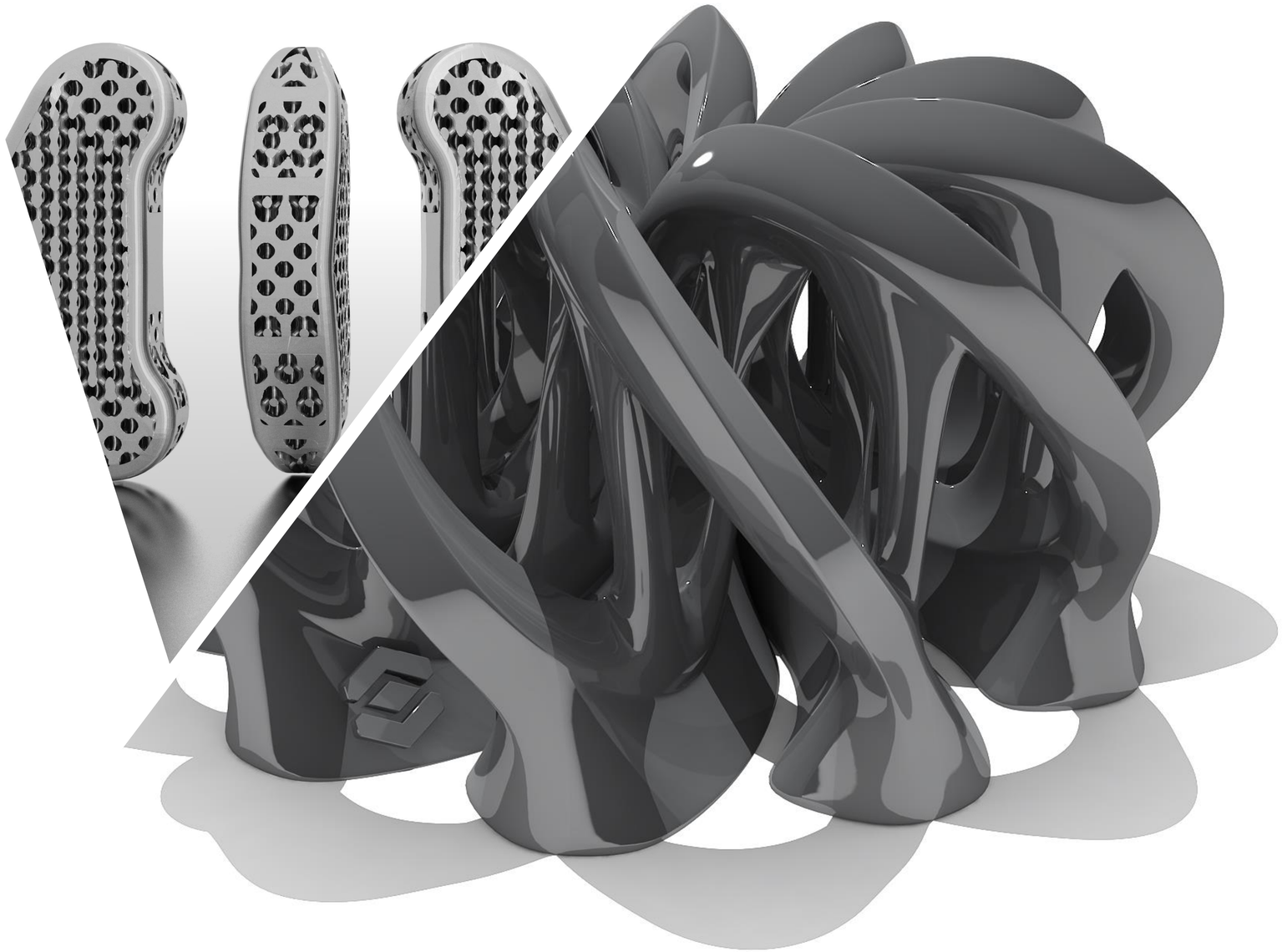
TEXT COMMANDS


RENISHAW
RMP600
RENGAGE™ 3D technology
RENISHAW

Additive Manufacturing

What?

- Build space for additive manufacturing processes
- Slicing of model ready for manufacture
- Support structures
- Uses Netfabb kernel



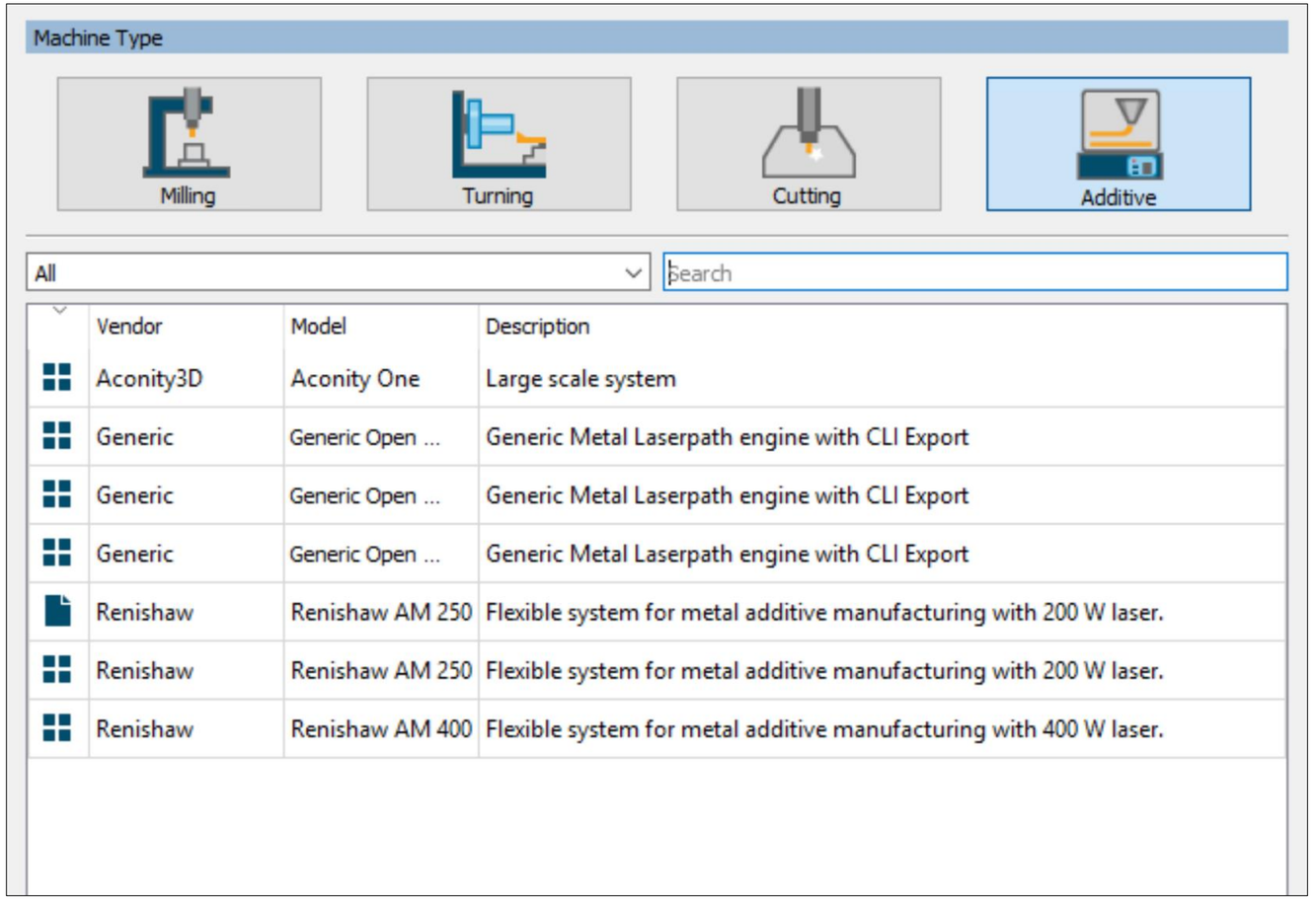
Why?

- Additive manufacture builds parts up layer by layer
- Rapid Prototyping - sense of scale
- Complex parts – internal cavities and shapes that would not be possible/extremely expensive using traditional subtractive techniques

Image: Courtesy of Under Armour

Machine Build Space

- Build space size
- Machines have different strengths
- Machine presets – get started quickly
- Flexible definition of parameters
- Limits Support Customization

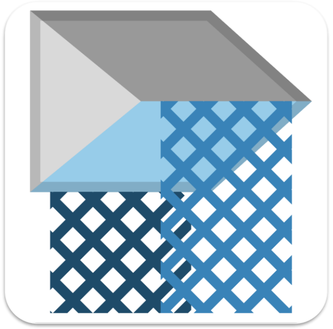


Build Support Structures

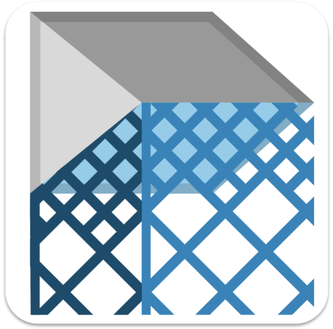
VOLUME SUPPORT

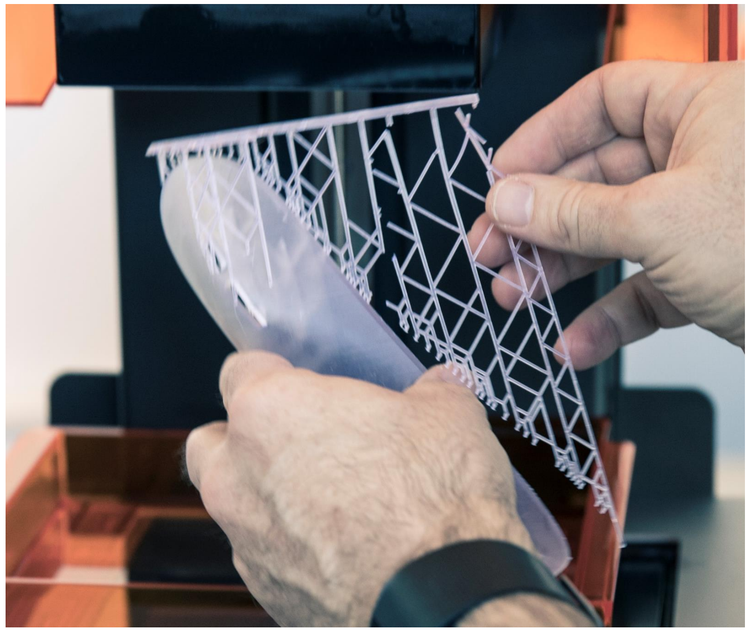
BAR SUPPORT

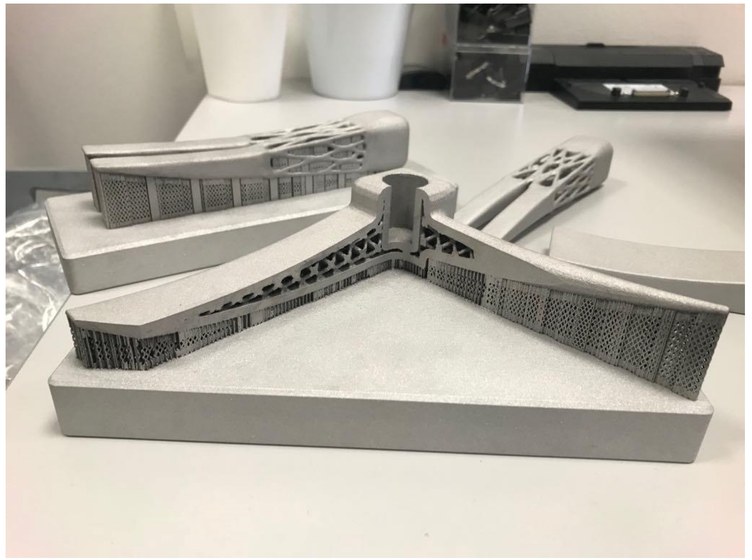
POLYLINE SUPPORT

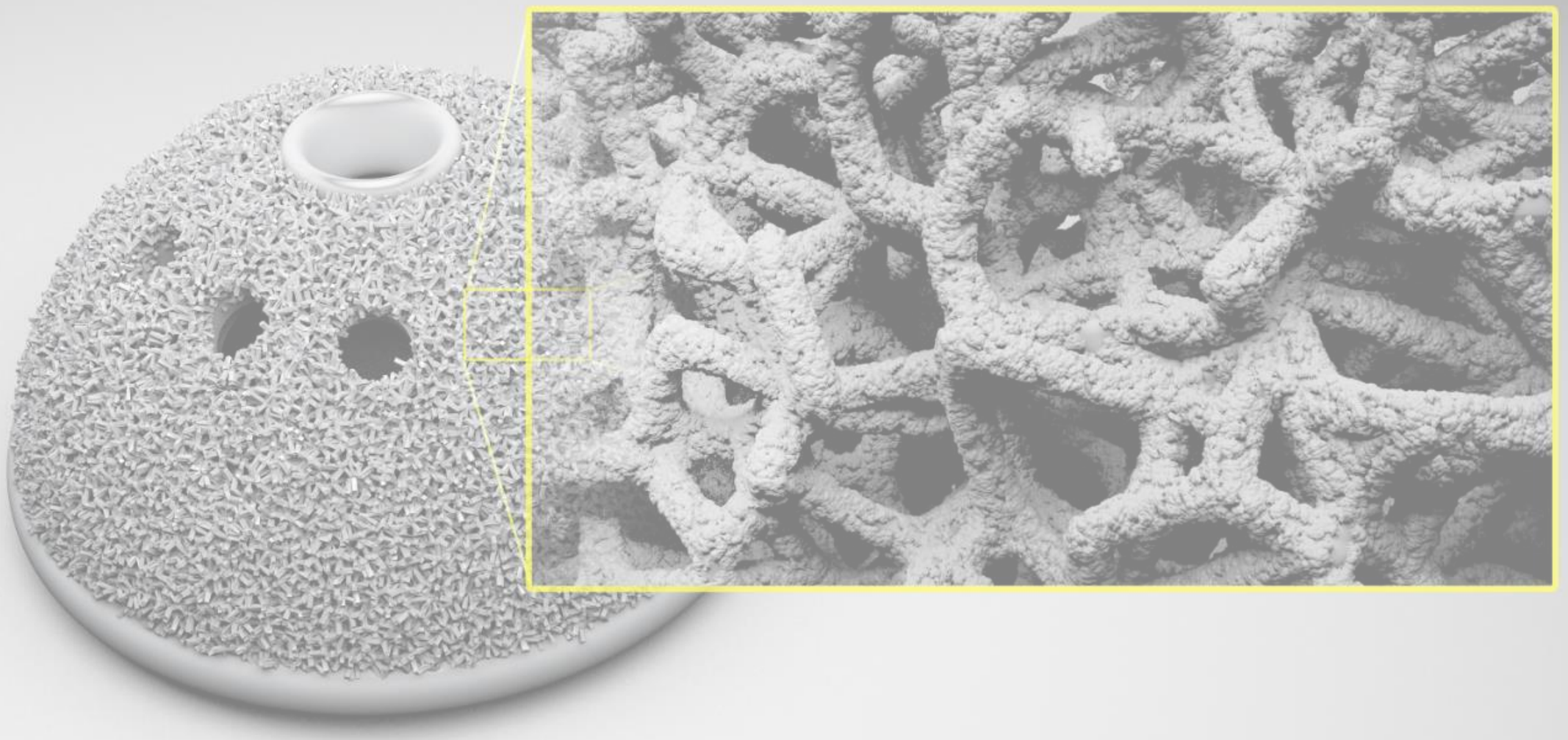


LATTICE VOLUME SUPPORT



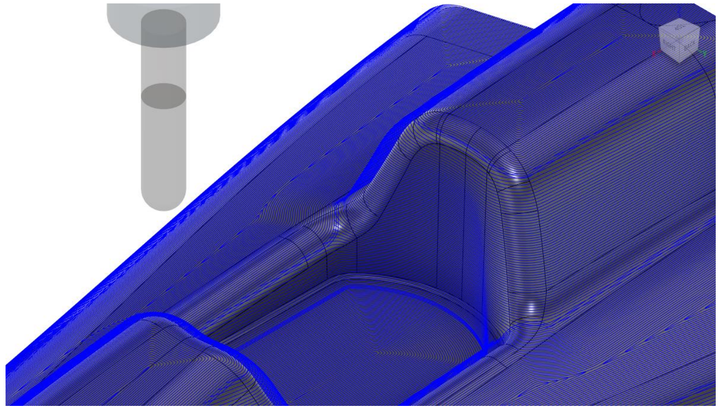




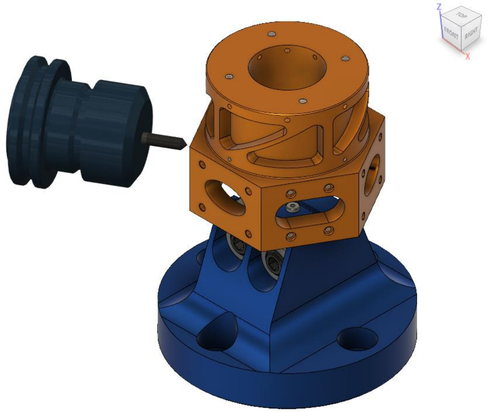


Summary

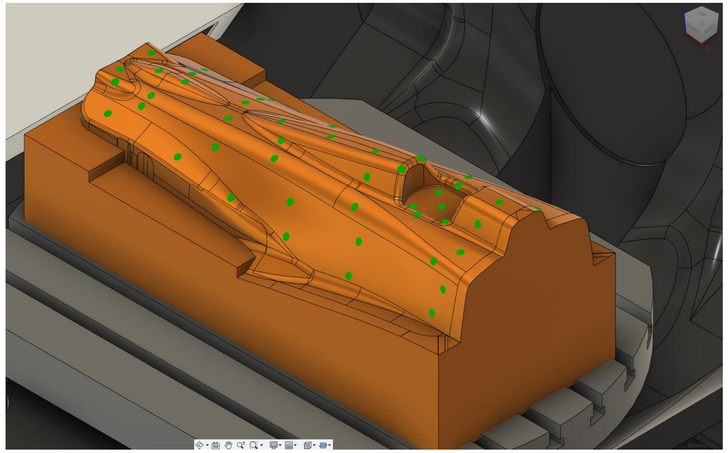
STEEP & SHALLOW FINISHING



AUTOMATIC HOLE RECOGNITION



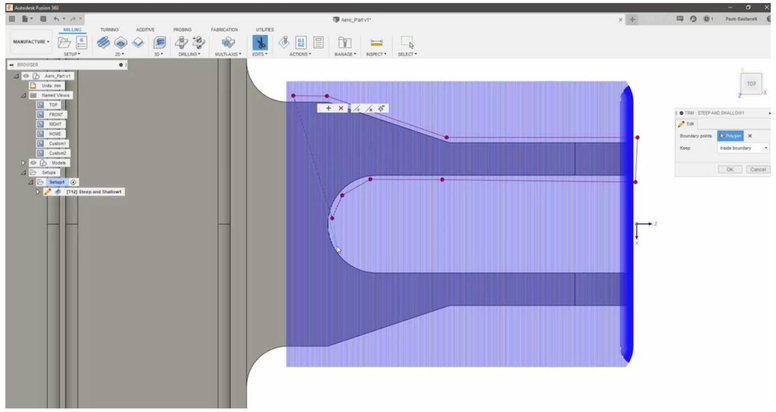
SURFACE INSPECTION & PROBE GEOMETRY



ADDITIVE MANUFACTURING

What’s Next?

Toolpath Trimming Coming to the Manufacturing Extension



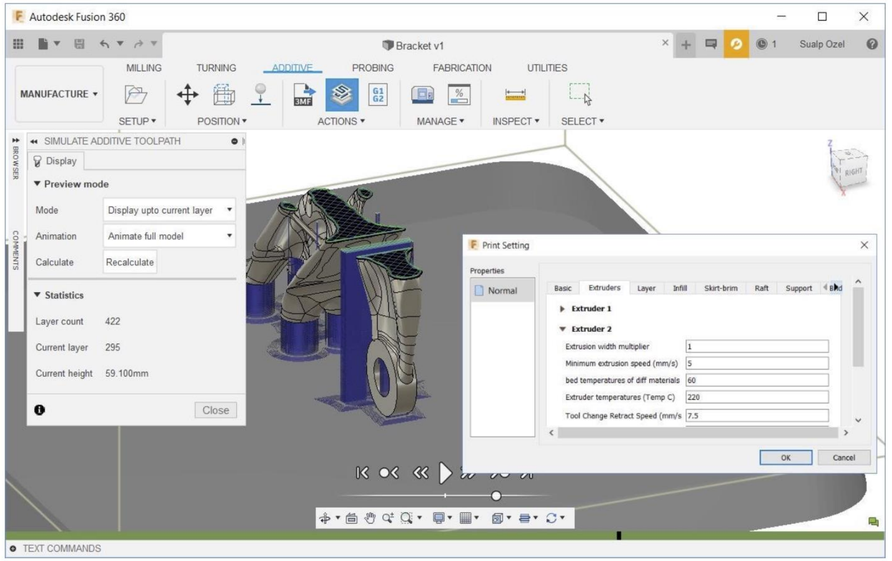
The toolpath strategies available in Fusion 360 are pretty smart, but sometimes you need extra control for more complex machining applications. We're working to bring toolpath trimming capabilities to the Manufacturing Extension for those of you who want to 'tidy up' certain toolpaths, remove inefficiencies such as aircutting, or avoid limitations in your chosen toolpath.

Multiple Features for Probe Geometry

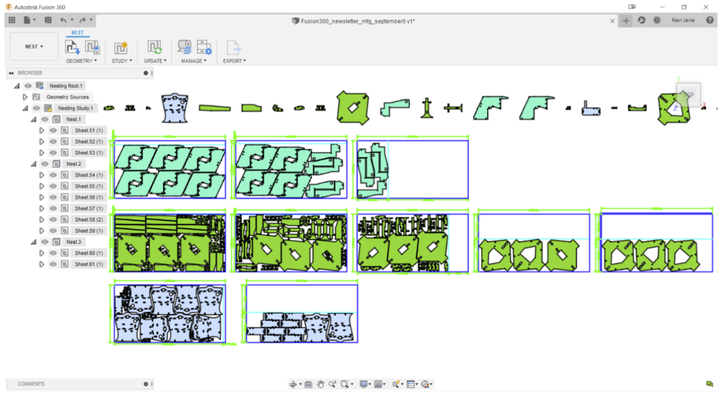
We're working on an improvement for the Probe Geometry feature that is accessible through the Manufacturing Extension. Soon you'll be able to select multiple features for 'Probe Geometry' that will make it faster and easier to create more complex inspection sequences.

Additive Manufacturing

Additive Manufacturing (AM) offer companies fabrication method capable of disrupting the status quo while providing them a means of market differentiation. Fusion 360 already offers several capabilities for Design with AM considerations, such as Generative Design and Shape Optimization. Once the Mesh project (highlighted above) is released, the latticed models can only be manufactured using AM.

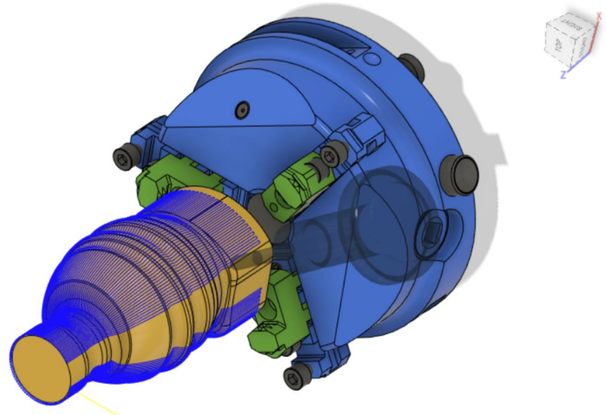


Nesting Planned for the Manufacturing Extension



As one of the highest requested features, we previewed it to those of you who attended our Fusion Academy. We're now getting closer to enabling sheet metal nesting in Fusion 360. Right from the beginning, you will be able to go from sheet metal **Design** & flat patterning to **Nesting** to **CAM** as a complete end-to-end workflow. If you make any design edits, the related nests will become "out-of-sync" and can be updated

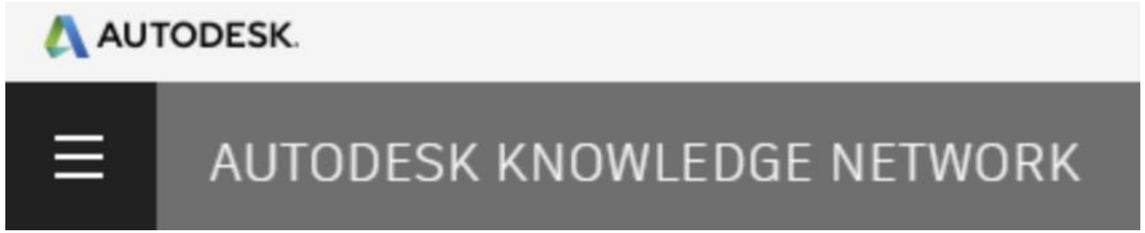
Adding 4 Axis Rotary Toolpath to the Manufacturing Extension



Many of you have a 4th, rotary axis on your machine tools, but don't yet have a good way of finish machining non-cylindrical parts with it.
We've been hard at work bringing a 4 Axis Rotary toolpath to Fusion 360, and we're happy to say that you'll be getting to try it soon on those organic geometries — we're excited to see what you make first!

https://www.autodesk.com/products/fusion-360/blog/fusion-360-roadmap-update-october-2019/

Bleiben Sie informiert



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