

GLOSSARY OF TERMS

A

accelerator

An additive to polyester resin that reacts with the catalyst to speed up polymerization. This is required in room temperature cured resins. See Promoter.

acetone

In an FRP context, acetone is primarily useful as a cleaning solvent for removal of uncured resin from applicator equipment and clothing. Very flammable liquid.

additive

Substance added to resin mix to impart special performance qualities, such as ultraviolet absorbers, flame retarding materials (antimony trioxide, chlorinated waxes).

air-drying

To cure at room temperature with the addition of catalyst but without the assistance of heat and pressure.

alligatoring

Wrinkling of the gelcoat film that resembles alligator hide.

B

bag molding

A technique for forming and pressure-hardening plastics or plastics laminates by means of air pressure, vacuum and/or heat in a flexible or semi-flexible bag or autoclave, usually in connection with a rigid die or mold.

barcol hardness

A determination of surface hardness of a polyester using a Barcol Impressor.

Benzoyl Peroxide

(BPO) The catalyst used in conjunction with aniline accelerators or where heat is used as an accelerator.

bi-directional

An arrangement of the reinforcing fiber strands in which half the strands are laid at right angles to the other half, a directional pattern that gives the maximum product strength to those two directions.

binder

A resin soluble adhesive that secures the random fibers in chopped strand mat or continuous strand roving.

blister

A flaw or air pocket between layers of laminant or between the gelcoat film and the first layer of laminant.

C

catalyst injection

Used with spray equipment to catalyze the polyester at the head of the spray gun, therefore eliminating the need to clean the system within the gel time of the polyester. Internal mix guns do require a solvent flush for cleaning the system.

catalyst

Technically considered an initiator, catalyst is a colloquial term given to the substance added to the resin or gelcoat in controlled quantities to initiate the cure.

chalking

A surface problem indicative of the breakdown of the cosmetic surface. A powdery film that is usually lighter in color than the original color.

chopped strand mat

A type of fiberglass made with short strands of fiber arranged in a random pattern and held together with a binder.

cloth

A fine weave or woven fiberglass.

composite

Dissimilar materials that are bonded together either chemically or mechanically to create a product whose cumulative properties are superior to the individual materials.

contact molding

An open-mold process that may include spraying, followed by hand lay-up or spray-up with glass and resin. Also called contact laminating or low pressure laminating.

core

A low density material used between two layers of fiberglass laminant. Examples are balsa wood, urethane foam, PVC foam, various honeycomb materials, etc..

crazing

Cracking of the gelcoat or resin due to stress.

cross-laminated

A type of laminating where some of the layers are oriented at right angles to the remaining layers with respect to the grain or the strongest direction in tension.

cross-linking

The chemical bonding of molecules that occur in the curing stage, going from a liquid to a solid.

cure

The completion of the cross-linking process which is when the composite reaches its full strength..

D

delamination

The separation of the laminants from each other.

density

A comparison of weight per volume, usually expressed as pounds per cubic foot.

diluent

Diluting agent that causes reducing or thinning.

dimensional stability

The description of the change in size of an object during the molding process or in varying temperatures or loads.

dimples

Small indentations in the gelcoat caused by contamination in the gelcoat or on the mold surface. Also caused by applying too much gelcoat too quickly.

dispersion

The means of incorporating additives into a polyester.

distortion

A change in the shape from what was intended. Usually caused by laminating problems, curing problems, tooling problems, or resin shrinkage.

draft

An engineering function taken into consideration when building molds to facilitate easier removal of parts from the mold. A minimum of three degrees is recommended.

drain out

The leaking, sagging, and puddling of the laminating resin from the laminate.

E**e-glass**

Electrical grade glass. Originally formulated for use in electric circuitry, it is the most common glass used in fiberglass reinforcements.

encapsulating

Completely surrounding an object with resin or a fiber resin composite.

exothermic heat

Internally developed heat accompanying a chemical reaction.

F**fading**

Loss of color in the gelcoat

fiber

A reinforcement material that is the main component in a composite matrix.

fiberglass

Glass that has been extruded into extremely fine filaments which vary in diameter and are measured in microns. The filaments are then treated with special binders and processed much like textile fibers. They come in many forms such as, mat, woven roving, biaxles, ect.

filament

A single thread-like fiber. Usually microns in diameter.

filament winding

A process for production of high-strength, lightweight products in which tape, roving or single strands are fed from a creel through a bath or resin (or fed dry using impregnated roving) and wound on a suitably designed rotating mandrel. The wound mandrel can be cured at room temperature or in an oven.

fillers

Relatively inert organic or inorganic materials which are added to plastics, resins or gelcoats for special flow characteristics, to extend volume, and lower the cost of the article being produced.

finish

A surface treatment give to the fibers or filaments after they are fabricated into strands, yarn, or woven fabrics to allow the resins to flow freely around and adhere to them.

fish eye

A circular separation in a gelcoat film generally caused by contamination such as silicone, oil, dust, and water.

flash point

The lowest temperature at which a substance gives off enough vapors to form a flammable or ignitable mixture with air near the surface of the substance being tested.

frp

Fiberglass Reinforced Plastics.

fumed silica

(Aerosil, Cabosil) A very light-weight thickening agent used in polyesters to increase thixotropic qualities.

G**gel**

The irreversible point at which a polymer changes from liquid to a semi-solid.

gel time

The length of time from catalyzation to gel...

gelcoat

A surface coat, either colored or clear, providing a cosmetic enhancement and exposure improvements to a fiberglass laminant.

H**hand layup**

Laminating by "hand" as opposed to using spray equipment. Usually requires glass mats and fabrics in sheet form.

honeycomb

Strips of paper, plastic, metal ect. Joined together to form a honeycomb pattern. Used as a light-weight core.

hot pot

Catalyst is mixed with the gelcoat or resin in the material container prior to spraying, as opposed to internal or external gun mixing.

humidity

Moisture content of the air.

hydrophobic

Moisture absorbing capability.

I**impregnate**

The saturation of fiberglass with a resin.

inhibitor

A substance designed to slow down the chemical reaction.

iso

Abbreviated terminology for isophthalic acid type resins and gelcoats.

L**laminant**

The product.

laminare

The process.

laminated plastics

Material consisting of super-imposed layers of synthetic resin-impregnated or coated filler that has been bonded together usually by means of heat and pressure, to form a single piece.

lamination

The laying on of layers of reinforcing materials and resin, much like the build-up of plywood. Several layers of material bonded together.

lay-up

Placing reinforcing material onto the mold and applying resin to it; can be done by hand or by using spray-up equipment. Lay-up is sometimes used as a term for the workpiece itself.

M**mass**

The quantity of matter contained in a specific body. In reference to polyesters, mass is measured in mils or inches.

master

(Plug) The permanent tool used to build molds for the manufacture of fiberglass parts.

mat

A randomly distributed felt of glass fibers held together with a binder, used in reinforced plastics lay-up molding.

mek peroxide

(MEKP) Abbreviation for methyl ethyl ketone peroxide used to catalyze polyester and vinylester resin based products.

mek solvent

Abbreviation for methyl ethyl ketone; a colorless, flammable liquid commonly used in gun clean-up procedures.

mil

The unit used in measuring film thickness and the diameter of glass fiber strands, wire, etc. (one mil = .001").

milled fibers

Crushed glass used generally for making glass filled putty.

Moisture absorption

The pick-up of water vapor from air by a material. It relates only to vapor withdrawn from the air by a material and must be distinguished from water absorption, which is the gain in weight due to the take-up of water by immersion.

mold release

A substance used to coat the mold in order to prevent sticking and for ease of part release.

mold

1.To shape plastic parts by heat and pressure. 2.The cavity or matrix into/onto which the plastics composition is placed and from which it takes its form. Female: made into; Male: made onto. 3.The assembly of all parts that function collectively in the molding process.

molding

The forming of glass materials and resin by various means, such as contact, pressure, matched die, and continuous laminating, into a given shape over a mold, and holding that shape by the mold until the resin cures.

monofilament

A single filament of indefinite length. Monofilaments are generally produced by extrusion.

N**non-air-inhibited resin**

A resin in which the surface cure will not be inhibited or stopped by the presence of air. A surfacing agent has been added to exclude air from the surface of the resin.

non-volatile material

Portion remaining as solid under specific conditions short of decomposition.

O

orange peel

Backside of the gelcoated surface that takes on the rough wavy texture of an orange peel.

ortho

Abbreviation for orthophthalic acid type resins and gelcoats.

P

parting agent

See mold release.

pattern

The initial model for making fiberglass molds.

pigment

The ingredient used in gelcoats to impart color.

pinholes

Small air bubbles in the gelcoat film, few enough to count. Generally larger size than porosity.

plastics

Usually synthetic materials chemically created from organic substances classified as thermoplastics or thermosets.

plug

See master.

polyester

(Unsaturated)A resin formed by the reaction between dibasic acids and dihydroxy alcohols, one of which must be unsaturated (typically maleic anhydride)to permit cross-linking.

polymer

A chain molecule composed of many identical groups, commonly found in plastics

polymerization

The chemical reaction of crosslinking the molecules in the resin. See also cure.

polyvinyl alcohol

(PVA)A liquid water soluble release agent for polyester.

porosity

Small gas bubbles entrapped in the gelcoat film; too numerous to count. Generally smaller in size than pinholes.

post-cure

To cure by heat after the exothermic reaction has subsided.

pot life?

The time that a catalyzed resin remains liquid or workable..

potting?

Similar to encapsulating, except that steps are taken to insure complete penetration of all the voids in the object before the resin polymerizes.

pre-release

Premature release of the gelcoat or laminant from the mold.

pre-form

A pre-shaped fibrous reinforcement formed by distribution of chopped fibers by air, water flotation, or vacuum over the surface of a perforated screen to the approximate contour and thickness desired in the finished part. Also a compact pill of compressed premixed materials.

premix

Reinforcing material mixed with resin, and usually with pigment, filler and catalyst, before placing in the mold. Premix can be extruded into ropes or used in bulk form.

prepreg

Reinforcing material impregnated with thickened resin and cured by applying heat.

pressure bag

A membrane which conforms to the inside of a laminant laid-up on a mold. The membrane or bag is then inflated, applying pressure which consolidates and densifies the laminant.

primary laminant

Laminate applied after the skin coat has cured. Generally thicker than the skin coat.

print through

A distortion on the gelcoat surface that allows the pattern of the core or laminant to be visible.

R**radius**

A rounded corner or edge. Can be male or female.

reinforcement

A fiber which when encapsulated in a polymer resin matrix forms a composite or fiberglass laminant. Also a structural member designed to stiffen a molded part.

release agent

See mold release.

resin

A liquid polymer that when catalyzed cures to become a solid.

Roving

A collection of bundles of continuous filaments in untwisted strands. For filament winding they are generally wound as bands or tapes with as little twist as possible.

S**sandwich lay-up**

A lamination composed of two outside layers of reinforced material such as glass mat and an inside layer or layers of honeycomb, polyurethane foam, or other light-weight core material.

shelf life

The time a product can be stored before it must be used.

skin coat

The first layer of laminate next to the gelcoat. Generally only 1/16" thick to afford good rollout and to reduce heat.

specific gravity

The ratio of the weight of any volume of a substance to the weight of an equal volume of some substance taken as a standard unit; usually water for solids and liquids, and air or hydrogen for gases.

spray-up

A process in which glass fibers, catalyzed resin and catalyst are simultaneously deposited in a mold. Roving is fed through a chopper and ejected into a resin stream directed at the mold. Resin and catalyst may be sprayed from one or two guns. The glass/resin mix is then rolled by hand before curing.

styrene monomer

An unsaturated hydrocarbon, used in plastics. In polyester, it is a co-reactant diluent.

surfacing agent

A material that allows the surface of polyester to cure. It limits adhesion of another coat of resin if the first is thoroughly cured. It may be removed by sanding or rubbing with steel wool.

T**tack**

Stickiness.

thixotropic

A term describing materials more jelly-like at rest than when stirred or agitated. Agitation (shear) reduces the gel and increased the flow characteristics.

U**undercut**

Negative or reverse draft on the mold. Split molds are necessary to shape pieces that are undercut.

V**vacuum bag molding**

Process for eliminating voids and forcing out entrapped air and excess resin from lay-ups by drawing a vacuum into a cellophane or polyvinyl acetate bag draped over the part.

vapor barrier

A material through which water vapor will not pass readily or at all.

viscosity

The internal resistance of a fluid to flow; thickness.

W

wax

A mold release agent.

wetout rate

The speed with which a reinforcing material can be completely saturated with resin. This rate is usually determined visually and measured in elapsed time.

woven roving fabric

Heavy fabrics woven from continuous filament in roving form. They drape well, are quickly impregnated and intermediate in price between mats and yarn cloths.

woven tape

Tape of various thicknesses woven from continuous filament yarns.