Insight into GRP

Glassfibre Reinforced Products (GRP) have much to offer the industry, with enduring quality that will complement most budgets. Serious and expensive problems can be solved efficiently, effectively and economically.

The Product

Chemical Resistancy

Extensive laboratory testing, field trials, case histories and practical experiences in various parts of the world have enabled the development of resins effective in various chemical environments and industries. Strength and enhanced protection is achieved by including chopped strand glass mat and acid resistant glass flakes or beads during different stages of its application.

Fire Retardant

Where specified, applications can be made fire retardant to conform to BS476, part 7, Class II Surface spread of flame or Class 0 (combustibility) Class I flame spread. These specifications may carry an additional financial cost.

Inherent Qualities

GRP systems are wide and varied. They have a high strength to weight ratio, excellent impact resistance and good dimensional stability or can offer 230% elongation where flexibility is essential. Unlike metals or cement GRP is weatherproof and virtually maintenance free, thus it is well suited for external applications as well as internal. It has elastomeric qualities and a good memory. Couple this with the fact that it is reinforced and we have a material that can expand and contract under the severest weather conditions and most industrial environments.

Heat Distortion

Certain resins have a very high heat distortion point. Where this is critical, specific details of the given environment should be supplied to Patterns and Moulds upon receipt of which an assessment can be made.

Application

Where product tainting needs to be avoided a cure period at ambient temperature of not less than 15^{0}C, for 7 days should be allowed. Alternatives include 24 hours post curing at a minimum of 40^{0}c or the surface can be steam cleaned for early use. This is a general guide and not applicable in all circumstances. In the event of it being necessary for the linings or mouldings to be conductive (i.e. for static electricity or

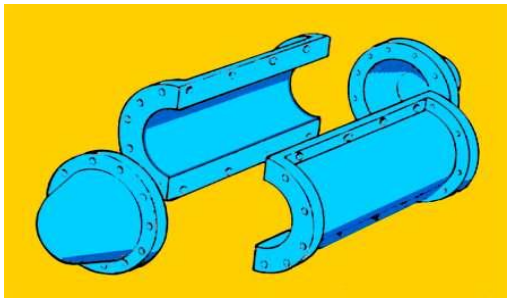
lightening) a carbon veil can be included in the lay-up specification. This carries an additional cost. For slip resistant surfaces a spread of glass beads is included in the final cost. The grade of bead can be varied to cope with different requirements. Floor finishes invariably contain a multi coloured flake to give a tasteful flecked finish. Otherwise a variety of colours are available. GRP lends itself to safety and hygiene in as much as it is seamless, easy to clean, non-corrosive and does not flake. In the unlikely event of damage, repairs are easy and economical to effect. Substrates must be sound and dry where solvent based materials are to be applied. Some dampness is permissible with water miscible systems.

The Process

Contact moulding is the main technique for fabrication used in the reinforced plastic industry. The contact moulding process requires a single faced mould or tooling. It can be either male or female depending on which face of the moulding requires the moulded finish. They can vary in size from small, easily handled moulds to huge moulds weighing many tonnes requiring mechanical handling equipment. They can be of single section design or multiple sections.

Production moulds are generally made from GRP and are manufactured to be rigid to maintain dimension stability. They are usually made from a timber pattern or plug.

The pattern is generally hand crafted from timber with the finish applied at the final stage. The finish can be as diverse as is practical to cover the pattern, from a high gloss 'class a' to leather grain or sand effect. Increasingly the use of CNC routing machines to produce the master patterns are being adopted.



Direct 3d cad data is sent to the CNC router via CadCam software packages to machine a pattern, the surface can then hand sanded to the required finish.

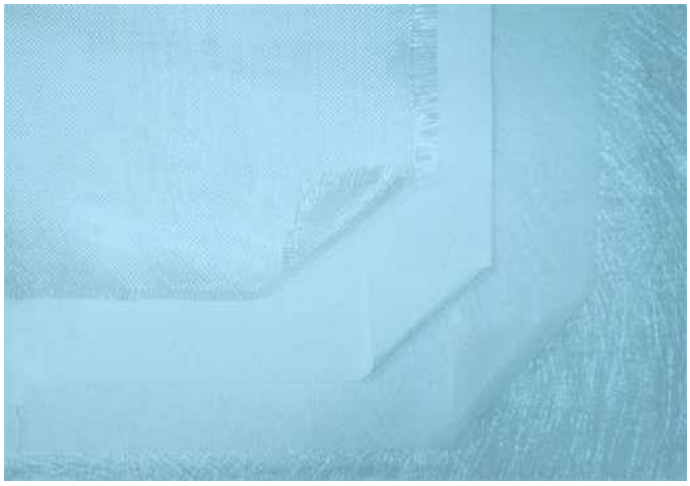
Slightly different materials are used to manufacture the mould, to achieve the required stiffness and a durable mould face. Once the mould is released from the pattern it is cleaned and prepared with release agents ready for production. A well designed, produced and looked after mould should be able to produce several thousand mouldings' before it requires replacing.

Materials

Gelcoat

Usually the outer finish of a GRP component is the Gelcoat. Gelcoat is a modified resin, usually coloured. The gelcoat gives the GRP good abrasion and weathering resistance. It can be applied by spray or brush to the mould surface. It can be colour matched to a customer's specific requirement, but more commonly is specified to either BS and RAL ranges of colours. Metallic and mirror flake are effects that can be achieved with the gelcoat. It is also used as a waterproof coating to the inside of a GRP component.

Different Reinforcements



Reinforcements

Glass fibres are the main reinforcements used in the GRP industry, though they come in many forms. Chopped Strand Mat is the most commonly used glass reinforcement. It is constructed of strands of glass about 45mm long held together in bundles of about 200 fibres called strands. The strands are randomly distributed and held together with a binder to form a mat which is supplied in rolls. Another form of glass reinforcement used are Woven Roving's, these are long strands of glass woven into a cloth. Depending on which direction the required tensile strength is needed the cloth can be woven at many different angles. It can also be combined with the Chopped Strand Mat to produce a product called Combination Mat.

Resin

The resin used in GRP is a thermoset, which basically means setting under heat. Once the liquid resin is set it is not possible to reheat it and use it again. To initiate the setting of the resin three basic chemicals are required, the resin, a catalyst and

an accelerator. The catalyst is the initiator and the accelerator, as the name suggests accelerates the reaction. Usually the accelerator is premixed into the resin as the direct mixing of accelerator and catalyst causes an explosive reaction! The main type of resin used in the GRP industry is polyester resin. This resin has good all-round properties for most moulding applications. Other resins such as phenolic, which are used for their non-flammable properties. Vinyl esters, which are used for their high laminate strength and resistance to water impregnation and epoxy resin which is used for its high strength.

For further information on the process you are invited to contact us.

Benefits of Patterns & Moulds GRP

GRP (Glass Reinforced Plastic) is able to satisfy most requirements. It creates a clean and safe environment which is easy to maintain, no matter the industry. The finished product is tough, hardwearing, seamless, attractive and economical to purchase.

Gary Lucas
Director

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