

Glass Reinforced Plastic (GRP) / Fibre Reinforced Plastic (FRP)

Introduction

Glass reinforced plastic (GRP) is also known as

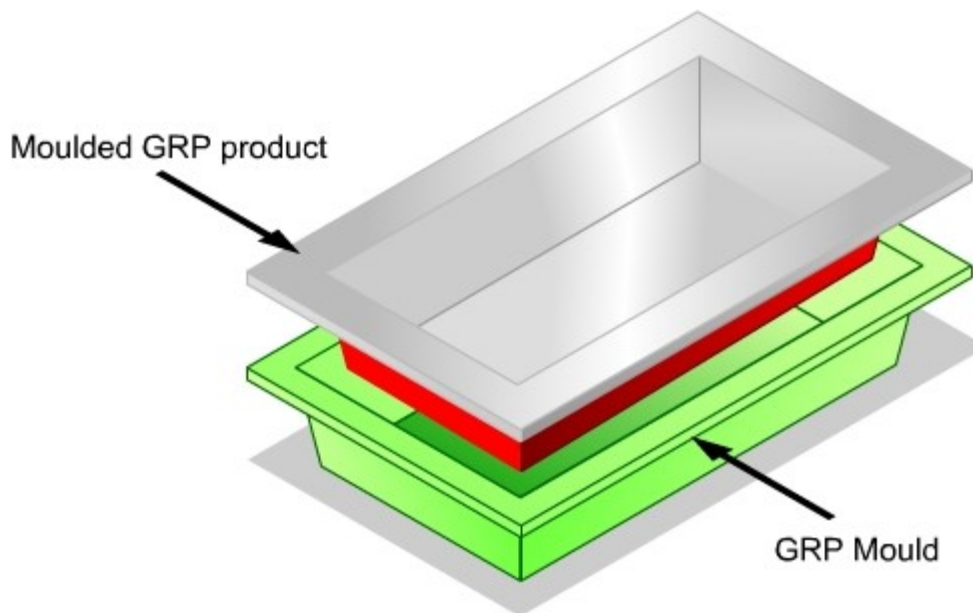
- glass reinforced polymer (GRP)
- fibre reinforced plastic (FRP)
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Glass reinforced plastic (GRP) is a composite consisting of a polymer resin, usually unsaturated polyester, vinyl ester or epoxy resin, mixed with catalyst and hardener and reinforcing fibres in chopped strand, rovings or mat form.

A one-off, original product may be made in GRP without using a mould, however the usual way of making GRP products is to lay the fibre reinforced plastic inside a mould.

Hand Lay-up of Glass Reinforced Plastic (GRP)

The easiest method of making a GRP product, e.g. a canoe is to use a mould. The mould may be made from GRP or it may be made from another structurally strong material.

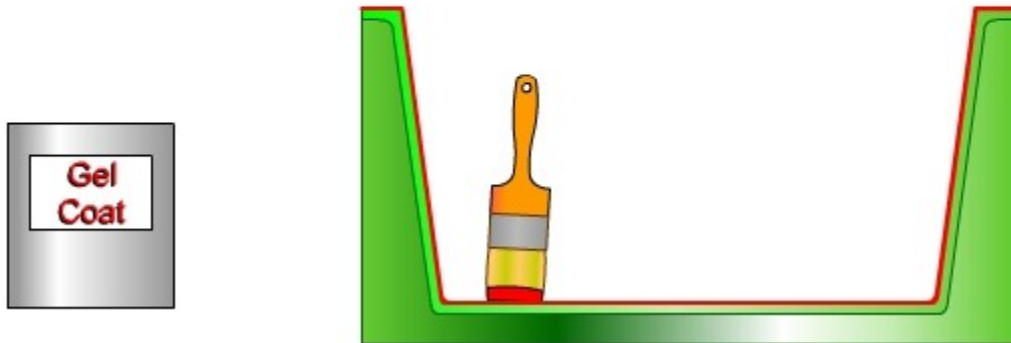


The mould is first checked for defects, any scratches etc. are filled. The mould is then polished with a wax polish to a very smooth, high quality finish. Next, a very thin film of a liquid release agent is applied to the inside of the mould. The wax and the release agent are there to prevent the glass fibre product from sticking to the mould.

Gel Coat

The gel coat is the first layer of resin to be applied to the mould. The gel coat is a mixture of polymer resin, hardener and a pigment mixed in the proportions recommended by the resin manufacturer. An exothermic reaction occurs as the hardener reacts with the resin and heat from the reaction causes the resin to cure and harden.

Resin, pigment, catalyst and hardener are mixed in the correct quantities for the gel coat. A thin even layer of gel coat is spread all over the inside of the mould, then it is left until it has cured.



Laying the first layer of fibre reinforcement



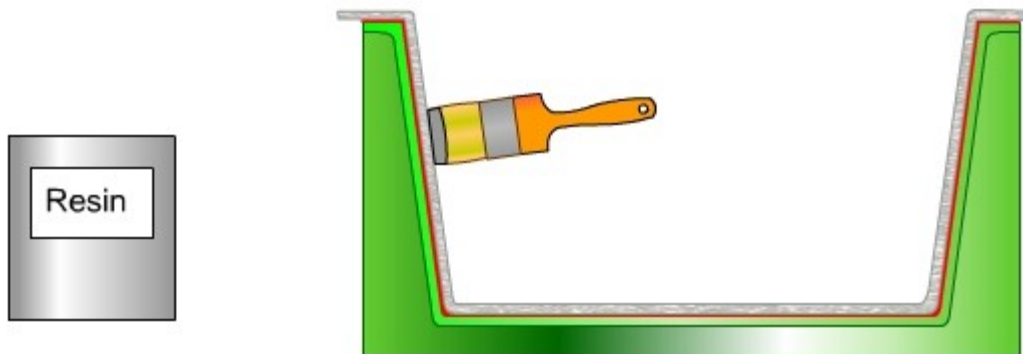
Once the gel coat has cured, strand glass fibre mat is laid all over the inside of the mould.



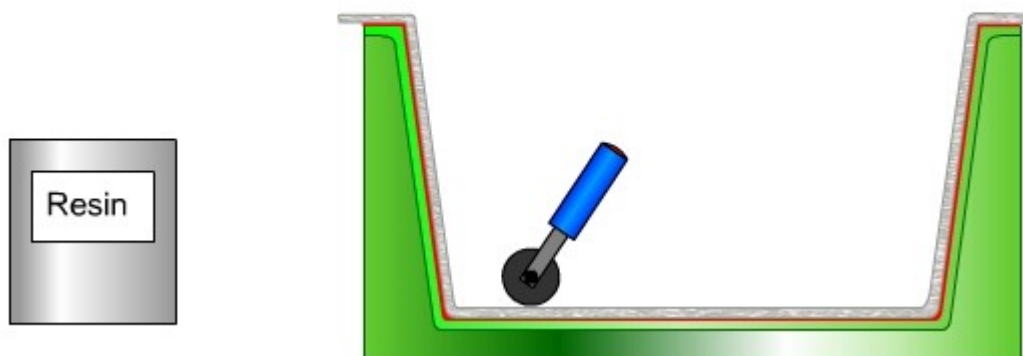
Stippling and rolling resin into the fibre reinforcement

When the gel coat has cured, a layer of fibre reinforcing material such as strand glass fibre is laid inside the mould and a measured amount of polyester resin mixed with a hardener is stippled and rolled into the reinforcing layer.

Next, a measured quantity of the resin, catalyst, hardener mixture is stippled into the glass fibre mat.



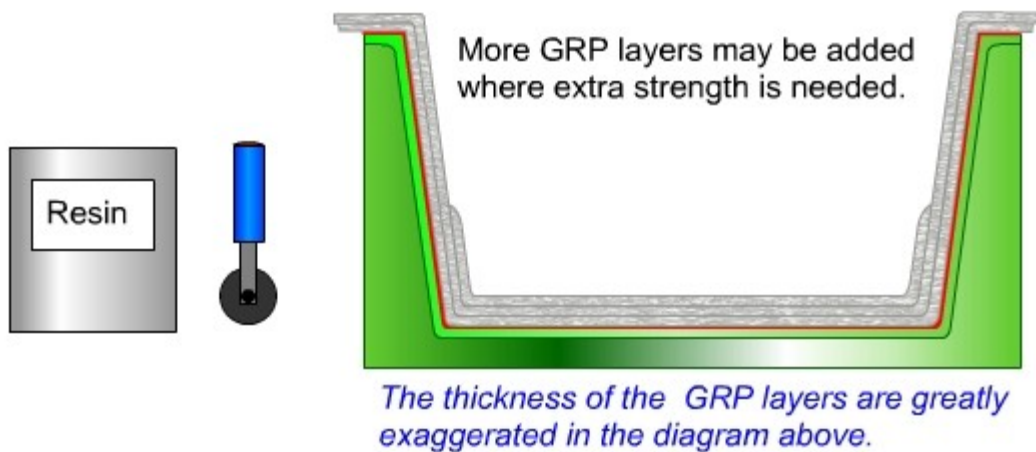
A roller is used to ensure that the resin is spread evenly all over the mould. After rolling, the glass reinforced composite is left to cure and harden.



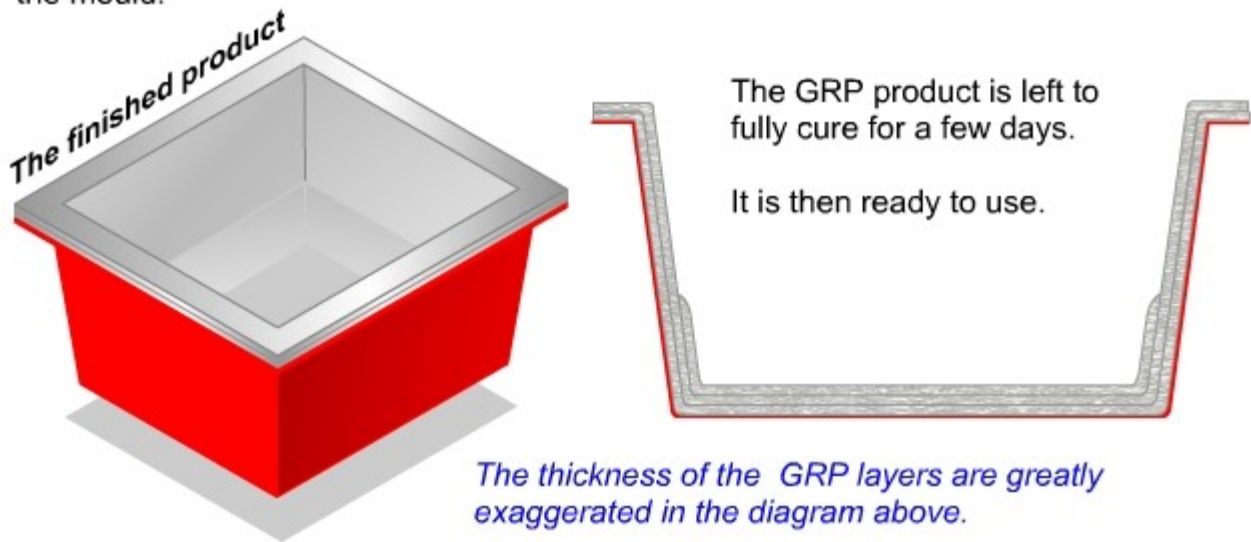
Once again an exothermic reaction occurs causing the resin to cure and harden and bond with the gel coat layer.

When the first GRP/FRP layer has cured, another layer of fibre reinforcing material is laid in the mould and resin is stippled and rolled into it. As each layer cures, more layers may be applied until the required GRP thickness is achieved.

Once the first GRP layer has cured and hardened, further layers may be added, leaving the GRP to cure and harden before each new layer is added.



When the GRP has cured, it may be knocked out of the mould.



When the product has fully cured, it may be removed from the mould. The coloured gel coat that was on the inside of the mould is now the exterior covering of the GRP product.

Any blemishes in the mould will have been reproduced in the finished moulding.

Please refer to **CLEAPSS**, Model Risk Assessments for Design and Technology in Secondary Schools and Colleges, Part 1.054 COSHH Regulations.