

FIBREGLASS

A BIT OF HISTORY:

Fibreglass, used for the first time in the 1950s, immediately obtained a considerable consensus.

It has been the first plastic composite, cold pressing and stamping pressure-free, that properly reinforced and improved the characteristics of mechanical resistance.

Previously, in the 1940s, polyester - initially reinforced with asbestos fibre – was first used to construct aircrafts' additional fuel tanks.

In later times, the asbestos fibre was replaced by glass fibre. The remarkable success of the new material fostered the manufacturing companies to prepare different types of resin and reinforcement fibres, leading to considerable technological progress.

The use of fibreglass in the construction of boats - from small ones to work and cruising boats, including large ones - has contributed to spreading knowledge of the material and allowed studying the performance of composites over time and in conditions of use under heavy work and stress.

Fibreglass in monocoque-body

Below we describe the materials used in the production phase:

- *Gelcoat:*

It constitutes the visible part of the products. It is applied using a double layer manual painting method. It gives the structure excellent impact and thermal resistance, protecting the product against atmospheric agents, ultraviolet rays and chemicals. In addition, the gel coat gives the structure an uninterrupted and smooth surface.

- *Resin:*

It has the function of a real "adhesive" and is the material that determines, through polymerization, the permanent shape of the bodywork. It has a high breaking resistance and tensile strength.

- *Glass fibre*

It is composed of 1 mm thick sheets applied by hand in three crossed layers (MAT) and gives high elasticity to the finished material.

- *Polyurethane foam*

Alternated with multilayer phenolic strips for better furniture fixing, it comprises 20 mm thick sheets (constitutes the largest portion of the thickness). It gives the structure strength and high technical resistance. Moreover, it is a self-extinguishing material.

Technical characteristics of the product

Strength and deflection: superior to any other product used for the construction of bodywork in general

Impact resistance: thanks to the high flexibility, it significantly absorbs impacts reducing the negative effects on the structure and reducing the risks for the passengers.

Technical resistance: a fibreglass body has an excellent climatization. In cold weather, the structure has a very low internal heat loss. In hot climates, it protects against solar radiation.

In case of violent shocks, such as a car accident, a body made of fibreglass compresses itself, cushions the impact and returns to the original position without permanent crushing. Therefore, repairs are simple and cost-effective, reducing the need for the use of spare parts and the replacement of damaged parts.

The fibreglass structure is continuous and excludes the risk of water infiltrations completely.

The lack of wear and tear and the resistance to atmospheric agents make the only maintenance required a simple polishing after several years of use.

DESIGN

Designing a monocoque fibreglass bodywork is equivalent to "dressing" a chassis, recalling the peculiar lines, volumes, and proportions in the design, making it efficient in its use and proportionate and pleasant.

Designing new models in compliance with these essential requirements is a constant challenge since it is impossible to change even the smallest detail after producing the mould.

The stage after the planning and designing entails the creation of a full-scale wooden model with inserts of polyurethane in the curved or rounded areas.

This manual work is entrusted to modellers with very cherished and professional hands who can be defined as authentic sculptors.

Modelling is long and requires extreme precision, given that what is created on one side of the body must be remade specularly and perfectly identical on the other side.

The operation is performed by making small reference templates and an indispensable professional "eye".

The wooden model, ready for the mould preparation phase, is sprayed with various coats of mould release and then numerous layers of MAT - fibreglass sheets with a thickness of 1mm - are placed on it until it reaches a few centimetres thickness.

Finally, a stiffening and handling metal structure is embedded on the outside of the mould, which is then cut along particular lines and flanged to extract the piece made out of it.

After a curing phase, the mould is ready for the first body.

PRODUCTION

The body's construction takes place after a thorough cleaning, polishing and preparation of the mould with release waxes.

First, the GEL COAT is spread with a variable thickness from 5/10 to 8/10 mm, constituting the first external layer. Then, three layers of MAT (fibre of glass) - crossed and each time rolled by hand - are spread and then impregnated with resin to allow an improved adhesion to the mould and its curves.

Thanks to this operation, great strength and elasticity combined with a significant size uniformity in every part of the produced piece are obtained.

On the resin layers, polyurethane foam in sheets of 20 mm is applied, which makes up most of the thickness of the body, and is punctuated by strips of phenolic plywood, of the same thickness, for the fixing the furniture.

To finish, two more crossed layers of MAT and resin are applied. In this way, a sandwich of two layers of resin anchored to the polyurethane is obtained, making the body extremely robust.

BENEFITS

A body made as described above is defined as "monocoque" because it is produced using a single mould without any further components.

The only element added later is the floor, which is resin-coated on its entire perimeter.

The final product is comparable to the hull of a boat.

The total absence of joints gives a lifetime guarantee of absolute waterproofness and perfect insulation.

Another fibreglass feature not to be overlooked is the bad heat conduction.

Anyone can personally carry out a test like this: parking two vehicles in the sun, one with a traditional body made with aluminum panels and another with a monocoque fibreglass

body. A lower temperature, with variations from 6 to 7 degrees, is detected in the latter: an excellent result.

It is important to evaluate the benefits of fibreglass monocoques since, over time, they offset the investment costs incurred at the time of purchase.

As already mentioned, robustness is a major advantage. As any camper traveler is aware, scratching the side of the vehicle, even against a modest size branch (and everyone knows how easy it is to be in situations where one is forced to follow fixed routes), causes considerable damage to aluminum walls, without dwelling further on the damage to aluminum roofs in the event of hailstorms (more frequent than you think).

The reparation of aluminum bodies requires dismantling the damaged part that must be replaced after bonding under the press, which is a laborious and expensive operation to be carried out exclusively at specialized centers or factories.

On the other hand, fibreglass is, as already mentioned, a highly resistant and elastic material that, under the same events, can at most present a minimal scratch on the GEL COAT surface, which is almost thick as the one in aluminum!

Abrasive paste and polish, and the problem is solved!

In the event of a major accident, the damaged part is removed and with the use MAT and polyester resin to plug the hole. Then, everything is plastered and painted like a normal automotive body.

Any coachbuilder can carry out the intervention.

Another advantage is the rounded shapes of the fibreglass monocoques, which eliminate the "box" effect, increasing the aerodynamics of the vehicles, both frontally and laterally.

This makes the vehicle safer and faster to drive and significantly reduces consumption.

We reiterate that the only disadvantage is that these products are difficult to industrialize. This entails slightly higher costs, which will be offset thanks to the remarkable reduction of the management expenses.

Today the market offers vehicles called "fibreglass" that have very little to do with a real fibreglass body.

These products have replaced the external aluminum sheet with an 8/10 calendered fibreglass sheet. Still, they remain some assembled structures (walls-roof-overcab), maintaining in practice the same peculiarities and the drawbacks (such as infiltrations) of such a production system.