



"It may be only one pair for her, but for you it's higher cutting yields"



Upgrading—keeping leather's elegance

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'Upgrading' is a widely used term in leather manufacturing today. In general, the term describes a masking or covering process that applies to all sorts of leather surface damage. This process can be a mechanical operation (e.g. sand blasting of the base coat) and/or the use of a special chemical system or product. In most cases, upgrading takes place in the first coats of the finishing process so, for this reason, usually includes sophisticated pre-grounds and base coat applications.

The importance of upgrading

About 20 years ago, the raw hide quality and supply to the leather industry was less of a problem than it is today. The supply and demand of the different raw material grades were more even, and the raw material quality range was sufficient to satisfy the different types of article.

Lower grade hides were mainly put into 'lower class articles', which led to lower prices of the final leather article. Low-grade crust was usually buffed and finished with a highly covering base coat. To increase the covering/masking effect even more, this type of leather received heavy embossing, although deeper defects could not be masked with this corrective action.

However, through a continuing decrease in raw hide quality, combined with a rise in demand for high-class leathers, the need for 'upgrading technologies' has become more important. Accordingly, the expression 'cutting yield' is a major term in the

leather industry nowadays, and tanneries need to produce profitable leather with a high sales appeal, by using lower grade crust material.

The central objective

The main objective in leather finishing is to upgrade low selection crust to create:

- Profitable leather goods with a high sales appeal
- Premium leather quality for premium leather articles

Moreover, upgrading also means greater efficiency in processing operations. Ideally, the efficient upgrading of a low selection crust produces the same article as would have been obtained beforehand i.e. when a better crust selection had been used. In addition, this leads to the production of more square metres of high quality leather from lower crust selections, which can be viewed as a larger yield in cutting operations.

Components for the successful upgrade of leathers

There are many steps within leather finishing that require close attention to ensure the successful upgrade of leathers. Different raw materials need to be finished as appropriate for the required leather texture, but the following details give a general guidance for achieving the best results. ►



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UPGRADING—KEEPING LEATHER'S ELEGANCE

THE PRE-BASE COAT^(legend)

The objective of this technique is to upgrade crust that shows scratches, pinholes and other areas that may be more severely damaged. This process employs a heavy filling application, and aqueous products are available as medium-to-high viscous polymer dispersions containing special filling additives. This can include products that can be either buffed—or not need buffing after application. Some of them are also polishable. Subsequent finishing layers can follow directly after an intermediate embossing process or be applied later. This is a major breakthrough in this technology.

These products cover a wide range of leathers: garment, shoe (including white sports shoes), furniture, automotive, and leather goods. The approach is generally indicated by the following parameters:

Crust type and degree of damage:

- Chrome or non-chrome
- Absorption of the crust leather
- Light, medium or heavy damage
- Buffed or full grain

Application:

- Palette knife or hand spatula
- Roller coater—new generation reverse roller coater application with suitable spiral roller
- Spraying

Key requirements and features:

- Higher cutting yield
- Excellent filling and covering power
- Simple/efficient handling and application
- Superior buffing behaviour if needed
- Some products do not need buffing after application
- Some products are polishable

PRE-BOTTOMS AND MILL GROUNDS^(legend)

Advanced pre-bottom systems play an important role in modern upgrading technology. Whenever the leathers are buffed, the main purpose is to restore the buffed grain, keeping the softness of the crust leather, and maintaining an elegant grain break. The effect of these pre-bottoms largely depends on their filling properties and their melting capacity on the leather surface after hot ironing or embossing. This results in a very soft and sealed surface.

The use of different products, in combination with a well-balanced binder mix, results in excellent upgrading for corrected grain and full grain upholstery leather, or other softer leather articles like boot nappa and garment. Depending on the leather article and formulation used, versatile aesthetics and the highest possible physical properties can be generated.

Key requirements and features:

- Very high filling effect
- A soft, smooth handle of the leather
- Levelling-out and seal the leather surface
- Keeping a fine grain break
- Helping to produce a regular absorption of the crust

UPGRADING—KEEPING LEATHER'S ELEGANCE

**PRE-GROUNDS AND GROUNDS** (*Anionic and Cationic*)

Pure natural finishing and elegant upgrading can be obtained with cationic polishing pre-grounds and grounds. This technique is mainly used for garment, shoe and other diverse fine leathers.

In general an anionic or a cationic pre-ground contains pigments, binders and additives. Depending on whether the pre-ground gets plated or polished, an acrylic or a fine particle sized PU resin respectively is the preferred choice as a binder.

Key requirements and features:

- Levelling out the crust absorption
- Masking grain defects with a thin application coat
- Reducing the amount of further coats
- Obtaining an excellent adhesion and intercoat adhesion
- Maintaining the softness of the crust leather
- Increasing the polishability and repolishability of the finish

MECHANICALLY GENERATED FOAM SYSTEMS^(legend)

The Melio Foam System was first presented on the occasion of the SIC 1992 in Paris. Since that time the patented system from Clariant has been fine-tuned to a successful upgrading finishing process.

According to its definition, foam is a colloidal solution in which the distribution material is liquid, and the distributed substance gaseous. In leather-related applications, the foam is a base coat mix of selected binders, additives and pigments. These are mechanically foamed by adding a controlled amount of air via a foam generator. The most important property of these foam systems is extremely high mechanical stability. This means that the foam does not collapse during application by rollcoating, airless, and HVLP spray. They can be applied on full grain, corrected grain leathers and splits to attain the highest physical properties.

Key requirements and features:

- Superior upgrading—higher cutting yield
- Can be used for full grain and buffed
- Excellent physical properties
- Excellent print retention

COMPACT FINISHING^(legend)

The compact base coat system is a mix of selected binders and additives, and can be used to upgrade the lowest grade crust. The products need only the addition of a pigment before starting the finishing process. New generation reverse roller coater machines and airless are the preferred application methods.

Key requirements and features:

- Higher upgrading power than conventional finishes
- Excellent coverage
- High fastness properties
- Simple handling and application

THERMO-ACTIVE FILLERS

Thermo-active products are based on selected fillers, which expand under the impact of heat. Medium/hard and medium/soft thermo-active fillers are used as filling additives in high quality pre-base, pre-grounds and conventional/foam coats.

These fillers show the best results when embossed or plated at a suitable temperature. They will also substantially improve the print retention.

Key requirements and features:

- High filling power
- Excellent print retention ➤

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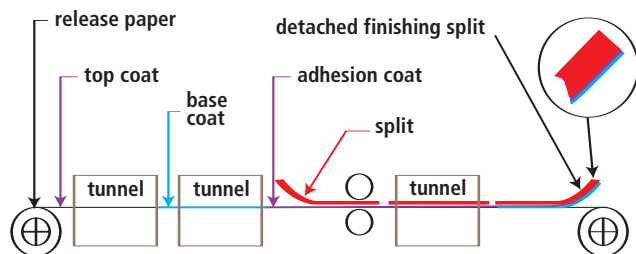
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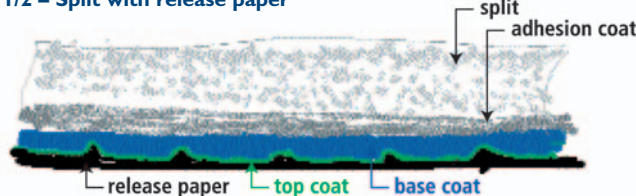
UPGRADING—KEEPING LEATHER'S ELEGANCE

Panel 1

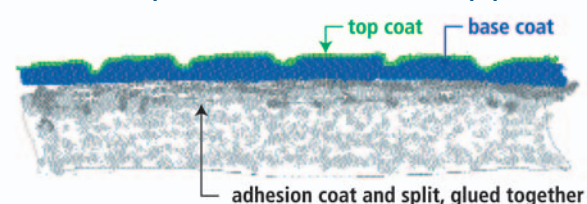
1/1 – Production line



1/2 – Split with release paper



1/3 – Finished split, taken off from the released paper



Process parameters

Length of transfer line	40 - 50 m made up of different work stations and drying tunnels	
Length of tunnels	10 - 12 m for top coat	
	16 - 18 m for base coat and adhesion coat	
Drying temperature	Tunnel 1	~ 80 °C
	Tunnel 2	~ 100 - 120 °C
	Tunnel 3	~ 100 °C

WATER-BASED PULL-UP ON PIGMENTED BASE COAT^(legend)

Not all crust leather is suitable for pull-up effects, as certain grain defects will be highlighted by 'pull-up' oils. This clearly indicates that, until now, crust leathers from a bad selection were unsuited for these effects. However, a special finishing system has been developed in order to overcome these problems. Known as 'Aladin', pull-up effects can be developed on pigmented leathers for maximum up-grade.

In practice, the product is applied onto a pigmented base coat, together with metal complex dyestuffs or micro-pigments, to achieve the required pull-up effect. A successive colourless fixing base coat ensures that the pronounced pull-up effect is maintained.

Depending on the absorption of the base coat and the use of the fixing-base coat, several degrees of pull-up can be generated. The final topcoat provides the physical properties as required.

Key requirements and features:

- Strong and bright pull-up effect
- Strong darkening after plating
- Excellent repolishability
- Very good surface levelling
- Remarkable upgrading

PULL-UP OILS AND WAXES^(legend)

Oils and waxes—used alone or in combination—will provide upgrade and various surface effects to buffed and full grain leathers. In addition to the standard pull-up oils and waxes that can cover a wide range of leather articles including American-style pull-up effects, there are specialised products for water-resistant type leathers.

There are many types of products available, and depending on the crust leather, different combinations of the oil/wax can be used to achieve the required effect.

Key requirements and features:

- Solvent free oils and waxes
- Highly concentrated
- Mild to strong pull-up effect
- Light to dark surface
- Different feels
- Soft to hard
- For both normal or water-resistant articles

WATER-BASED TRANSFER FINISHING^(legend)

Solvent finishing in transfer techniques has been established for a long time. However, due to a strong move towards solvent-free products in leather finishing, an environmentally friendly water-based transfer finishing technique has been developed for splits. The technique—known as the Melio Coater upgrading system—is applied by knife system, or combined with reverse roller coater application and is illustrated in *Panel 1*.

The process starts with the top coat application onto a special release paper. This thin coat is responsible for the surface appearance, the physical properties and feel of the finish.

After the top coat, the release paper then runs through a drier before receiving a base coat application(s). After each application, the release paper carrying the finish is passed through a drying tunnel.

After the film has been fully developed on the release paper, and depending on the machine set up, an adhesive coat is applied onto the split or the base coat of the finish. The split is then pressed onto the paper, and receives a final intensive heat treatment to bond the finish to the split. As the final operation at the end of the machine, with the finish now fully adhering to the split, the release paper is peeled away.

Key requirements and features:

- Elegant optical appearance
- Water-based, environmentally friendly system
- Highest physical properties, and suitable for automotive use
- Perfect reproduction of fine to heavy grain textures
- Excellent cutting yield
- Super soft leather types possible
- Minimum chemical wastage


Summary of the most relevant upgrading finishing products respectively finishing techniques

... = most suitable .. = suitable • = less suitable

Type of Upgrading	Cationic Pre-grounds	Soft Pre-bottoms	Melio Aquabase	Thermo-active Fillers	Melio Prograde	Melio Foam	Aladin Effect	Melio Coater Split
Leather type								
Automotive Upholstery	•	••	...	...	...	...	—	...
Furniture Upholstery	...	...	...	...	...	...	••	...
Shoe Upper	...	...	...	...	••	•	...	...
Garment Leather	...	...	...	...	•	•	••	—
Leathergoods	...	...	...	...	••	•	...	...

COLOURANTS AND PIGMENTS^(legend)

These products are essential to complete sophisticated upgrading systems.

Casein-free, aqueous pigment dispersions:

These products offer customised solutions and outstanding advantages for all kinds of leather. The use of high quality products together with suitable computer colour-matching support is a major step in reducing metamerism and attaining the right physical properties within the finish.

Casein-containing, aqueous pigment dispersions:

Depending on the technical requirements and preferences of the finisher, casein-containing pigments support—to a high degree—leather finishing upgrading in today's processes.

Key requirements and features:

- High upgrading/covering power
- High physical properties
- Heavy metal free
- Mono-pigment dispersion (*untinted*)
- Computer colour-matching support
- Suitable for use in dispensing machines
- Same dispersion agent across the whole range

Colourants for fine leather upgrading

Cationic pigments as aqueous dispersions can also be used effectively for customised solutions to provide high quality and good fastness properties. These cationic pigments complete the cationic upgrading systems available.

Key requirements and features:

- Easy to handle
- Good fastness properties
- For general use in water-based cationic finishes

Specialised highly concentrated solutions of metal complex dyes

These products are dilutable with water and/or with selected

organic solvents. These are designed for use in staining, base or effect coats.

Key requirements and features:

- Brilliant shades including Jet Black
- Highly concentrated
- Excellent fastness properties

Conclusions and summary

All of the upgrading techniques set out in this paper have a strong impact within the leather industry, due to the declining of high quality raw hides available. In particular, it is very important that the leather quality meets the highest standards, in terms of aesthetics and physical performance, at all times. To meet these objectives, sophisticated finishing products and systems are at hand for a wide range of finish applications.

Besides meeting all aesthetic and physical requirements, it is very important to maintain the elegance of the leather by sophisticated upgrading technologies to keep up the good reputation of leather in the end consumer's mind.

Depending on the customer's requirements and the degree of surface damage to the crust leather, different combinations can be used as outlined here. These result in:

- Upgraded leather articles with highest selling appeal
- Greater operation efficiency
- Higher cutting yields
- More profit. 

Legend

- *THE PRE-BASE COAT (Melio Aquabase Technique)*
- *PRE-BOTTOMS AND MILL GROUNDS (Melio Ground products)*
- *MECHANICALLY-GENERATED FOAM SYSTEMS (Melio Foam System)*
- *COMPACT FINISHING (Melio Prograde System)*
- *WATER-BASED PULL-UP ON PIGMENTED BASE COAT ("Aladin Effect")*
- *PULL-UP OILS AND WAXES (Melio/Bavon Oils and Waxes)*
- *WATER-BASED TRANSFER FINISHING (Melio Coater System)*
- *COLOURANTS AND PIGMENTS (Neosan 2000 Pigments, PPE Pigments, Catiofin Pigments and Supronil HK Dyes)*