

Back to Basics: A Framework for Leather Manufacture

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Flat and predictable leather

Hides and skins are naturally rounded and fully contoured to the shape of the living animal. In addition the skin allows flexibility of movement and protection, but these needs vary according to the area being covered.

Some parts, such as the belly areas, need to stretch easily while other areas, such as the butt and backbone, are thicker, denser and less extendable.

One of the main leather making tasks is to produce a flat leather. However the leather must also show greater uniformity in terms of elasticity and shape retention to be useful as a material in the manufacture of an end product.

The liming process starts to address the problems of curvature by causing swelling, and an opening and separation of the fibre structure. This leads to a general flattening in the finished leather as the fibres can move more readily. Moreover, a major relaxation occurs during the fleshing operation as the membrane-like tissues are cut from the flesh side of the hide, as these restrict and confine movement. This is especially noticeable in the peripheral parts of the hide—bellies and shanks—and in the growthy neck areas.

The hides relax further during the deliming/bating, and degreasing if appropriate, with the benefits largely maintained during the tanning process. If managed correctly, the process not only stabilises the hide, but also maintains a flat grain with minimised draw and growth.

Stretch: Aiming for cross-hide uniformity

The other key operations are splitting and shaving, particularly lime splitting. As the band-knife cuts through the fibre weave there is considerable relaxation, area gain, and a greater tendency for the hide to lay flat.

However, fibre shearing is most severe in the areas of naturally high substance, dense structure and higher angle of weave. In the thinner parts of the skin the structure remains more intact. This major shearing in the butt and backbone areas allows those naturally less flexible parts to become more easily stretched, moving towards the behaviour of the thinner belly sections.

A further levelling of stretch and elasticity can also be developed during tannage and retannage, as the more open hide parts can be selectively filled. This can reduce the level of stretch in the belly areas, further improving cross-hide or skin uniformity.

The forces applied during mechanical dewatering before drying also play a significant role. The shanks and bellies are more extended by the samm/setting operation than the more densely fibred central parts. If this form is retained during first time drying then greater uniformity is achieved in terms of final elasticity and shape retention.

Where vacuum drying is used for drying, extra mechanical effort is applied in the shanks and bellies areas before

machine closure. If toggle drying, then the outer hide parts are pulled out into the most flattened form, with the tension and flattening increasing as drying occurs. In contrast, there can even be a degree of relaxation in the more centrally placed parts. The degree of firmness can thus be significantly reduced in the originally thick, firm centre areas, becoming more similar to the more extended belly parts.

Shape retention and set

One of the properties of leather is that it develops dimensional stability as a result of first time drying. Once dried, if the leather is stretched then allowed to relax it will return to the original form. The shape is therefore largely maintained throughout the remaining leather making stages. The transition from the original rounded form of the flayed skin to the flat and stable condition is almost complete.

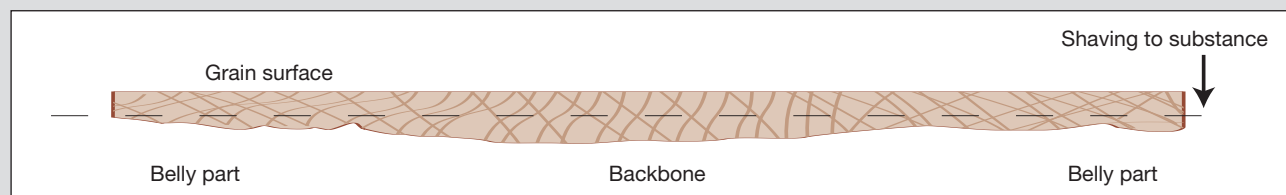
Moreover, the level of stretch required in the outer parts of the living skin has become reduced, while more dense butt and backbone areas now provide more stretch. Uniformity is never achieved, but the leather is flat and variations in elasticity and set across the hide have become both predictable and manageable. 🌐

Additional Information

This is an abridged version of the paper Round Hides into Flat Leather: R. Daniels—June/July 2003.

Panel E1/1:

The effects of splitting / shaving to substance



In addition to the differences in fibre structure between the butt and belly area, the two parts are significantly different in substance. In the raw hide the butt parts may be twice the thickness of the belly area. A large proportion of the hide structure is cut from the dense butt

causing a weakening. Under given tension the butt area of the final leather therefore extends more readily, with a shift in softness and extension characteristics towards the properties of the more opened structured belly parts.