SmiTools - Tightness

how to influence tightness during post-tanning processing

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

Introduction

Obtaining a tight grain while maintaining all aesthetic and functional characteristics may be difficult enough, to reduce the rejection rate by a small percentage only may seem impossible. To achieve this factors influencing grain tightness need to be understood. Improving on tightness in most cases means an increase in cutting yield and thus a higher profit.

For this SmiTools 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 grain tightness?

Grain tightness is a property of the hide. Some hides always yield a loose grain, while others have a tight grain and full flanks unless subjected to specific processes for making the grain float.

This inborn property stems from the differences of the fibres' structure. Tight interweaving and connection between the layers is likely to produce tight grained leathers. Spongier structures and looser connections inevitably lead to a looser grain.

The main reason caused during the early tannery processes is a weakening of the bond between papillary and reticulary layer. When their firm connection is weakened, both layers tend to "float" on top of each other. Since their structures are not the same, the upper layer reacts differently to pressing or bending than the lower one. The tensions within the two

The upper layer, on the other hand, likes its freedom and adapts to the forces exerted. Its freedom is limited since, although considerably weaker in places, the connection is still in place. The result is a regular / irregular pattern of the upper, papillary, layer moving freely in places, but held back in others. This effect is observed as looseness of grain.

The thickness of the corium major varies in proportion to the leather substance (it is directly altered by shaving). Thicker leathers, having a higher proportion of this stiffer layer and thus a greater difference in inner-structural tension, will show a stronger degree of looseness of the grain.

How to influence grain tightness by retanning and fatliquoring?

For the minimization or disappearance of this effect two methods are available. Firstly, and fore mostly, further deterioration of the inner-structure bonds needs to be avoided. Secondly, targeted use of the products and development of a process for the purpose of repairing are necessary.

The first point is commonly associated with fatliquoring: the wrong choice will make the structure too soft and stimulate the weakening of the connection between papillary layer and reticulary layer even further. Both structures are imagined to float on a layer of deeply penetrated oil holding them apart.

Retanning in all its variations is commonly seen as the way to repair the original or damaged structure by holding it all together again.

Both associations, although not incorrect, may require further investigation when attempting to further improve the grain tightness.

How can we prevent further deterioration?

Careful choosing of the fatliquors is mandatory. Excessive amounts of deeply penetrating and strongly softening fatliquors will inevitably worsen the problem. For this purpose, oils with less penetrating power are available that do affect the sensitive connection between the layers to the same extent as the more deeply penetrating ones.

The empty spaces between papillary and reticular layer which make both layers float on top of each other are indeed not a good condition for a tight grain. A good remedy against these floating layers is to fill these empty spaces. The approach that with increasing amounts of retanning agents the degree of grain tightness will improve in proportion, eventually results in a worsening of the situation.

Looseness is also caused by the physical pressure from the small particles squeezing themselves between fiber bundles on their way into the leather.

The latter are pushed apart and if too large amounts are applied, excessive fibre separation is the result. This overloading of the fibres and the increased tensions within the hide stemming from too much astringent retanning cause the forces holding the leather's structure together to weaken in a manner comparable to that from wrong fatliquoring. While the adverse effect of too large quantities of oil is limited to increasing weight and looseness of the grain, a further side effect of uncontrolled retanning is the notable deterioration in strength properties.

How can we repair grain tightness?

Too superficial fatliquoring does not guarantee the most tight-grained leathers since it does not contribute to a reduced tension between the upper and lower layers. A certain amount of a lubricant with the ability to partly offset them is necessary, both for improved grain tightness and a degree of inner lubrication.

Yet it is the variety of retanning agents available that remains the most important instrument for influencing the leather's grain tightness. When excessive amounts are avoided and after careful development the proper balance between fatliquoring and retanning has been found, the improved grain tightness will largely be due to their application.

What influence does neutralization have?

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.

The process is a necessary condition for the subsequently added products to penetrate into the deeper layers of the hide and enables them to fully develop their effect on the leather's properties.

Its fibre-opening effect is also a fibre-loosening effect. For this reason sensitive material is commonly neutralized to the minimum pH possible for the post-tanning process to take place. The low pH, on the other hand, is contrary to the need for penetration and distribution of the products applied and may prevent to fully develop the positive effects expected.

Experience has shown that in certain cases a drastic elevation of the neutralizing pH may be considered for the purpose of an effective retannage yielding leathers of notably improved grain tightness.

How do Smit & zoon products influence grain tightness?

The individual products have a direct impact on tightness. A general comparison for universal application can not be made, yet for guidance a compact overview is given below.

Syntans

The grain tightening properties of retanning agents need to be described individually:

- phenolic: Syntan HO, Syntan AM 656, Syntan SA

Syntan HO and Syntan AM 656 fill and tan the critical areas evenly, throughout the entire cross section. Syntan SA tans and fills the entire cross section, but its main strength is developed below the grain area.

- melamine's/DCD: Syntan RF 181
  Safetan DD 001

Syntan RF 181 is a powerful filling and grain tightening product applied for upper leathers. It tends to firm the leathers when applied in larger amounts. Safetan DD 001 is an all-purpose filling agent for the hide's overall grain tightness, yet most notably improving grain tightness in the flanks.

- acrylics/SMA resins: Syntan RS 540, Syntan RS 3, Syntan SMA 678

Syntan RS 540 and Syntan RS 3 can be applied after neutralization in a variety of ways. Most common is their addition at the very beginning of the retannage. Syntan SMA 678 is best applied at before or during neutralization since it acts best between pH 3,6 – 4,2.

- biopolymers: Safetan BB 003

Safetan BB 003 is applied alone before or after the acrylic resin. The optimum pH range for this is 4,2 – 4,8.

Fatliquors

- softening polymers: Synthol GS 606

Synthol GS 606 acts in the whole cross section and softens the fibres without their further adverse loosening.

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

Their application minimizes the risk of loose grain. 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 RW -New, Synthol WP

Synthol PL 565 ensure maximum grain tightness on stock prone to loose grain

Synthol RW NEW and Synthol WP are highly effective as pre-fatliquors at the beginning of the retanning step, but are also to be applied during the main fatliquor without adverse effect.

- Sulphited oils: Sulphirol EG 60

Sulphirol EG 60, although sulphited and therefore deeper penetrating, combines high softening properties with proven suitability for fatliquoring tight-grained leathers.

- Synthetic oils: Synthol NE

Synthol NE is a base oil for all tight grained leathers. Its possibilities for application is wide since it can be combined with all other oils while retaining its full effect on leather.

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 to contact our Leather Service Centre or your usual relation within Smit & zoon.

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