

Ceramic Matrix Composites

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1

Ceramic Matrix Composites

- What are ceramic matrix composites?
- Ceramic matrix composites have matrices of alumina, calcium alumino silicate (CAS), lithium alumino silicate (LAS). Examples include Silicon Carbide/CAS and Carbon/LAS.

2

Advantages of CMCs

- High strength, hardness and high service temperatures
- Chemical inertness
- Low Density

3

Table 1.12 Typical fracture toughness of monolithic materials and ceramic matrix composites

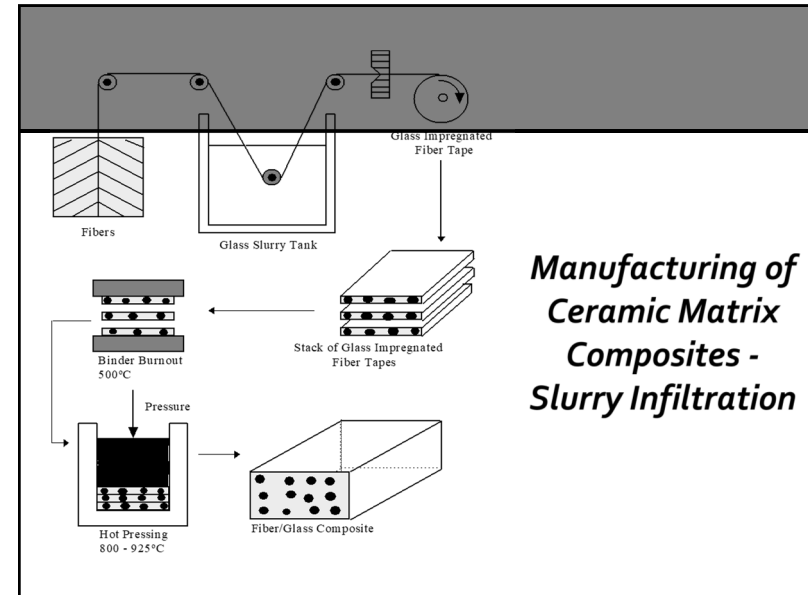
Material	Fracture Toughness, MPa \sqrt{m}	Fracture Toughness, Ksi \sqrt{in}
Epoxy	3	2.73
Aluminum Alloys	35	31.85
Silicon Carbide	3	2.73
SiC/Al ₂ O ₃	27	24.6
SiC/SiC	30	27.3

4

Table 1.13 Typical mechanical properties of some ceramic matrix composites

Property	Units	SiC/LAS	SiC/CAS	Steel	Aluminum
Specific Gravity		2.1	2.5	7.8	2.6
Young's modulus	Msi	13	17.55	30.0	10.0
Ultimate Tensile Strength	Ksi	72	58.0	94.0	34.0
Coefficient of Thermal Expansion	$\mu\text{in}/\text{in}/^\circ\text{F}$	2	2.5	6.5	12.8

5



6

Application of CMCs



7