УДК 629.

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THE DEVELOPMENT OF PLASTIC CARS

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Анотація

Стаття присвячена розвитку автомобілів з пластику.

Ключові слова: розвиток автомобілів, нові технології, автомобілі, композити, пластик, автомобільне скло-волокно, кузов автомобіля.

Abstract

The article is devoted to the development of plasic cars.

Key words: development of automobiles, new technologies, automobiles, composites, plastic, glass fibre cars, body of car.

Introduction

Mention plastic cars, and most people think of the leaky, creaky and crazed bodywork so common on glass fibre cars of the 1960s.

Plastic still has a poor image even today, being connected more with flimsy toys than the leading edge of motor industry technology. But plastics are becoming increasingly used in making cars, largely as a result of the drive towards weight reduction for lower fuel consumption and greater economy.

For many years the problem has been that plastics are not strong enough to be used without reinforcement. Now the scene is changing, with more complicated, composite materials taking over from simple plastics. These new materials bring changes in design and manufacturing processes but, most of all, offer greater driving economy.

The Results of the Research

Glass fibre - more correctly known as GRP, which stands for glass- reinforced polyester - combines lightness with strength. Weight for weight, glass fibre is much stronger than steel, so the panels can be made lighter. For many years it was the only plastics material used for structural car parts, and it is still widely used today.

In a glass fibre bodyshell, glass fibre matting is used to reinforce a polyester or epoxy resin panel. The resulting material is relatively stiff, but still has sufficient ‘give’ to withstand low-speed knocks. In the 1950s, manufacturers started to use the material for car bodies. The first car to appear with a glass fibre body was the Chevrolet Corvette of 1957, but underneath it still used a conventional steel chassis to give it strength.

The following year, Lotus introduced the original Elite-the world’s first, all-glass fibre monocoque. It had no steel chassis, and the engine, gearbox and suspension were bolted directly into the glass fibre shell. Among the cars currently in production with this construction is the Midas, a low-volume specialist car that takes much of its running gear from the BL Mini and Metro.

As an alternative to steel, glass fibre construction has considerable advantages. Though of much thicker section the structure is light, and rust becomes a thing of the past (except where it is bolted to metal). For the manufacturer, tooling costs are lower than for car construction in steel because large presses are not usually needed.

Despite the advantages, glass fibre cars have only been produced by small manufacturers, usually attracted by the low tooling costs. For mass production, it has never really been a viable proposition. Manufacturing is relatively slow, since each body section needs to cure for a couple of hours. Car body manufacture in steel, on the other hand, has had the benefit of much more investment and development.

Since the early days of glass fibre, the use of plastics and other composites has come a long way, with techniques such as reaction injection moulding allowing a much faster manufacturing cycle.

Most manufacturers now use some form of plastic for the bumpers of their cars. In the early days of

plastics, the bumper moulding would have been a single piece of ugly heavy-gauge plastic (polypropylene or thermoplastic) in black or grey, usually with metal reinforcement behind to give adequate strength and resistance to sagging.

Nowadays the strength is more likely to come from moulded-in box sections: a piece of lightweight foam, is used as a base, around which the rest of the bumper is moulded. The foam has no real strength of is own, but when it is used as a spacer it moulds the plastic into a strong 'hollow' section. Rover make the bumpers of the 800 series in this way but Lotus have developed the technique to the extent that they can use it for the main structural sections of their car bodies. Steel parts can also be moulded-in to give localized reinforcement for door hinge or lock mounting, and for protective parts such as door girders and roll bars.

Many of the plastic-bodied cars in production now use different types of plastic for different parts. Bumpers need to be deformable to absorb impact, and elastic to avoid permanent damage, so they are made from a variety of specially modified plastics with some rubber-like properties (such as polypropylene or modified thermoplastic polyester). For panels like the boot lid it's better to use more rigid material such as fairly heavy gauge glass fibre or cold-pressed reinforced polyester so that the driver feels solidness when slamming it.

Using many different materials is easy to arrange if the body is made up from a number of different parts bolted to a central structure, but Lotus, who make their bodies in two main parts, manage to combine several different materials into the same casting. With vehicles that have individual panels bolted on to a separate steel frame, such as the Reliant Kitten and Scimitar and the Renault Espace, each panel may be made of only one material or a composite of two.

Provided that all the different materials used can be made to accept the same type of paint system, there will be no problems with finish.

Conclusion

Summing it up, we can say, the plastic materials very perspective for development of cars.

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