



Challenges in China around VOCs and leather's smell

New legislation in China imposes strict limits on emissions in car interiors, changing the requirements original equipment manufacturers face when testing automotive leather. In turn, this will have an impact on automotive leather manufacturers. Leather chemicals company Lanxess has shared details of some of the work it has done to help tanners respond effectively.

It has become widely known that Chinese consumers often find the odour of a new car off-putting. Research firm JD Power, which publishes a report every year on the most common grievances car buyers voice, placed "unpleasant odour in the vehicle interior" at the top of the list for China in 2015 and again in 2016.

No improvement in Chinese consumers' evaluation of the odour has occurred since then. In contrast, the reduction in the total volatile organic compounds (TVOC) emitted by leather is ongoing, and this is significant. Among the consequences is new Chinese legislation for vehicle interior

air quality (VIAQ), which, in turn, has prompted leather chemicals manufacturer Lanxess to analyse the question of car interior smells from a scientific point of view. It wanted to analyse the odour of automotive leather more fully and to come up with solutions that will help automotive tanners and original equipment manufacturers (OEMs) stay the right side of the given limits.

Dr Volker Rabe, Lanxess's head of technical product management for tanning technology, says the question that needs addressing, as far as tanners are concerned, is the contribution that leather upholstery makes to the overall

Ongoing demand to reduce the Total Volatile Organic Compounds (TVOC) emitted by leather has, in some cases, made the smell of leather more noticeable in car interiors.

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smell inside the car. Dr Rabe explains. "We have identified 70 substances that have an influence on the smell of leather, including sulfide compounds, aldehydes, amines and aromatic compounds. TVOCs and odour are linked but they are not the same. VOCs reflect the measurable substances only, while odour goes beyond that. It's like a plant. You can see what's above the ground (reflecting the measurable part, the TVOC), but your nose also picks up the smell of the roots, the smell of the earth and so on (reflecting the part not measurable with artificial devices)."

Odour trends

According to Dr Rabe, the drive in recent years to lower TVOCs in leather has led to some aspects of odour becoming more prominent, making this an issue that is likely to become more urgent for tanners and OEMs to resolve, especially in China, with its VIAQ legislation and its odour-sensitive consumers. "With the stricter regulations, the lower thresholds and the reduction of VOCs, other molecules have become more prominent," he says. "Furthermore, we have in the tannery more and more water-reduction processes and recycling systems and these, too, can have an influence on the odour of the leather afterwards." He makes the point that the varying degree to which tanners are using water-saving and recycling systems means their attempts to tackle the odour challenge will need to be tailor-made."

Counter-measures

With 70 different substances having an influence on the smell that leather carries, the overall picture is complicated. Molecules will react with one another, sometimes neutralising each other, but sometimes increasing a substance's impact on the smell of the leather. "Even this is

A nose for success. Specialist research groups predict passenger vehicle sales in China of almost 25 million in 2018, cementing its position as the largest market in the world. It is only natural, therefore, for OEMs to take seriously Chinese consumers' concerns about the smell of car interiors.

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not the end of the story," Dr Rabe continues, "because the odour of the leather can change over time." He insists that the safest strategy is to reduce as much as possible all the molecules that contribute to the smell that leather has. Lanxess's work shows it is possible to "chemically cluster" the substances that have an influence on that smell, identify the main sources of most of the substances and take counter-measures against them.

Single substances

Another consequence of the reduction in VOC levels in recent years, beside the effect this has had on odour, is that the focus of the regulations has switched more towards single substances emitted from leather rather than the overall picture.

The new China's new Vehicle Interior Air Quality (VIAQ) standard can be regarded as one of the latest examples of this trend. This standard regulates eight substances with limits and related test methods for the car interior. OEMs have already taken these regulations as a basis for their requirements and adapted their individual leather specifications with stricter limits and harsher test conditions.

Nevertheless, the given limit values for seven of these eight substances for leather can be adhered to. The only exception was acetaldehyde because the source of this substance in automotive leather was initially unknown. Dr Rabe explains that the first target Lanxess set itself,



Dr Volker Rabe of Lanxess speaking to Chinese tanners in Shanghai in August 2018.

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therefore, in working out how to help tanners meet the demands of the new legislation was to figure out the source of acetaldehyde in the leather.

Wet blue wash

Previous work by a German research institute was of help here; it set out to measure the levels of acetaldehyde present at different stages of leather production: in the raw hide, in wet blue and in finished leather. "It was clear from this that we have the highest concentration of acetaldehyde in the raw hide," Dr Rabe says. "This can only be explained if the acetaldehyde is the result of decomposition of proteins. Concentration decreases as the process moves from the raw hide to finished leather, but it does not disappear completely; you can still find acetaldehyde in finished leather and we need an auxiliary to remove the residual acetaldehyde from the finished leather."

One auxiliary Lanxess has developed to carry out this function is called Tanigan SL-C01. Tests it has carried out on a series of samples of different kinds of finished automotive leather suggest that the auxiliary can make an important difference. Without using the auxiliary led to levels of acetaldehyde concentration in the finished leather samples of up to 5.4 microgrammes per sample. In contrast, washing the same materials at the wet blue stage with Tanigan SL-C01 brought the concentration of acetaldehyde in the finished leather below detection levels. "That means we have removed completely from the system the acetaldehyde generated by the decomposition of proteins," Dr Rabe says.

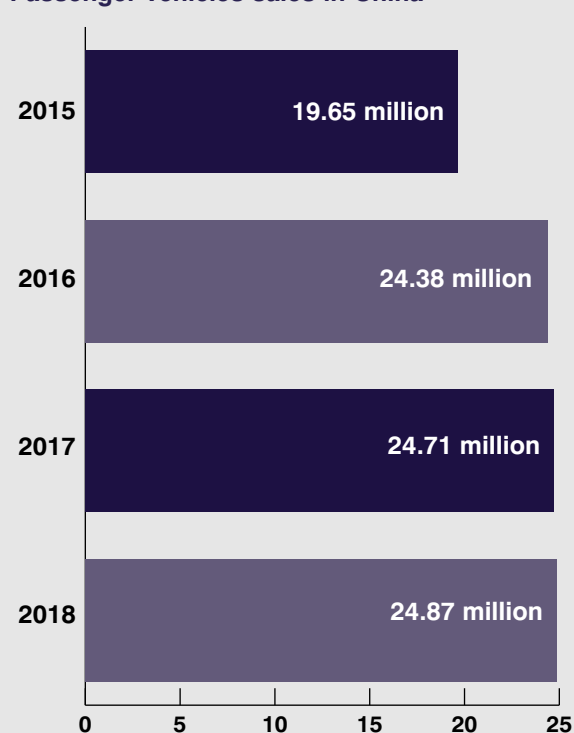
Lipids and fatliquors as a secondary source

During this research, however, Lanxess reached the conclusion that this decomposition of proteins could not be the sole source of acetaldehyde; its presence in some of the samples could only be explained, if the decomposition of lipids or fatliquors is another source of the molecule. Its response to this was to develop another product, a polymer softener called Levotan RV, again part of a wider Levotan range. In this case, the tests showed that replacing the fatliquor partly in the existing recipe with Levotan RV reduced acetaldehyde concentrations from, in some samples, 8 microgrammes to 1.1. In parallel, it became clear to Lanxess that, acetaldehyde aside, the use of these auxiliaries made it possible to reduce dramatically the concentration of other aldehydes in the finished leather, bringing down the overall presence of VOCs by more than a factor of three.

These two products have distinct targets. Tanigan SL-C01 reduces acetaldehyde formed by the decomposition of proteins in the raw hide, while Levotan RV's influence is on the acetaldehyde formed by the decomposition of lipids and fatliquors further along the tannery production line. Still unsatisfied, Lanxess set about making a product that will tackle acetaldehyde formation from both sources. The result is another new finishing product, Primal Fleshcoat AR-2. Employing the new product in retanning and finishing recipes "definitely removes acetaldehyde from the entire system," Volker Rabe says.

Whether one, two or all three products are needed to fulfil the set limits depends on requirements and the actual concentration levels measured in the emissions test without using one of these auxiliaries. 🌐

Passenger vehicles sales in China



Sources: IHS Markit and The Chinese Association of Automobile Manufacturers