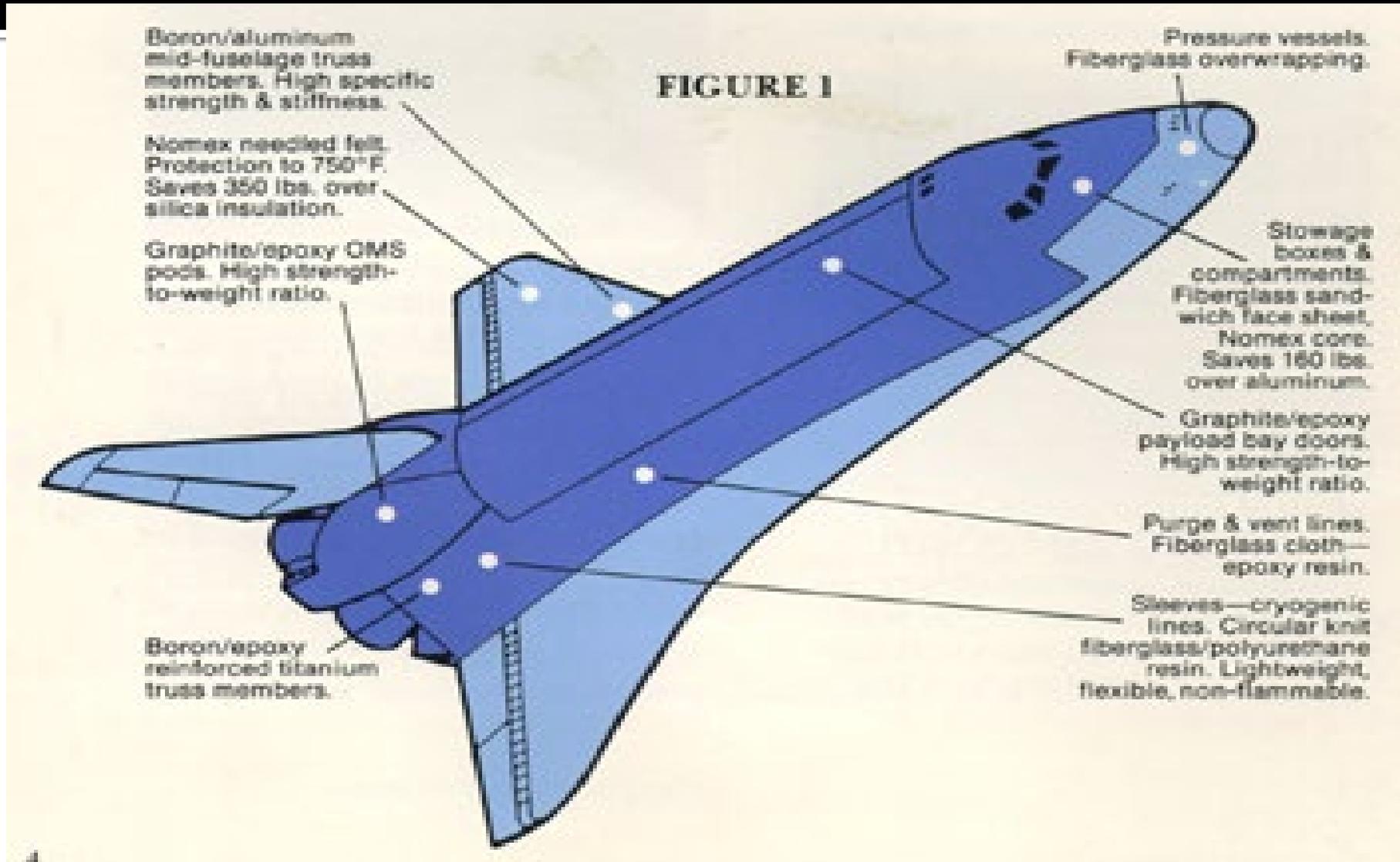


# Application of Polymer Matrix Composites



**A strong, ultra light leg prosthesis of graphite/epoxy help athletes compete at the highest levels.**

# Space Shuttle



# Every body skiing USA

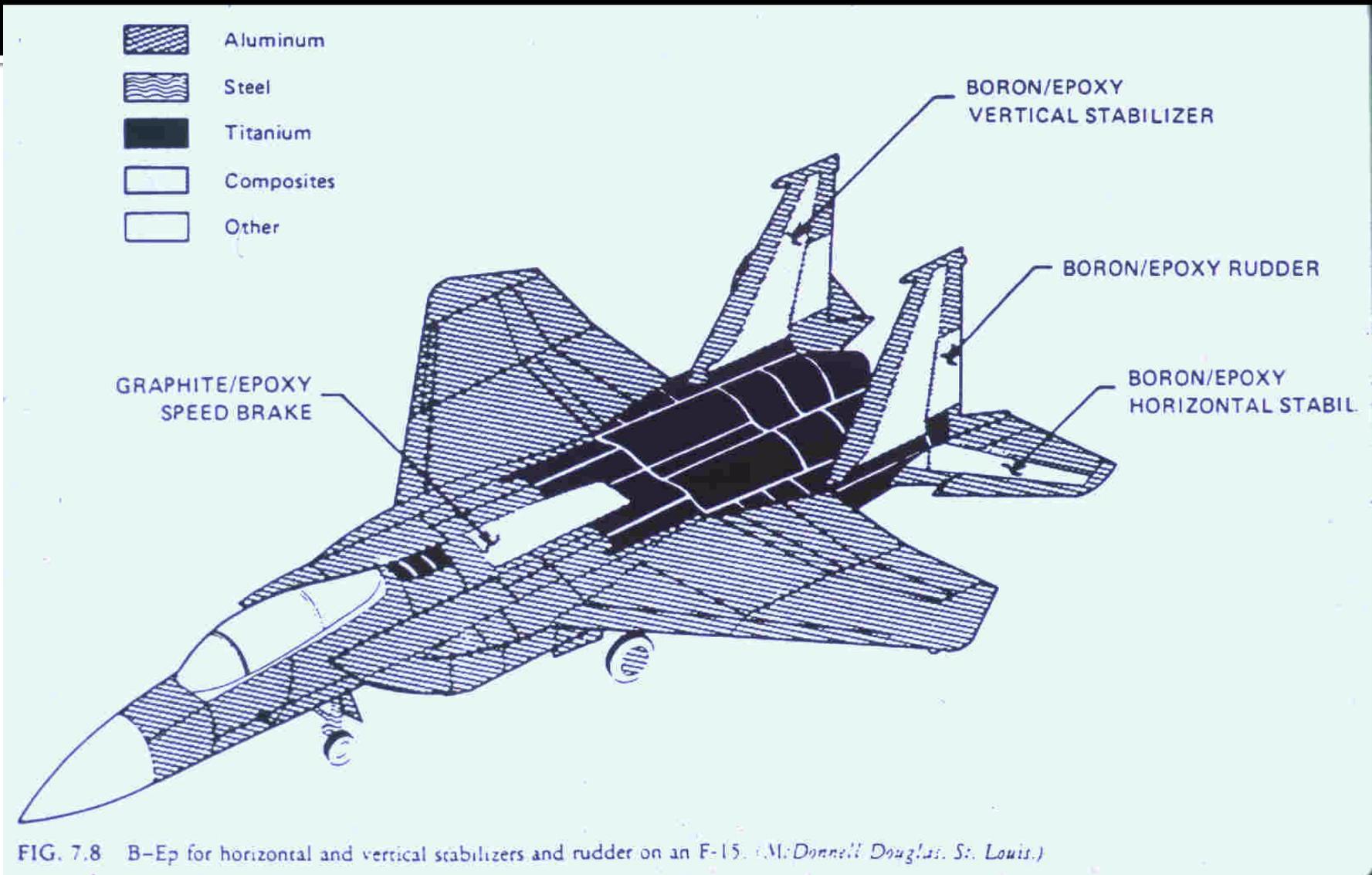


- SMC: sheet molded compound
- FRC :  
Fiberglass  
Reinforced  
composite .

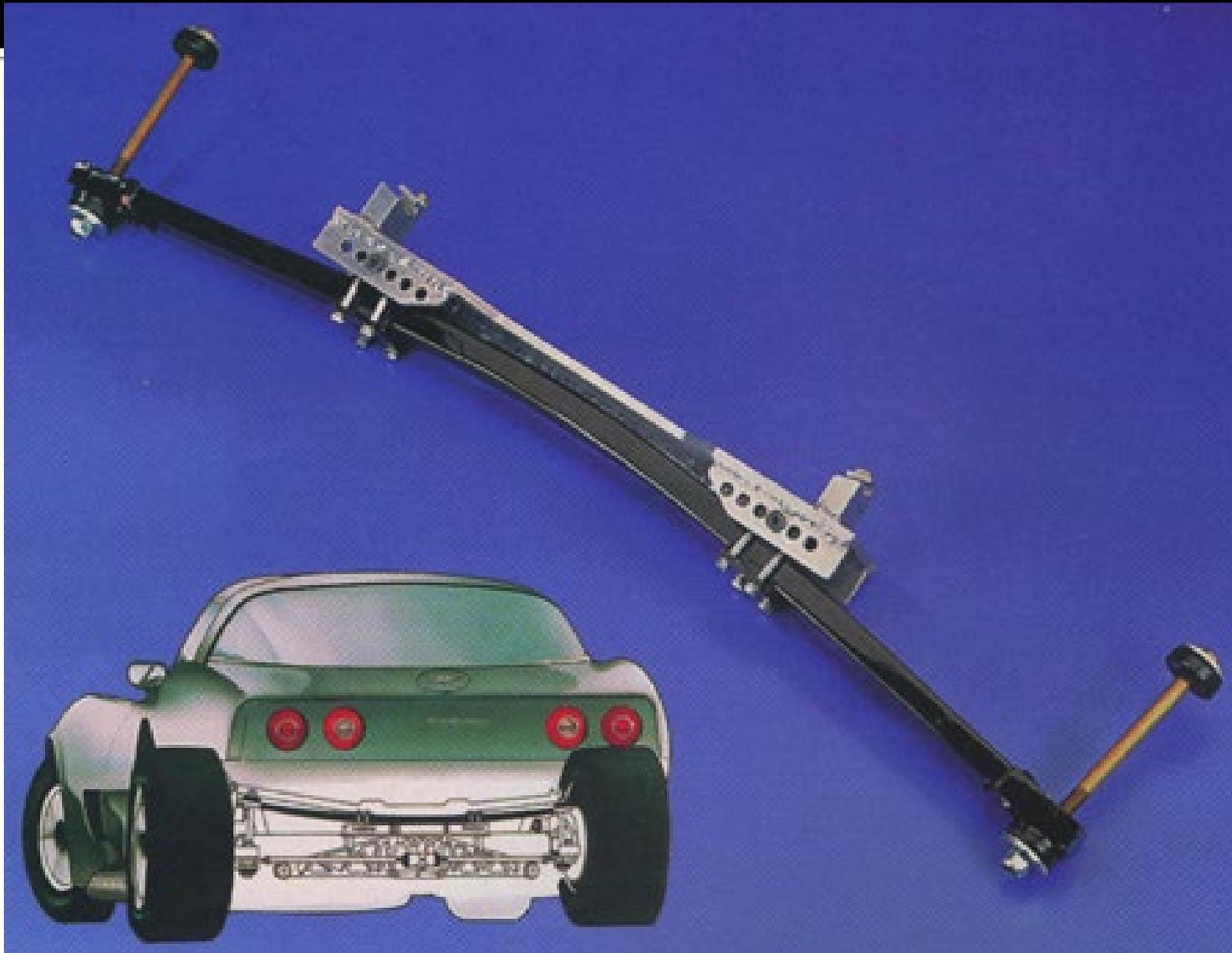
# Lear Fan



# Fighter Jets



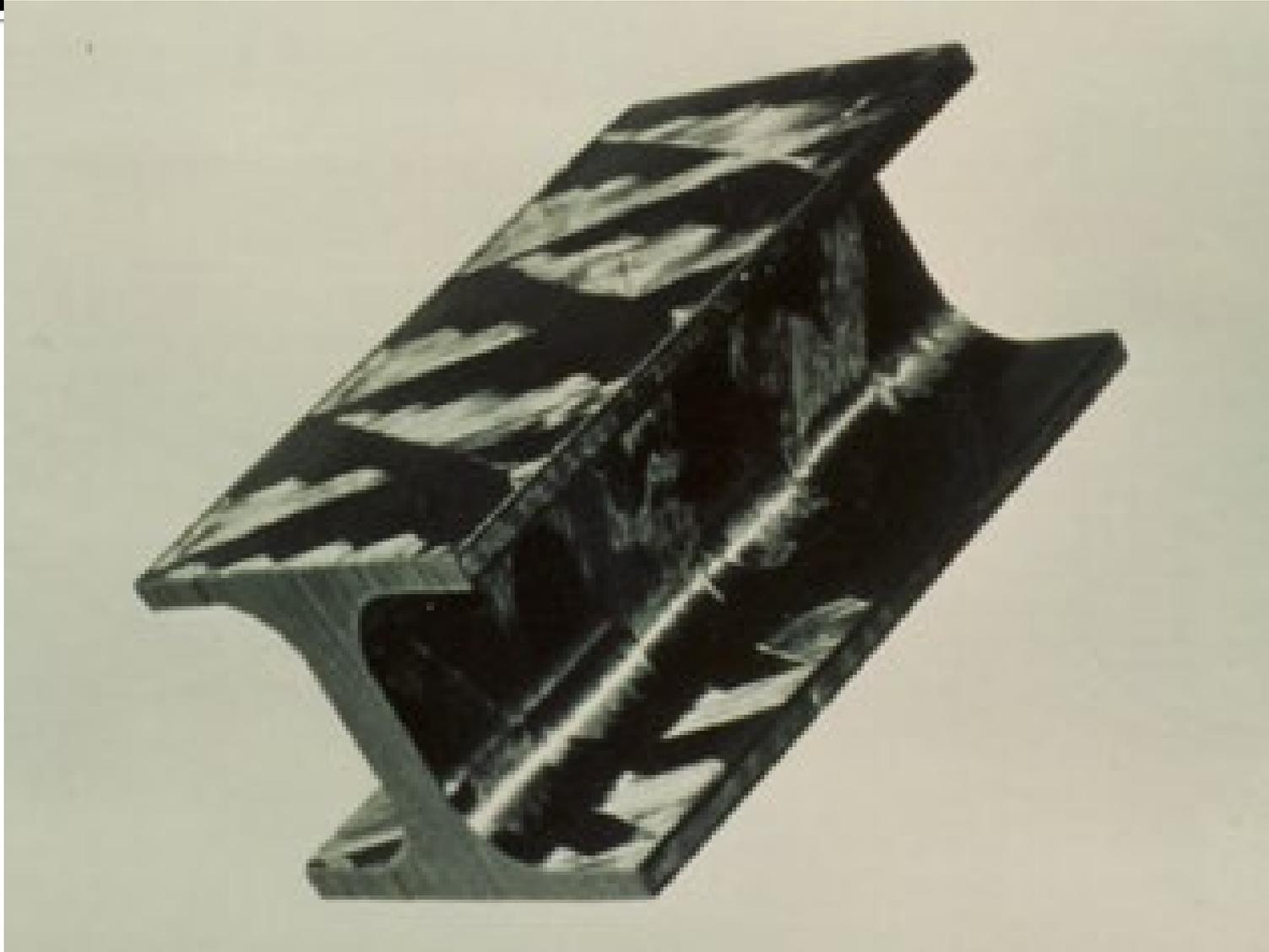
# Corvette Leaf Springs



# Snow Skis



# I-beam



# Pressure vessels



## Thermosets

soften on heating



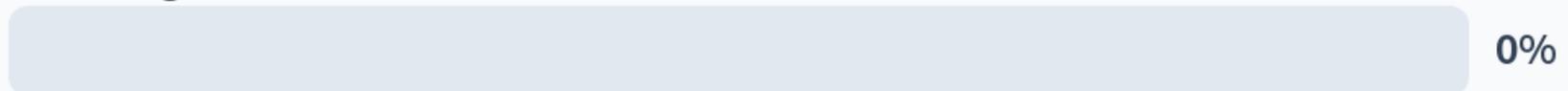
have short cure cycles



decompose on heating



have high strains to failure



## The most common fibers used in advanced polymer composites are

Glass, Steel, and Aluminum

0%

Glass, Graphite, and Kevlar

0%

Glass, Steel, and Kevlar

0%

Glass, Steel, and Graphite

0%

## A lamina is defined as

one layer of composite material

0%

two layers of composite material

0%

multiple layers bonded together

0%

an isotropic layer

0%

## The D in D-glass fibers stands for

Diehard



Dielectric



Diuretic



Delicate



For low cost, out of the polymers given below, the best polymer to use is

epoxy



phenolic



polyester



silicone



The area of the fiber-matrix interface for a fixed volume of fibers in a composite is inversely proportional to the  $d^p$ , where  $d$  is the diameter of the fiber, and  $p$  is

1



2



3



4



## Advanced composites are

naturally found.

0%

traditionally used in aerospace industries.

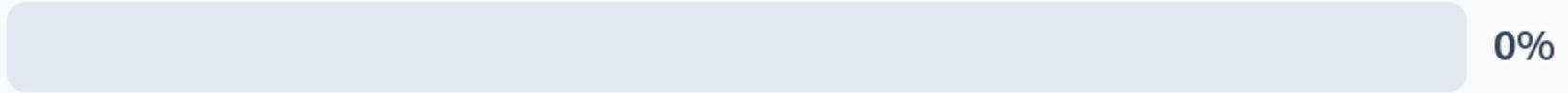
0%

low performance composites.

0%

Composites are easy to repair.

TRUE

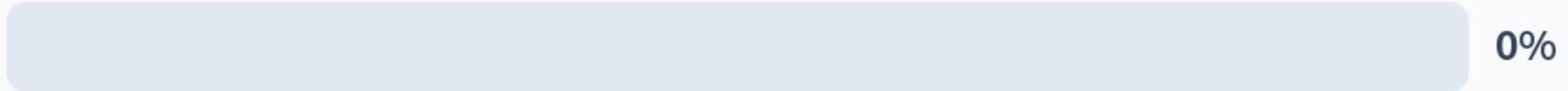


FALSE



## What fiber factors contribute to the mechanical performance of a composite?

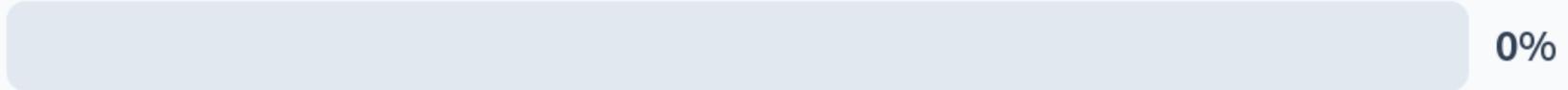
Length



Orientation



Shape



All of the above





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## The most common fibers used in advanced composites are

glass, steel, and aluminum.

0%

glass, graphite, and kelvar.

0%

glass, steel, and kelvar.

0%



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## One of the major drawbacks of composites is

high cost of fabrication.

0%

nobody needs them.

0%

they are extremely heavy.

0%

## SMC stands for

Structural Metal Composite.

0%

Strong Metal Composite.

0%

Sheet Molding Compound.

0%

Reducing one pound of mass in a commercial aircraft can save up to how many gallons per year?

50



0%

350



0%

3500



0%

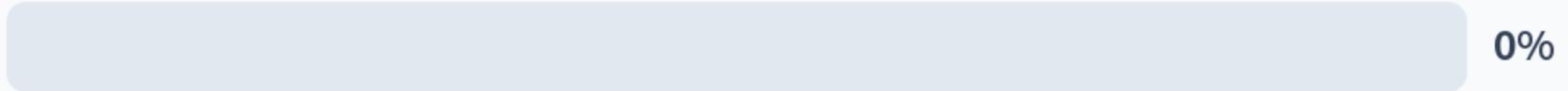
30000



0%

## The most common fiber shape is

Rectangular



Triangular



Circular



## Units of fracture toughness are

MPa-m

0%

MPa<sup>0.5</sup>-m

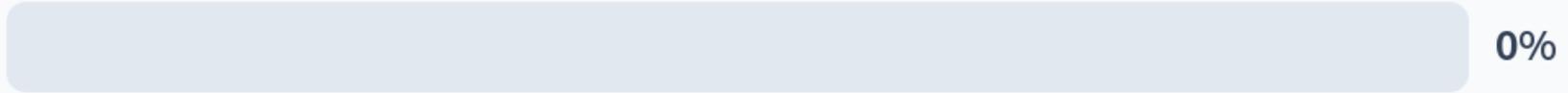
0%

MPa-m<sup>0.5</sup>

0%

## A typical range of carbon content in carbon fiber is

93-95%



0%

92-95%



0%

93-94%



0%

90-95%



0%

## Graphite fibers have one of the following carbon content

99%



<99%



>99%



95%



## Current service temperature limits for polymers reach .

750F



1750F



450F



350F



## Isotropic means

a material with different properties in all directions.

0%

a material with the same properties in all directions.

0%

a material with identical properties at different locations

0%

a material with different properties at different locations

0%

## Composite materials are

isotropic but not homogeneous.

0%

homogeneous but not isotropic

0%

both homogeneous and isotropic.

0%

neither homogeneous or isotropic.

0%

## Anisotropic means

a material with different properties in all directions.

0%

a material with the same properties in all directions.

0%

a material with identical properties at different locations

0%

a material with different properties at different locations

0%

## Inter-ply hybrid composites consist of

two or more different composite systems.

0%

two or more different fibers used in the same ply.

0%

## Aramid fibers are made up of

Carbon, Hydrogen, Oxygen and Graphite.

0%

Carbon, Hydrogen, Oxygen and Nitrogen.

0%

Carbon, Hydrogen, Oxygen.

0%

Carbon, Hydrogen, Nitrogen.

0%

## A typical example of thermoplastics include

polyesters.

0%

polyethylene.

0%

phenolics.

0%

Polymer matrix composites are manufactured in the automotive industry where short production runs are necessary by

filament winding.



autoclave forming.



resin transfer molding.



## Which of the following composites have replaced metals in golf club shafts

Graphite-Epoxy.

0%

Carbon-Carbon

0%

Glass-Epoxy.

0%

## Which of the following is the main drawback for phenolic resin systems

high cost

0%

low mechanical strength

0%

high void content

0%

brittleness

0%

## Bullet proof vests use

Kevlar



graphite



boron



glass



The reduction of mass performance indicator for buckling of a rod under a compressive load is

Young's modulus / density.

0%

$(\text{Young's modulus}^{1/2}) / \text{density}$ .

0%

$(\text{Young's modulus}^{1/3}) / \text{density}$ .

0%

## The reduction of mass performance indicator for a rod under an axial load

Young's modulus / density.

0%

$(\text{Young's modulus}^{1/2}) / \text{density}$ .

0%

$(\text{Young's modulus}^{1/3}) / \text{density}$ .

0%



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## Which polymer is least desirable for smoke emission?

phenolic

0%

silicone

0%

polyester

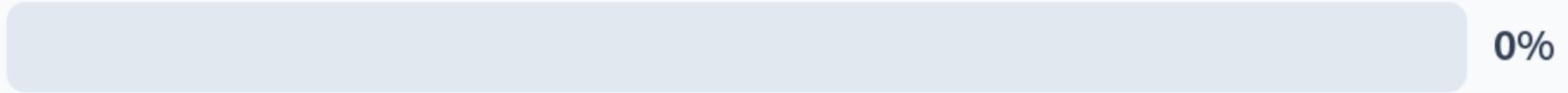
0%

polymide

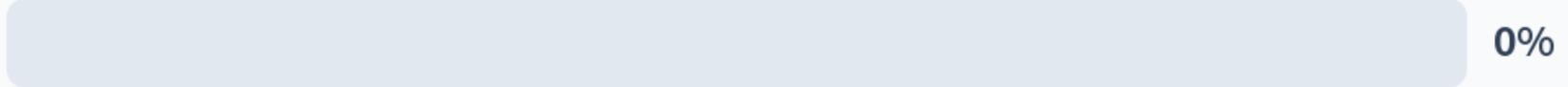
0%

## Which polymer has the most strength

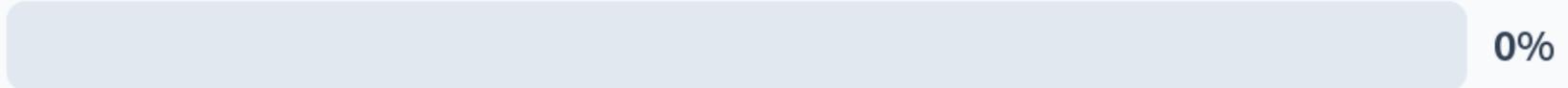
phenolic



epoxy



polyester



polyimide



## Which polymer has the highest service temperature?

phenolic

0%

epoxy

0%

polyimide

0%

polyester

0%