

Foamlinx Uses VisualCAM[®] to Fly High for Elytron Prototype Aircraft

[Foamlinx](#) – parent company of “We Cut Foam”, is a company that began selling foam cutting machines at around the turn of the century. Today, sixty (60%) percent of their sales is hot wire machines and forty (40%) is CNC routers that are commonly used to cut industrial foam. As machine sales slowed during the economic slump, an additional company was formed that offered the service of cutting, machining, shaping, and finishing foam products directly for their customers. These two complementary companies now provide full service to the foam cutting industry.

The service company that provides machining and finishing of foam products uses **Geomagic Design[®]** for modeling the designs that their customers require. For parts that require more complex contour milling and shaping, they purchased and use **VisualCAM[®] for Geomagic** to create tool paths on surfaced CAD models. **VisualCAM[®]** is fully integrated into **Geomagic** so the transition between CAD and CAM is easy and convenient with no need to translate CAD models. They also take in CAD geometry models directly from customers through standard formats such as IGES and STEP. They do some fascinating work from simple to very complex shaping and coating, as you can see in the pictures that follow.

Foamlinx has made products ranging from artistic items, such as logos and symbols, advertising signs and props to technical objects, like aero-wing designs and automotive prototypes. Just a few of the companies that they have provided service to include: Raytheon, Google, Boeing, Universal Studios, and more.

Foam Based Wingbox Project for ELYTRON Aircraft Inc.

About the Prototype Aircraft

The unique Elytron 2S design from Elytron Aircraft combines three sets of wings: one pair of rotary wings called "proprotors", mounted on a single tilt-wing in central position, and two pairs of fixed wings. The fixed wings are split into a forward pair and an aft pair that are joined by winglets, which make use of the joined-wing concept. By splitting the wings apart, the design eliminates any interference with the thrust of the proprotors. You can read more about this unique design at the [ELYTRON website](#).



Wingbox Design Challenges

Traditionally, wingboxes are built quite similarly to a wing section, with a higher density of ribs and spars, but are built from aluminum and other metal alloys.

The challenges for a foam-based wingbox were numerous:

- Cutting a network of deep inner ribs
- Ensuring that the CNC machining could cut both inner and outer walls
- Cutting surfaces were friendly to carbon lamination
- The ability to laminate using low-cost bagging techniques

The CAD and CNC CAM Process

The wingbox design itself was complex and required the machining from both sides of the core to accurately follow the complex contours of the inside structure as well as the outside airfoil skins. The original CAD design was completed using SolidWorks and then delivered to Foamlinx in a CAD-neutral data format such as IGES and STEP CAD files.

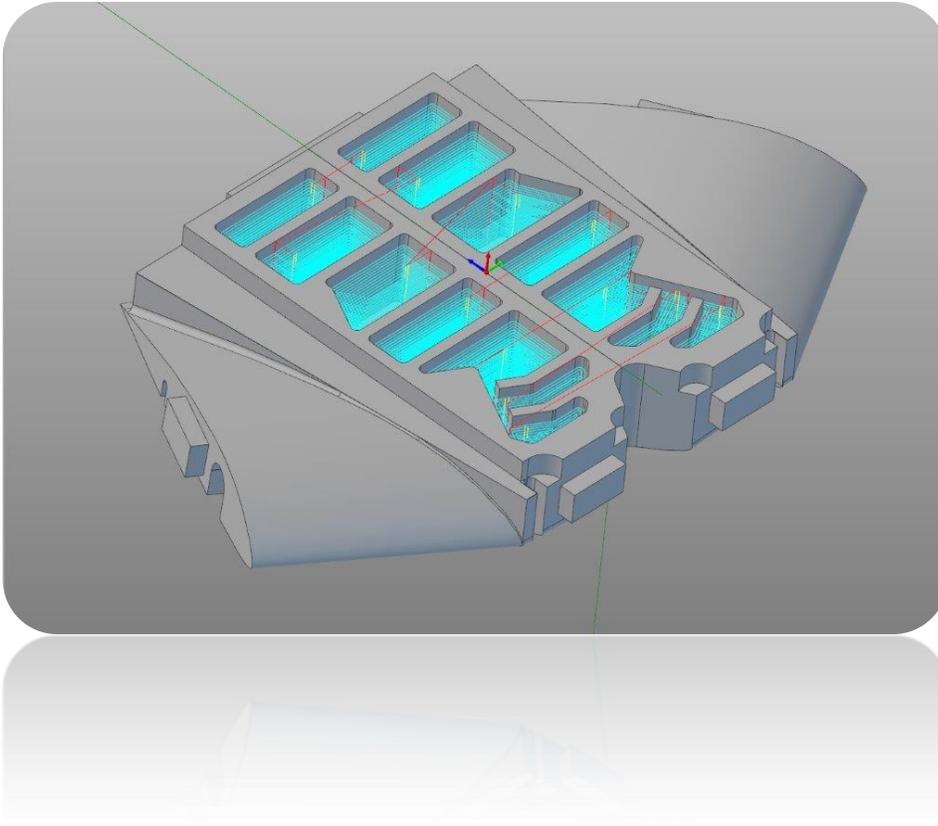
Foamlinx then opened the CAD neutral file in **Geomagic Design®** and used **VisualCAM® for Geomagic®** to program the complex toolpath operations required to machine the part on their 3-axis CNC cutter.



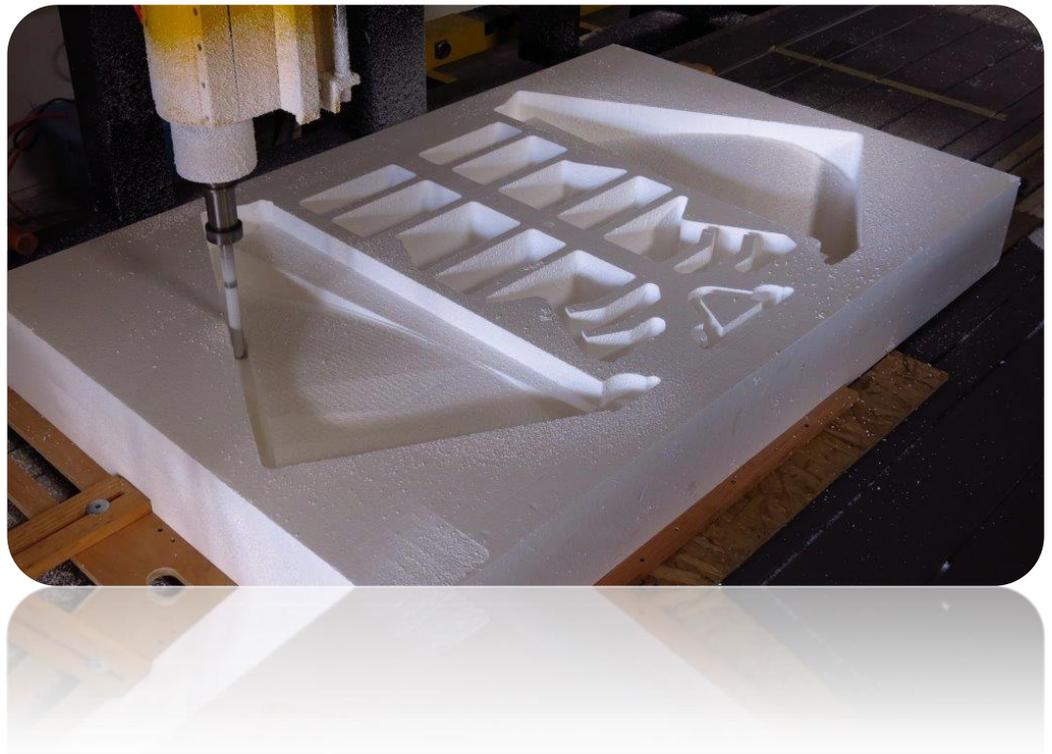
“The resulting single part was more than satisfactory and very light at about 9 lbs for the bare foam core. This is remarkable because a wingbox design such as this may experience several thousand pounds of stress loads in flight.”

The following images show the several stages of the wingbox assembly, the finished core with the wood bulkheads and titanium tubing spars ended up at 21 lbs and finally, 31 lbs after all the carbon lamination was completed.

The results are impressive for a part that will withstand 100x times its weight in lifting forces!!



The wingbox 3D CAD model with toolpaths created and displayed in **VisualCAM[®] for Geomagic**



The wingbox foam core being machined on Foamlinx's 3 Axis CNC Router



The wingbox foam core with wood bulkheads and titanium tubing spars



The completed wingbox with carbon lamination





The completed Elytron 2-Seater prototype from Elytron Aircraft

To see more of Foamlinx's use of **VisualCAM[®] for Geomagic**, go to their [website](#) and check out their 'Machining' web page.