The use of sustainable materials in the car interior

By Colin Pawsey

In 2011 the European Commission released a white paper – 'Roadmap to a single European transport area – Towards a competitive and resource efficient transport system'. One of the key goals of the strategy is to reduce carbon emissions from transport by 60% by 2050, as part of the overall aim of achieving a near carbon zero society by 2050.

A holistic view is taken of the proposed reductions across the automotive sector, and there is a need to reduce the energy used during manufacture, the wastage produced, the impact of the vehicle at end-of-life, and the energy and resources used to manufacture components. In recent years there has been a shift in the industry towards renewable materials, recycled materials and sustainable production. The majority of automakers are implementing these ideas into all aspects of their designs, and the interior is no exception.

As consumers are becoming more aware of environmental issues, so they are demanding more environmentally-friendly vehicles. The consumer's definition of an environmentally-friendly vehicle may vary considerably, however, from a car with high fuel economy, to a car which can be almost completely recycled at end-of-life. One thing that is clear is that consumers are not prepared to accept any reduction in quality for the sake of sustainability, and one of the biggest challenges for automakers is to implement new, sustainable materials into their designs without any significant impact on cost or quality.

Nissan – recycled materials

Nissan is one manufacturer which is embracing recycled materials in the production of their vehicles, and showcases many of its innovations in last year's car of the year, the Nissan Leaf. As part of the company's philosophy towards recycling it has

targeted 100% resource recovery for end-of-life vehicles, while promoting designs which centre on the vehicle life cycle, waste reduction, and other resource saving measures. Nissan also aims to increase recycled resource usage rates to 25% by adopting their own closed-loop recycling concept, whereby the company will recover and recycle end-of-life products, and use them in production of new vehicles.

Pictured below is an image of the Nissan Leaf, with details of the recycled products used in its manufacture. From recycled bumpers used to produce new bumpers, to plastic bottles which are recycled into sound insulation layers in the dashboard, the Leaf incorporates several innovative concepts. Around 60% of the plastic used in the Leafs interior is recycled from plastic drinks bottles, while seat fabrics, trim, door panels, and the carpeting all make use of partly recycled materials. More than 95% of the entire vehicle can be recycled when it reaches end-of-life.

Ford – sustainable interiors

Early in 2012 Ford introduced its first 100% sustainable interior in the Focus Electric, which utilizes several different renewable and recycled materials in its design. Ford state that up to 35% of the cars interior is made up of recycled

materials, from plastic bottles to post-industrial fabrics. Caster oil and soy foam is used in the instrument panel, the seats and head restraints; and it is estimated that two pairs of jeans and 20 plastic water bottles are kept out of landfill sites per vehicle.

The 2013 model of the ford fusion (interior pictured below), also benefits from the same uses of renewable and sustainable materials. Noise, vibration and harshness (NVH) in the car is held to world class standards by the use post-industrial, recycled cotton as a sound-absorbing material. Again, this is the equivalent of two pairs jeans, and rather than the material going into landfill, it is used to reduce noise inside the cabin.

The cloth seat covers are manufactured from 100% Repreve yarn, which is derived from plastic bottles. The bottles are melted and reformed into chips which are then extruded and textured into fibres. It is estimated that the seating in a Fusion model contains the equivalent of over 39 plastic drinks containers.

Repreve recycled fibre

In partnership with Repreve, Ford plans to divert up to two million used plastic bottles from landfill, and use them in production of new vehicles.

Repreve is made by Unifi, one of the global leaders in sustainable textiles. It is a 100% recycled fibre, made from a variety of post-consumer and post-industrial waste. The products and waste materials are pulled out of the waste stream after consumer use, but also after manufacturing where much of the waste is also sent to landfill. Plastic bottles are one of the most notable examples. These are melted down and converted into fibres to be used to create fabrics. The fabrics are then dyed and rolled ready to be used for a variety of purposes, including automotive seating covers.

The use of Repreve recycled fibres impacts the environment in several ways beyond creating a sustainable interior. The production process of making Repreve uses less energy and water, and creates less greenhouse gas emissions than manufacturing virgin polyester. It also reduces the need to refine crude oil to make polyester and nylon, and lessens the dependence on this natural resource.

BMW i3 Concept Car

The BMW i3 concept car, pictured below is an example of the future of car design, with the interior demonstrating the use of sustainable materials alongside innovative design features.

The interior visibly shows the use of materials such as European eucalyptus wood, while the leather used in the interior is tanned using a natural tanning agent which is derived from olive leaves. The wood used to manufacture the dashboard is entirely from timber grown in Europe and certified as sustainable by the FSC (Forest Stewardship council). The wood is also crafted in Europe which enables BMW to reduce the delivery routes during all stages of production. All of the natural materials used in the construction of the car emit only as much CO2 when they are disposed of, as the plant stored during its growth.

The interior cabin benefits from a fresh design, most notably the removal of the centre console dividing the cabin. This helps to create a spacious feel to the cabin, complemented by the coach style doors and full width bench seats both in the front and the rear.

The all electric i3, when compared with a similar class car with a combustion engine, has one third less global warming potential over the entire product life-cycle.

Summary

Sustainable mobility is a key issue in the European strategy to reduce carbon emissions almost completely by 2050, but it covers a broad spectrum of industries

and sectors. For the auto manufacturing industry, there are several ways in which the EU strategy will affect design and manufacture, and car makers are all in the process of developing new technologies to help reduce each vehicles impact on the environment; from the initial stages of sourcing components, to the production process, to emissions while the vehicle is in use, to end-of-life recyclability.

It is clear from the efforts and the self-imposed targets of companies such as Nissan and Ford that the 100% sustainable vehicle is not far away in terms of design. The challenge for these companies, and other automakers, is to bring these designs and strategies to the mainstream production process and the mass market.

Nissan has shown its intention of 100% recyclability by developing its own closed loop recycling system whereby the company will recover and recycle end-of-life vehicles and use those parts for the manufacture of new vehicles. It is also implementing plans in its major construction plants, to re-use and recycle as much waste as possible to aid sustainability.

Ford's introduction of 100% sustainable interiors into its vehicles, some of which are already in production, is a valuable step forward in interior design. The use of recycled materials and renewable materials in models such as the Focus Electric and the Fusion shows that sustainability is certainly achievable for automotive interiors.

One of the key issues for manufacturers is highlighted by the BMW i3, which demonstrates the use of local sustainable materials. This will be vitally important for the industry as it moves towards further reductions in the carbon emissions which can be attributed to vehicle production. Supporting locally grown sustainable forests and using locally recycled materials shortens delivery routes, and reduces the amount of energy used for transportation.

As ever, much of the progress will depend on the consumer and their attitude towards sustainability. It is interesting to note that consumer feedback on the Nissan Leaf suggested that many would have preferred leather as an option for the seating rather than the fabrics used, which were made from recycled materials. Automakers will always need to navigate this balance between sustainability, innovation, and consumer demands.

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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