

SmiTools - Softness

how to influence softness during post-tanning processing

In this SmiTools Smit & zoon is sharing a synopsis on the topic 'Softness'. Learn about the important aspects when making soft leather, the influence of wet-end processes and what Smit & zoon products are most suitable for your optimal leather properties.

Introduction

A leather's softness is one of its most striking features and perhaps the property constituting its prominent initial appeal. Unknown to the purchaser is that this very particular appeal constitutes a delicate balancing act between the various processes and the way each individual step is taken.

For this paper the focus is on the influence of post-tanning processing. The various influences of the previous steps are too varied to discuss in a general way. Moreover, a lot of crust is made from wetblue of outside origin. Where it comes from and how it was made is not always known and the material available needs to be taken as a given fact.

Retanning and fatliquoring processes need to be developed for the leathers available under consideration of their peculiarities.

What is softness?

Apart from the subjective hand-felt experience, softness is a measurable property of the fiber structure. The elasticity or resistance demonstrated in reaction to external stress such as bending or pressing can be described as "softness". Starting from the tanning process products are specifically applied to form a lasting bond with the hide fibres. The hide is subject to all the influences of the subsequently added products and remains so. All these products leave their own mark on the structure by their manner of reaction or inter-fibrillary deposition. A collective influence, whether a syntan or a fatliquor, is that of fibre separation and tensions. The understanding of softness can be limited to the addition of lubricating substances, but must also be seen as the avoidance of hardening.



The influence of fatliquors

Nothing is softer than fully wetted collagen. However, since the leathers eventually need to be sold as a dry substrate, something needs to take over from water. This is the purpose of fatliquoring. To fully do so the fatliquors need to act in a two-fold manner. Firstly, the tendency of the fibres to stick together on dehydration, as during the drying process, needs to be thwarted. The adhesive forces need to be strongly reduced. Secondly, for the fibres flexibility in all directions the products applied should not exert new adhesive forces, but need to lubricate the structure so that one fibre can slide freely over another.

Without the fibres being separated and having an ability to move freely within the limits their structure allows, the leathers would be extremely stiff after drying.

The influence of retanning agents

A leather's softness is influenced by minimizing the retanning agents' stiffening effect on the fibre.

Retanning agents require space to bind or deposit and thus also contribute to fibre separation. However, since they lack any lubricating power they can not contribute directly to the development of softness. The binding forces products tannin-containing products exert on the collagen fiber cause it to tense and resist external forces applied.

Any retanning agent takes a certain amount of space which otherwise could be occupied by a flexibly moving fiber. In this manner the fibres' freedom of movement is being limited. It is obvious that large-sized products have a stronger limiting influence than those of smaller size.

The positive effect retanning agents may have on softness is from indirect effects. Their anionic charge, hydrophilicity, and the fact that they are usually applied prior to fatliquoring can have a beneficial effect on the lubricating agent's penetration and uniformity of distribution. On the other hand, however, when applied without considering their effect on the leather's charge they can obstruct proper and lasting fixation of the oils subsequently applied. The effect is a negative effect on the leather's softness.

Other post-tanning influences

Neutralization has a fibre-opening and relaxing effect, increasingly so when approaching the leathers IP in the case of wet blue. Wet white pretanned leathers may require some raising of pH before the application of retanning agents and fatliquors for the creation of an environment where these products can act best, but a neutralization in the strict sense this is not.

Not all leathers requiring a high degree of softness benefit from a high neutralization pH, for various reasons and grain tightness being the most common one. For this purpose specific fatliquors to combine exist. Remark: the assumption that a low neutralizing pH is a condition for improved grain tightness, while a high pH by nature has an adverse effect on it, is not to be considered correct. See also: "Grain Tightness".

Wetting or degreasing agents applied at earlier stages influence both the retanning agents' but particularly the fatliquors behaviour. They can both cause a desired improvement of penetration and distribution and the undesired effect of reduced fixation of fatliquors.

Running time of the fatliquor needs to be adjusted for maximum softness achieved, but next to this the influence of right acidifying is to be considered. For good fixation and maximum softness the running time and amount of the fatliquor are not necessary the determining factors. Slow and longer acidification has a beneficial effect on softness with the same amounts of oil applied. Improved softness can be achieved by adjusting the process and in cases the fatliquor applied can be reduced by some quantities.

How do the individual Smit & zoon products influence softness?

Apart from the influences described the individual products have an influence. A general comparison for universal application can not be made, yet for guidance a compact overview is given below.

Fatliquors

Maximum softness

- Softening polymers: Synthol GS 606, Synthol FL 327

These products are not applied alone. Their effect is based on their interaction with other fatliquors.

- Phosphated oils: Synthol DT
- Lecithin's: Polyol HS 818

These products are not applied alone and only used as addition to a fatliquor. Their effect is based on the extreme fibre-lubricating power.

- Emulsified silicones: Synthol WP

These products can be used as a main component of the softest fatliquor combinations. Their effect is enhanced by additions of natural oils.

- Fatty polymers: Syncotan TL

Such products do not have any softening power when used alone. Neither do they possess any emulsifying properties, but their impact is in their ability to influence the properties of emulsions and the improved fixation of the fatliquor.

High softness

- Sulphited fatliquors: Sulphirol CLWN, Sulphirol SQ 610, Sulphirol EG 60

This class of products constitutes the classic range of very soft fatliquors. They can be used alone or in any combination and can be considered a basis for fatliquoring a wide variety of soft to very soft articles.

Medium softness

- Sulphated fatliquors: Polyol AK, Synthol SF 838, Polyol CT 688

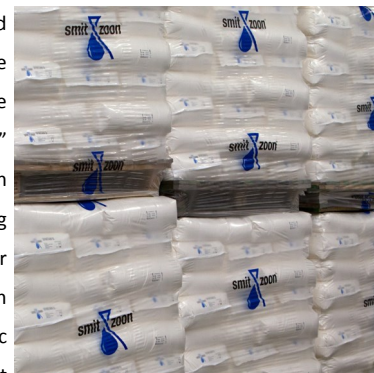
This class of oils does not fully penetrate the leather's cross section and does not affect the junction between corium minor and corium major to the degree deeply penetrating products do.

- Emulsified silicones: Synthol PL 565, Synthol EW 321, Synthol RW New

These products can be used as a main component for a wide range of shoe uppers. Their effect is enhanced by additions of natural oils.

Syntans

Syntans can not be classified the same way as done with the fatliquors. Neither is it possible to compare "hardening" properties since too much depends on the ever-varying amounts applied, their reception by and distribution in the leather. An unproblematic but unfixed retanning agent



may have an adverse effect on the fatliquor's behaviour by interacting with some of the oils applied.

Products with a known soft handle are

- Phenolic: Syntan S, Syntan SF 156, Syntan SA

These products are applied with the softest articles without conferring firmness to the crust.

Syntan SF 156 can be used in larger quantities without adverse effect, but because of its low astringency exceeding amounts will not further enhance the leather. Syntan S, due to its affinity for collagen, will compact the leather and may confer a firmer handle when the quantities applied exceed an optimum. Syntan SA lacks some of the softness that Syntan S confers, but can be applied in larger quantities without firming effect than the latter.

Products with a known medium-soft handle are

- Dihydroxydiphenyl: Syntan DM 262
- Phenolic: Syntan SA, Syntan HO,
Syntan AM 656
- Acrylics: Syntan RS 540
- DCD/Melamine Safetan DD 001

These products, although considered medium-soft, all have their own specific handle so that their comparison can only be of limited and general nature.

Products with a firming character

- DCD/Melamine Syntan DF 585, Syntan RF 181,
Safetan BB 003

Please note that this list only represents examples for a general illustration. The properties of the soft and medium-soft products move on a sliding scale, largely depending on the amounts and combinations applied.

Contact Smit & Zoon for further information

The information given in this SmiTools is just a short synopsis on the topic. We would be glad to help you further in case of questions, the sharing of information or help with choosing the right wet-end products for your application. Please feel free to contact our Leather Service Centre or your usual relation within Smit & Zoon.

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