Polymer Composites

Composites consist of two main parts:

- a binding material
- a reinforcement material

Binding material (the matrix)

Polymer resins are used as the binding material in a polymer composite. Commonly used resins are:

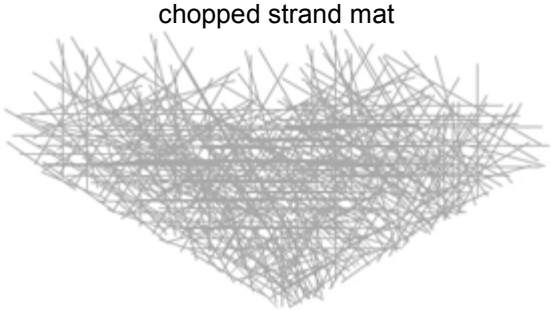
- unsaturated polyester
- vinyl ester
- epoxy resin.

Reinforcement

The reinforcing material in a polymer composite may be:

- chopped strand mat,
- continuous strand mat,
- rovings,
- woven rovings
- woven fabrics
- hybrid fabrics
- multiaxials
- braided fabrics

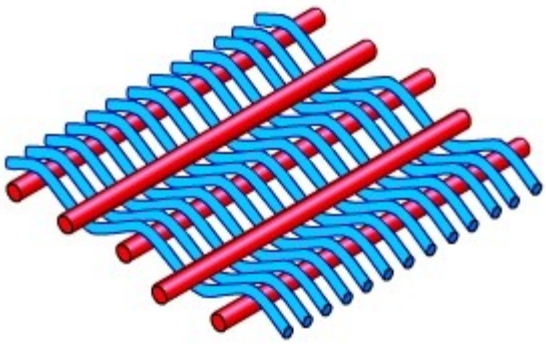
chopped strand mat



Chopped strand mats consist of a blanket of randomly laid chopped glass strands of between about 35mm and 65mm length, held together by an adhesive binder.

Continuous strand mats are made from continuous strands, often in a swirling pattern, held together by an adhesive binder.

Rovings are continuous strands (that look like fishing line). Rovings may be chopped, braided, knitted and made into woven and hybrid fabrics.



woven rovings

Woven fabrics are made on looms. The strands are bidirectional, i.e. the fill rovings cross over and under the warp rovings (the lengthwise yarn/ rovings). In some weaves, the fill rovings cross over and under multiple warp rovings (e.g., over two, under two) making a more flexible fabric.

Hybrid fabrics have different types of warp and filler rovings.

For example a hybrid fabric:

- may be made with very strong and costly warp fibres laid lengthwise and less expensive fill fibres laid over and under them
- may be made with one type of fabric stitched to another fabric or mat to create a two layered or multiple layered fabric

Multiaxial fabrics are made with fibres are arranged at any angle between 0° and 360°. Two or more layers make up the fabric. The layers are stitched, knitted or held together by a binder.

Braided fabrics are made by intertwining three or more rovings/yarns. Braided fabrics may be made flat or in sleeve form. Sleeved braided fabrics may be used as the reinforcing material when making tubular composites.