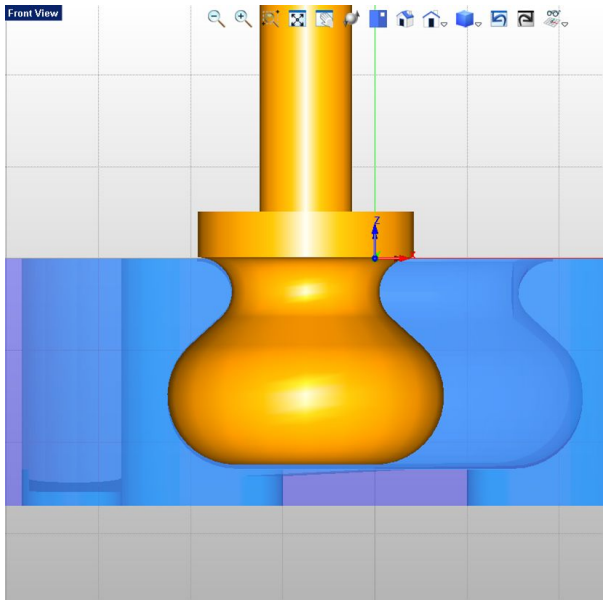
VisualCAD/CAM at Curtis Erpelding Furniture

Curtis Erpelding, Proprietor or Erpelding Furniture located in Port Orchard Washington, has spent the last 40 years woodworking fine furniture. Curtis produces his own line of Bentwood stackable chairs and tables and also produces commissioned pieces that are just as much fine works of art as functional furniture.



In 2004 Curtis started implementing Computerized Numerical Control (CNC) into his woodworking processes. He built his own 3 Axis CNC router and started out using BobCADCAM. After some time Curtis realized that he needed a CAM software with more functionality and greater ease of use. That's when, in 2019, Curtis turned to VisualCAD/CAM from MecSoft Corporation.

Curtis Erpelding Furniture

VisualCAD/CAM®

Here is a great example of the fine quality and craftsmanship of a Curtis Erpelding piece.

The VisualCAD/CAM Difference

We recently sat down with Curtis to gain some inside knowledge into how he utilizes CNC technology and VisualCAD/CAM in his shop. As part of his CNC work, Curtis has cut templates, carved furniture legs, created bending forms for compound curved laminations, engraved brass, drilled holes for shelves that can be adjusted, cut polygonal miters that fit perfectly without trial-and-error test runs and cut grooves and parts for intricate inlay.

Anytime Curtis encounters a process or procedure that seems insurmountable, he knows he can turn to MecSoft technical support for guidance. Here is a recent comment that Curtis made about his VisualCAD/CAM support.

Curtis Erpelding Furniture

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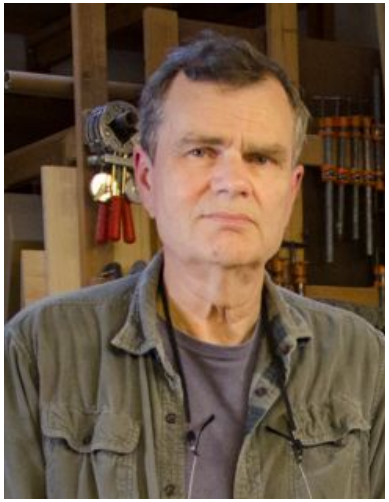

"Thanks for clarifying my issues. I heeded your advice on not inserting faster feed rates in the corners. It simulates flawlessly, even with the custom tool, and the G-code runs without hesitation on the router. I will definitely remember what I learned on this project and be aware of how 3D polylines can affect G code output. Thanks again for your help and advice."

Curtis Erpelding, Proprietor, Erpelding Furniture

The VisualCAD/CAM Part

The chosen part for this case study are the Drawer Pulls on the Dresser design shown below. The dresser is made of European Pearwood. It is 72 inches wide, 22 inches deep and 36 inches high. It is composed of 11 drawers, 4 on each side and 3 in the middle. Each drawer has identical Drawer Pulls, 11 total. The Drawer Pull design is unique in that it consists of a curved undercut pocket shown in the illustrations below.

Curtis Erpelding Furniture

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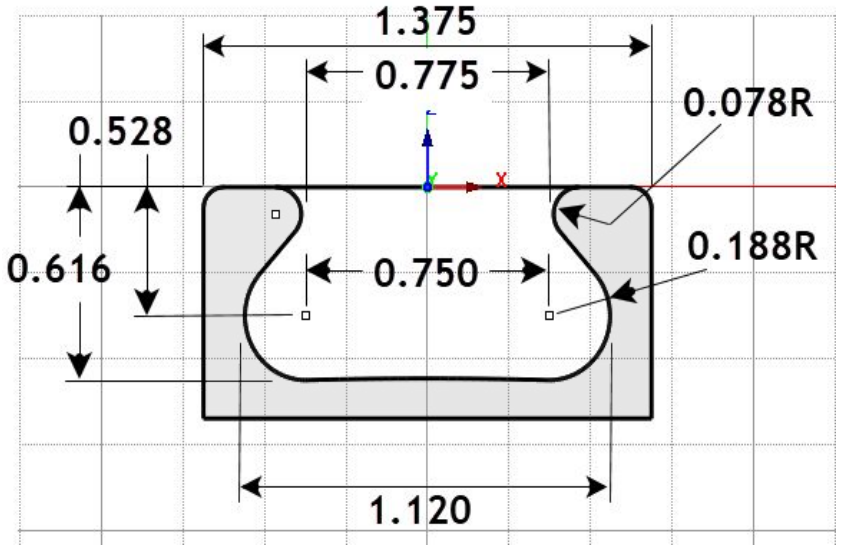
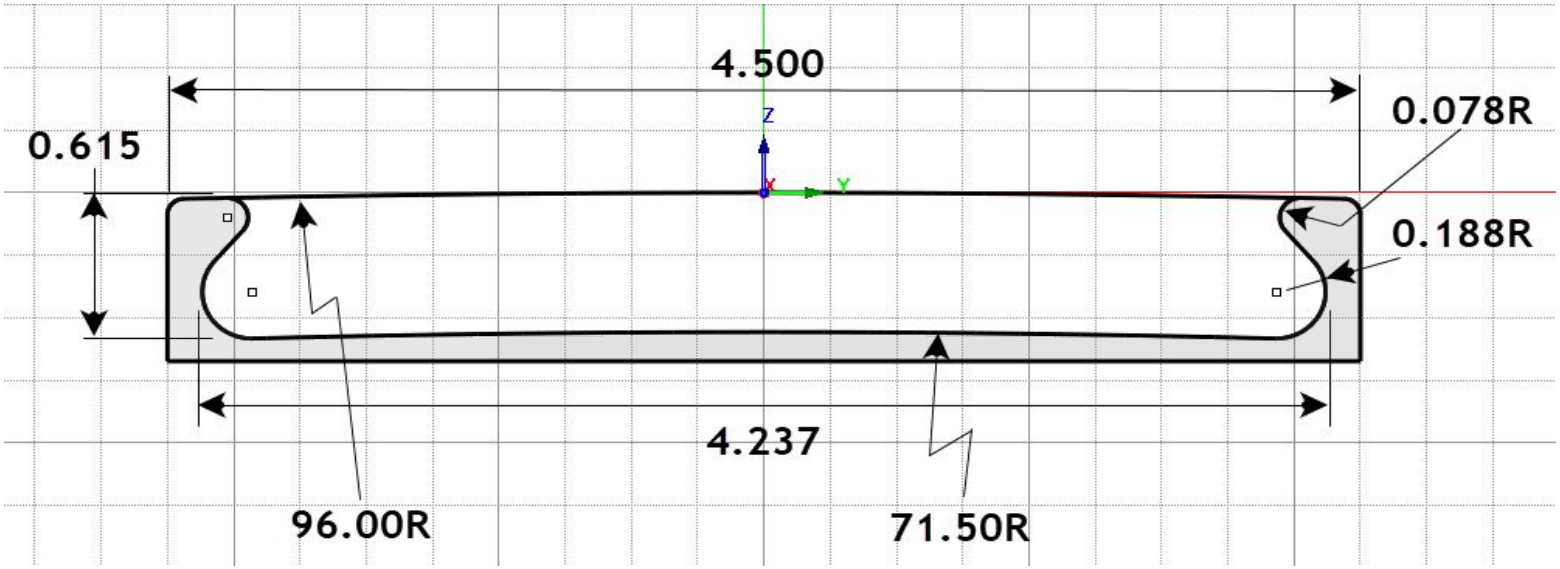
European Pearwood dresser with drawer pull design (inset) - Erpelding Furniture



Here we see the width section view of the Drawer Pull showing the dimensions of the undercut. The part is 1.375” wide and 0.676: High.

The length section of the Drawer Pull, shows that the top of the part and the bottom of the pull pocket are cut on a radius of 96.00” and 71.50” respectively. The arc at the base of the pocket requires special attention. This is not a simple flat-bottom pocket.

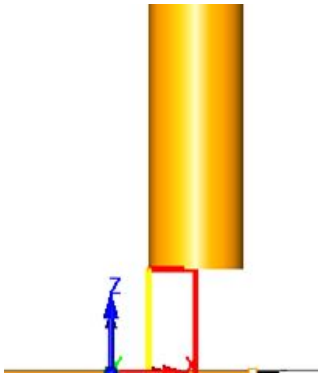


Here we see the Length section view of the Drawer Pull. As noted, the top of the part and the bottom of the pocket are cut on an arc. It is a very unique design that requires some very unique machining operations.

The Cutting Tools

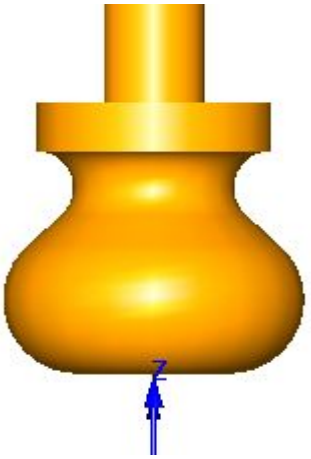
The Machining Job for this project will require three Carbide cutting tools. They are shown below listed in the Tools tab of the Machining Objects Browser (left side image). Two are standard tools, 1⁄4" Flat End Mill and ¼” Ball End Mill. The third is a custom tool. Custom tools, also referred to as Form Tools, can be defined by drawing the tool profile and then using the Custom Tool definition from the Create/Select Tools dialog.

Tool Library



¼ Flat End Mill

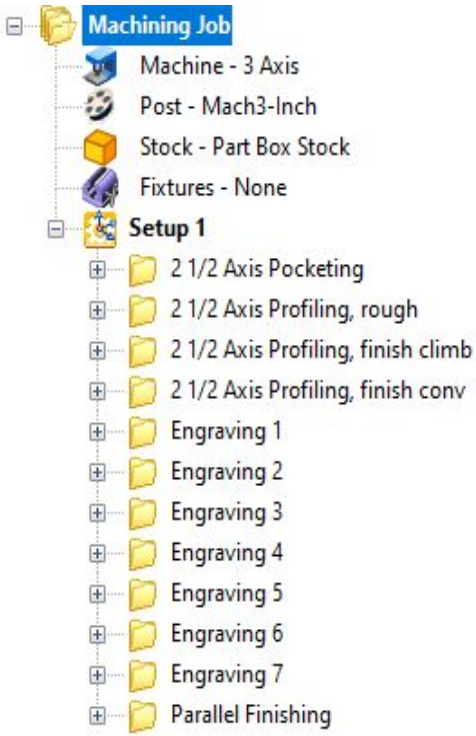
½” Ball End Mill



Custom Profile Tool

The Machining Job

Based on the part features described above, the following toolpath operations are used to machine this part. You will notice from the Machining Job shown below that there are seven 2 axis Engraving operations. These are the paths needed to machine the undercut. The Engraving operations 1 thru 6 are considered roughing passes while the 7th and final path is the finishing.

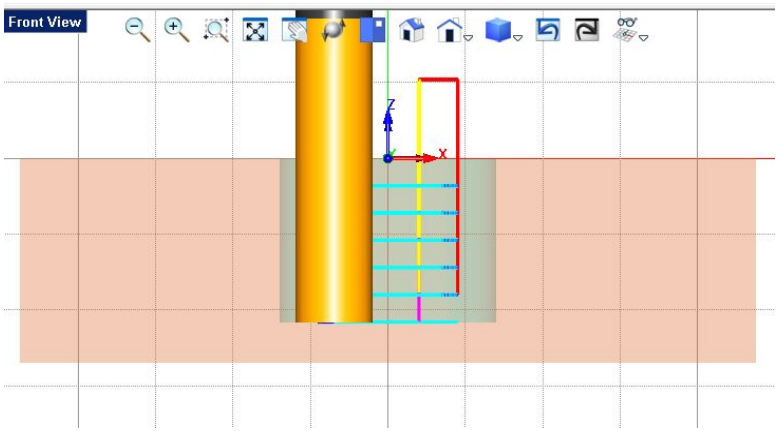


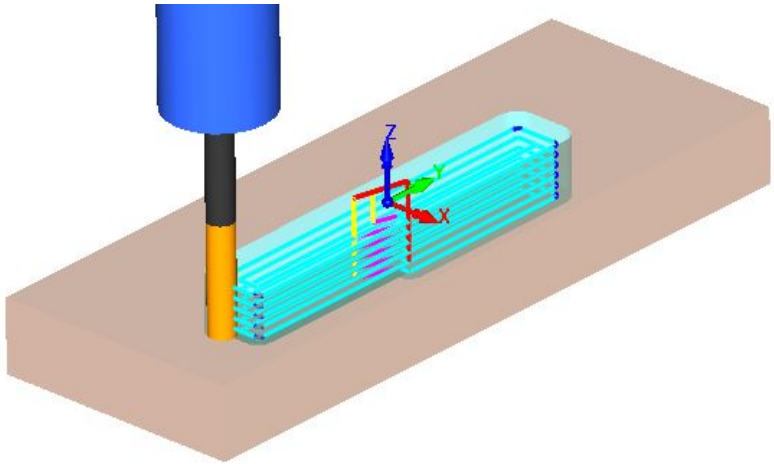
The Machining Job shown above consists of one Setup containing 2 axis and 3 axis roughing and finishing operations.

You will also notice from the Machining Job that the first operation is 2 axis pocketing. This serves as the roughing path to remove the bulk of material from the undercut pocket. The three 2 axis profiling operations rough and finish the perimeter of the part. The last 3 axis Parallel Finishing operation cuts the top of the part across the 96” radius.

2½ Axis Pocketing (Roughing)

This initial Pocketing operation is a roughing operation that uses a ¼” diameter Carbide Flat End Mill and cuts in 7 cut levels, each approximately ⅛” deep for a total depth of 0.54”. The cutter enters on a 10 degree ramp entry, Arc Fitting is enabled and the in-process Stock Allowance is 0.025”. You can refer to the illustrations below.

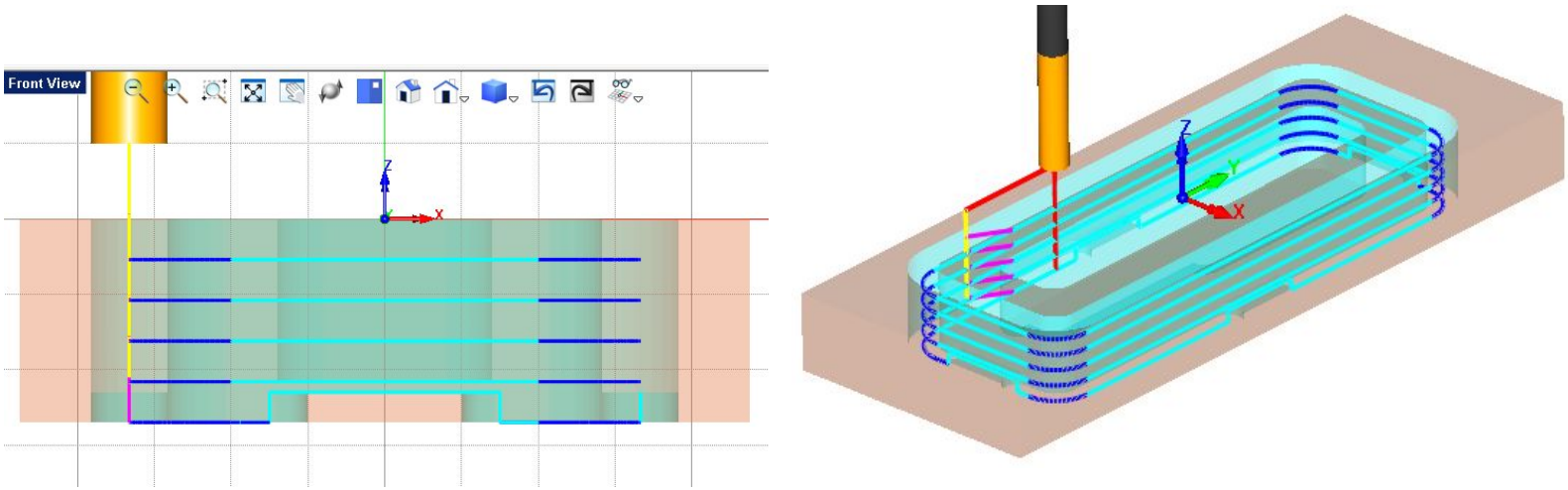




The first operation is 2 Axis Pocketing and serves as the first roughing operation.

2½ Axis Profiling (Roughing)

Next in the Machining Job are 3 consecutive 2 Axis Profiling operations to rough and finish the outer perimeter of the part using the same Carbide Flat End Mill. The first Profile cuts in 5 cut levels, each at 0.135” deep. This first Profile is a roughing operation leaving 0.02” of stock. You will also notice that all three Profiling operations have automatic Bridges and Tabs enabled with one tab on each side of the part. These tabs will serve to anchor the part to the remaining stock during machining and will be removed manually.

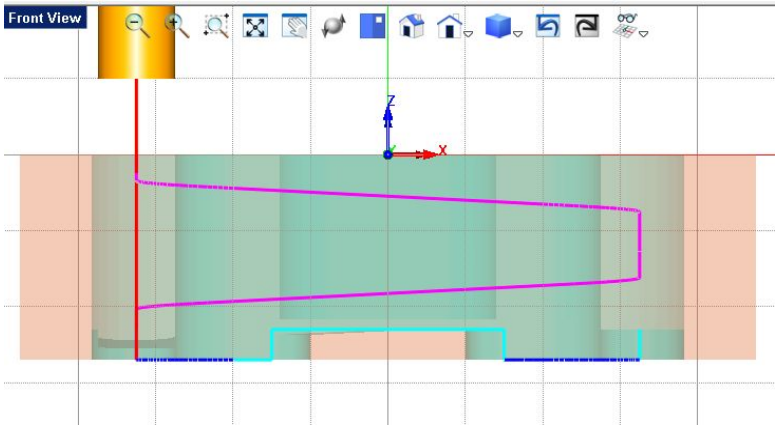


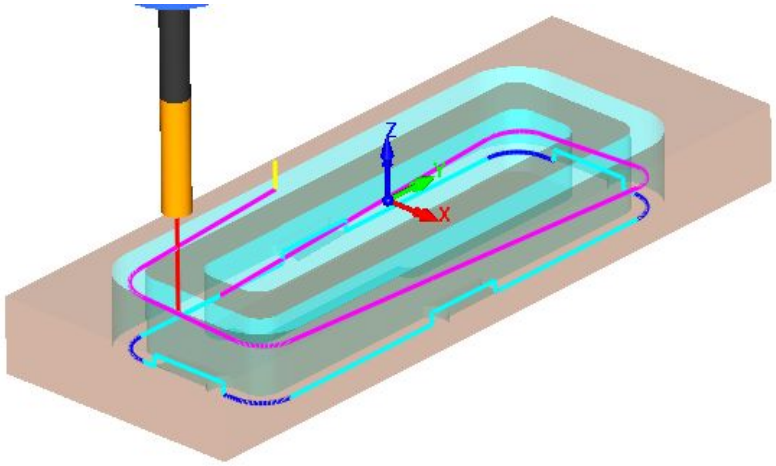
Here we see the first 2 Axis Profiling operations with multiple cut levels.

2½ Axis Profiling (Finishing)

The second and third Profiling operations are identical except for the direction of cut. The second operation uses a Climb (down cut) direction while the 3rd uses a Conventional (Up Cut) direction. Both operations have a 3 degree Ramp Entry (shown in magenta in the images below). Again, automatic Bridges and Tabs enabled are enabled with the same parameters as the first profiling operation.

Here we see illustrations for the three cut directions (Climb, Conventional and Mixed).

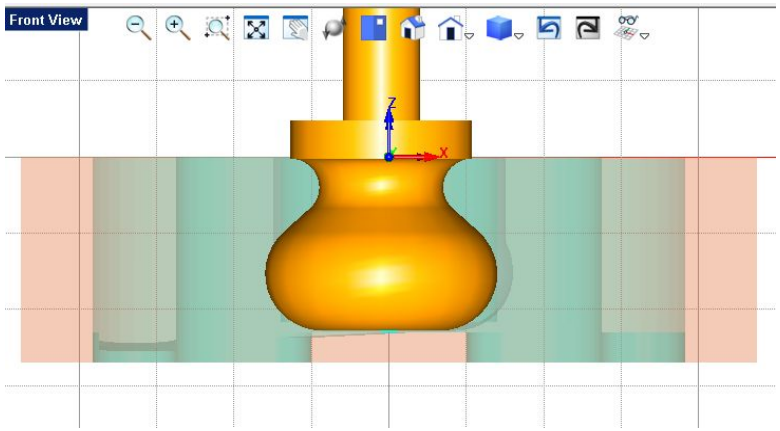


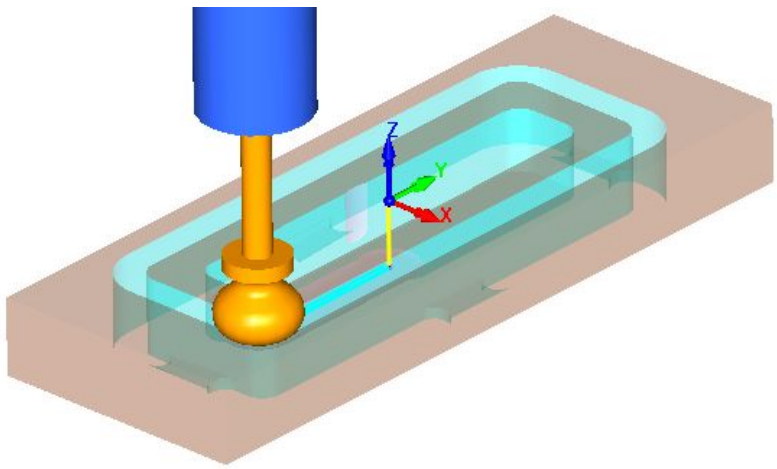


Here we see the third 2 Axis Profiling operations. This is the finish pass for the perimeter of the part. The 3 degree ramp entry is shown in magenta.

2½ Axis Engraving (Roughing)

The next seven operations in the Machining Job are all 2 Axis Engraving paths. During Engraving, the tip of the Custom Tool cutter will follow a predefined curve region. This provides the exact control needed to cut the undercut pocket. Each of the first 6 Engraving operations are considered roughing passes.

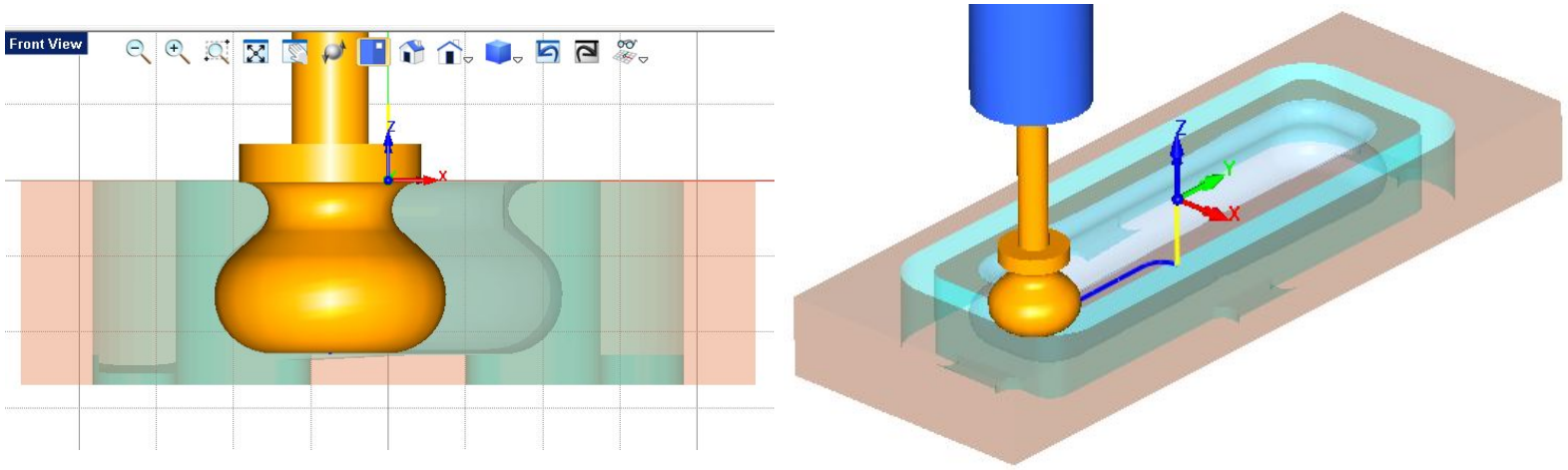




Here we see the Custom Tool profile cutter rough machining the undercut pocket. The toolpath is at the tip of the cutter.

2½ Axis Engraving (Finishing)

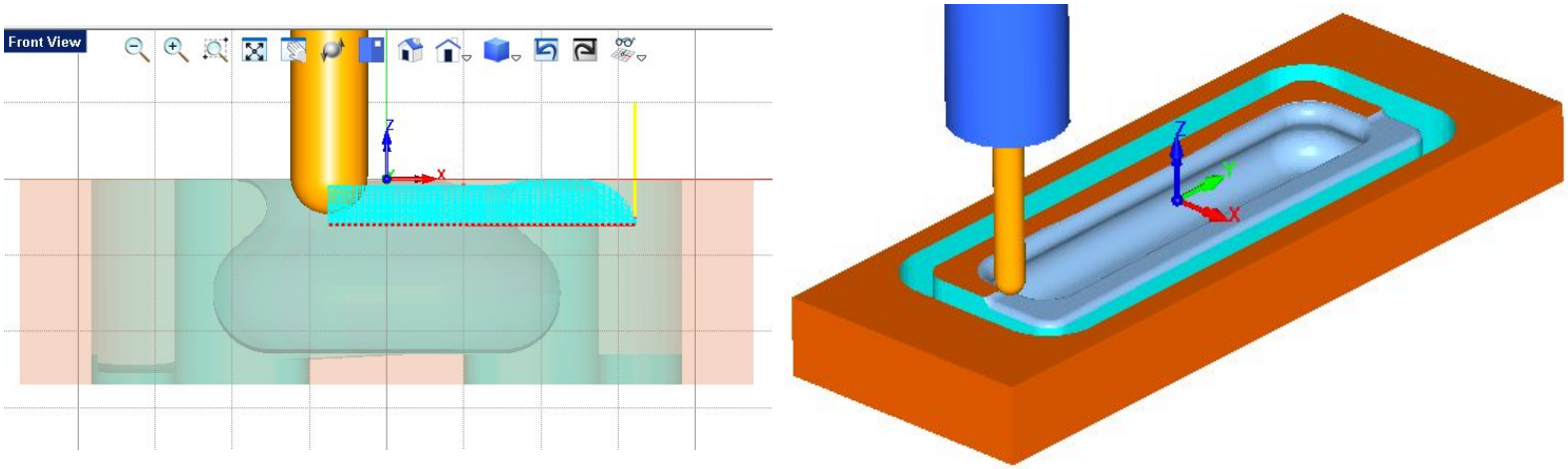
The last Engraving operation is considered the finishing path. The cutter profile is used to form each side of the pocket. While the previous 6 Engraving operations cut flat horizontal passes, for this final Engraving operation, the pre-defined curve region follows the exact curvature at the base of the undercut pocket.



Here we see the Custom Tool profile cutter finishing the undercut pocket. Again, the toolpath is at the tip of the cutter.

3 Axis Parallel Finishing (Final Finishing)

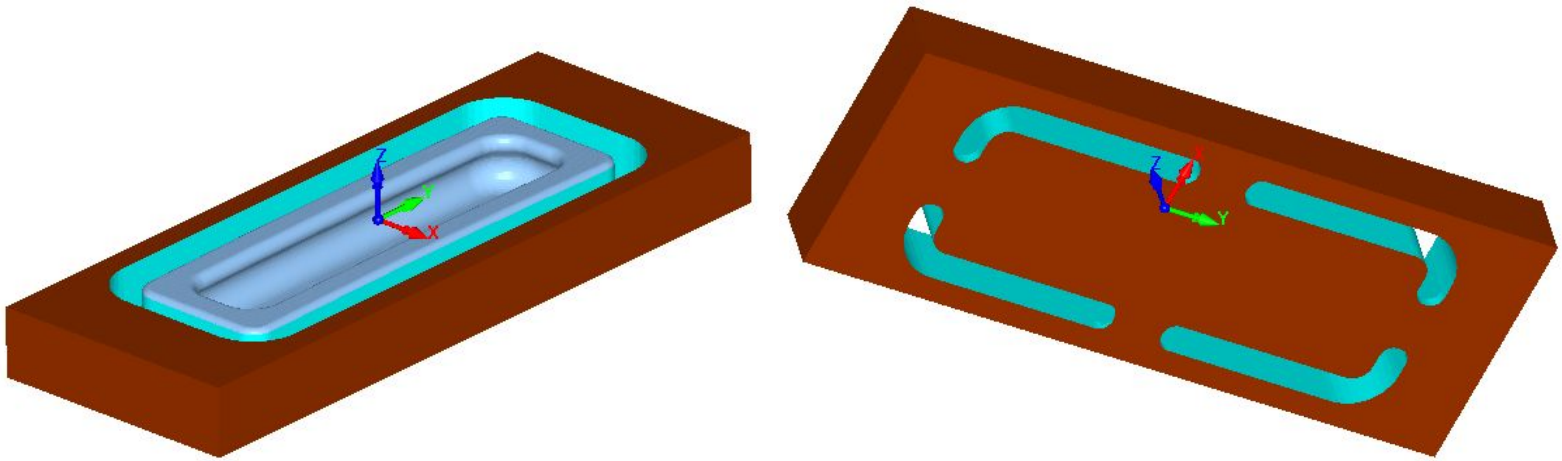
This final 3 Axis Horizontal Finishing operation finishes the 96” radius across the top of the part using a ¼” ball end mill. Cut parameters include a cutting tolerance of 0.001”, a mixed cut direction, a stepover of 0.01” and a Z depth containment of -0.15”.



Here we see the final finishing cut across the top 96” radius of the part.

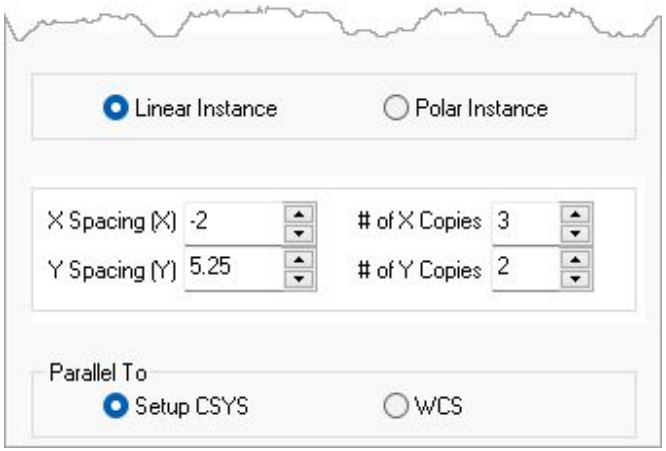
The Final part Simulated

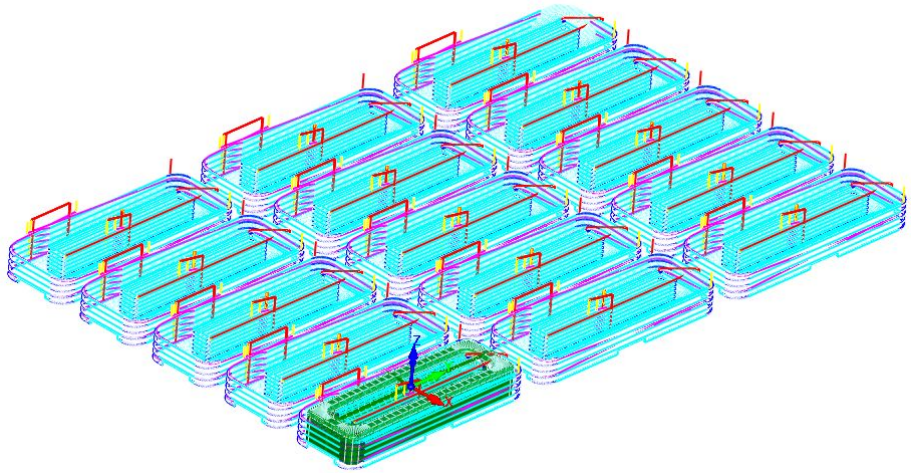
Below you can see the cut material simulation results after all operations in the Machining Job are simulated. You can clearly see the tabs that were left behind serving to keep the part attached to the stock during machining.



Cutting Multiple Copies

In this article we show how one part is programmed. Curtis needs 14 identical Drawer Pulls. He can do this easily using VisualCAD/CAM's XY Instancing feature. He will need 3 copies in the Y direction and 2 copies in the -X direction. The dialog and the resulting toolpaths are shown below.for r. To cut all 14 Drawer Pulls at the same time, you can use XY Instancing or even Work Offset registers.





Using the XY Instancing function in VisualCAD/CAM is easy. Just specify the X and Y offsets and the number of copies and the instancing takes place, well instantly!

More About Curtis Erpelding

My design interests and inspirations have always been eclectic. Scandinavian modern design and traditional Japanese wood joinery as well as the classic styles of 18th century England and France are important influences . Architecture, both ancient and modern, informs my sense of proportion and use of ornamental detail. I love fusion. The challenge is to connect disparate elements harmoniously into a new look.

Curtis Erpelding, Proprietor, Erpelding Furniture

We want to extend a special thanks to Curtis Erpelding and his team at Erpelding Furniture for allowing us to showcase his work with RhinoCAM!

Cool project!

Thank you Curtis Erpelding Furniture for allowing us to showcase your work!

You can reach out to Curtis Erpelding using the following links.

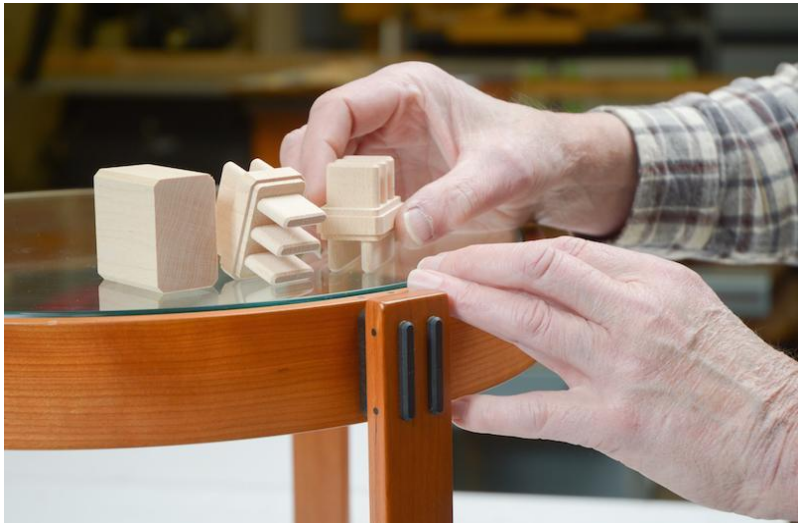
Email: curtiserpelding@aol.com

Pricing and ordering: http://curtiserpelding.com/priceOrder.html

Home page: Curtis Erpelding Bentwood Furniture Collection

More Pics From Curtis Erpelding's Shop

Below are some additional pics from Erpelding Furniture. The quality and details are unmatched!



Curtis Erpelding Furniture

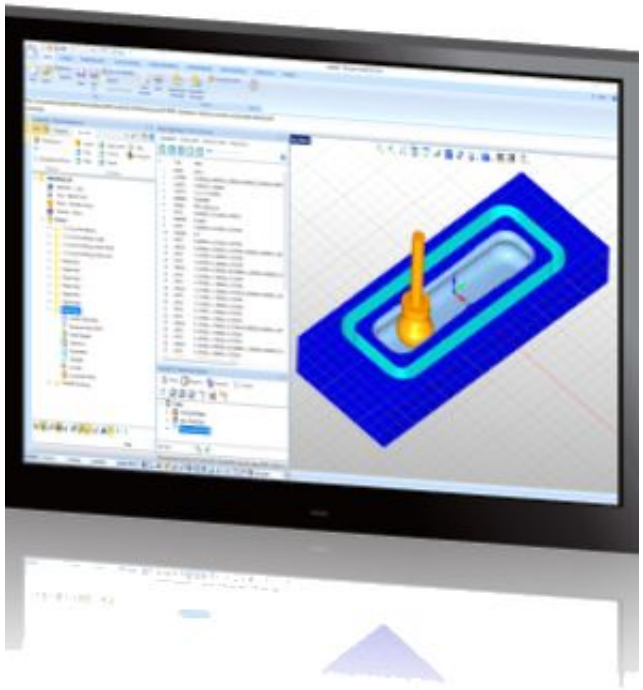
VisualCAD/CAM®

Want to see how VisualCAD/CAM can help you? Click Here to download a demo!

More about VisualCAD/CAM

VisualCAD/CAM MILL (VisualMILL) is available in 5 different configurations (Express, Standard, Expert, Professional and Premium). The parts shown in this article were programmed using the Professional configuration. Here are some additional details about each of the available configurations. For the complete features list, visit the VisualCAD/CAM Product Page.

- **VisualCAD/CAM MILL Express**: This is a general-purpose program tailored for hobbyists, makers and students. Ideal for getting started with CAM programming. Includes 2 & 3 axis machining methods. Includes ART & NEST modules as well!
- **VisualCAD/CAM MILL Standard**: This configuration includes everything that is in the Express configuration plus additional 2-1/2 Axis, 3 Axis & Drilling machining methods. Also now includes 2½ Axis Turning!



- **VisualCAD/CAM MILL Expert**: Suitable for 4 Axis rotary machining. Includes the Standard configuration, plus 4 Axis machining strategies, advanced cut material simulation and tool holder collision detection.
- **VisualCAD/CAM MILL Professional**: Ideal for complex 3D machining. Includes the Standard and Expert configuration, plus advanced 3 Axis machining strategies, 5 Axis indexed machining, machine tool simulation, graphical toolpath editing and a host of other features.
- **VisualCAD/CAM MILL Premium**: Tailored for complex 3D machining with both 3 Axis and full 5 Axis methods. Includes the Standard, Expert and Professional configurations, plus 5 Axis simultaneous machining strategies.