

# **PROCESSING METHODOLOGIES FOR A NOVEL BRAIDED PREFORM MADE WITH CARBON/PPS THERMOPLASTIC TAPE**

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## **ABSTRACT**

A novel preform is made with carbon/PPS unidirectional tape, which is slit and converted into a braid. This preform is being used in production for aircraft interior applications where flame smoke and toxicity properties are needed. Additional attributes of the material include excellent corrosion resistance, high temperature mechanical properties, high speed conversion into composite form, and green processing. This paper discusses basic processing methodologies that can be used to convert the preform into a final composite form.

## **1. BACKGROUND**

Carbon fiber reinforced polyphenylene sulfide is a thermoplastic composite material that has been demonstrated in production for aircraft composites structural exterior and interior applications (ref 1). The material exhibits excellent structural and environmental performance, and is relatively low cost as compared to PEEK, PEKK and PEI carbon fiber composites. In addition, the material is an environmentally friendly alternative to thermoset composites. Thermoplastic composites are processed with far less energy than thermosets, and they are typically fully recyclable. They exhibit less process scrap than thermosets, and part processing does not result in generation of volatile organic compounds. (ref 2)

The incorporation of light weight plastic and composite materials in commercial aerospace vehicles is becoming a common design practice for reducing vehicle weight and achieving fuel savings. The aerospace composites industry is very familiar with the design and processing of thermoset based composites; however, very few companies in the aerospace value chain understand the differences and attributes in the processing of thermoplastic vs thermoset composites. One recently developed product is a braid manufactured with carbon/PPS unidirectional tape (ref 3). The braided tape is used as a preform in the manufacture of composite tubes and plates. This paper will describe the basic principles of processing this specific thermoplastic composite material, and compare it to typical processes and properties of an equivalent thermoset composite product.

## **2. PREFORM DESCRIPTION**