

Innovative design in car interiors

By Colin Pawsey

The design of automotive interiors is facing a challenging, exciting time. Consumers are demanding advanced functionality, better aesthetics, and durability from their car interiors. At the same time expect environmentally friendly, sustainable vehicles. The introduction of new technologies and materials gives manufacturers the opportunity to design interiors with greater comfort, whilst exploring the use of many different types of innovative and sustainable materials.

Faurecia – Weight reduction

Faurecia manufacture components for the automotive industry, and are developing a range of reduced weight products under their 'light attitude' program. Faurecia's components and modules account for 15%-20% of a vehicle's weight overall, and the concepts behind light attitude can reduce the weight of a Faurecia-produced module by up to 30%.

The approach to interiors is to replace the plastic used in many of hard surfaces in the interior with soft fabrics. The centre console is manufactured from flexible materials, including a flexible storage space for a bag or briefcase. In a change to the traditional ventilation system, plastic vents are replaced by fabric which diffuses the air. The glovebox is covered by a sliding fabric lid, and a door module which is partially trimmed with natural fibres acts as an acoustic chamber, enabling the use of lighter speakers.

Weight reduction is a key issue for vehicle manufacturers as they look to meet targets for more fuel efficient vehicles. This type of design for weight saving in interiors will develop further in the coming years.

HBW-Gubesch

The German-based company HBW-Gubesch supplies plastic parts and components to the automotive industry, and has developed an in-mould injection decoration process with continuous film roll feeding. Their IMD-Pro process overcomes many of the issues and geometrical limitations usually associated with IMD (In-Mould Decoration). Complex parts which previously could only be decorated with FIM (Film-Insert Moulding) can be decorated with IMD-Pro at a cost reduction of around 40% due to the elimination of the decorative insert used with FIM.

To further this innovation, HBW-Gubesch has recently introduced the IMD Multi-K technique, which opens up several design possibilities for decorative and illuminated foils. The manufacturing process is split, with the first segment decorated with an endless film feed during the first injection process, and the next segment decorated with a separate film, then merged with the first segment during a second injection process. The whole process is carried out in the same mould, which avoids any mismatch between film and component shape, and negates the problems associated with single image decoration. The Multi-K process can be used to apply text or chrome highlights to curved IMD surfaces, without the usual high costs involved with ensuring correct positioning during individual process steps. The combination of transparent and non-transparent compounds also presents the opportunity to design foils with writing or images which can be partially illuminated for decoration or to aid drivers at night.

Visteon – C-Beyond

Last year automotive supplier Visteon released a demonstration vehicle, the C-Beyond – A new vision for connected and sustainable mobility, which incorporates a variety of innovative technologies and concepts. The interior is packed with design features which reduce weight, increase comfort, and improve the ambience of the interior.

Expanded materials are used in the production of some of the hard plastic surfaces of the interior. This involves using a blowing agent during the injection moulding process to intentionally add voids in the part. This reduces the weight of the component without affecting the finished appearance or feel of the surface. Also used in the vehicle is Visteon's R-Flax, which consists of a polypropylene natural

fibre composite that utilises flax straw and small fibres, dispersed on a coloured background to achieve a natural, grained finish.

Visteon has developed several innovations into the skin of their interiors, which gives manufacturers greater design options. Their 'inskin' is a negative vacuum formed manufacturing process which allows a decorative or functional feature to be inserted directly into the thermoplastic skin, resulting in a completely flush finish. They have also developed a translucent skin, which maintains a conventional appearance, but has translucent properties. This enables lighting to be strategically placed to create an ambient interior, or for branding or more functional purposes.

The vehicle also includes adjustable ambient lighting which enables users to create a variety of atmospheres to suit their mood, while motion sensing lighting (pictured below) has also been developed to aid ease of use and comfort.



The centre console has also been developed to improve comfort and usability for the driver. Visteon have integrated a power sliding console which the driver can position to suit, and which is ergonomically designed for the user to rest their hand while controlling the functions on the console.

The vehicles of tomorrow can be expected to implement many of these concepts, as manufacturers strive to produce interiors which give the consumer greater comfort, greater usability, and an overall more enjoyable driving experience.

Recycled Materials

Johnson Controls

Johnson Controls is one of the world leaders in automotive interiors, and currently uses several sustainable materials for their designs. They supply components to automotive manufacturers; such as door and instrument panels, as well as complete interiors. Natural raw materials are used for the manufacture of door panels, which contributes to a 10% reduction in carbon emissions over the course of the life cycle of the door.

For instrument panels and dashboards, Johnson Controls uses a material recycling process for glass fibre reinforced plastics; materials which are commonly found in instrument panels. The recycled glass fibre plastics can then be used to create components for the same parts. They are also currently investigating the use of door panel production waste to manufacture armrests and door panels.

Ford

Ford is another manufacturer improving the design of interiors and developing the use of renewable and sustainable materials in its interiors. Certain models of vehicle have seen the use of a micro-denier suede which is manufactured from recycled plastic drinks bottles. One metre of suede can be produced from 20 plastic bottles, and the material maintains the luxurious feel and appearance associated with suede used in high-end models.

One of the key factors Ford established in its research is that although consumers desire sustainable materials and cars which can be manufactured with less impact on the environment, they still expect the same feeling of quality, durability and luxury. Along with producing micro-denier suede, Ford has also used engineered ebony wood for interiors. The wood is recycled and re-assembled grain by grain,

then stained with a water-based stain to give it the deep rich tones that consumers associate with luxury wood trim.

For future applications Ford is researching the possibility of using corn-based, compostable, and natural fibre filled plastics, as an alternative to glass fibre plastics currently used to produce many of the plastic components within a car interior. While there is also the possibility of using Polyactic acid (PLA), which is a biodegradable plastic derived from sugars in corn, sugar beet and sugarcane. This plastic can biodegrade in 90-120 days, rather than the 1,000 years it takes petroleum based plastics.

Summary

The development of recycled materials, new types of reinforced plastics, engineered wood and foam substitutes, gives automakers greater scope than ever to experiment with different types of materials to produce cars which are much more sustainable.

The European Union is committed to reducing carbon emissions, with the aim of a carbon-zero society by 2050, and cars have long been one of the biggest candidates for improved energy efficiency. The issue of sustainable mobility is one which will continue to be pushed in Europe and it is essential for designers and manufacturers to take a holistic approach to the production process.

Despite the clamour for the use of renewable and recycled materials, consumers do not expect any reduction in quality, durability or safety in their vehicles. Quite the opposite, in fact, as consumers are demanding more functionality, better performance, better fuel efficiency, and more safety features. To develop new materials which have a sustainable life cycle without any reduction in quality, or significant increase in cost, is quite a challenge for manufacturers.

With the advent of smart technology and car to car communication, there are almost limitless possibilities to improve upon the design and functionality of the car interior. However, the key for manufacturers is to implement this new technology while remaining cost-effective, and maintaining a reduction in energy usage during manufacture.

It is vital to the development of sustainable cars, that more and more components can be constructed locally, from sustainable materials. The manufacture of a car must be viewed over the entire life cycle of each and every component, if the overall global warming potential of the car is to be reduced.

Automotive interiors are developing in several different ways. New materials are being used to reduce weight, while there are several advances in comfort, lighting and usability. The use of capacitive sensors for functional controls could even change the face of the interior completely. The challenge for manufacturers is to bring together these advances, along with sustainable and recycled products, to produce the interiors for the next generation of vehicles.

Colin Pawsey's background and experience is in the water heating industry, with a focus on technical data analysis and energy efficient products for both commercial and residential sectors. He also works as a freelance journalist focusing on renewable and sustainable resources, energy efficiency, and consumer information.

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