Pacific Northwest Pollution Prevention Resource Center (PPRC)
513 First Avenue West, Seattle Washington, 98119
Main: 206-352-2050 Fax: 206-352-2049
office@pprc.org www.pprc.org

Topic Hub: Fiberglass Fabrication Subsection : Glossary of Terms

Accelerator - A compound added to speed up the action of a catalyst in a resin mix.

Additive - A component that may be included in the formulation of the composite mixture to modify its properties and in general, enhance its processing or end-product performance. Additives may include catalysts, colorants, hardeners, accelerators, inhibitors, flame retardants and other ingredients.

Catalyst - In fiber reinforced plastics (FRP) the catalyst is the substance added to the gel coat or resin to initiate the curing process. The catalyst usually oxidizes an accelerator creating free radicals which cause the resin or gel coat to polymerize or cross-link.

Closed Molding - A molding process using two matched molds. This method of molding reinforced plastic provides a good inside and outside surface. This type of mold tooling is much more expensive than open mold tooling, but generates less emissions.

Composite - A combination of one or more materials differing in form or composition. The individual constituents retain their identities; i.e. they do not meld or , although they act in concert. Normally, the components can be physically identified and exhibit an interface between one another.

Crosslinking - The linking together of long resin molecules by a monomer. (Also called polymerization).

Curing - A polymerization process transforming the liquid resin to a solid creating the maximum physical properties attainable from the materials.

Filament Winding- the process of winding resin-impregnated fiber or tape on a mandrel surface in a precise geometric pattern. This is accomplished by rotating the mandrel while a delivery head precisely positions fibers on the mandrel surface.

Filler - An inorganic addition to the composite matrix that may impart a variety of performance improvements such as shrinkage control, surface smoothness, water resistance and cost reduction or is added to lower cost or density.

Gel Coat - A resin used as a surface coat for molded fiberglass products. It provides an aesthetic enhancement to the surface and overall protection for the fiberglass laminate.

Hand Lay-up - Placing reinforcement materials and resin onto a mold by hand. The resin application is frequently accomplished with a spray gun.

Hardener - Additive that aids in the curing process.

Inhibitor - Additive that prevents premature polymerization of the resin blend.

Mold Release Agent - Waxes or stearates applied to the mold to aid in separation of the mold from the finished product.

Open Molding - An open mold provides a finished and dimensional accurate surface upon which the lay-up can be placed. Gel coat is usually sprayed first on the prepared surface of the mold. The reinforcement materials are applied on top of the gel coat. This form of molding provides one finished side.

Resin - A class of organic products either natural or synthetic in origin, generally having high molecular weight. Most uncured resins used in open molding are liquids. Generally resins are used to surround and hold fibers. When catalyzed, the resin cures going through a polymerization process transforming the liqufied resin into a solid. The cured resin and reinforcement creates a composite material with mechanical properties that exceed those of the individual components. Two commonly used resins are:

> **Phenolic Resins** - Phenolic composites have many desirable performance qualities including high temperature resistance, creep resistance, excellent thermal insulation and sound damping properties, corrosion resistance and excellent fire/smoke/ smoke toxicity properties.
>
> **Polyester Resin** - these resins offer a balance of properties such as versatility in processing and dimensional stability. Polyesters are popular due to lower cost and ease of handling and processing.

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Polymerization - a chemical process that combines several monomers to form a polymer or polymeric compound; usually refers to the curing of the polymers into the final solid product.

Pultrusion - a continuous process that pulls a fiber through a resin impregnation bath and through a shaping die. The dimensions and shape of the die will define the finished part being fabricated. Inside the metal die, precise temperature control activates the curing of the thermoset resin. The solid laminate emerges from the die to the exact shape of the die cavity and cut to the desired length.

Reinforcement - strong materials, including glass fibers, bonded to or combined into a resin to improve mechanical properties of the composite.

Resin Transfer Molding (RTM) - A closed-mold pressure injection system which allows for faster gel and cure times as compared to contact molded parts. The process uses polyester matrix materials systems association with cold-molding and most reinforcement material types such as continuous strand, cloth, woven roving, long fiber and chopped strand.

Seemann Composite Resin Infusion Molding Process (SCRIMP) - a vacuum infusion molding process that eliminates volatile organic compound (VOC) emissions.

Thermoplastic - a resin that is not cross linked. Thermoplastic resin generally can be remelted and recycled.

Thermoset - a resin that is formed by cross linking polymer chains. A thermoset cannot be melted and recycled because the polymer chains form a three dimensional network.

Styrene - An unsaturated hydrocarbon used in plastics. In polyester resin it serves as a solvent and as a co-reactant in the polymerization process that occurs during curing.

Wet-Out - Saturating reinforcing material (glass fiber) with resin. The rate or speed of saturation is a key factor in effective and profitable molding.

Additional Reference: The ABCs of FRP, by the Fiberglass Grating Manufacturers Council and About.com: Composites

Last Updated: 07/01/2008

The Topic Hub™ is a product of the Pollution Prevention Resource Exchange (P2RX™)

The Fiberglass Fabrication Topic Hub™ was developed by:

PPRC
Contact Ken Grimm (PPRC)
206-352-2050 or kgrimm@pprc.org

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