



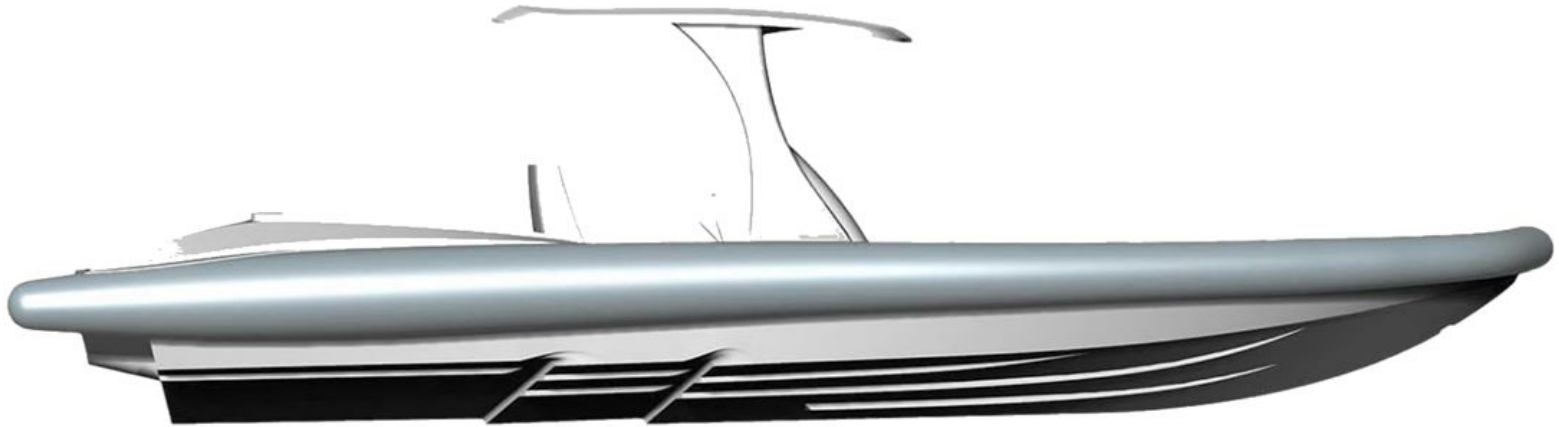
RhinoCAM at AirShip Ribs

[Airship Ribs](#) (Vermilion, OH) took shape in 2005 when three offshore powerboat racers entered into an agreement to start a boat building company. A unique opportunity was presented - to use technology learned on the racing circuit in the building of high technology boats that still represented value and excellent quality at a fair price.

The 31-foot [Model AirShip 310](#) shown below was developed to accept twin-engine installations. Long distance customers wanted the extra reliability of twins, and the extended cruise range with optional larger fuel capacity. That being said, the 310 is an exceptional performer with a single engine.

In July of 2018, an Airship 310 beat the sanctioned single engine outboard record around Long Island by half!





The AirShip 310



The RhinoCAM Difference

Mike Mihalek is the Shop Floor Manager at Airship Ribs and is one of the designated users of their [Rhinoceros CAD \(Rhino\)](#) and the [RhinoCAM plugin from MecSoft Corporation](#) to generate the CAM g-code programs to run their [5x10 CMS Athena 5 Axis Machining Center](#). You can learn more about [Airship Ribs RhinoCAM](#) configuration in the section below. We recently sat down with Mike to discuss his use of [RhinoCAM](#) at Airship Ribs. Here is some of what Mike had to say about RhinoCAM.

“We chose RhinoCAM as our CAM solution because it integrated very well with Rhino. This made our shop floor implementation, training and support much easier than expected.”

Mike Mihalek, Shop Floor Manager,

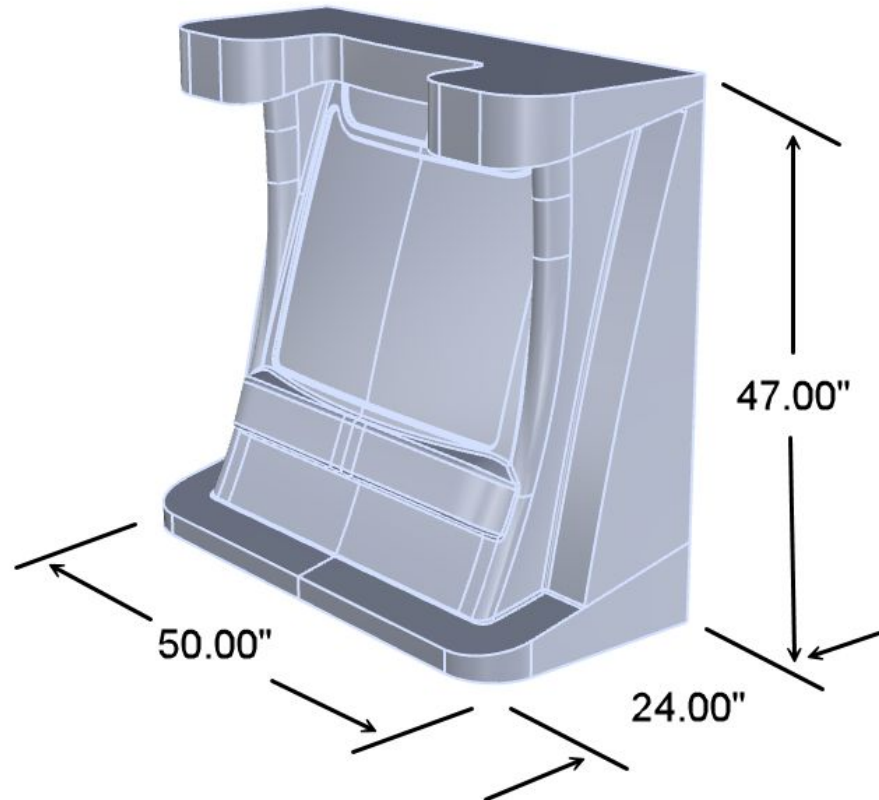
AirShip Ribs, Vermilion, Ohio



The Part to Machine

The part for this case study is the master core plug for a hard top windshield support used on the [Model AirShip 310](#) craft. The core plug is used to lay up composite materials for marine applications. Layup refers to the process of laying a composition of materials over a core plug that represents the shape of the final part.

The composition of materials include fiberglass sheets infused with bonding agents. Once the composite has cured, it is removed from the core and further shaped either mechanically or manually. The images below show the [RhinoCAM](#) part geometry and the in-process and completed core plug for the [Model AirShip 310](#).



The RhinoCAM part geometry and basic dimensions.



The core plug is still in the CMS Athena 5 Axis Machining Center.



The finished core plug, one of several that are ready for layup.

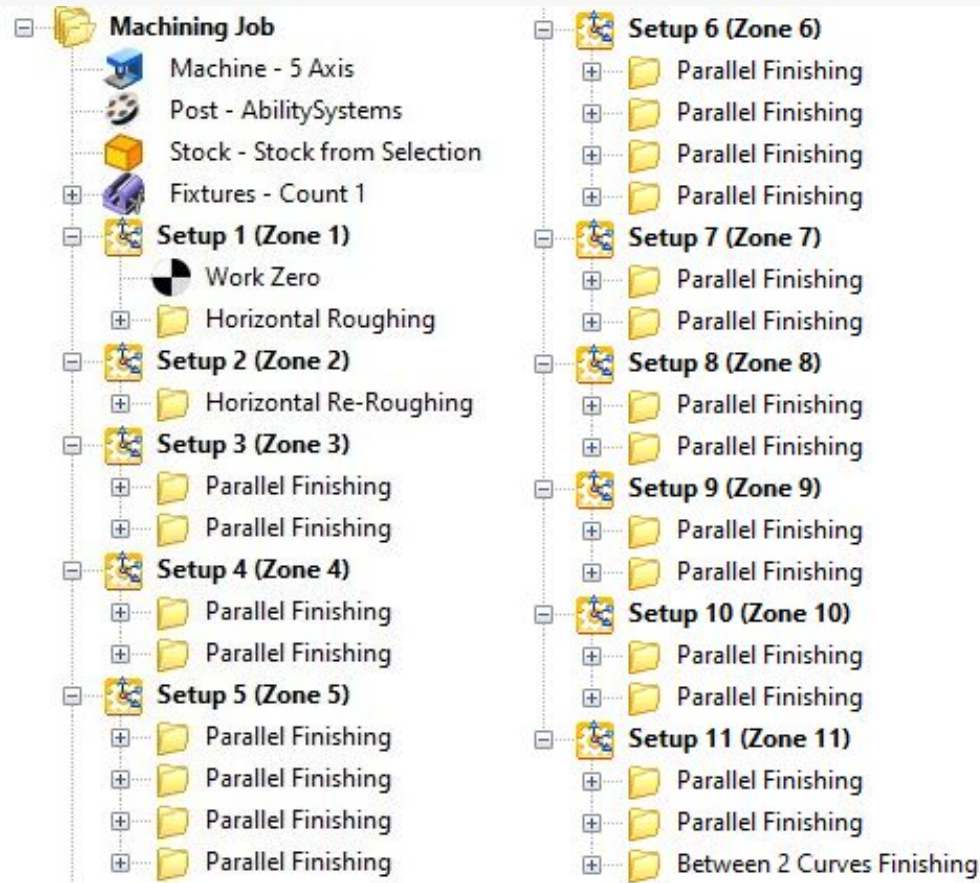


Index 5 Axis Setups

Due to the size and complexity of the part geometry, a total of 11 indexed 5 axis Setups are created, each assigned a specific zone on the part to be machined. Each of these indexed Setups are shown in the Machining Job tree below. Note that the Machining Job is broken into 2 sections in order to fit it on this page.

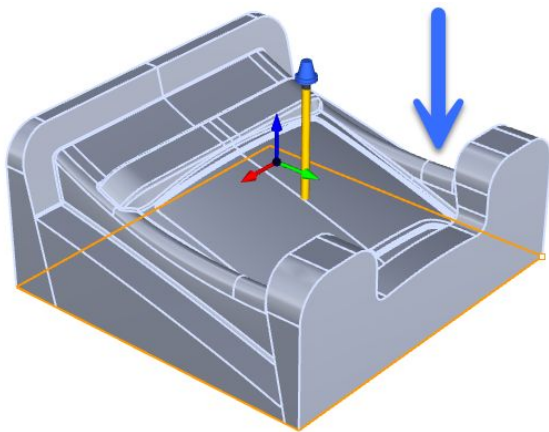
The Machining Job begins with one 3 Axis Horizontal Roughing operation (Zone 1) followed by a 3 Axis Horizontal Re-Roughing operation (Zone 2). Both zones are identical as far as orientation and containment is concerned. In Zone 2, the Re-Roughing operation calculates the remaining in-process stock left behind after the roughing in Zone 1 is completed.

Zones 3 through 10 all contain 3 Axis Parallel Finishing operations to remove the remaining stock. Zone 11 contains two Parallel Finishing operations and one Between 2 Curves Finishing operation. The posted g-code will contain the multi-axis rotation codes necessary to navigate from one setup to another.

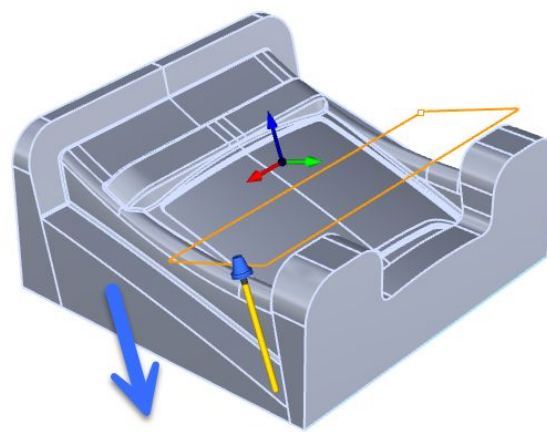


The RhinoCAM Machining Job tree is shown above broken into two sections. It shows a total of 11 Setups. The duplicate 3 Axis Parallel Finishing operations are each cut in opposite directions for complete coverage and optimum surface quality.

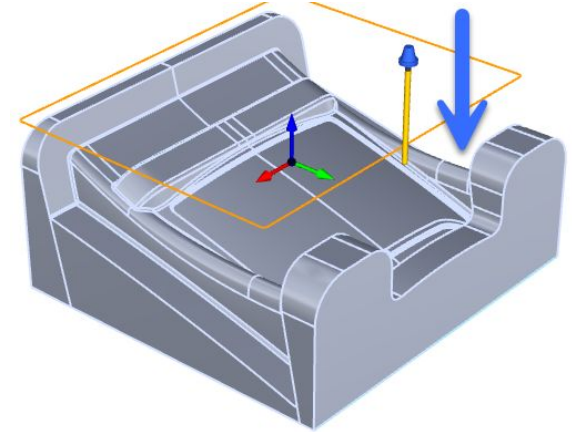
In the part images below, we show the Setup for each Zone. We have added a blue arrow to indicate the direction and orientation of the cutting tool in that zone. Also, the closed perimeter curves (shown in orange) indicate how the cutting tool is contained within that zone. You can also refer to the Indexed 5 Axis Cut material Simulations below for the in-process stock after each zone is machined.



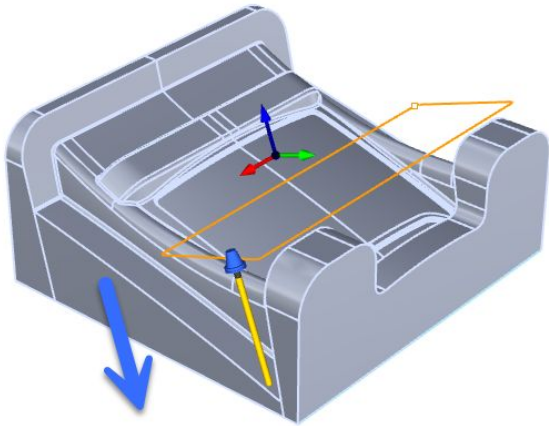
Setup 1 (Zone 1)



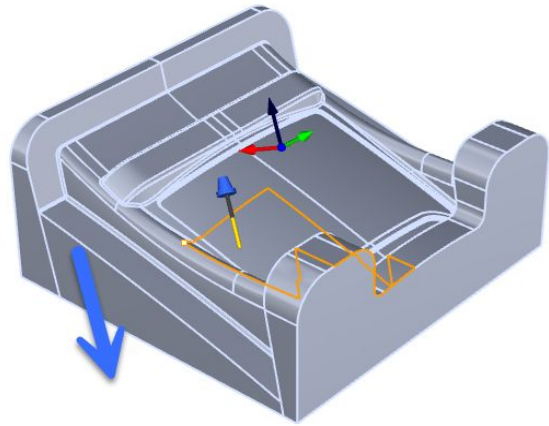
Setup 2 (Zone 2)



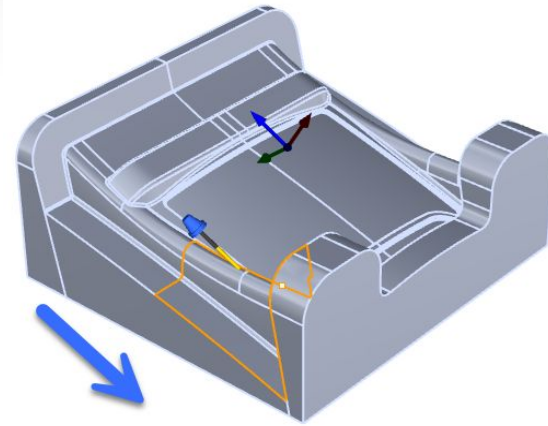
Setup 3 (Zone 3)



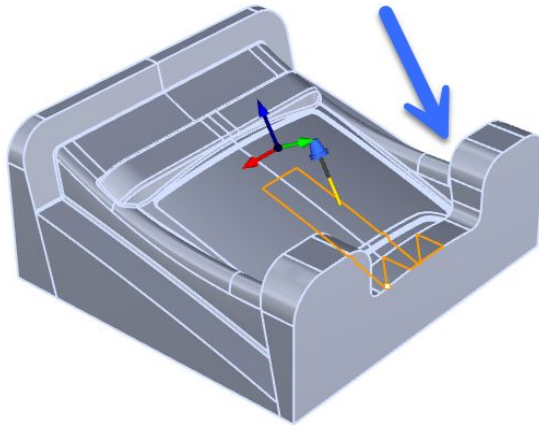
Setup 4 (Zone 4)



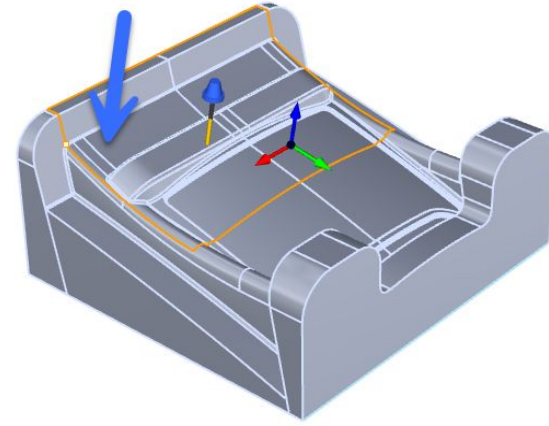
Setup 5 (Zone 5)



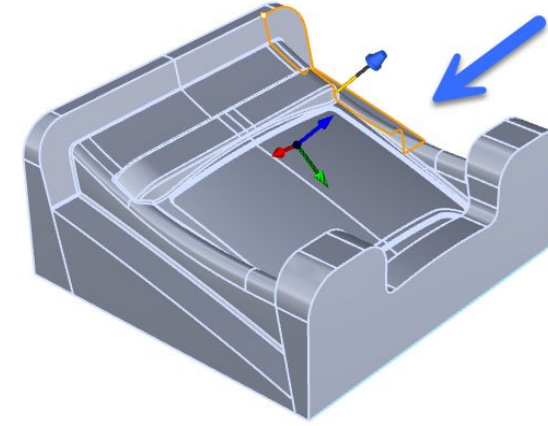
Setup 6 (Zone 6)



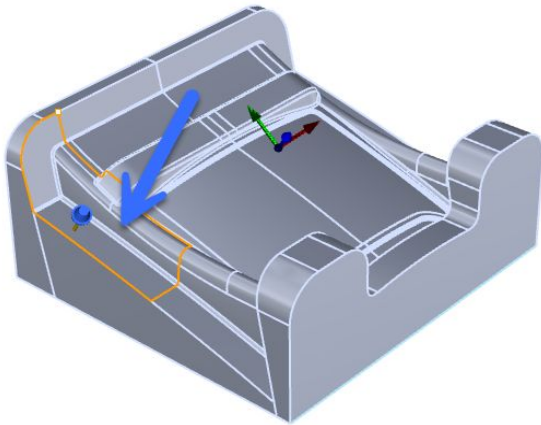
Setup 7 (Zone 7)



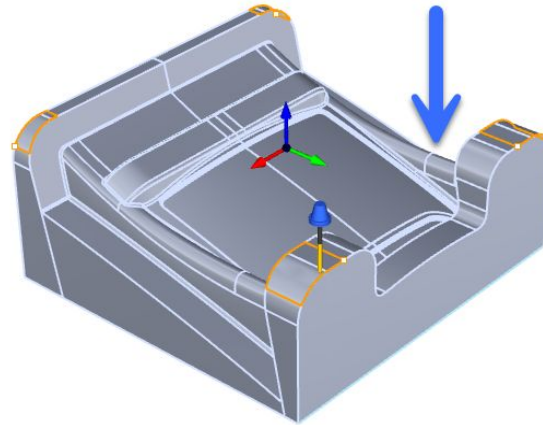
Setup 8 (Zone 8)



Setup 9 (Zone 9)



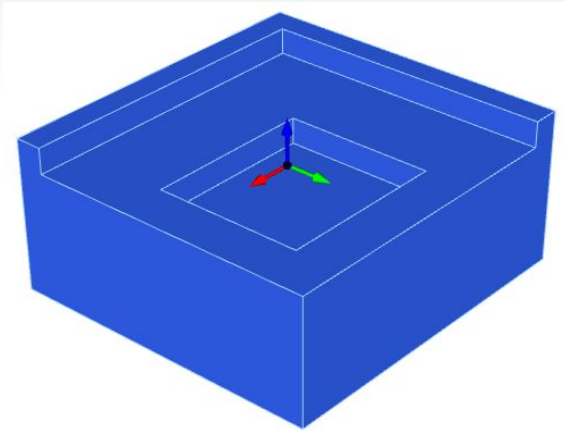
Setup 10 (Zone 10)



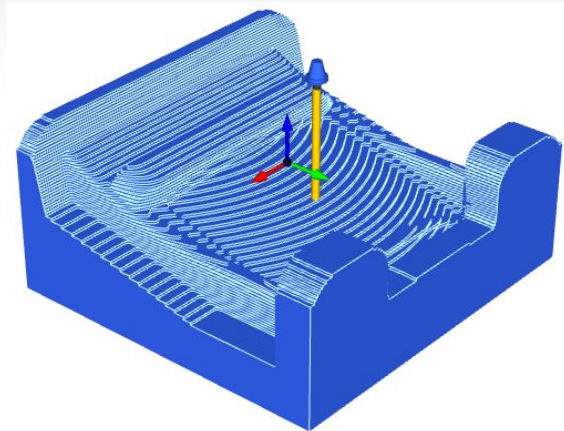
Setup 11 (Zone 11)

Index 5 Axis Cut Material Simulations

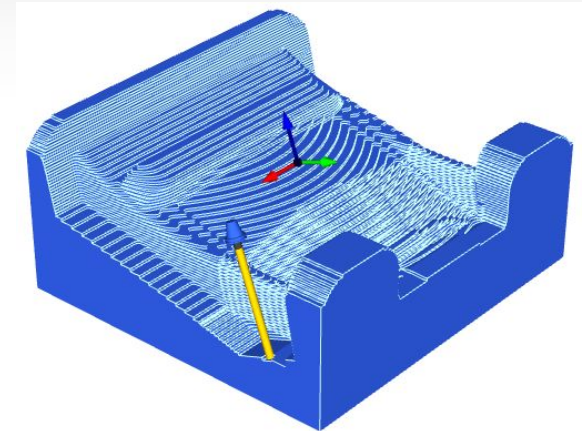
The illustrations below show how the in-process stock material will look after each Setup zone is machined. In the first illustration (top left) you see how the Stock from Selection appears prior to machining. The illustration at Zone 11 below (the last image on the right side) shows how the part will look when all zones are machined.



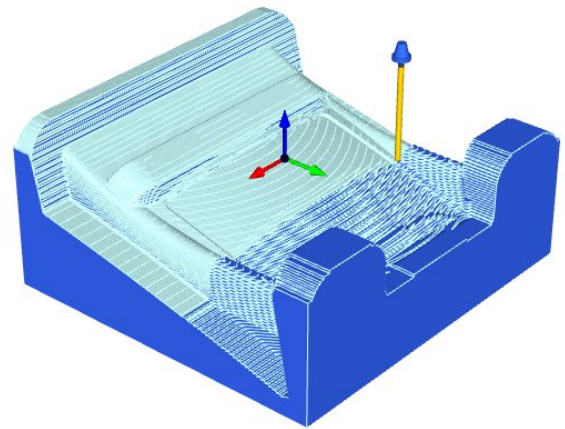
Setup 1 (Zone 1)



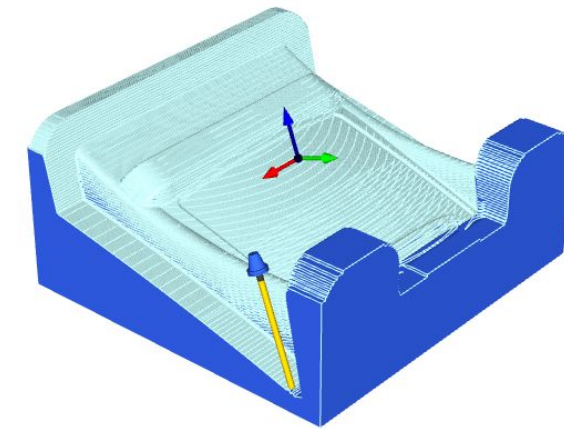
Setup 1 (Zone 1)



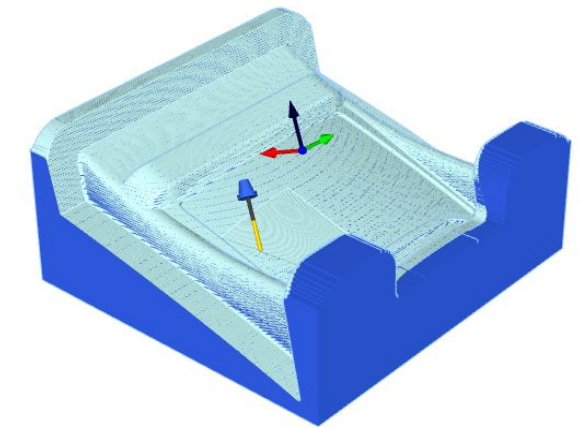
Setup 2 (Zone 2)



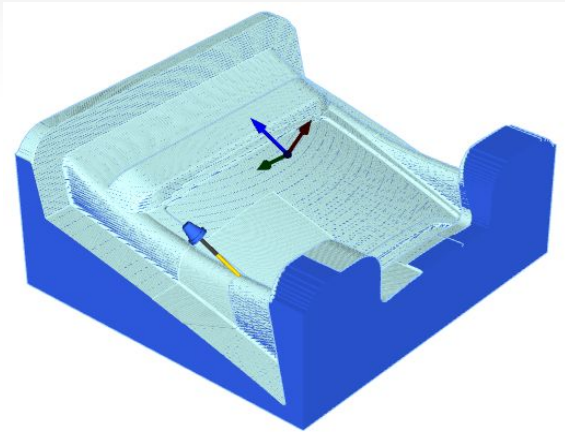
Setup 3 (Zone 3)



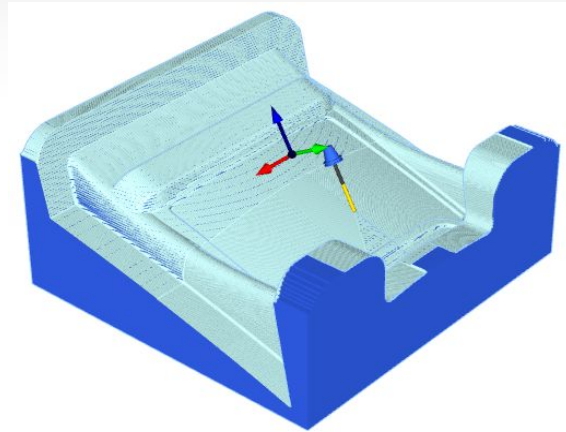
Setup 4 (Zone 4)



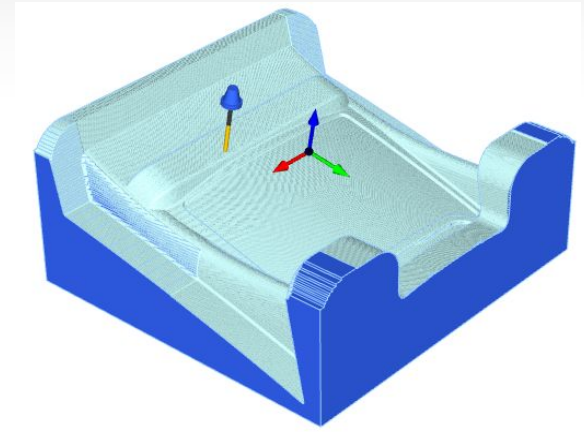
Setup 5 (Zone 5)



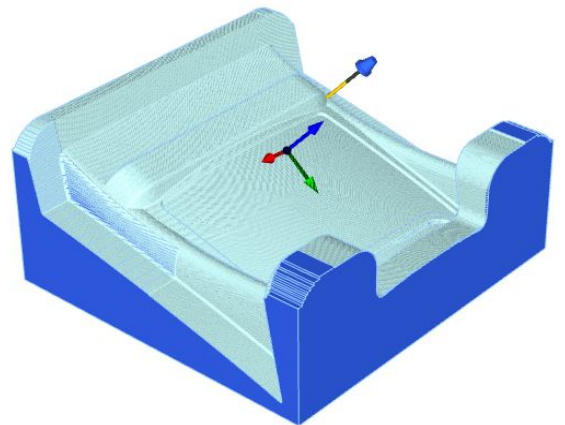
Setup 6 (Zone 6)



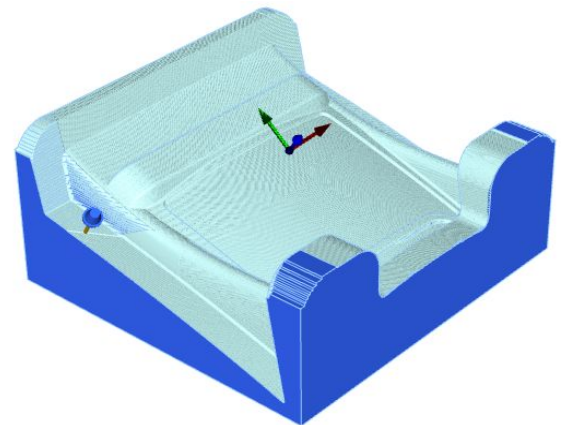
Setup 7 (Zone 7)



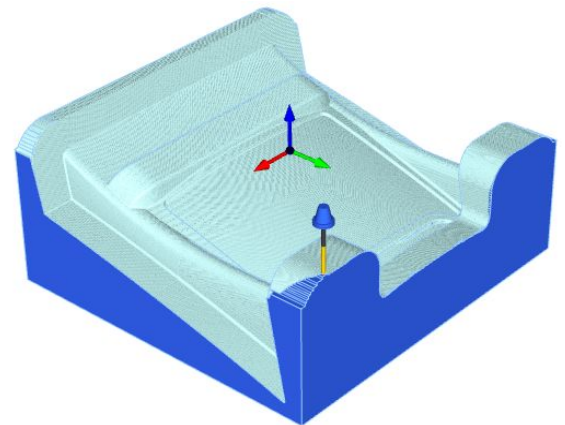
Setup 8 (Zone 8)



Setup 9 (Zone 9)



Setup 10 (Zone 10)



Setup 11 (Zone 11)

The Final Product

In the images below we see the completed component and the final assembly for the hard top windshield support ready to be assembled into Airship Rib's [Model AirShip 310](#) craft.

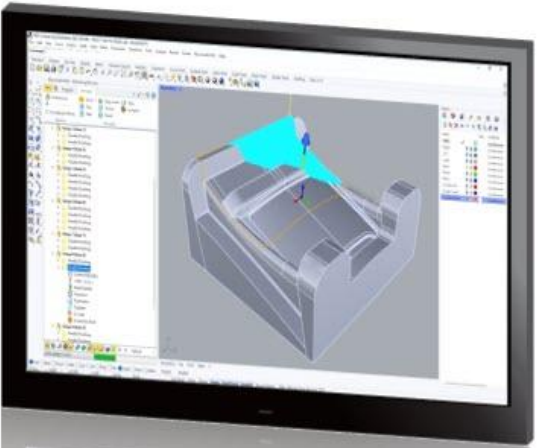
Sweet!



The finished component prior to assembly



The completed assembly



Cool project Mike!
Thank you for allowing us to showcase your work!





More about Airship Ribs

The folks at Airship are Passionate about building and developing the world's most technically advanced RIB. Their customers' build requirements, ideas, and desires are thoughtfully executed with each Airship delivery. Airship's goal is to provide a product that is versatile, quality-driven, and offers value regardless of use.

As the world moves forward with technology, material and product advancements, Airship stands committed to their customers as they take the lead in these fields. No idea is too small, or too big. No two Airships are ever the same.

Your Airship is waiting for you. Let's ride!

[The Airship Product Models](#)



We invite you to follow Airship Ribs online:

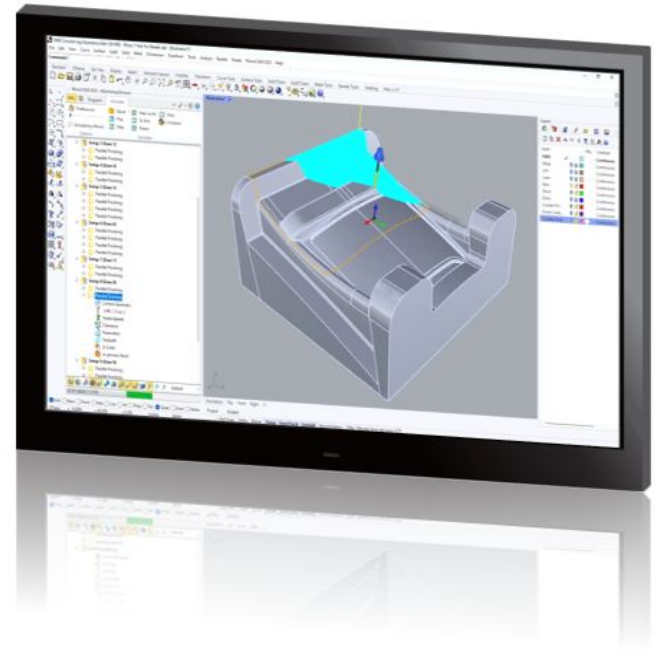




More about RhinoCAM

RhinoCAM - MILL is available in five different configurations (Express, Standard, Expert, Professional and Premium). The part shown here was programmed using the 5 Axis Premium configuration. Here are some additional details about each of the available configurations. For the complete features list, visit the [RhinoCAM Product Page](#).

- **RhinoCAM 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!
- **RhinoCAM MILL Standard:** This configuration includes everything that is in the Express configuration and additional 2-1/2 Axis, 3 Axis & Drilling machining methods. Also now includes 2½ Axis Turning!





- **RhinoCAM 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.
- **RhinoCAM 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.
- **RhinoCAM 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.

For the complete features list, we invite you to visit the [RhinoCAM Product Page](http://mecsoft.com/rhinocam):
mecsoft.com/rhinocam

Try RhinoCAM Today!

Powerful production CAM for Rhino users!