

DuPont™ Vespel® SF Foam for Aerospace Applications

High temperature polyimide foam improves performance and reduces fuel consumption

Applications

Vespel® SF foam products are ideal candidates for aerospace applications in which temperature resistance, weight, dampening, and sealing are of concern. Due to the unique properties of Vespel® SF, it has been used in the aerospace industry to solve an array of problems including specific applications in stator vane seals, variable bushing packing, nacelle insulation, abradable seals, and reinforced composite panels.

Challenges

- Isolating systems of varying pressures
- Insulation from temperature variations
- Environments where operating temperatures can exceed 300 °C
- Light weight
- Acoustic and dampening isolation
- Provide structural stability
- Seals/coating systems that are easily maintained in the field, thus extending MTBR and reducing cost

Solution

- Vespel® SF is a unique open-cell high performance custom densified polyimide foam which has been produced at varying densities ranging from approximately 10–35 lb/ft³ to suit the most demanding aerospace applications. (Figure 4)
- Customizable Vespel® SF densification allows for “tailoring” of mechanical properties to meet appropriate structural application needs. (Figure 3)
- Vespel® SF can be pre-formed and machined into complex geometries to suit varying customer requirements. (Figures 1 and 2)
- Vespel® SF is a durable material with a high degree of chemical stability as well as thermal and acoustic insulation
- Vespel® SF offers high temperature continuous use at 300 °C with the added benefits of being flame resistant as well as safe to handle when exposed to open flames with no off gas or release of toxic fumes
- Vespel® SF can be easily bonded to various mating surfaces thus making them suitable for field repairs

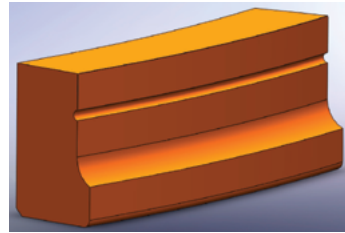


Figure 1

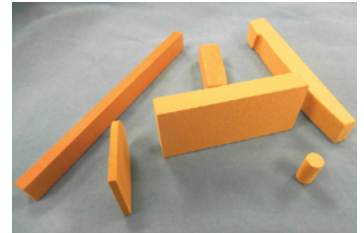


Figure 2

Features and Benefits

Sealing properties

Vespel® SF seals offer a unique balance of properties including durability, high temperature resistance, low CTE, abradable properties, and low weight (PCF) without compromising structural integrity making it a material of choice when it comes to sealing applications.

Tensile strength

Ultimate tensile strength varying from approximately 425 to more than 26,000 kPa depending on the design density.

Safety and environmental stewardship

Fire resistant by design, Vespel® SF polyimide foam emits virtually no off gas and does not release toxic fumes when exposed to open flames. Its non-fibrous composition promotes safe handling during processing and final assembly.

Design flexibility

Vespel® SF polyimide foam can be molded to match unique geometries of most complex designs. Parts can be easily bonded at initial assembly or in the field. (Figures 1 and 2)

Improves efficiency by reducing fuel consumption and increasing payload capacity

Vespel® SF polyimide foam can be manufactured to meet density requirements in the range of approximately 10–35 lb/ft³.

Solving a variety of problems

Vespel® SF has been used to solve a variety of problems. From abradable seals, stator vane seals, variable bushing packing, and nacelle insulation to composite paneling in structural applications, the versatility and durability allows you to think out of the box to solve some of the most challenging aerospace problems.

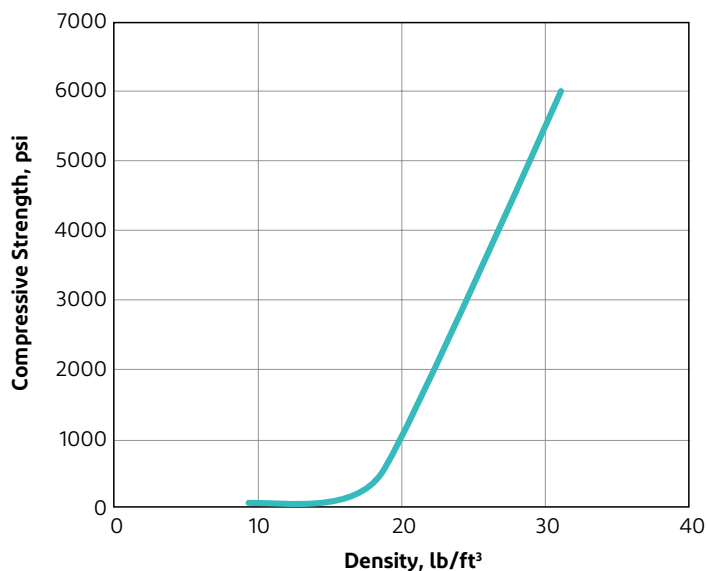


Figure 3. DuPont™ Vespel® SF Compressive Strength

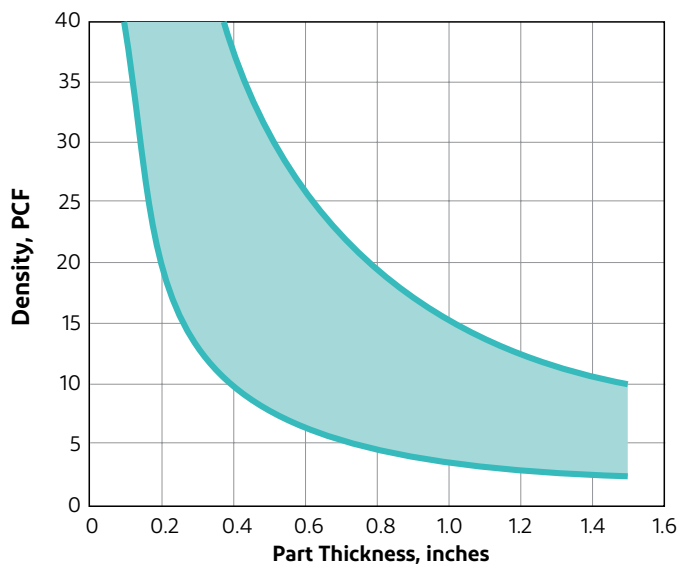


Figure 4. DuPont™ Vespel® SF Customizable Densification at Varying Part Thickness

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