

Automotive and furniture leather Changing demands in characteristics and performance

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The character and properties of shoe and clothing leathers are determined by changing fashions. Automobile leather, however, is a high technology material whose leather character is influenced by very high fastness requirements. It has always been a conservative material without the effects seen where textiles are used in cars and furniture. The fastness requirements demanded of a car upholstery leather have given both tanners and chemical suppliers a technical headache, but the challenge has been met. Car upholstery should on average stand up to 25 - 30 high performance test methods. However, there is no general specification and although requirements are similar, each car manufacturer has two or three methods which present a particular challenge. These are given in outline in Figure 1, and may be compared with test methods and standards common to furniture leathers given as Figure 2.

Automotive leathers in Europe and America

Originally, the automotive leathers were firm and fully coated with finish, being hardly distinguishable from PVC materials. This was welcomed by the automotive industry on cost grounds as uses were often in conjunction with PVC. It was therefore desirable that the two materials should be indistinguishable. Materials could be used together and it was not always clear how much PVC was being used. In Europe the leathers were somewhat softer and more attractive than in American cars. The finish was applied in many thin coats, with considerable drying times between coats. In contrast, in America finishing evolved using fewer and heavier coats producing a less attractive leather appearance. About 10 years ago, the need to change from solvent to solvent-free or low solvent containing finishes challenged the producers of these leathers and the chemical industry. These water based systems brought new difficulties. Existing fastness properties had to match, and there should be no intercoat adhesion failures. The solvents in low solvent finishes also remained longer in the leather, so problems concerning migration fastness, especially of dyes and fatliquors, needed resolving.

The effects of globalisation

In the last 6 - 10 years, car manufactures have required other developments. Many automobile leather now look more similar to furniture leather, being soft and lightly pigmented with a pleasant surface handle, and the colour range has increased enormously. Rising demands for leather car upholstery meant new rules for all concerned. Leathers could be colourful and look like leather, and were introduced into cheaper models. To meet rising demands and minimise costs some car manufactures turned to "globalisation of car components". This included leather, and new supply sources were considered. Quality criteria moved to the fore. As more tanners offered leathers of the same type, often being combined with each other, the quality aspects assumed greater importance. This affected visual properties, e.g. grain patterns, depth of emboss,

substance, shade and matt effects. As a result of these quality demands, and the competition between the suppliers, the customer gained uniform high quality leathers.

Comfort in automotive leathers

The customer desires, particularly in the luxury automobile class, a leather that is elegant and comfortable with a natural feel and appearance. Comfortable aniline, semi-aniline and nubuck leathers are established in the furniture sector, and there are demands for the leather and chemical industry to develop these leathers for automotive use. The chemicals and techniques are now available to meet these developments, particular in the areas of retannage, fatliquoring and dyeing. This makes it possible to develop an unpigmented car upholstery. These chemicals, especially fatliquors and polymeric softening agents, now have excellent fogging, heat and light resistance. It is also possible to achieve higher light fastness ratings by drum dyeing with specially chosen dyes. This can be further improved by the use of antioxidants, light stabilisers and UV absorbers. The odour problem of car upholstery fatliquors has been solved for a number of years. Comfort can be technically established by, for instance, the determination of water vapour transmission. A lightly pigmented leather can have a value of 8 mg/cm/hr and an aniline leather can reach 10-15 mg/cm/hr. If one compares this with values of 1.0 - 1.5 mg/cm/hr which is demanded for pigmented leathers, then the current developments are a significant step forward towards seating comfort.

Furniture characteristics in automotive leathers

It is possible for the design of car upholstery to move in the direction of furniture upholstery. A certain reduction in the fastness requirements of the car upholstery must, however, be accepted. There should be a balance between leather character and fastness properties. By increasing the wear resistance properties of furniture leather to the standards demanded by car upholstery, the nature of the leather would change. The handle of furniture leathers would shift towards existing automotive leather characteristics. A solution is required to raise the physical performance without a deterioration of the high quality standards attained in furniture leathers such as leather character and seating comfort.

Balancing the standards of performance

It is not possible to make an overall improvement in fastness properties, particularly in the extreme case of car upholstery. Performance is dependent upon many factors, for example, leather type and colour. It is therefore best to analyse individual problems based on these parameters and so target the root of the problem. To attain the highest standards for furniture type leathers without jeopardising the feel and comfort factors, the following points are considered:

The light fastness

- for natural, nubuck and grain leather it would be desirable to raise the standard from Blue Wool Scale 3. This is very difficult and in some shades impossible. At the present it should be left at 3.
- lightly pigmented leathers require raising from 4 to 5. This is possible in principle, but depends on the particular shade.
- furniture leather should not be raised in general. It is more important to report whether there is a change in hue during exposure.

The rub fastness

- Nubuck, aniline full grain require a rating of 3, and lightly pigmented leather 4. These values should stay as present, being very dependent on shade.
- To raise the value of grade 4 to grade 5 for pigmented leathers is not recommended. For certain shades of auto leathers a grade 4-5 is accepted.
- The number of cycles should be considered and raised particularly for light and heavily pigmented furniture leathers.

The flex resistance

- This is an important test for pigmented leathers and can provide useful information of durability. This is of particular use if the flexometer values are compared before and after the aging test. Abrasion resistance
- This test gives information not only for the protection of the leather but also the adhesion, and wear resistance properties are particularly high in America. This is not only for auto leathers but also for pigmented furniture leather. Unfortunately the fastness abrasion demanded for car upholstery is so high, that it can only be achieved by a thick coating of the leather surface, which has a negative effect on the leather character.

Compromise between character and performance

For a shift towards furniture leather comfort for automotive upholstery there must be a compromise between leather character and performance. For the smaller volume of leather in the luxury class, attractive leathers similar to present furniture leathers need developing. The image of leather is thus confirmed as a natural product with high seating comfort and attractive leather design. Some reduction in fastness requirements from the automobile industry will have to be accepted. The large volume of auto leathers in the popular range will require full pigmented finishes, but with a noticeable improvement in softness and surface handle. No lowering of existing standards is likely. The characteristics of furniture leather should not adjust towards automotive leathers. To ensure user assurance and improve quality standards, the current fastness requirements should be analysed and changes made. The higher demands should never be at the expense of the leather character and seating comfort.