Composites

Fiber Reinforced Plastics (FRP)

Fibres are reinforced in polymer matrix

Properties
- → High strength
- → Prevent slip.
- → High heat resistant
- → do not conduct electricity.
- → Corrosion / resistant
- → Light weight
- → They offer design flexibility.

uses.
- ✓ used in making cars and aircrafts due to light weight.
- ✓ making cars and boats due to corrosion resistance
- ✓ making armors due to their strength and insulation.
- ✓ used in building insulation and air condition units.
- ✓ Since they are non conductive in nature, fiber glass ladders are used in electricity related work.

metal matrix composites

20-60% of vol. of carbon, boron and Silicon carbide matrices of aluminium, magnesium and titanium.

Properties
- ✓ Exhibits extremely good strength
- ✓ High strength, high stiffness, low specific weight
- ✓ They can be used at higher service temperature than polymer composites.
- ✓ They resist corrosion even at higher temperature.
- ✓ They poses high impact strength

uses.
- ✓ Aluminium and Magnesium metal matrix are used in automotive industry eg: desk break, drive shift engines.
- ✓ They are used in turbine engines and combustion charges.
- ✓ They are used in disc craft components
- ✓ They are used in push rods for rising engines
- ✓ They are used in biomedical industries.

Ceramic metal composites.

CMC consists of ceramic embedded in a ceramic matrix carbon, silicon carbide, alumina (Al_2O_3) and mullite ($Al_2O_3.SiO_2$).

C/C - Carbon fiber reinforced in carbon.

C/SiC - Carbon fibers are reinforced in silicon carbide.

Properties

→ High fracture temperature
→ They have extremely high thermal shock resistance
→ They have high load capability.
→ They have good corrosion resistance.

uses.

- They are used as components for high temperature gas turbines, such as combustion chambers, exhaust mixture, turbine blades.
- They are used as components for burners flame holder and gas ducts
- They are used in heat shield system for space vehicles.

Particle reinforced plastics (PRP).

Consists of particles of one material dispersed in a matrix of a second material.

Preparation

PRP composite is prepared by dispersing small particles uniformly in the dispersed phase with help of heat treatment. this process is called precipitation hardening.

Eg: Al-Cu, Cu-Bo, Mg-Al, Cu-Sn.

Properties:

- They possess high strength
- They have low density and low coefficient of thermal expansion.
- They possess excellent resistance to fatigue, creep and creep rupture
- Corrosion resistant and wear resistants.

Application :

- They are used in road surfaces where high level of wear resistant
- The hardness of cement is increased signific. adding gravel as reinforcing fillers.