

TECHNICAL DIFFERENCES BETWEEN U.S. AND EUROPEAN AUTOMOTIVE LEATHERS*

by

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BACKGROUND

Historically, European and U.S. Automotive leathers have followed different paths. Whilst the distinction is some what less clear at the current time, it is interesting to look at why the differences arose and what did they actually mean to the people technically responsible for making the leather. A better understanding of this issue can help us address the needs of the current and future market.

RAW MATERIAL

Traditionally the best hides for automotive leather are from the South of Germany. The reason for this are they are firstly large in area, relative free of insect damage, they benefit from good animal husbandry, and they are heavy enough to give a level uniform substance across the whole hide. However, they are in short supply, and as red meat consumption drops in Europe, the percentage of auto leather made from such hides continues to fall. Even for the sophisticated German auto market, plenty of South American hides are used - these can have been finished almost anywhere in the world.

The South German hides, whilst obviously desirable in terms of cutting returns, cannot be said to offer any technical advantage over hides from other sources, with the possible exception of consistent tear strength properties. However the availability of such hides primarily to European tanners has given them greater freedom to produce the more aesthetically pleasing - translating into more lightly finished - leathers, and partially explains the wider usage of such leathers in cars destined for the European market.

Possibly the biggest challenge of all facing the technical staff in automotive leather tanneries around the world is to upgrade the raw material they are working with. Some of the techniques used to do this will be covered later in this paper. The huge increase in demand for automotive leather of the past twenty years has meant that new hide sources are constantly being explored, and splits are already widely

used for steering wheels and door panels, although use in seating itself remains minimal.

Returning to the original title of the paper, it cannot be said that the availability of superior raw material to the European tanners has in itself been responsible for technical differences between there and U.S., but it has influenced the types of leather made, and set a standard for leathers in the higher priced cars around the world. The consequence of this is that auto tanners in different locations have to adjust their processing according to the quality of raw material, in order to get a maximum return. It is rather unfortunate that the lower quality material can actually cost more to produce because of extra upgrading steps required during the processing.

WET PROCESSING

Given the subject matter, it is impossible to ignore this vital area, although in truth the differences in approach on both sides of the Atlantic are not too significant. There are local adjustments to be made in the beamhouse, tanning and retanning operations to account for the differing raw material, and there is an increasing demand in Europe for softer leathers, a demand that cannot be addressed only in the finishing operation. The introduction and widespread adoption of chrome free leather has led to processing change, not only in the tannage, but also in the retanning operation, but again development on both sides of the Atlantic has run more or less along the same lines. Right from the start of the wet processing, it is vital to avoid any chemical that will lead to fogging, and all materials must be fast to any prescribed migration test to avoid issues with colour change. The total process has to balance the needs of maximum yield against uniformity of substance and sufficient tear strength.

One of the main drivers behind differences between U.S. and European leathers is the availability or restriction of chemicals according to the European EINECS register or the U.S. TSCA. In common with the finishing process, this

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does lead to significant differences in chemical usage, especially as the major part of the leather chemical industry is European based, meaning many products used in Europe have never been TSCA registered - some cannot be - so are unavailable to U.S. tanners. The need to eliminate unwanted residual chemicals in the leather such as free formaldehyde is again common to both sides of the Atlantic. The driving force behind this can either be local or national statutes, or dictates from the car companies. The high costs involved with effluent treatment have driven U.S. and European auto tanners to do at least a part of their wet processing off shore with the result that although they retain a degree of control of the process, their own technical staff are more likely to be specialised in the finishing operations.

With regard to the issue of softness, the wet end processing has a major influence, although there is a secondary issue of post hardening of the leather which is more influenced by the finish. The pursuit of softer leathers also needs to respect the fact that many auto leathers are and will continue to be printed, and that a retannage that does not help to hold a print will lead to big losses in cutting yield and possible customer complaint. Like every other stage of leather processing, it is a question of achieving the right balance of properties, in this case perhaps sacrificing some softness in order to give a more uniform finished appearance.

CRUST OPERATIONS

There has been a significant move from toggle to vacuum drying over the last few years. This has happened on both sides of the Atlantic, and the scale of the adoption indicates that the high capital outlay is paid back by labour savings. Clearly there is no significant loss of yield, or the process would not be commercially viable; there are claims of improved grain appearance, but how many auto leathers are finished lightly enough to take advantage of this. One significant advantage is that leather can be dried to a set moisture level rather than dried right down then being in need of some rehumidification.

The control of the dry milling operation is now far greater than in the past, but as with the move to vacuum drying, this is common to both sides of the Atlantic so is not responsible for any difference between U.S. and European leathers.

FINISHING

It is in the finishing operations that the real differences between the leathers emerge. Up to now, we have seen some concession to adjustments in the wet processing for different sources of raw material, but no major differences. The

demand in U.S. for high abrasion properties against the need in Europe for higher flex performance means that the approach to this final stage of the process needs to be different. We should not ignore the Japanese market, where they want U.S. abrasion properties on softer more flexible European leathers!

The high demand for physical properties for automotive leathers cannot be met with topcoat alone. To get good scuff resistance or wet rubs, it is essential that the initial adhesion to the finish to the crust leather is high enough. All too often this is the source of physical test failure, especially on chrome free leathers where every single minor variation in the retanning process demands that the wet adhesion is rechecked.

The increased use of reverse roller coating is taking place on both sides of the Atlantic for the application of the first basecoat. As well as offering good coverage with little chemical wastage as opposed to spraying, the use of a more viscous coat prevents wetting of the leather which in turn results in a softer end product. Local and national legislation in the U.S. means that generally VOC levels have to be extremely low in all finish coats, in Europe, the levels although low, do not have to go quite as low as the U.S.. Certain solvents however, especially in recent years NMP, need to be drastically reduced in the finish.

In order to get the softer more aesthetically pleasing leathers, the Europeans have tended to build up the finish with an increased number of lighter coats rather than the U.S. approach of a minimum number of heavier coats. However, the downward price pressure on automotive leathers has led to this becoming a luxury few can afford. This does not mean European tanners can necessarily match the U.S. multi stage spray lines - because of the greater variety of smaller colour runs, the finishing lines have to have a greater degree of flexibility built into them in order to avoid long delays on the whole finishing floor when colours are changed and matched.

As the basecoat contributes most of the physical thickness of the total finish, it is obvious that it will have a big influence on the final softness, therefore with this in mind, softer resins would normally be preferred. However, to get better abrasion resistance, harder resins are preferred. Whilst the softer resins are more elastic and hence more flexible, the harder resins will tend to hold a print better. The final basecoat formulation comes down to finding the ratio of resins to give the best balance of the desired properties. The resins available will be acrylics and urethanes, butadienes are ruled out because of poor lightfastness. The variation

between European and U.S. leathers is much more the result of different application techniques, especially add ons, than any chemical difference in the basecoat products, although the U.S. systems would tend to be harder to help with abrasion resistance.

Coverage is of course a vital function of the basecoat particularly. The recent introduction of the roller coater "stucco" products is being fairly extensively tested for automotive, but this is not yet approved by some of the OEMs. Undoubtedly it helps with coverage, and with the correct selection of product, it can give a softer leather because it forms an effective barrier for the first basecoat, preventing too much penetration. On U.S. leathers, it is possible to use a higher pigment to resin ratio, on European leathers this is damaging to the flex properties.

A traditional U.S. auto finish consists of basecoat, color coat, and topcoat. In Europe, it is more likely to be conventional basecoat followed by topcoat. The color coat used in the U.S. is half way between a top and a base, sacrificing some of the coverage of the base in order to boost the physical properties, very useful when high abrasion resistance is required. In Europe, a light intermediate top is sometimes used to keep the leather cleaner on milling and to prevent sticking of the basecoat. Although the cost of the additional coat can be recovered by the fact that reduced contamination gives better cutting yield, correct formulation of the basecoat can also go a long way to achieving this goal.

Printing can be done on the base, intermediate or final topcoat. When printing on the final top, there can be a labour saving if using a multi station spray line, and the risk of contamination is reduced. Against this, colour control becomes more difficult and there is always the risk of glossy valleys on the print.

In recent years, the topcoat systems used on both sides of the Atlantic are virtually the same. This was not so much the case in the earlier days of water based topcoats because the remaining VOC level in the European tops was too high for the U.S.A.. There is however still a difference in the add on. A typical European top will have an add on of around 0.8 gm per sq. ft., whereas something around 1.2 gm would be more common in the U.S.. The difference again is explained by the need for higher abrasion resistance on the U.S. auto leather. The topcoats used to promote the properties of the leather are relatively hard and consequently the heavier the top, the harder the leather. This is going against the desirable aesthetic qualities needed for a top end auto leather, and gives the U.S. leathers their more heavily finished appearance.

CONCLUSIONS

We can see that the differences between the two leathers are more due to the demand for higher flex or abrasion properties than any other factor. Variations in raw material require some adjustment to be able to make the same end material, and legislation plays a minor part, but as the world continues to shrink, it should be possible to make either leather type in almost any location provided the formulation adjustments, primarily in the finishing, are made to give the final physical requirements.

CONVENTION DISCUSSION

Ricardo Lopez, GST AutoLeather - Mike, would you comment on the acceptance of leather in Europe by the consumer as far as accepting more or less natural defects compared to North America.

I heard a very interesting comment from somebody in the leather industry in Europe a month or two ago. He said that we assume that the people going to buy leather or a car with leather know virtually nothing about leather. If we look at it honestly, thirty or forty percent of those people buying cars with leather have already been out and bought a leather settee so they know what they are looking at. They want to see real leather. I think that is true in the US as well as in Europe. There is a greater awareness of leather than the car manufacturers would have us believe. To us leather people, we would love to see a scar in the back of a seat and know that it is really natural. In Europe, it is becoming more acceptable. There is a demand for lighter finish leathers showing that they are real leather. The problem with that, of course, is as you reduce the finish and don't put so much pigment in, then you have a problem with lightfastness. So to answer, yes I think that you can get away with more (If it is getting away with something. I am not sure that is the right expression) in Europe. The question is whether it is the car manufacturer in the US that is going to complete uniformity or is it the consumer. I believe that it is really more the influence of the car manufacturer. The consumers, if we could ever get to them and educate them, would be much more prepared to take a more European style leather.

Rodney Hammond, Seton Company - Mike I have a question for you. You did not touch on the issue of cleanability at all. I think that is a key difference. Consumers in the United States eat their breakfast on the way to work in morning. Drink coffee. You don't see people tooling down the autobahn in Germany doing that. What are your comments on cleanability as an issue too?

Cleanability is becoming a bigger issue for a number of reasons. It is not just what you eat in the car but it is also what you wear. A few years ago, if you were driving a luxury car you would probably have a business suit on. Now a lot of people with dirty jeans and leather belts with loose oil are getting into cars. There has been a big move away from dark colored leathers as well. I was in China a couple of weeks ago going around a big car showroom there. I probably looked at 100 cars. Well over 90 of them had leather. Only two had black leather. So it is becoming a much bigger issue. I think the answer will come from the finish companies who are already promoting a non-soiling finish. That will reduce the problem dramatically. I don't think that it is that significant a difference on either side of the Atlantic. It is a problem on both sides.

Wolfgang Wenzel, Bayer Chemicals Corp. - What is the squeeking? For example, in Germany we know that in the luxury cars the noise of the leather when they touch each other is far higher than the noise of the engine. Is it also a problem in the States? It is a particular problem in the BMW, Mercedes - these big german cars and probably some Japanese cars too.

There is a very good reason why that has come about. You can see the figures, particularly for the people from Ziegler Instruments who are the people making the anti-squeek machine. They have some nice graphs showing how engines have gotten quieter, wind resistance has dropped so those nasty little noises that were always present in the car you can now hear. They say, and BMW also says, that one of the reasons people are not buying the same model again is because they are annoyed with some little defect - some little noise on the inside. That rattle that you are always looking around and wondering where the hell is that coming from. The anti-squeek stick slip test is about to be introduced in Europe. I think it is September at the VDA. BMW already has it in place, Mercedes is coming on board, even Fiat is coming on board. At the moment, there are no American companies showing an interest in it. But I think that American leathers squeek just as much as European. So we can assume that it is going to come. It is a very big issue in Europe.