



The use of micro-balls for low density finishing and better aesthetics for embossed leather

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For years there has been a problem in leather finishing, which, until now, has not been solved. Conventional, fully finished leathers are compressed when being embossed, especially the surface layers, and this automatically leads to a reduction in thickness, hardening and inferior aesthetics. In order to soften the leathers afterwards they are often milled but, however, a large area of the grain may become loose through this process.

In order to reduce the density of embossed leather finishes, several procedures have been investigated. This includes foam finishing, with air being introduced into the finish to create a foam. But, there are disadvantages, namely that the foam can collapse during embossing, and this can lead to high density characteristics: the foam can also change its density during roller coat application.

Another investigation included the use of gas separating products similar to those used in the textile coating industry for the foaming of polymers. However, due to the inadequate heat resistance these are not suitable for leather finishing.

Compact micro-sphere technology

A requirement for extremely soft upholstery leathers is to have a high print retention, to provide easy care properties, and to have good aesthetics. The application of micro-sphere technology within leather finishing can help to achieve these objectives.

In this event, despite the softness of the leather, there is a far lesser tendency towards loose grain than conventional leathers with a higher finishing density. The density of the finishing is homogeneous in all areas and, depending on the kind and quantity of the pigments, is below 0.9g/cm^3 . In conventional finishing the density is normally above 1g/cm^3 .

The finish density is also known to be important for the aesthetics, along with the smoothness and the softness of the surface. The lower the density the more pleasant the feel, because of the reduced heat conductivity.

Applying the technology

Compact micro-spheres consist of a thermoplastic synthetic outer shell containing a propellant that will expand at an elevated temperature to form larger sized micro-spheres. The use of these so-called compact micro-spheres leads to successful results when combined with suitable binders within a defined process. However, the use of expanded micro-spheres in the basecoat alone will not lead to satisfactory results. This is because in their expanded state they are difficult to emboss due to their pressure elasticity. They can also collapse at high pressure and temperatures in a similar way to foam finishes.

In the successful development of this technology the major problem to overcome was to achieve a spontaneous expansion of the micro-balls embedded in the binder. This was achieved by warming the leathers after the application of the expandable

binder base coat before feeding them into the embossing machine.

This ensures that all of the micro-spheres expand spontaneously as the base coat comes into contact with the hot embossing roll. The finish expands, and acquires the exact structure of the embossing roll evenly across the leather surface. This expansion of the base coat takes place in connection with an increase in thickness and a lightening in colour—a typical sign of increasing volume.

Without these measures, the embossing speed would have to be reduced considerably in order to achieve sufficient expansion in the lower layers of the base coat. However, the reduced pressure embossing of the base coat, as described, expands this finish spontaneously and thus prevents a hardening of the leathers.

Specific leather applications

All of the micro-spheres expand with preheating and, therefore the amount of particles can be reduced. Generally, 1% by weight of micro-spheres calculated on solids of the binders is sufficient.

The base coat binder containing micro-spheres is applied onto the leather in the usual way via reverse coating. The micro-spheres act, to a certain extent, as a separating agent and prevent an adhesion of the base coat to the hot roll. To overcome any colour change during embossing, a very thin second binder layer which does not contain any micro-spheres may be applied.

For the appearance of the grain, only the base coated leather is embossed, and this is followed by milling. This causes the surface to become very smooth with a polished appearance, and illustrates that only a thin topcoat is sufficient. A base coat formulation with a combination of expanded and compact micro-spheres can be advantageous for many types of leather finishing. To preserve the high quality character of the full grain leather, thin base coat layers containing non-expanded micro-spheres, can be expanded with a smooth roller. With the subsequent milling, a high quality natural-looking surface is formed. In addition, these low-density finishes can be used for both full and corrected grain leathers.

Selection of the binder

It is important that completely solvent free binders are used to ensure that the micro-spheres do not dissolve at an elevated temperature. These binder coats also foam extremely well, even if they contain a small amount of micro-spheres. This type of finishing not only provides the advantages of better aesthetics and longer term wear resistance for the upholstery area, it also offers special productivity advantages for the automotive industry. All of the required fastness properties are achieved as well as low VOC-values. 

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