CASTING IN POLYESTER RESINS

This type of work differs in several ways from the methods of laminating glass fibre with Polyester Resins described in our General Literature. A casting in un-reinforced Polyester Resin has impact strength but virtually no Tensile Strength, unless glass fibre re-enforcement is incorporated. A slab of Cast Resin the size of a Telephone Directory could easily be snapped in half across one's knee but the incorporation of even one lamination of the thinnest Chopped Strand Mat (1oz/sq.ft density) would add sufficient tensile strength to prevent this. Most small castings such as Chess Pieces, Translucent Paper Weights etc, never likely to be subject to tensile strength are made without any glass fibre reinforcement but larger castings, such as wall plaques, cladding panels for building etc, should always be reinforced with a lamination of glass fibre.

EXOTHERM & SHRINKAGE. One effect of the addition of the catalyst (hardener) to resins is to create Gelation Heat. The greater the proportion of catalyst added &/or the greater volume of resin catalysed results in a greater degree of gelation heat & of subsequent shrinkage. If for instance one were to fill a pint milk bottle with ordinary laminating resin catalysed at normal level for laminating work, 2% (10cc per lb/resin), the resin would harden very rapidly, shrink by 20% or more (compared to 5% in normal laminating work) & the casting would fissure & crack badly. TO MINIMISE GELATION HEAT have a warm working temp. which means not only the air in the workshop but also the temp of the resin & moulds, which permits the minimal additive of catalyst. The addition of filler powders, such as Talc, Fordacal, Slate etc, also reduces shrinkage, as the powders do not shrink, only the resin shrinks. **LAYERING** by applying the resin in layers not more than ¾" (20mm) in thickness, allowing each layer to harden before applying the next. This minimises gelation heat. With larger areas of casting the layers should be restricted to ½" (12mm), especially if no filler powders are being used in such as Translucent Paper Weights. SHRINKAGE of most unfilled resin casting is 6 to 9%.

RESIN USED FOR CASTINGS. For small "one-shot" castings, such as chess pieces up to 1" diameter & 3" height our standard Resin "A" (QC30) is very suitable. It is NON AIR-INHIBITED see our notes below. For larger casting such as Statues the Aggregate Fill able Type is used. This resin will accept nearly twice as much loading of filler powder than will Resin "A" (or any other Thixotropic Resin), but if using this Resin the maximum loading of filler powder should be used, because if this is not done the filler powder will sink in the resin leaving top layer containing a lot less powder than the lower half, causing a differential gelation heat which can cause cracking. The Aggregate Fill able Resin is Air inhibited. The Clear casting resin is also Air Inhibited. This resin is used for making castings of water-white degree of clarity. Hazen Scale 30: Alpha Scale Max 30.Refractive index is 1.546. Shrinkage is 6%

AIR INHIBITED RESINS. Some resins, including our standard Resin "A" (QC30) are NON Air-inhibited which means that the surface of the resin exposed to air will be tack-free within a short time of hardening. Resins that are termed Air Inhibited remain surface tacky for a considerate time after hardening. All initial Gel Coats (Resin "B") are very Air-Inhibited, being completely wax free, so that a better chemical bond is obtained when glass fibre is applied with Resin "A" over the surface of the Gel Coat after it has been allowed to cure for 5 hours. The Clear Casting & Aggregate Fill able Resins are also Air-Inhibited.

MOULDS. Rigid moulds made of GRP: metal, ceramic etc, are used whenever possible but when there are re-entrant angles (undercuts) Flexible Moulds have to be used as release from the mould would be impossible otherwise. We stock Liquid Latex, generally used for Casting Chess Pieces & small figurines. Silicone Rubber which is quite expensive but reproduces very fine detail and Vinamold which is used for large Castings and for casting in concrete. All Flexible Moulds except Latex Moulds have to be contained in an outer rigid mould casing made of GRP or plaster so that the flexible mould retains its shape, e.g. a flexible mould in the shape of a bowl would flop over when placed on a flat surface so it has to be retained in rigid mould casing.

GEL COATS IN FLEXIBLE MOULDS. Where Gel Coat Resin "B" is applied to the surface of a rigid mould, no air can get between the surface of the mould and the Gel Coat applied to it. So that the finished casting or laminate is tack-free upon release. Air can creep between surface of Flexible Mould and Gel Coat applied to it so when using a flexible mould instead of using Resin "B" as Gel Coat use a mix of ½ kg of Thixotropic Paste to 1 ½ kg of Resin "A" (QC30). This mix is non Air Inhibited so that castings are tack free upon release from the moulds. It is essential to use initial Gel Coat when making castings. They are normally used where Metal Powder, Copper, Bronze etc, are being used as pigmentation. These are often in ratios as high as 3 or 4 lbs powder per lb of Resin, which would make an expensive casting where they would to be used through-out the "ONE SHOT METHOD described below. They are therefore only added to the Gel Coat. Always specify for this particular type of Resin "A". This Gel Coat should always be cured for five hours or so before completing the casting by pouring Resin "A" filled with Talc or Fordacal Powder into the Gel Coat surrounded cavity. The 1/8" can be left unfilled & when the resin has hardened this 1/8" can be filled with the Metal Powder/Resin Mix.

THE ONE SHOT METHOD is used for producing small castings such as Ivory & Black Pigmented chess pieces. No Gel Coat is used. The Resin "A" to which the Polyester Colour Paste has been added in a ratio of 10% by weight and very well dispersed in the resin is poured into the mould and allowed to harden and cure before release.

ELIMATION OF SURFACE TACK. Where a casting has been produced & surface remains tacky. Such as when Clear Castings Resin has been used in a Flexible Mould, coat the outside surface of the casting thickly with polish, which cuts off exposure to air. Leave for 72 hours and then buff off the polish. Immersion for 48 hours in a bucket of non-corrosive type oil such as Baby Oil will also work, or talc dusting but stays dusty.

EMBEDDING ELECTRONIC ASSEMBLIES. The "ONE SHOT METHOD" described above can be used except that it is normal to use Resin "A" filled with Talc Powder. This not only conceals the wiring lay out but the addition of filler powder minimises Gelation Heat, avoiding "Cooking" of the PVC coating of the wiring & shrinkage is also minimised.

CLEAR CASTING RESINS. This is of water white degree of clarity & is used for making paperweights etc, with flowers, coins, and laboratory specimens etc, embedded therein. It should always be used in very warm conditions, as described above, so that minimal catalyst additive is possible to eliminate risk of gelation heat "cooking" flowers, lab specimens etc. We supply Special Additional Notes on the use of Clear Casting.

WATER FILLABLE CASTING RESIN. It is mainly used for economy, as it will absorb from 40 to 80% of water. It can also be filled with Aggregate Powder. It is used for making wall plaques, tubs for holding plants etc. The castings are usually not less than ½" & up to 1" thickness. Larger castings such as large tubs should have a lamination of Glass fibre CSM applied to the non-visible side of laminate, to provide sufficient tensile strength to avoid breakage if casting is dropped on the floor.

GLASSFIBRE REINFORCEMENT OF CASTINGS. Any large panel of casting should be reinforced with a lamination of CSM. Even a single lamination of the thinnest CSM, 1oz/300 gr. will suffice. Castings for use in such as Bearing Housings can be Glass fibre reinforced by adding Glass fibre Chopped Ends, materials similar to chaff. The ¼" (6mm) is normally used but we stock ½" and 1".

CATALYST & FILLED RESINS. The catalyst should be added to the Resin & well dispersed therein BEFORE the addition of Filler Powders such as Talc, Fordacal, Slate & particularly Fillite, because of chemical reaction of the powders with the Catalyst if this is added after the Fillers have been added to the Resins. This chemical reaction causes areas to remain under-catalysed.

SPECIAL NOTES. We can supply special notes on use of Clear Casting, Water Fill able & Aggregate Casting Resins, as also on each of the Flexible Mould Compounds listed below.

LIQUID LATEX. This is the cheapest & most flexible type. Average shrinkage is 6% used for casting chessman & other small castings. Hardens by air contact.

SILICONE RUBBER. Much dearer. Reproduces very fine detail. Shrinkage is 0.3% up to 0.5% depending on type. Hardens by addition of catalyst, a different catalyst for each type of rubber.

VINAMOLD. Hot Melt Compound. Heated to 170c & poured over a plug, it solidifies as it cools. Moulds can be re-melted and material used again. Three types stocked, the most flexible grade is used for Polyester Castings, the others mainly for casting concrete, also for making Rubber Castings. Vinamould Shrinkage is 2 to 3%.

RIGID CASTINGS in GRP or Plaster are used to hold Flexible Moulds in shape, e.g. a bowl shaped flexible mould would flop over if placed on a flat surface without Rigid Casting. Store moulds in the casting to retain shape.