



Tannery of the Year: Kings International Ltd, Unnao, Uttar Pradesh, India

Kings International Ltd started life in 1977 as a producer of finished leather products, mostly saddles and other equestrian equipment. But 20 years ago it set up its own tannery to guarantee the quality and quantity of leather it uses. It still consumes all the leather it makes in-house (even trimmings and fleshings are converted into dog chews).

At first glance, the Kings International tannery in Uttar Pradesh, in northern India, looks like an oasis on the busy, dusty road that connects Kanpur to the state capital, Lucknow. Managing director, Taj Alam, has constructed a garden just inside the entrance with a fountain, tall trees and arrays of roses, marigolds, dahlias and other flowers. Mr Alam explains that he likes to sit here in the evening, drinking tea and enjoying some thinking time. "We all have to spend a lot of time at work," he says, "so I want it to be as pleasant an environment as possible." These moments of peace are valuable because the tannery is a busy place. The company came into being in 1977 as a producer of finished products.

Kings International used to buy its leather from other companies in the surrounding area and devoted itself to making saddles for

horse riding and a small number of other products. After almost 20 years Mr Alam decided it was becoming too difficult to find the right quality of hides in the right quantities and he decided to move the company from Kanpur to Unnao, set up the current tanning facility and produce his own leather.

It processes 200 buffalo and cow hides per day and uses all the leather it produces to make its own finished products, with equestrian items such as saddles, harnesses and so on its real speciality, although it also makes bags, belts, small leathergoods and, since the start of 2016, casual footwear, too, using mostly cutting waste from its saddle-making operations. The company produces around 1,000 saddles per month at the moment with around 50% of these bearing the brand name Fouganza, which



belongs to French sports retail group Decathlon. A new factory is being erected on the site over the course of the first quarter of 2016 as the company expands its production into footwear as well. If the footwear idea is a success, it may alter slightly the balance of finished product output, which at the moment stands at 80% equestrian equipment, 10% bags and belts and 10% pet products.

Raw material sensitivities

Of the 200 hides, typically 70% are buffalo and the rest cow; 80% of them are veg-tanned (a 45-day process here) and the rest are full chrome-tanned. Buffalo hides come from reliable suppliers in the local area and are of good quality; cow hides come from further afield, from states that allow cow slaughter, such as West Bengal. Cow hide is an essential raw material for the tannery, Mr Alam explains, because there are parts of a saddle, most notably the seat and panel, that require leather with the softness and texture that cow hides can provide. A smaller amount of material also comes as crust from Spain, Argentina and Mexico. Fresh hides come salted at the moment but a project is under way to try chilled (it will take a full 45 days to find out if this has any effect on finished leather quality). Abattoirs in this part of India have an enviable business model in many ways, in Mr Alam's opinion. The material stays in India because there is a 60% export duty on raw hides, wet blue and crust. Tanners typically pay upfront 15 days in advance while the abattoirs grant themselves 15 days' grace before paying livestock farmers. The prices the abattoirs charge tanners go up and up "as per their whim and fancy, with no negotiation", the Kings International founder complains, making the raw materials market "very unstable".

The supply of leather chemicals is running more smoothly; all of the multinationals are well established in the Indian market and in cases in which domestic chemicals manufacturers offer tanners what they claim are parallel products at an improved price, Kings International Ltd is careful to take compliance issues into account before using them.

New pressures on hide supply

There are enough tanners in India to snap up all the raw local material available, but there are some new pressures on the abattoirs now. Religious and political sensitivities have led to bans on cow



The tannery originated from the need for a reliable supply of leathers for the manufacture of high quality saddles and harnesses.

slaughter in many Indian states and abattoirs; tanners have long been used to that, with tanners importing cow hide from other parts of the country or from overseas if required (as in the case of Kings International with regard to requiring cow hide specifically to make some of the key components of its saddles). In the natural course of things, plenty of bulls were born too and slaughter of bulls and oxen was common practice, making hides from those animals widely available. In 2015, however, important states including Maharashtra and Rajasthan extended the slaughter ban to male animals putting the leather industry's raw material supply chain under strain. As a result, imports of hides at the raw, brine-cured, wet blue, wet white and crust stages have increased; one person close to the situation recently suggested to *World Leather* that imports into India of crust have increased by 70% in the last two years. Mr Alam says he finds the suggestion plausible, not least because, unlike exports of hides, imported raw material comes into India duty free. He adds that this situation is now providing an unexpected boost for rival producers in neighbouring countries because of course bulls are still being born and farmers do not want to feed them.

Farmers in the affected states are unable to sell their cattle openly but one (unofficial) solution that is available to them is to sell the male animals for a small amount of cash to traders who transport them towards

India's borders with Bangladesh and Pakistan and the animals go for slaughter there, with tanners in those countries gaining an advantage from Indian raw materials. "Being able to import raw material from overseas is no solution," Mr Alam says, "because even though it's duty free it's still expensive for us; Indian buffalo is probably half the price and it's the same with imported cow or bull hide. It's twice the price of the equivalent raw material here." He says he finds it difficult to quantify the volume of bull hides being lost to the Indian tanning industry in this way but points to a February 2016 statement from the country's Council for Leather Exports (CLE) saying exports between April and November 2015 declined in value by 10% compared to the same period the previous year, reaching \$6.5 billion. This is in the context of a very ambitious government target for the industry's export values to reach \$27 billion by 2020. The CLE said at the time that a decline of as much as 6% in the supply of domestic raw material may have been a factor.

Added value

Consuming all of its own leather is a policy that will continue because, without this, Kings International would employ far fewer people than it does today. If a raw hide has a value of \$50, Taj Alam says for the purposes of illustration, it will be worth \$150 after finishing and, possibly, \$300 when converted into various finished products.



From a technical point of view

(1) Overview of operations

Kings International tannery and saddlery factory was established in the Unnao Industrial area near Kanpur, in 1995, and now employs 220 people. The origins of the company earlier were in the manufacture of leather saddles, but it was decided to extend the operation upstream by creating a tannery to provide long-term security of supply of leathers consistently and to specification. The range of products manufactured on site has since expanded to include bags, cases and small leathergoods, adding value to an input of 200 hides per day.

The input is a 70:30 mix of buffalo and cow salted hides. The buffalo hides are from an abattoir situated within the same industrial cluster. Of this input, 80% of the hides are chrome-tanned with 2% Cr_2O_3 for vegetable tannage, and 20% to 4%-6% Cr_2O_3 as full-chrome leather manufacture. Of this mix 75% is used on site for the 24 different types of saddle that are made, together with harness manufacture, the balance as softee leathers, nubuck and full-grain for bags and belts. Crust leathers are also purchased for leathergoods manufacture.

The substance ranges vary from 3.5-4.5mm for saddle goods, 3.0-4.5mm for harnesses, 2.0-3.5mm for leathergoods, and 1.0-1.4 mm as softee leathers. All of the leather is finished and manufactured into finished goods on site.

(2) Manufacture and processing

All soaking and liming is performed in a two-day cycle in a set of four wooden drums manufactured by the company itself onsite; these operate with an input of 100 hides, maximum weight 2,500kg. These drums are six months old; they are elevated and fitted with collection troughs to enable separation of the various discharges as required for the recycling of lime liquors. At the moment hair burn systems are used, but a hair recovery system is being introduced with full hair recovery and compression using equipment funded by UNIDO.



This row of drums is being installed by the tannery to create a new vegetable tanning department. Each vessel has a capacity of 4 tonnes input weight, and once in operation it will be possible to separate used vegetable tanning baths for reuse.



A recovery system for collection and reuse of used unhairing/lime floats is in the final stages of construction. The discharged floats and the recovered supernatant will be held in storage sumps constructed below the assembly.



The chrome recovery plant uses magnesium oxide as the source of alkali for precipitation. The settled chrome sludge is discharged directly into the reaction vessel set below the settling vessel for the regeneration of chrome liquors.



The dried vegetable tanned saddle leathers are lightly rewetted, then set out by hand in preparation for a hand oiling of the grain with linseed oil.



All of the leathers are chrome tanned to two different chrome contents [see section 1], with the low-chrome content leathers after splitting to substance and siding being vegetable tanned.

After samm/setting the leathers are shaved to substance, hang dried, then lightly wetted on the flesh side, hand set on the grain on a flat stone table, then hand oiled with linseed oil. They are then re-dried tension free on poles fitted to an online track conveyor system. Following this operation, the sides are vacuum dried to flatten and develop the traditional grain sheen.

After inspection, all of the graded leathers are measured for area, then weighed as part of production control before finishing operations. In this department there are both hand spraying booths, and a single-head spraying unit followed by steam heated tunnel drying cells. This unit is fitted with a roller-coater, so when spray finishing only is required each piece is loaded onto the conveyor strings from the side of the unit instead of conventional front offer.

[a] RECYCLING WATER AND USED FLOATS

- A new computerised water feed system has recently been installed to improve water use and management.
- A recovery plant is in the final stages of installation for the recycling of used lime liquors. This operates by the collection of the segregated discharged lime liquors in a sump from the four soaking unhairing/liming drums. These wastewaters are then pumped into two conically based settling cylinders where the supernatant can be withdrawn for holding in a second sump before discharge of the settled hair and debris to the primary effluent treatment plant. This reservoir of recovered lime liquor is then to be used in subsequent liming/unhairing processes, where it is expected to save 30,000 m³ of water each year.
- A chrome regeneration plant is already in operation. Here the used chrome liquors are collected, mixed and dosed slowly with magnesium oxide over a two-hour period, then settled. The sludges are discharged directly from the conical base of these settling vessels into reaction vessels where they are mixed with sulfuric acid to create regenerated chrome liquors at pH 3.2 for use in subsequent tanning loads.

(3) Solids management

- All raw hide trimmings and limed fleshings are consumed in dog chew manufacturing.
- All of the salt shaken from the salted hides is returned to the abattoir.
- Wet blue splits are trimmed and manufactured in-house for use in leathergoods.
- The waste from split trimming is sold wherever possible for small goods reuse, and the residual material used for leather board manufacture.
- Shavings are sold for leather board manufacture.
- Waste from saddle and bag manufacture was originally around 10% of the total area of leather manufactured and sold for small leather items. It is now being turned into a wide variety of strap-sandals, manufactured on-site.



All of the leathers are dried naturally in the roof areas of the tannery. The movement of the conveyor system is operated by a 1-HP electric motor.



On entering the finishing department all leathers are measured for area, then weighed as part of process control.



Many of the leathers produced are ram pressed both to consolidate the structure and to develop the gloss.



- Company policy is for all chemicals to be supplied in barrels which are returned to the supplier for reuse.
- Where chemicals are received in bags, these are given away.
- Dewatered solids from primary treatment are deposited in a dedicated secure landfill facility.

(4) Water and environmental management

[a] WATER

All of the water used within manufacture is abstracted from bore holes. To help maintain the aquifer, 20 rainwater collection points have been established across 3,500m² of the roof area to return approximately 34,000m³ water directly into the ground via bore holes. This system is being extended across the whole roof space, ultimately a 10,000m² catchment area.

[b] EFFLUENT TREATMENT

All of the effluent generated is given full primary treatment on site, comprising mixing and balancing, chemical dosing and primary clarification. The sludges produced are dewatered using conventional drying beds, although a belt press is being installed at the moment to rationalise and replace this operation.

The effluent is sampled and analysed continuously for pH, TDS, COD and volume, being especially important as the tannery is strictly limited to a maximum discharge of 120m³ of effluent per day. This information is continuously monitored online to the local authorities, with the performance fully available to the public.

The effluent is then discharged using a dedicated effluent pipeline to a common effluent treatment plant where it is treated together with effluents from the 15 other Unnao tanneries. This system treats only tannery effluents and was first established in 1995, with a new plant of the same size brought into operation in 2013. The two systems work together as follows:

The effluent is delivered to the first effluent treatment plant where it is mixed, balanced and settled before the first biological stage, where it is retained for 24 hours. After settling, the operation is repeated, with the discharge made to the new effluent treatment plant to improve the quality of the effluent discharged.

Effectively, the effluent is subjected to four stages of biological treatment each with 24 hours' retention, and this avoids a chemical dosing and clarification stage, and the performance details are:

Performance of SPV Leather CETP

Parameter	In-feed	Out-feed mg/l
pH	8.0 – 9.0	7.5 – 8.0
COD	5,000 – 6,000 mg/l	180 – 240 mg/l
BOD	2,000 – 2,500 mg/l	20 – 30 mg/l
SS	Up to 1,100 mg/l	Less than 100 mg/l
Cr	2 – 10 mg/l	Less than 1.0 mg/l
Vol	Approx. 1,600 m ³ /day	



Rainwater is collected from roof areas, and returned to the aquifer via soakaways for replenishment. The roof area is also fitted with many wind powered turbines to assist air evacuation from drying areas.



The waste from cutting operations for saddles and leathergoods is about 10% of the leather used. Until recently this was sold, but Kings International has now started making strapped sandals with leather insoles, and this now utilises almost all of the waste including cushioning material recovered from saddle making.



An unusual feature at Kings International Ltd is that the primary effluent treatment and sludge dewatering plant is placed immediately at the side of the main entrance to the tannery.



The final effluent is sampled and monitored at the point of discharge into an adjacent stream, before river discharge, and then flows into the River Ganges at a point some 150km distant from the site. The site is open to inspection and independent sampling by the local authorities at any time.

The operating company for the CETP is owned by the 15 tanneries, and each has a maximum volume allowance for discharge. This volume cannot be exceeded - the maximum operational load on the CETP being 1800 m³/day - and payment for treatment is based on this value regardless that the discharge volume by the tannery will inevitably be at a lower volume. The sludges produced are dewatered using conventional sludge drying beds, with the solid wastes finally being deposited into a licensed landfill site. Investigations are taking place to pulverise these solids for use with ballast for road construction.

[c] ENERGY

- All of the energy is being provided by heavy fuel using two thermic fluid heaters of different capacities to tailor the energy requirement as suitable to meet changing demands.
- Standby generators are available in an acoustically enclosed building to cover times when electricity from the grid fails. This comprises four diesel generators of 380 KVA, 125 KVA, 83 KVA and 40 KVA capacity so that the demand can be matched without excessive fuel consumption.
- Energy monitoring is carried out for each department.
- All standard lighting bulbs are replaced by LEDs.
- Wind turbines are used to drive the exhaust fans fitted to drying areas.
- The 1184 side capacity conveyor suspension drying system is driven by a 1-HP electric motor.
- Installation starts October 2016 of a 250-300 KWh solar plant on the roof of the new building. This should provide all of the power needs of the tannery, with a payback time estimated at four years.



The effluent is finally treated by the CETP plant located less than 1km from the tannery. This effluent treatment plant does not chemically dose the effluent, but has extended the biological treatment to four days' retention time.



All of the solid waste from the tanneries in the area are deposited to licensed landfill. The site is secure and sealed with an impervious PVC membrane, and was constructed with a life expectancy of 20 years.

Whatever the actual figures, his company adds value, creates wealth and generates jobs at each stage along the way.

Saddles are a specialist product and the company makes them for racing, jumping, polo, dressage and so on, with each one consuming around 25 square-feet of finished leather. Marketing director, Shahid Idris, explains that, apart from Decathlon's share, Kings International sells most of saddles to wholesalers "to get a volume that makes sense"; most of these wholesalers are in Europe, where he is based himself most of the time, although there are also customers in North America, Australia and the Middle East. He describes it as a seasonal business with a quieter period during winter months, but he explains that a lack of snow at the

start of the 2015-2016 winter was good news and that demand for saddles remained strong. "One customer in Germany took so many orders at Christmas that its dispatch operations to consumers continued until well into January," he says. Leather remains the material of choice for this type of equipment, Mr Idris adds, because it works well in terms of breathability, absorption and ability not to cause the horse discomfort through friction; there are alternatives, with entry-level bridles and saddles now available in synthetic materials, but he is confident leather will maintain its status in this product segment. "Leather even grows old gracefully," he points out, "whereas plastic is plastic."

The company typically generates 10% of waste from its cutting operations for saddles

and used to sell this material "for peanuts". Turning it into open footwear for the domestic market looks to Taj Alam to be a much better idea. The outer sole is the only externally provided component; everything else comes from waste material the company thought it could not use. Mr Alam says he allowed himself to be persuaded (because of cost) into buying office furniture upholstered in synthetic material some years ago and quickly regretted it. "After only two years the upholstery was all worn away, so I tanned some leather myself and sent it off with the chairs for re-upholstery and we have not looked back. Leather is for ever. Yes, the colour might fade a little but it's durable, breathable and contact with it feels good."



There is a mosque on site for use by the workforce five times each day. It is also used on Fridays by people from nearby factories and the local population.



The interior of the rest rooms and eating area for the workforce. Health and safety notices are on clear display in this facility.

Nature's way

Mr Alam says his company's commitment to sustainable production is strong and offers the following recent example. The new production area will have solar panels on its roof, allowing it to be self-sufficient in energy. Power cuts are frequent in this part of the world and energy is expensive. "We are going to save that money," the managing director says, "and what's more the energy we generate will be clean energy. It's a project that will pay for itself in four or five years and will run for at least another 25 years after that." He explains that the solar energy will flow into the government's national grid and that Kings

International will continue to take its supply from there, but it will do so with a meter that works in reverse, counting backwards to register the tannery's contribution and discounting its bills accordingly.

Another project, this one from 2015, involves harvesting rainwater from the roofs of the tannery buildings. As with the solar energy, the water goes into communal resources through natural channels; Taj Alam explains that to keep it all on site he would have to construct a substantial storage area and says he thinks "nature's storage is best".

One common effluent treatment plant serves Unnao's entire tanning community, which consists of 15 operators. It's a pleasant

place, framed by trees, the Lucknow-Kanpur railway and a narrow stream called the Sai River (which runs parallel here to the mighty Ganges River and flows into it 150 kilometres to the east). Most of the sound comes from aquatic birds and an eagle patrols the skies overhead. "If there were high levels of toxicity here the birds would not come," Taj Alam believes. A radius of just 20 kilometres encompasses the cluster at Unnao, a slightly larger one (25 tanneries) at Banthar and the much larger one (as many as 400 facilities) just across the Ganges in the Kanpur district of Jajmau. Jajmau and Banthar have their own effluent treatment plants; the only link to Unnao is a licensed landfill site for sludge that its tanners share with their Banthar counterparts.

Dr Subash Awasthi, the engineer who runs the Unnao common effluent treatment plant explains that remote monitoring of the flow has been in place since midway through 2015. Using sensor-based technology from Austria the authorities are able to see at any time if any of the tanneries in the cluster are attempting to operate at higher than their agreed capacity. Dr Awasthi's team carries out parallel laboratory analyses to make sure the remote monitoring is capturing the data accurately. Tanneries have been asked to fit remote monitoring technology to their on-site primary effluent treatment plants too and Kings International has already complied. Taj Alam says he believes prompt compliance with this is in his own interests. "Everyone is going to have to fall in line sooner or later," he says. "We all know where we stand. But my view is that we should be an open book because we are not pollution creators, we are people who manage pollution, converting waste into something valuable. And we can do more. Tanners often carry out all the correct treatments only for tannery effluent to end up in the same drain as untreated domestic sewage, which defeats the purpose; we are not yet at the stage of every town or city in India having its own sewage treatment plant. Towns that have tanneries with their own effluent treatment plants should let us mix domestic and industrial effluent together and run it for them, as happens in parts of Europe."

Because he's in charge of the shared landfill site, too, Dr Awasthi, a former UNIDO consultant, has been working on improvement projects there as well and believes using solid waste from tanneries in road construction is an idea with great



potential. "The chromium is stable and locked in so it won't wash away in the rainy season," he maintains, "and there is no danger that it would leach into the water table if we have a flood. It's a long way down to the water table from the highway; the landfill site is much closer to the water table."

Sharper skills

The leather industry is clearly of great importance to the economy of Kanpur and the surrounding region and the source of many thousands of jobs. Nevertheless, Taj Alam places great emphasis on skills development as part of his commitment to the people who work for him. "It's a question of reskilling," he says. "Our supervisors have all been trained at India's Central Leather Research Institute but the operators we have working on the samming and splitting machines and so on have just learned on the job over time." In this, he says, tanning machinery manufacturers have been immensely supportive because they (or their agents in northern India) have guided the Kings International workforce through new developments and helped them find improved ways of working. Other regular visitors include representatives of the National Skill Development Corporation and the Central Footwear Training Institute who come to deliver skills development training in-house during working hours.

Community resources

In total, 220 people work at Kings International, all of them contributors to and supporters of the pension, health insurance and social security scheme run by India's Employees' State Insurance Corporation (ESIC), with the company and the workers contributing to the funds that provide a safety net for them and their families. This includes check-ups at the tannery from dentists and doctors; there are also extensive health awareness programmes, which the managing director says often brings to the attention of workers for the first time the extent of the care and treatment available to them thanks to ESIC. "It's not a new thing," Mr Alam explains, "but a lot of people are unaware of all the benefits available. For example, a lot of people think they can only go to state hospitals when they also have the right to attend specialist private hospitals for particular treatments without having to pay, apart from the contribution they make automatically from their salaries."



The front entrance to the tannery. The whole area is heavily planted with trees and flower beds and potted arrangements, and includes a waterfall and bird boxes.

There is a mosque on site offering a place to pray for Kings International employees every day. On Fridays, people also come from other tanneries in the cluster and from surrounding villages to attend prayers so it's a facility for the entire community.

Workers for the long haul

Most of the people who work here live in Unnao, but some the company brings them from Kanpur every day by bus; the journey takes half an hour each way, traffic permitting and the bus is free of charge. The Kanpur contingent has to pass the huge Jajmau cluster of tanneries to come to Kings International and the managing director accepts that he will always have to pay a small premium to prevent people from going to work for a competitor to save themselves the commute. "People could certainly get a job in Jajmau," he says, "so we need to pay a bit more, as other tanners in Unnao have to do. The workers feel they deserve a bit extra." But he says there's more to this

question than money. "You also have to offer good working conditions," Mr Alam continues. "This place of work is neat and clean, ventilated, with good light and the workers have the right protective equipment to wear, including boots, aprons, masks and so on, and the people who join us don't want to leave."

There are workers at Kings International who have been there since the company started. Mr Alam describes these people as "a devoted and dedicated workforce that has worked hard to help bring the business to this level" and says he intends to reward them for this, not least by promoting some senior people to director positions. He also aims to list Kings International shares on one of India's stock exchanges and, if the plan comes to fruition, intends to give shares as a gift to "a select group" of at least 20 long-serving employees. "They will be able to keep their shares and reap the dividends, or sell them to raise money for retirement, for a child's wedding or for whatever they want." 🌐

Awards and Accreditations

- ISO 9001: 2008 Quality Management System.
- ISO 14001: 2004 Environmental Management System.
- OHSAS 18001:2007 Occupational Health and Safety Management System.
- SA 8000: 2008 Social Accountability System.
- Supply Chain Risk Management System PAS 7000:2014
- LWG Environment Protocol 5.2.3.