Rocket Composites

Use Case – Composite Tooling With OpenAM Software

Customer Profile

Rocket Composites manufactures high-quality carbon fiber parts for clients in the aerospace, automotive, consumer, and medical device industries. The company prides itself on creating customized production parts in low and high volumes that meet each client's needs.

Challenge

A client order for custom carbon fiber parts required fabricating a composite layup tool and trim fixture. Engineers chose to 3D print them with their Fortus 450mc™ printer since this would be faster and more economical than machining them from aluminum. The layup tool was printed with ULTEM™ 1010 resin and the trim fixture with ABS-CF10 carbon fiber material. However, FDM® technology's inherent porous nature due to layer-by-layer construction would not provide the desired surface finish for both tools, which would require post-processing. Additionally, ABS-CF10 is not available on the Fortus 450mc and is currently compatible only with F123 Series™ printers, which Rocket Composites does not possess.

Solution

For a solution, engineers installed OpenAM™ software on their Fortus 450mc which "opens" the printer, allowing them to alter print settings to optimize results. Engineers created custom print profiles for ULTEM™ resin and ABS-CF10 to increase parameters like flow factor, extrusion temperature and raster penetration while slowing the raster fill velocity. OpenAM software also allowed engineers to add ABS-CF10 as an additional material to the Fortus 450mc for the trim fixture, which otherwise wouldn't be possible without OpenAM software.

Impact

Tuning the ULTEM™ 1010 resin and ABS-CF10 print parameters resulted in tools that exhibited no porosity, providing surface finishes that met each tool's design intent. In addition, the ability to use a non-bill-of-material FDM filament on its Fortus 450mc printer allowed Rocket Composites to make an optimal material choice for the trim tool application. The capabilities enabled by OpenAM software saved Rocket Composites $5700 and reduced delivery time by a week compared with the alternative machined-metal solution.
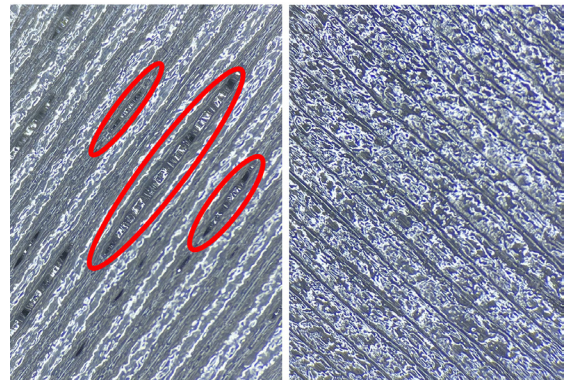
Magnified images of ABS-CF10 with porosity (bead gaps) circled on the left and no gaps after tuning with OpenAM on the right.

Finished carbon fiber parts produced from the 3D printed layup and trim tools.

Time Savings

One Week

Cost Savings

$5700