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Leather:

AN OVERVIEW OF MANUFACTURE

(Part 5)

Different types of bovine leather

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Leather: AN OVERVIEW OF MANUFACTURE

Content and Structure:

This section includes a summary of hides and skins as raw materials.

Part 1: The removal of unwanted materials and extension of the structure.
Part 2: The introduction of new materials and extension of the structure.
Part 3: The removal of water and reconfiguration to a flat form.
Part 4: Application of the finish.
Part 5: Different types of bovine leathers.
Part 6: Small skins: hair sheep and goat: grain leathers.
Part 7: Small skins: wool bearing sheep: double face, shearling and rugs.
Part 8: Discussion.

Annex.

Parts 1, 2, 3, and 4 sets down the general procedures for manufacturing chrome tanned shoe upper leathers.

The broad details apply when making other bovine leather types, but with changes in technique according to the hide/skin characteristics and end requirements.

Various options are given in the following sections:

Automotive and upholstery: comparison with footwear leathers

The differences between the manufacture of automotive and upholstery leathers, when compared to shoe upper leathers, have been largely shaped by the need for cutting large components for panels for seating constructions.

Also, longer life-use and durability, as opposed to serving the requirements of shoe upper leathers which are often fashion driven.

In addition, auto and furniture leathers are mainly lower in substance than shoe upper leathers, and this favours the processing of cow hides.

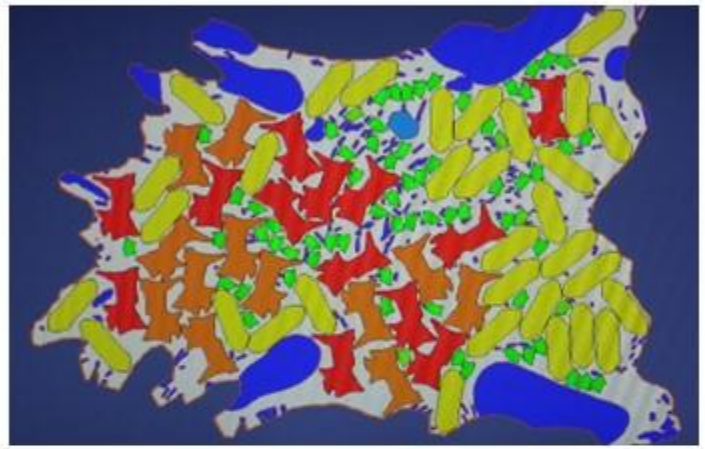
For the same raw hide weight, cow hides provide a greater area of lower substance than bull hides.

Defects identified before cutting automotive leathers.

Templates positioned around defects before press cutting.

- For automotive interior use, there is a need for larger components in the construction of seating and panels.
- Areas free from defects are required in the most visible parts of the seat.
- Faults in the grain surface are revealed by stretching the leather, then marked to identify.
- Patterns are then positioned around these defects before press cutting.
- Alternatively, cutting may be computer managed.

Computer cutting option based on hide defects + directional stability.



Steering wheel components - high compatibility essential in assembly.

- Dimensional stability is a particularly important property too.
- The components required for seating, steering wheels and trim must retain their shape and integrity in assembly and long term wear.
- This is a key consideration when cutting requirements are determined.

Required: long-life and durability for high wear/exposed auto interiors.

Aggressive situations: saddles and customised fuel tank covers.

- **Whole hide processing for both automotive and furniture leather manufacture is needed to obtain the best cutting coefficients and minimise waste.**
- **In comparison, the components required in footwear construction are relatively small.**
- **The various patterns can thus be more tightly positioned.**
- **Sides can be managed easily and cut efficiently when cutting *(clicking)* components within footwear manufacture.**

For automotive manufacture:

Larger scale machinery is needed from the tanned to finished state to handle hides.

These are expensive, large capacity machines, and this favours high volume production.

Production runs for auto-supply are large and predictable in terms of substance, surface pattern, colour, handle and physical properties.

This means that considerable rationalisation is possible.

This favours fewer but larger capacity units.

In comparison, the footwear leather manufacture:

Has a wider spread of customers, but mostly as smaller size units.

The range of substances, surface patterns and effects, colour, handle and physical properties required in footwear construction is considerable.

Accordingly, production batches tend to be smaller.

Leather requirements and specifications are also subject to considerable change.

Rationalisation is possible in hide production until the tanned state.

Rationalisation from the tanned to finished state is more limited due to the bespoke needs of customers.

Linkage between samm/set, wet stretch, drying, staking & stacking.

Conveyors can link pairs of spray cabinets/drying tunnels/stackers.

- For auto leather manufacture, rationalisation offers a shift from batch to line production.
- Machines can be brought together and linked by conveyors.
- Individual hides can be processed from the wet dyed state to pre-crust condition in as little as one hour.
- Many linkages and high through-put is possible in finishing too.
- This minimises variation, the quantity of goods in work, and reduces labour costs.
- This provides technical and production advantage.

Tannages for auto and furniture leathers

Chrome tanned leathers:

For chrome tannage of limed split bovine hides, there is very little difference in chemical processing when compared to footwear leather manufacture.

And, over and above issues of rationalisation, the machine actions are very similar.

The chemical and physical requirement for auto and furniture leathers need emphasis in areas of lightfastness, abrasion resistance, perspiration, odour/emissions, changes associated with ageing, and needs of long-term use.

However, at the same substance and softness, in the broadest terms, the manufacturing approach for footwear, auto and furniture uses are similar.

White tannages:

For the various “white” tannages the mechanical operations required in making auto / furniture leathers are interchangeable with chrome leather manufacture.

However, higher offers of retanning agents and fatliquors are needed to achieve similar handling and aesthetic characteristics when compared to chrome tannage. This is because of the different properties in terms of tightness, dimensional stability, and emptiness within the “wet-white” structure.

Moreover, chrome tanned leathers carry a strong cationic charge that enables greater fixation of anionic products and less waste.

There are technical differences between the chrome tanned and “white” leathers in terms of performance.

Leather for furniture use

Heavy duty + easy clean seating as fitted in this rail carriage interior.

Luxury home fittings providing good design and comfort.

- Automotive interiors may be robust and utilitarian, or customised and refined to meet a precise customer specification.
- There are other uses for these leather types too - for example - aircraft and rail carriage seating and power boat fittings.
- Where use is high - commercial aircraft, bus and train interiors - easy clean properties are necessary for good hygiene.
- Similarly, furniture leathers have to meet a wide range of needs and specifications.
- Includes durability, comfort, odour-free and fire retardant properties.

Leather for clothing

Made to measure – value adding for a small skin manufacturer.

Bovine clothing leathers for jackets and full length coats too.

- Clothing leathers are mainly made from sheep and goat skins.
- Bovine clothing leathers are not so common, but in this event, are usually made from cow hides.
- These have a relatively high grain to corium thickness ratio.
- This provides less resistance to tearing at low substances.
- However, these leathers can be very soft, generally with a more open break than provided by smaller skins.

Bags and leather goods

Dyed belly leathers, air-dried free of tension, awaiting tumbling.

Bags from a variety of bovine and small skin leathers.

- There are many different types and uses for bags and leather goods – both high fashion and general accessories.
- Specialised manufacture required for high value products.
- However, leathers often adapted from other types of production.
- Includes chrome, wet-white and light vegetable tannages.
- The residual belly and shank parts from "squaring" raw hides are ideal for super soft bag making.

Miscellaneous vegetable tanned bovine leathers

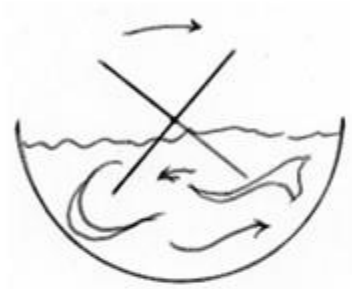
Details concerning heavy and light vegetable tannage have been given in Part 2. However, there are significant differences in manufacturing techniques compared to other bovine leather manufacture.

Heavy vegetable tanned leather making is determined by four main factors:

1) The need to achieve the highest usable substance at selection after tannage.
2) The high quantity of vegetable tanning agent required for tannage and to provide filling within the structure.
3) The length of time of the tanning technique when compared to other systems.
4) The tendency for vegetable tanning to discolour due to migration of tannins in drying operations.

Heavy vegetable tanned leathers

Paddles: rotating paddle blades keep hides and float in motion.

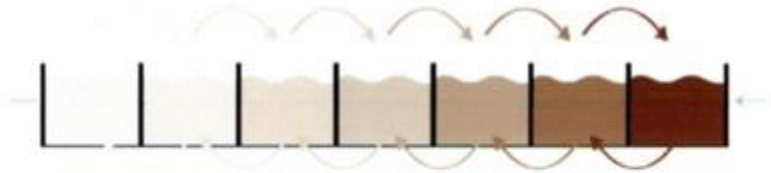


Paddles are often fully covered to prevent heat loss.

- **Large hides are mainly used as they provide the greatest substance.**
- **Limed splitting is usually avoided to retain the greatest hide thickness selections after tanning.**
- **Hides are sometimes "white limed" *(suspension in lime solution only)* after fleshing as an extension of liming.**
- **Drums are used for liming and deliming, but some use of paddles.**
- **Otherwise, the processing is similar to other bovine leathers until the tanning stage.**

Counter flow movement of hides and veg tan solutions.

>>>> Movement of hides >>>>



<<<< Movement of veg tan solutions <<<<

Hides are suspended on frames, and moved using overhead hoists.

- **Pit tannages are used, with an absence of mechanical action.**
- **Tannage commences with hides being introduced to weak exhausted tanning solutions.**
- **They are gradually moved to pits of higher tannin concentration.**
- **As tannins are taken up by the hides, the concentration reduces.**
- **These solutions of lowering concentration are moved in counter flow to the hides.**
- **This can take +/- 10 days.**
- **Drum systems can be used, but the uptake of vegetable tanning agent is less than with pit systems.**

(Ref: Part 3: 15 - 22)

On selections, higher substances have the higher potential value.

Hot greased leathers, after setting on flesh side, in 5-day "laying" time.

- Many different mechanical operations when compared to other bovine leather types.
- Splitting in the tanned state is needed after selection to gain the greatest substance from these leathers.
- Retannage is minimal as the structure is already highly filled with tannins.
- Fatliquors or greases are applied for surface lubrication, dependent upon end use.
- Softening operations such as vibration staking and milling are not employed.

Slow toggle drying may be used.

Tension-free drying too - as with these *(squared)* hide butt sections.

- The drying times are very slow and carefully controlled.
- This is because vegetable tanning agents are not fixed as strongly to the collagen as chrome tannages.
- As water evaporates from the surface, veg tans can migrate within the structure.
- This causes both surface discolourations, and a build up of veg tans within the grain layer.
- This excess of tannins causes a weakening of the grain structure too.

High pressure rolling for soling to consolidate the structure.

Glazing to develop a high gloss wax aniline finish.

- Finishing is comparatively basic compared to footwear and upholstery leathers.
- The leathers are often rolled under high pressure to consolidate the structure.
- Usually, the leather has only a very light protective cover.
- This can include applications of wax or oils, hot rolling for fibre compression, and high gloss effects.

Light vegetable tanned leathers

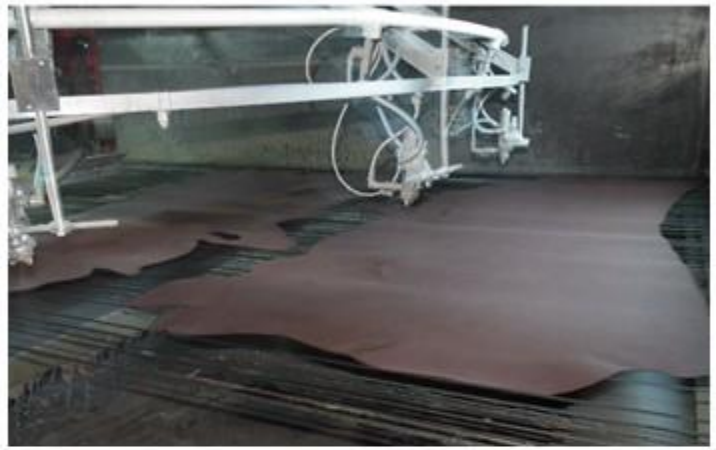
Drum processes are used for liming, deliming/bating, pickle and tannage.

Tanning agents are mainly lighter in colour than used for heavy leather.

- The requirements for “light leathers” differ from heavy vegetable tanned leathers.
- The quantity of vegetable tanning agent required for tannage is less than required for heavy leathers.
- The tannage is performed in drums and is relatively rapid.
- These leathers may be retanned fairly heavily to modify the leather for different uses.
- The processing details - apart from tannage and avoiding high temperatures in drying - can be more similar to footwear leather manufacture.

(Ref: Part 2)

Conventional softening, buffing and finishing procedures, as required.



Bespoke luggage from tumbled vegetable tanned bovine leathers.

- Wide variety of end uses - shoe upper leathers, bags, wallets, general leather goods, and occasionally upholstery.
- Size of cut components can vary, but mainly smaller items.
- Appearance “improves” on ageing and use.
- When used for both shoe uppers and linings they offers both comfort and hygiene.
- Antibacterial properties provided by the tannins, and high moisture vapour permeability for coolness.

Suede leathers

There are several different suede leather categories.

Traditional suede leathers are based on a raised open fibre structure *(or nap)* on the flesh side of upper leathers, created by heavy buffing.

Velour or nubuck leathers are also produced as upper leathers, where the grain layer is finely buffed, creating a high value product.

Most suedes, however, are based on processing flesh splits as follows.

Trimming flesh splits after limed splitting.

Careful selection for substance potential before blue splitting.

Splits are produced from two different parts of manufacture:

1] After limed splitting:

- Limed splits are sold for food processing, or bio-gas production.
- However, they may be trimmed, and receive a tannage as splits.

2] After tannage:

- If splitting takes place after tanning, these splits tend to be thin as pre-splitting gradings focus on seeking the highest substance of the grain split.
- Splits are mostly from chrome tannage, but some arise from vegetable tannage too.

Undyed splits

Vacuum drying commonly used for split drying.

Finishing undyed splits for light sports footwear trimmings.

- After shaving, splits may be lightly retanned and fatliquored, but without dyestuff additions.
- After drying, these splits are buffed.
- They may be heavily finished, or laminated for applications.
- Many variations.
- Uses include linings for footwear, some types of shoe upper, belts, trimmings, seating panels, and leather goods.

Dyed suede splits

Setting to avoid compression and firming, before a tension-free drying.

Splits after buffing, de-dusting and milling.

There are two methods of processing splits as dyed suede:

1] Direct dyeing:

- The leather is dyed to shade at the time of retanning and fatliquoring.
- They are dried, then heavily buffed to produce a suede with fibre length as required, then de-dusted.
- They are softened by milling or tumbling.
- The milling action also raises the surface fibres or “nap”.

Buffing is critical as there is high variation in flesh fibre length.

Suede after silicon spray to enhance water repellency.

2] Crusting and dyeing.

- The splits are retanned and fatliquored without dyeing.
- After drying, they are buffed to produce the required nap.
- They are then inspected for quality, and if necessary rebuffed.
- They are then dyed to shade and redried.
- There is no further buffing and no residual dust.
- This produces a uniform nap, with very consistent dyeings.

Nubuck leathers

Nubuck leather after second time drying for inspection and trim.

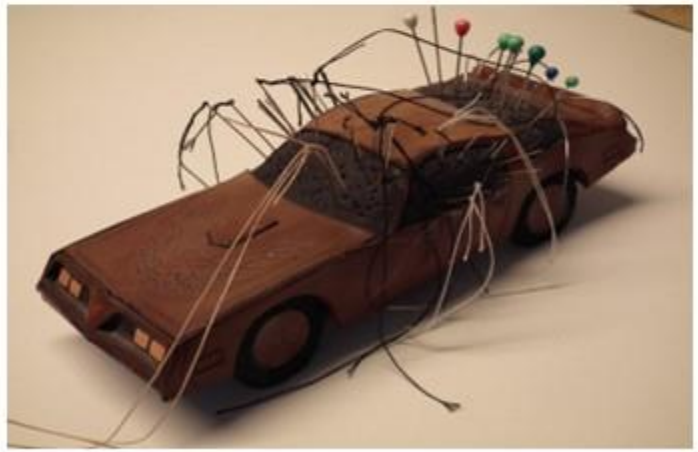
Nubuck leather awaiting final dispatch.

- These are pure aniline leathers, that have been buffed on the grain side to produce a very fine and uniform “velour” grain surface.
- As there is no “cover” in finishing, the grain should be free of small surface detects.
- For the highest quality, they are manufactured to the crust state, buffed, inspected and re-buffed as necessary.
- They are then dyed to shade in a similar manner to high quality suede, and redried.
- Without any cover in finishing, the only protection is by a final water repellent spray.

Uses for trimmings

Leather gear shift covers being carefully hand stitched.

Pin cushion created from vegetable tanned cuttings.



- There is little waste after cutting components.
- Dependant upon the leather type, uses range from small items such as key fobs, to mobile phone cases and auto gear shifts.
- There are examples of suede cuttings as small as 3 x 3 cm being stitched together, then cut and used for bags.

Review:

The various bovine leather types follow the four stages of manufacture as described in previous Parts.

The equipment used is similar, but of different size and detail according to side or whole hide manufacture, and end specifications.

Large volume runs of production significantly influence the degree of rationalisation that is possible.

In turn, this affects the uniformity and logistics of manufacture.

Probably the greatest differences in manufacturing technique are found with heavy vegetable tanned leathers.

This is due to weight of individual pieces, the lack of mechanical action in tanning, the properties of vegetable tanning agents, and the need for a firm compact structure.

Continues as:

Leather:

AN OVERVIEW OF MANUFACTURE

(Part 6)

Small skins: hair sheep and goat: grain leathers.

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