



Tannery of the Year: Henan Prosper, Mengzhou, Henan Province

Specialist sheepskin tannery Henan Prosper has ambitions to be one of the biggest and most successful producers in the world of leather from this raw material. Beyond that, it is manufacturing and bringing to market a wide range of footwear under various own-brand names some of which it hopes to float on the stock market within five years. The company insists it will survive and thrive after the major changes to the Chinese tanning industry that have begun in 2014.

Henan Prosper has its roots in sheepskin. It was formed in 1994 from a smaller tannery called Feng Da in an area with a large Muslim population and a high level of mutton and lamb consumption. Skins were available and an entrepreneur in the small town of Sanpo, Hepin Wong (whom everyone at Henan Prosper refers to as Boss Wong), was one of the people who set up businesses to produce leather from them. In recent times, it was still a common sight to see people in Sanpo carry out fleshing by hand by the roadside.

Boss Wong's specialism quickly became footwear lining for customers in Russia. However, there were some restrictions in the

early 1990s on imports of materials and exports of leather and, to help him fulfill his ambitions, he invited a rising local business star, Michael Lyu, to become his partner. This led to a move to Mengzhou and the setting up of the company we know today, with its capacity to process 15 million pieces of sheepskin per year.

Henan Prosper has gone through a number of phases in its development so far. The first four years constituted a start-up period. Production capacity reached one million pieces annually, mostly from Australian skins, but it was spread across three sites: the old Feng Da tannery, the new one in Mengzhou and a site in the east of Henan province sub-contracted to keep up with demand.



After 1998 and economic crises in Asia and in Russia, the company realised that it needed a wider range of products and a more diverse spread of customers. By 2002, Henan Prosper was selling sheepskin leather for applications as varied as car-seat covers and paint-rollers and it had begun to produce what would prove to be its most important product of all, footwear uppers from double-face, with wool on the inside and the flesh side of the leather on the outside. It had customers in the US, Australia and throughout China, as well as in Russia and the rest of Europe.

At the end of 2002, the company decided to build a new tannery at its site in Mengzhou, with production beginning in October 2003. At this point, the site covered an area of 100,000 square-metres, including a newly built effluent treatment plant, and had a capacity to handle 10,000 skins per day. Expansion has continued and the facility now covers 800,000 square-metres and the effluent treatment plant is being completely rebuilt, with an investment of around \$30 million. Vice-general manager, Mark Ma, says an effective effluent treatment plant has been integral to the project from the outset, which is one of the reasons why Henan Prosper feels completely unthreatened by the recent round of closures of tanneries in China for poor environmental practice.

"We have always known that to be able to guarantee sustainable supply we will have to meet all requirements in this area," Mr Ma adds. "This will be the fourth generation of our effluent treatment plant." He recalls "the old days" in Sanpo where something like 130 small-scale tanners used a common effluent treatment plant. "Even then there were problems and the local authority would frequently cut power supplies in an attempt to limit leather production." He says this made Michael Lyu determined to be independent, to keep to all the rules and to anticipate what future requirements would be, reading avidly, thinking deeply and asking widely about what was going on outside China. "He knew that, one day, we would feel the same pressures in China as tanners in Europe have faced," Mr Ma continues.

In keeping with its spirit of independence, Henan Prosper has its own power station now (for steam production) and the site is close to a network of reservoirs the local authorities have built with water from the



There are many stages for selection in the production of both nappa, double-faced and woolskin rugs. This shows the sorting of double face after the chrome retanning stage.

Xiao Lang Di dam on the Yellow River, 40 kilometres away. Construction is under way on a new, extended wet-end unit for Henan Prosper, which will have the capacity to process 46,000 wool-on skins per day, a 50% increase on the current production capacity. Starting from soaking, the tannery will aim to recycle much of the water it uses in production when the new set-up is in place. Other ideas include Eco-Tan, an in-house-developed tanning system that uses less chrome, less water and fewer chemicals.

Attractive material

Henan Prosper received its first orders for double-face sheepskin in 2003, when footwear group Deckers Corporation asked it for 70,000 square-feet for its most famous brand, UGG. With this, a new phase in the tanning company's development began. This side of the business built up rapidly between 2004 and 2008 and another big global name, Ikea, also became a customer, using Henan Prosper sheepskin in rugs. Turnover doubled, or close to it, every year and even the start of the global economic downturn in 2008 could not halt this. Production capacity doubled to 20,000 skins a day and the tannery began to source New Zealand sheepskins to supplement those from Australia. Soon, even this was not enough to meet production demands and the Henan

Prosper sourcing team turned its attention to Europe too.

During a visit to Catalonia in 2008, Michael Lyu learned that one of the most prominent nappa and garment double-face tanners in the world, Vic-based Colomer, wanted to set up a joint-venture in China with a local business partner. They went ahead together, resulting in a second, separate tannery at the Henan Prosper site. The two facilities are about 1,000 metres apart with the Colomer plant concentrating mostly on fell-mongering, removing the wool before tanning the skin, as opposed to the mainly wool-on production on the Henan Prosper side. The Colomer family was long-retired when the joint-venture got up and running, and the Spanish company that began processing sheepskins in the 1790s was, by this time, in the hands of a group of investors. When Mr Lyu asked them to increase their investment to take the new joint-venture further, they were reluctant to put more money in, so he bought them out, including the brand name, with the proviso that technicians from Spain would continue to travel to Mengzhou to continue a process of knowledge-transfer that had begun with the joint-venture. This is ongoing.

The acquisition of Colomer marked the start of a fourth phase in the history of Henan Prosper; it meant the small tannery that grew out of Boss Wong's hand-fleshing



From a technical point of view

(1) Overview of operations

Henan Prosper has operated at its current site close to Mengzhou since 2003. Basically, the company operates two units.

The Henan Prosper plant that was inaugurated in 2003, and is now manufacturing sheepskins as double-faced shearlings for car seat covers, baby care products, paint rollers, footwear leathers (uppers and linings) and sheepskin rugs.

The Colomer plant was constructed as a joint venture with Colomer in 2008, but is now fully owned by Henan Prosper. This produces both double-faced sheepskins and nappa leathers for mainly garments, gloves and shoe upper leathers.

Production almost doubled each year between 2004 and 2008, and now each of these two units consume 30,000 sheepskins per day. The area of the manufacturing plant is now greater than 800,000 m², and approximately 7,000 people are employed on site.

(2) Manufacture and processing

Both manufacturing units operate separately, and the end products serve different markets, but there are strong similarities between them. Both have their own chilled storage facilities for raw salted skins, each holding approximately 1.4 million skins. Sourcing is mainly from Australia, New Zealand, the US, UK, Ireland and other parts of Europe, mainly wet salted, but with wide differences due to seasonal variations and availability, husbandry, species and structure and type of wool. Considerable stocks are needed to ensure consistency in both the wool and skin input, and this is also reflected in the individual crust departments.

There has been heavy investment in recycling of process floats to reduce the consumption of water and chemicals. The float levels for processing and washing are high to protect the wool and a delicate substrate, and the paddles used are constructed with perforated ends and floor sections to enable fast discharge of floats.



There are 20 tables used for trimming the salted sheepskins, and all are served by a central conveyor for removing the offcuts. The trimming knives are made from used band-knife blades.



The double-faced sheepskins are dry wheeled after toggle drying and before dyeing.

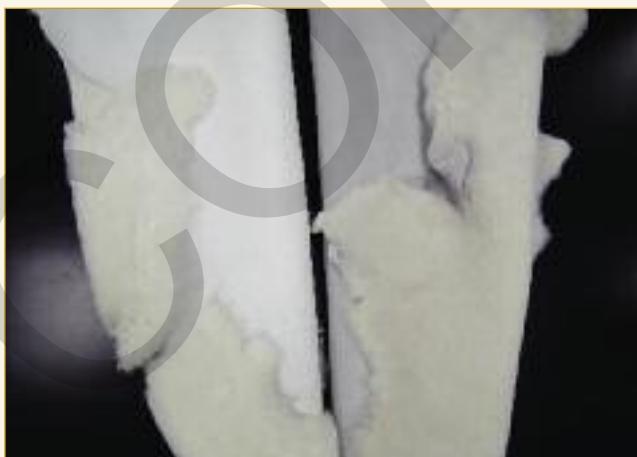


Photo shows a comparison between crust double-face sheepskins that have been tanned using conventional and low chrome combination tannages. Known as Eco Leathers, the combination tannage reduces the chrome content by 70%, provides a cleaner skin and wool and improved wool and leather dyeings, especially for pastel shades.



Paddles of 5000 litre capacity are constructed with an inner perforated shell that enables the load to be rapidly drained, then raised and tilted to assist unloading. The floats can be separated on discharge from each paddle for screening, making up to strength and recycling. The system includes computer management.



These floats can be segregated to enable the used pickle liquors to be screened to remove residual grease and wool fibre, followed by collection in sumps. These recovered liquors can then be checked for salt concentration and acidity, and then amended as required for direct reuse in subsequent pickling processes. Similarly, where chrome tannage is performed, the used chrome liquors are recycled from the paddles, then adjusted with fresh chromium salts before reuse.

There is also reuse of wash waters, where the second bath is collected after discharge and used for the first wash, and the fully treated effluent is of suitable quality for use within soaking operations.

For nappa production in the Colomer unit, sodium sulfide is sprayed onto the flesh side of the skins to enable wool recovery. The overspray of sulfide solution is screened to remove solids, then made up to strength to enable reuse.

In the Henan Prosper unit white tanning systems in paddles have been developed that are based on specialised products, syntans and fatliquors, and the exhausted floats from processing are also filtered, analysed, and made up to strength before reuse. At approximately 80% of the production, this white tannage is supported by a lower chrome offer in retannage, where there is a progression from mixers towards larger loads in drums in a new department resulting in savings in both water and chemicals.

In addition to the technical differences between the two units as demanded by end-product requirements, there are significant variations in material handling and the management of manufacture for good reasons. The Henan Prosper unit has experienced enormous expansion and development in a short time. This has required the construction of new buildings while maintaining production, and inevitably this has caused a physical separation of the various departments. Also additional plant and equipment has been required, and this equipment has been largely based on the original and established requirements. This has resulted in batch sizes of average size 220 skins (input is based on both skin weight and volume) with heavy reliance for movement on forklift trucks within and between the various departments, the skins being contained within rectangular stainless steel cages or on pallets.

However, the Colomer plant was initially designed for a greater capacity, and with strong influence in design and technology from the original Spanish partner. This is apparent in the larger size of input loads, the degree of machine linkages and the management of chemical processes. The paddles are of larger capacity, and there is very heavy reliance upon conveyor systems throughout the fellmongery sections with an associated reduction in the size of workforce. These linkages include the loading of all paddles for soaking and pickling using belt conveyor systems, all fully managed by computer control.

These are Feltre systems, and extend to the movement of pickled skins using Caravel trucks for receipt of skins discharged from paddles, then automatic delivery to a belt conveyor feed for centrifuge and fleshing after soaking, and fleshing after acid or salt pickle. In addition, there is a high level of computer control throughout all chemical processing where the control – including water additions and drainage, additions of chemicals in solutions and process management – is completely managed using an Olcina computer system.

The Henan Prosper unit is rapidly changing manufacture in the fellmongery departments towards large paddles that can



After liming and deliming, the skins are dropped from the paddle via chutes into a Caravel unit. This will automatically transport the load on rails towards a conveyor belt, then tip the skins onto the conveyor belt for delivery as required to wet back or pickle fleshing.



Belt transport of sheepskins after soaking for presentation to the fleshing operation. This stage is especially important to ensure both a clean flesh and remove grease. These sheepskins are for nappa leather production and wool recovery.



After spraying on the flesh side with sodium sulfide to loosen the wool, the skins are mechanically pulled to remove the wool from the skin. This is of high value, and is immediately machine-washed as shown above to clean and ensure the complete removal of residual sulfide before scouring.



accommodate a four-fold increase in pack sizes, and from processors to large drum-based processing in the dyeing areas. However, the production based on larger capacity vessels is fully established in the Colomer unit based on paddles and drums from Olcina and Capdevila.

(3) Solids management

- Trimmings from raw sheepskins are sold to small companies for wool recovery and hydrolysate manufacture. Fleshings are rendered to extract grease, which is sold. The degreased fleshings are dewatered and sold for blending with other materials as fuel.
- Chrome precipitates after dewatering are contained in polypropylene bags for deposit in banded landfill sites that are government approved.
- The major solids from effluent treatment are delivered to southern China, blended with other fuels and used for heat generation. Salt from raw skin trimmings and grading is sold for de-icing roads in winter. Clean salt is reused in the acid pickle process.

(4a) Water and environmental management

All water used within manufacture is from municipal supply provided from the Xiao Lang Di dam, served by the Yellow River.

(4b) Effluent treatment

The existing discharge standards of COD <300 mg/l, BOD <210 mg/l, N-NH₃ <25 mg/l, Cr <1.5 mg/l and SS <280 mg/l are being met, with final discharge to the municipality for mixing with other wastewaters for further treatment. However, a new plant is under construction with the objective of raising performance to COD 50 mg/l, BOD 10 mg/l, N-NH₃ 8 mg/l, Cr 0.8 mg/l, SS 10 mg/l. The present level for Cl stands at 4,000 mg/l, but this is being reduced to a target of 3,000 mg/l by changes within manufacturing procedures.

There are two effluent treatment plants on site. One serves the original Henan Prosper plant, and the second the Colomer plant. The volumes for treatment are 6,000m³ and 3,000-4,000m³ respectively, the main differences in treatment being the presence of sulfide generated from processing nappa leathers.

The outline technique for treating the effluent from the HP plant is as follows. Wastewaters containing the higher concentrations of chrome are segregated. The other wastewaters are mixed then screened to remove gross solids. Balancing is followed by chemical dosing using aluminium salts, then primary clarification. This supernatant is then subjected to anaerobic digestion using a pair of UASB (Upflow Anaerobic Sludge Blanket) tanks for 36 hours, followed by clarification, before conventional activated sludge treatment for 24 hours, with clarification. For tertiary treatment, this effluent is then chemically dosed with aluminium salts. All of the solids from these operations are mixed together for sludge thickening, then dewatered by filter press.

The chrome-containing wastewaters (20-30m³/day) are collected then treated in dosing tanks with sodium hydroxide to create a precipitate of chromium hydroxide, followed by filtration using two filter presses. The filtrate is mixed with the major effluent component before discharge to sewers.



The dyeing department is highly automated with both the additions of skins to process, and additions of water and chemicals under computer control. There are both wooden drums by Olcina, and stainless steel vessels as shown by Capdevila.



In addition to these woolskin rugs, large rugs are created from sheared sheepskins where four skins are matched and stitched together, bed mattresses in various patterns, and rugs cut and stitched to novel design.



Double-faced sheepskin leathers were traditionally produced as suede with wool of varying length to suit purpose. This variety of finishes is created by laser printing and transfer systems for use mainly in footwear.



The separation and treatment of chrome-containing wastewaters is a key component in effluent treatment. This shows the mixing and precipitation of chromium salts using sodium hydroxide before separation and dewatering of the precipitates using a filter press.



Work has commenced on a new effluent treatment plant that is capable of treating 40,000m³/day. This will replace the existing systems, ensure a very high level of performance to meet pending legislation, and allow for considerable future expansion.

The effluent from the Colomer unit is treated similarly, but with the following modifications. The sulfide-containing wastewaters are oxidised before mixing with the main effluent stream. An anaerobic treatment stage is also used but by simple retention for 24 hours instead of UASB treatment, followed by clarification. A 24-hour activated sludge treatment with secondary clarification, followed by a second activated sludge treatment stage for 48 hours serves as tertiary treatment. The tanks used for both the sulfide removal and anaerobic treatment are capped to avoid odour.

A new effluent treatment plant is already under construction as a fourth stage of expansion at a cost of \$30 million to replace these two treatment systems and is due for completion in one year. This is to upgrade the quality of effluent treatment and to meet anticipated expansion.

Essentially the system will use anaerobic treatment in sealed containers to initially reduce the BOD and COD, with

methane collected as fuel for energy production. Clarification will be followed by chemical dosing, then conventional secondary biological treatment. As an additional stage for tertiary treatment, a Fenton reaction will be applied to chemically oxidise the effluent and lower the residual COD and BOD and remove colour. The area for this new plant is 86,000m², with a capacity sufficient to treat 40,000m³ of effluent each day, and thus enable a four-fold increase in production without taking into account advances in manufacturing technologies.

(4c) Energy

The energy requirements for hot water and steam are provided by a coal-fired steam generation plant that is owned by the company. The electrical supply is provided from the national grid. ⚡

operation in Sanpo was now a multi-national group. And, as a group, Henan Prosper decided it could and would start making finished products of its own, including shoes, boots and bags under a brand name it has registered, Cozy Steps. Cozy Steps boots are made from double-face sheepskin in an on-site facility that also makes UGG boots and Deckers is content with the arrangement, Michael Lyu says. Deckers chief executive, Ángel Martínez, has visited the plant, and Mr Lyu says they have an open arrangement under which he can visit Deckers head office in California any time he wants to. Openness and honesty have governed the relationship all the way, he insists.

The in-house brand is growing, making a name for itself in the domestic Chinese market in particular. A huge investment in

direct soling technology from Desma in Germany to inject polyurethane and thermoplastic polyurethane soles straight onto uppers in a highly automated production line is about to transform the footwear production side of the business. When the new Desma production line is in operation, which may be as soon as August 2014, footwear manufacturing capacity will increase rapidly. Within three years, its target is to produce 2.5 million pairs of boots with double-face uppers per year and another 2.5 million pairs of shoes using the Desma technology. It says it is almost hitting the double-face target already, with around 50% of the boots being produced for UGG. With direct soling, the company will make shoes with uppers made from grain leather and become less reliant on the double-face look. New brand names

will follow: Rich Steps for the Desma-soled shoes with grain uppers and, possibly, a new use of the Colomer brand name for a range of high-end formal shoes for men. There is also an intention to float one or more of these brands on the stock market.

Travel broadens the mind

As well as travelling far and wide to source sheepskin (vice general manager, Mark Ma, has even been to the most southern parts of Chile in the South Atlantic), Michael Lyu says he and his team are enthusiastic gatherers and retainers of all the market information they pick up, which means that he feels Henan Prosper is in a good position to analyse what is happening in the raw materials market for skins. "This is important because that's where a lot of your profit margin is," he



points out.

A summary of his assessment of the way the market works is that all abattoir people in Australia like to remain "stone-faced" because of their practice of auctioning material day by day. In New Zealand, by contrast, everything works on contracts. He describes his relationships with raw material suppliers there as "a little bit more long-term", adding that especially high levels of probity and honesty among suppliers in New Zealand make this possible. In the UK, the market has, traditionally, been dominated by a small number of big players, centered on West Yorkshire, whose association with the wool trade goes back centuries. "That's why we have set up our European headquarters there," Mr Lyu explains. "We have an office close to Leeds and a warehouse too." Following its acquisition of Colomer, his group's European operation was run from Barcelona, but Henan Prosper has changed that now, moving its base to the UK instead. "We have our own people there and will build up a collection of warehouses," the chief executive continues; "sourcing people are very important." For this reason, Henan Prosper has sourcing professionals in place in France and Spain too, as well as in the Americas.

Raw material at risk

"Sheepskin is different from hides, from a sourcing point of view," Mr Lyu insists. "It [sheepskin] is certainly not a commodity; it's more risky because preservation of the material is a big issue. The solution is to go to crust quickly, but to do that, you have to know what your customer will want at finished stage, you have to know what's happening in the market, you have to know what material is right for you and your customers, and know what you can use each different type of material for."

He believes his company has a big opportunity to become dominant in the supply of sheepskin leather because, on the positive side, it has funding, it pays its suppliers on time, it knows what is happening and it knows what its customers want, he says. It insists that suppliers come and visit the tannery to see its operation for themselves, and it has a good reputation.

One of the reasons for Michael Lyu's optimism about the size of his company's opportunity in the years ahead is that the environmental pressures tanners in China



A partnership with Ikea has led to the tannery donating money for school equipment in the mountain village of Qian Shan.



This image shows part of the accommodation built for the workforce at Henan Prosper. It is often the case that over and above husband and wife who work on site, children and grandparents also are housed here.

have come under in recent years, leading to a string of closures in 2014, are not going to go away. Henan Prosper's policy has been to follow government regulations and to have high levels of transparency throughout its operation. It decided years ago, the chief executive says, that investing heavily in a high-tech effluent treatment plant was not just good policy, but an obligation, a duty to future generations. "We told people this years ago," he continues. "There was a time when we had laws about this, but the way the law worked was the Chinese way, with some people in authority abusing their

power. This has changed. We have always done things differently, hiring lots of consultants from outside China to show us the best way to do things and following their advice on the best way to meet all our environmental obligations. We knew that, in the long run, keeping to the rules would prove successful."

Talk ends, action starts

He goes on to explain that the tannery closures in 2014 are a sign that what the central, provincial and municipal governments have been saying for years



about environmental care is "no longer all talk". There are increasingly demanding laws coming into force across China on waste and water management. "You will break the law if you don't keep to the rules now," Mr Lyu insists; "you can go to jail." His view is that only "real tanners", those who want to work sustainably, who are able and willing to meet rising costs for effluent treatment, to pay their workers well, to invest in innovation and in research and in technology will survive. In his opinion, this means as many as 85% of tanneries operating in China at the moment (the China Leather Industry Association confirmed a total of 1,800 at the end of 2011, but suggested the figure was likely to be 1,500 by the end of 2014) will be forced to close. "Chinese tanners are in a fight for survival," he continues, "and the mentality has to change. All the short-cuts, all the so-called clever ways of getting round our obligations...those days are gone."

He has the idea that some tanners in China have "sacrificed the environment" to stay competitive, but insists that only serious investment in automation and clean technology will allow anyone to remain competitive in the long run. "There are operations in Italy that can process with 20 people what we process with 120," he continues. "This is very important. In time, tanning costs in Italy will be cheaper than in China."

In everyone's interest

The Henan Prosper chief executive says he has no objection to paying his people well, including extra for living allowances, pension funds and to make sure people have televisions, air conditioning, the internet and other services. "People need a life," he continues. "In China today food is not an issue any more. Food is taken care of, but people now want to own their own cars. So it's in their interests to work hard and earn more and I approve. If you protect other people's interests, you protect your own interest."

After more than 30 years in the woolskin tanning industry in his native New Zealand, Andrew Bowron, with his wife, Sheron, has been working as a consultant with Henan Prosper since 2002, helping it build up its product range to today's offering. Between 50% and 60% of the skins it processes go into double-face for UGG and Cozy Steps boots. Then there is a mouton product, for

which, in contrast, the wool goes on the outside and the skin on the inside. It's used in coats as a good alternative to fur and is very popular in markets where the winter is cold, especially Russia. Skins for rugs, rollers and covers for car seats, wheelchairs, bedding and childcare products complete the list. One of the things that has impressed Mr Bowron in the time he has spent helping to shape and observing the development of the business in Mengzhou is the skill with which people on the tannery floor are able to grade skins, quickly and accurately. Grading takes place at a number of stages throughout the production process, allowing the Henan Prosper team to make decisions on the best type of product each skin should be used for: from double-face at the top end, footwear lining at the opposite end and everything else in between. "Michael often says that it's the dirty-handed people that make this company," Mr Bowron explains. "You have to band-knife the wool just right for each product. You have to get it right because you have to get the right return on the wool and on the skin, with no waste at all, to be able to get the right return on the raw material." At the moment, the tannery is producing and selling 30 tonnes of wool per day.

Life and laughter

Situated in an industrial zone 20 kilometres to the west of the city of Mengzhou the tannery is in a quiet area, but there are plenty of things on site to keep people happy, including an impressively large and well equipped gym, a table-tennis room with four tables, a basketball court, snooker and pool tables, grocery stores, a library, a yoga room with regular classes, two lecture theatres, a karaoke room and even a sauna. Many of these amenities are housed within the company's own 250-room hotel, which provides accommodation for management and guests. There are also eight workers' dormitories, housing up to 4,000 people in total. There are also two clinics, each with its own doctor and nurses on site.

Across the group, there are 7,000 workers at the moment, not all of whom live on site. Shuttle buses go every day between the tannery and nearby urban areas. Initiatives to assist them include a fund set up in 2005 to help employees send their children to university. In

partnership with Ikea, the tannery has also donated money for school equipment in a nearby mountain village called Qian Shan: the Swedish furniture retail group pledges to match donations its suppliers make to projects like this. Large sums of money also went from Henan Prosper to relief funds for victims of earthquakes in Sichuan in 2008 and in Christchurch, New Zealand, in support of an initiative begun by a skins supplier there, in 2011.

One of the reasons Michael Lyu says he would like to make Henan Prosper a public company is that this would enable it to create more wealth and contribute more to society. "I think this will happen within five years at the most," he says. "Our volume can double and, if the brand part goes well, we can become a billion-dollar company. We have the numbers and the quality. The cheap labour advantage is gone and production will move back to Europe, so we have to keep innovating and coming up with things such as Eco-Tan, which no one can touch. We have to keep doing this; we have no choice." ☺



Control and Accreditations

LABORATORY SERVICES

Both chemical and physical testing is performed in the laboratories. There is special attention paid to lightfastness of the dyed leather as suede and nappa, but also for the wool. Leather and wool have different test procedures, and use different lightfastness equipment.

ACCREDITATION AND AWARDS

Approval and accreditation include:

- ISO 9001: 2008
- GB/T 19001-2008
- ISO 14001: 2004
- OHSAS 18001: 2007
- GB/T 28001-2011
- LWG Gold Standard