



Imported skins are kept at 3°C until ready to be processed. When summer heat can reach over 40°C this is an essential store for maintaining the integrity of the raw material. It is also used to store the salted off-cuts from the trimming operation, thereby avoiding an odour issue should they be allowed to decompose. ALL CREDITS: WTP



Peter Geng Double Face Company Technical report

Peter Geng Double Face Leather Company is situated on the outskirts of Nangong City in Hebei Province – some 350 km south of Beijing. Set back from the main road, the entrance to the tannery passes a small woodland and a field set aside for growing sunflowers, fruit and vegetables – all of which were planted by the tannery owners. Having previously worked for one of the area's largest tanneries, the Xingtai Leather Factory, in 2008 due to the system of state-owned enterprises and various market mechanisms, Peter Geng founded his own company in the city of Xinji, and in 2011 moved it to the Nangong City Economic Development Zone, to a plot of approximately 34,000 square-metres.

With a capacity of approximately 3,000 skins per day, the tannery

purchases 65% of its raw materials from Spain with the remainder coming from domestic sources. The salted Spanish raw material, bought from long-standing partners in the business, is brought in by refrigerated containers and kept on site in a refrigerated store. The domestic materials are processed as and when they arrive. For the imported material, there is a 5% tolerance on the incoming grades but there is an understanding that only the best skins will make the double-face products whereas the lower-quality materials will go for shoe and garment linings. The tannery also buys in crust skins, these being stored in a separate part of the building. First impressions are of the segmental style in which the tannery is built – as a result of its layout and the progressive expansion as the tannery business grew.



At the entrance to each new processing department is a photograph of the team leader and a brief outline of the operations and health and safety requirements in that area. Should anything arise that needs clarification it is clear to see who should be contacted.



Sorting of the skins in the garment manufacturing department prior to cutting is done to not only match colour but also wool length and growth direction.



At the end of chrome tannage, the remaining float is passed through a perforated drum filter to remove solids. The resultant screened liquor is then held in the underground storage tank below the vessel for reuse with fresh chrome.

Manufacturing and Processing

The raw material that is needed by the tannery is defined by the order book but falls into three main categories, these being toscana, entrefino and merino sheepskins. The difference between these materials is partly down to physical size, with the toscana being the smallest but also due to the wool type and quality. Toscana sheepskins are characterised by their luxurious, long, often fur like wool and as such can often be mistaken for fur. The entrefino offers a larger size with a good wool quality whereas the merino has the largest size and best quality of wool – the down side to the merino is the ribbiness that can come as a result of the weight of the wool pulling down on the skin whilst the sheep is alive. In order to improve on this, the tannery also processes a domestic merino-entrefino cross – thus giving the best compromise for both wool and leather.

Production starts with the desalting of the skins – in this case rather than using standard slated tumble drums, a rotating cylindrical cage is used. The skins are then trimmed and sorted for selection based on size, wool length and quality and occasionally for colour. From the selection stage, the skins are first taken via forklift truck to the first of two sets of paddles, in total the tannery has seven paddles – three for soaking and four for pickling. In the first set of paddles, the skins are washed to remove any residual salt and to rehydrate. After soaking, the skins are stacked to allow some drainage and then passed through a band knife wet-shearing machine to give a uniform wool length. They are then fleshed and go through an aqueous degreasing operation. From here the skins are then transferred to one of the four pickling paddles whereby the skins are pickled to pH 2.7 within the day and left overnight to reach equilibrium. Once in the pickled state, the skins can be safely left for a few days to allow settling and opening of the fibres. It is at this stage that the domestic skins undergo a further sorting and grading. In this pickle selection, the operators inspect the skins for size, colour and wool quality but most importantly for cuts to the flesh side or instances of ribbiness.

The chrome tanning operation is carried out in one of three hide processors, one of which is reputed to be the largest in China. Depending on their size, up to 2,500 skins are given a short ripickle prior to the main chrome tannage. The benefits of the hide processor are that felting of the wool is avoided due to the gentle mechanical action when combined with the float. The chrome tanning process utilises a blend of fresh and recycled chrome. From here the skins are emptied into perforated Dolav boxes to allow the skins to drain, after which they are then samm set out on the flesh side and hung to dry. In this crust state they can be further inspected and sent for 'dry cleaning' to remove excess wool grease should the need arise.

The crust stores at the tannery are quite vast. Offering a lead time of only five days from order to dispatch, having access to the right raw material suitable for dyeing and finishing is something that Peter Geng sees as vitally important to the production flow and as such they will have 200,000 crust skins in stock at any one time. In the most part these are presorted for wool quality and size. Prior to dyeing, the skins will be buffed to remove any excess fibres the fleshing operation left behind and to give a fine suede nap.

Carried out in stainless steel drums, the dyeing and fatliquoring operation can perform suede dyeing – leaving the wool neutral or



both wool and suede dyeing giving the wool and suede the same colour. Depending on the size, up to 3,000 skins can be dyed at once and looking in the showroom, imagination is the only limitation on available colours. To this point, they have worked with one supplier to produce a two-tone wool that is dyed in one drum process, circumventing the traditional 'tipping' process. This novel approach gives a unique character to the wool.

After dyeing, the skins are again drained in slotted Dolavs and samm set on the flesh side. The skins are then hung to dry on an overhead conveyor. Once dried they are either staked or dry drummed to soften, the latter being done in the presence of rubber balls to act as ballast—in this way contaminants are kept to a minimum so as not to spoil the wool. Once softened, the skins are sent for combing – this operation separates the wool and gives a softer feel to the final product.

Once softened, the skins are sent to the finishing department. In this department, two lines are set up consisting of automated rotary spray machines connected to drying cells. One of the lines is for dark colours whilst the other is for natural and pale colours. Finishing of double-face leather is less complex than with grain or corrected grain leathers as in many cases a suede nap is a desired property, but where a sealed finish is required, throughfeed plating and ironing machines are utilised to finish out the leather. Once finished, the skins are measured and dispatched to customers or utilised in an on-site garment manufacturing facility.

For trial work and smaller orders, the tannery has a small-scale pilot area consisting of drums and paddles and, through working with chemical suppliers, the company can keep up to speed with technological advances and put these into practice.

The tannery also hires out some of its processing space to other smaller tanners who are unable to reach the environmental standards that the local authorities enforce.

Waste Management

The lack of smell around the site proves that waste management is taken very seriously with both solids management and wastewater treatment being the foundations on which the business was based. To this end:



The final stage prior to finishing is an automated toggling that gives a final stretch to the skins. This operation ensures the skins are flat but also allows the area to be maintained.



Reputed to be the largest in China, this hide processor can tan up to 3,000 skins at a time. Whilst rotating in one direction, the gentle mechanical action aids the tanning without felting the wool. When run in the opposite direction the Archimedes screw type arrangement of the blade discharges the contents.



After dyeing, the skins are dropped into slatted Dolav boxes to allow drainage. The boxes are easily lifted by forklift truck and taken to the next stage of the processing. It is in similar boxes that the chrome tanned skins are also held prior to further mechanical dewatering.



Drained skins are samm set on the flesh side prior to hang drying on the elevated conveyor.



- Salt is reused by local hide merchants
- Salted trimmings are kept in cold storage before being sold for wool and glue manufacture
- Buffing dust is compacted and taken by an official waste management company
- Filter cake is taken for chrome recovery
- Fleshings are taken for rendering
- Wool clippings are sold for rugs and carpets

The wastewater management system is of a typical set-up including dissolved air flotation, biological treatment, settlement and clarification. The end-of-pipe effluent gets sent to the municipal sewer system once it has been analysed in the onsite government-regulated test house.

Reuse and recycling

Many of the process liquors are reused or recycled. From the degreasing operation, the wastewater is reused for the initial soaking operation prior to being discharged to the effluent plant. After the chrome tanning process is complete, the chrome liquor is filtered to remove solids and stored in large underground tanks situated underneath the hide processors. For the next tanning batch, the float is made up of a mix in the ratio of 3:2 recycled to fresh chrome, plus auxiliaries to give the right pH parameters. This recycling process is repeated approximately 20 times where upon the 'old' liquor is disposed of and a wholly fresh bath is used.

Energy and water

The energy for the plant comes from the national grid and is used to power an electric boiler at night when costs are lower, for all other times a natural gas boiler is used to generate steam. Process water for dyeing is heated using solar power water heaters.

Water is drawn from an artesian well under an abstraction licence that is carefully monitored by the local enforcement authorities. ☉



Solar powered water heaters in place on the roof of one of the tannery buildings. With an ability to heat the process water to 90°C in the summer and 50°C in the winter, the implementation of these heaters removed the need for a coal burning boiler that used 2,000kg of coal per day.



Wastewater is treated at the onsite effluent treatment plant. Through the process of dissolved air flotation, biological treatment, adsorption and clarifying, the resultant end of pipe effluent is monitored by the Environmental Bureau before being discharged to the local sewer system.



The real time testing results are displayed on an illuminated board attached to the government-owned testing station. Access to the building is restricted to government officials.



After desalting the skins are trimmed and sorted into piles for further processing. At this stage they are purely sorted into size with any that have ink-based identification marks on the wool put to one side.