

Assignment

What is Composite Material :-

- A composite material is a combination of two materials with different physical and chemical properties. When they are combined they create a material which is specialized to do a certain job, for instance to become stronger, lighter or resistant to electricity. They can also improve strength and stiffness.

Composites :-

A. Fibers

1. Glass :-

- High strength, low stiffness, high density; lowest cost; E (calcium aluminoborosilicate) and S (magnesia-aluminosilicate) types commonly used.

2. Graphite :-

- Available as high-modulus or high-strength; low cost; less dense than glass.

3. Boron :-

- High strength and stiffness; highest density; highest cost; has tungsten filament at its center.

4. Other :-

- Nylon, silicon carbide, silicon nitride, aluminum oxide, boron carbide, boron nitride, tantalum carbide, steel, tungsten, molybdenum.

B. Matrix materials :-

1. Thermosets :-

- Epoxy and polyester, with the former most commonly used; others are phenolics, fluorocarbons, polyethersulfone, silicon, and polyimides.

2. Thermoplastics :-

- Polyetheretherketone; tougher than thermosets but lower resistance to temperature.

3. Metals :-

- Aluminum, aluminum-lithium, magnesium, and titanium; fibers are graphite, aluminum oxide, silicon carbide, and boron.

4. Ceramics :-

- Silicon carbide, silicon nitride, aluminum oxide; fibers are various ceramics.

General Properties of composites materials :-

- High Strength to weight Ratio
- Light weight
- Fire Resistance
- Electrical Properties
- Chemical and weathering resistance
- Color
- Translucency
- Design
- Low thermal conductivity
- Manufacturing Economy

Applications of composite materials :-

Fiber	Matrix	Applications
Graphite	Aluminum	Satellite, missile, and helicopter structures
Boron	Magnesium	Space and satellite structures
Alumina	Lead	Storage-battery plates
Silicon carbide	Copper	Electrical contacts and bearings
Molybdenum, tungsten	Aluminum	Compressor blades and structural supports
	Magnesium	Antenna structures
	Titanium	Jet-engine fan blades
	Aluminum	Superconductor restraints in fission power reactors
	Lead	Storage-battery plates
	Magnesium	Helicopter transmission structures
	Aluminum, titanium	High-temperature structures
	Superalloy (cobalt-base)	High-temperature engine components
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