COMPOSITE ENVISIONS KNOWLEDGE HUB
PRACTICAL AND INSIGHTFUL COMPOSITES INFORMATION

WHAT DOES AEROSPACE GRADE FIBER REALLY MEAN, AND DO YOU NEED IT?

COMPOSITE ENVISIONS

AEROSPACE GRADE COMPOSITES

INTRODUCTION

“Aerospace Grade” is commonly referenced in the composite industry as establishing a basis of the highest standard within composite grade materials. Sold as the best, most advanced materials on earth, right? To an extent yes, aerospace grade composites are industry leading. But that’s not exactly what the term means. “Aerospace Grade” implies that any material, part, fiber, or resin system is suitable for placing on an aircraft.

DEFINING AEROSPACE GRADE

Everything inside commercial aircraft goes through a process called “certification” The Federal Aviation Administration (FAA) sets a standardized process for literally everything that is within an aircraft becoming “certified”. Certified aircraft have aerospace grade everything: bolts, aluminum, windows, adhesives, rivets, screws, carbon fiber fuselage(s), titanium plating and pretty much anything else you can imagine. Each piece that goes onto an aircraft or aircraft engine is certified to a respective aviation standard that makes it “aerospace grade”. These standards carry a long paper trail that is traceable down to a molecular level in most senses.

Aircraft(s) hold precious cargo inside them, which is often but not limited to us humans. Flight in today’s world is safe because of the attention to detail that goes into each part that is made. The FAA’s deep involvement in commercial and certified aircraft ensures quality control and precise manufacturing practices are upheld, even when a part is the exact same as the non-aerospace component. Aerospace grade components come with certification paperwork from the manufacturer of the part stating that it is made to a certain quality standard and how it was tested to that standard.

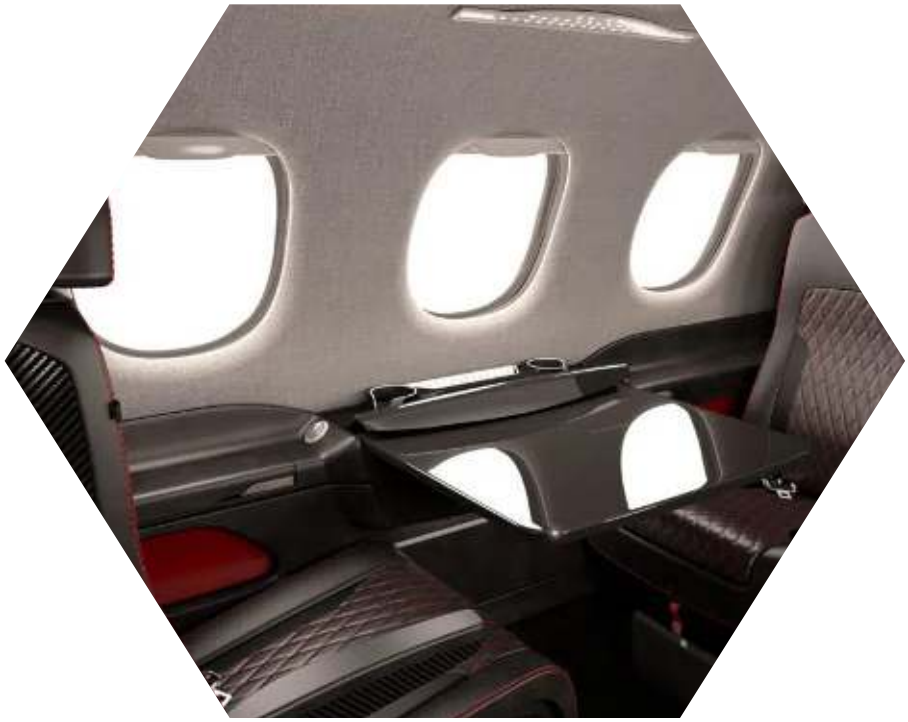
AEROSPACE GRADE COMPOSITES

Let’s take a (simple) carbon fiber part that will go onto an aircraft as an example. This carbon fiber part is coming into assembly and going on the wing of an aircraft. There is an inspection process for this part before it is approved for placement onto that aircraft. For the part specifically, the inspection will include paperwork as to where the part was made and who made it.

That specific part has a paper trail of traceability. Traceable for details such as where and how it was non-destructively tested, what autoclave cycle it may have cured in, at what times the prepreg material was taken in and out of climate-controlled storage, if any repairs have been done on the part, what materials went into that repair, where the fabric material came from, where the core material came from, what adhesives went into it and where they were made. That is just the top level for the part itself. It gets deeper.

AEROSPACE GRADE COMPOSITES

The materials that go into making the fabrics, tapes, or resins go through the same in-depth testing and certification process. Aerospace suppliers achieve certifications in their manufacturing plants for making various fibers, resins, cores, and adhesives. This ensures the manufacturers carry out processes with utmost quality. What is placed on a given testing report for a particular material is more or less, “written in stone”. The testing report from the lab is not fudging any numbers here. There are no sell’s pitches for what the numbers to a specific fiber or fabric made to a specified testing method. The manufacturing processes that go into making the materials are the same as well. Process control is aerospace grade.



One may find that a non-aerospace grade material is stronger or cheaper than an aerospace grade material. But it is hard pressed to find a material tested to the extent that an aerospace grade material is tested to. Quality assurance is nearly unmatched for an aerospace grade component.

DO YOU NEED IT?

Aerospace grade materials in composites are generally industry leading. Boundaries are always being pushed to be lighter, faster and stronger. Big companies have the “wallet” to go out and design the latest and greatest prepreg systems that push the science to bounds once thought incapable of reaching. On the other hand, aerospace grade components have been around for decades. Aerospace grade fabrics introduced in the 1980s still go onto composite aircraft parts today. There are non-aerospace grade fabrics produced in today’s market that have as good or better laminate properties than that of what goes onto existing planes today. But does all this mean an aerospace grade roll of fabric is needed for one’s next spoiler build? Not really.

It is the same concept of putting an aerospace grade screw into your kitchen table. Will it hold? Yeah, and probably really well. If your table falls or fails because of the screw, it’s no big deal. Aerospace and Aviation, a totally different story would be told.

So why pay double if not triple the cost for the aerospace grade name? There are other “non-aerospace grade” or “regular” fabric and resin combinations available on the market that can match the properties of what is needed in most any project on the ground and even in the air for “experimental” section aircraft. They may not come with a book of paperwork

and the fabricator may have to look up specifications of the material(s) online before building. There are a lot of factors that go into picking a fabric and resin or even prepreg combination for any project. The best advice is to check existing fabrications of the part. Do the design work upfront and research for your next project. There is so much out there to learn on material systems and fabrication of composites. If one uses the term “aerospace grade” as an assumption to properties, they may be disappointed to know that there are the same or higher quality fabrics available at a lower cost.

Composite Envisions LLC
8450 Development Court
Wausau, WI 54401 USA
+1 715-842-0101
info@compositeenvisions.com
https://compositeenvisions.com/

COMPOSITE ENVISIONS