



One of several fish ponds onsite at PrimeAsia China that use recycled tannery effluent. This pond uses a small portion of the approximately 900 cubic-metres recycled daily.

Tannery of the Year: PrimeAsia China, Huangjiang, Guangdong, China

Part of the network of tanneries that PrimeAsia runs, the facility in Huangjiang in southern China is a long-serving supplier to many of the footwear industry's household names. More recently, it pioneered a way of calculating the carbon footprint of its leather.

PrimeAsia China opened its tannery in Huangjiang, close to the footwear manufacturing powerhouse of Dongguan, in July 1998. This area has probably gone through more intense industrial and commercial development in the intervening 14 years than anywhere in the world. Life in, around and for the tannery has changed.

What hasn't changed is the company's focus on quality, environmental sustainability, and best practice in labour management. "From a workforce perspective, we're geared up to produce 4.4 million square-feet per month at the moment," explains chief operations officer, Michael Hsu. PrimeAsia China works from wet blue averaging out at around 24.5 square-feet of finished leather per side. "At the end of the 1990s, this was the centre of the

global footwear industry," Mr Hsu says. "Within a 100-kilometre radius of here in 1999 there must have been 25,000 footwear factories. The number now is difficult to calculate but it's certainly much lower. Due to labour costs, many moved to cheaper locations in inland China, and many small operations closed. Due to the significant investment in their facilities, the largest footwear companies stayed."

The Tsai family that established and manages Pou Chen, the major footwear manufacturing group that owns PrimeAsia, is a case in point. Pou Chen had already been in Guangdong Province for 11 years when this tannery (it also has one in Vietnam and recently ceased leather production at a third facility in its native Taiwan)



opened as a joint venture between Pou Chen and former US-owned group Prime Tanning. It started producing leather for a range of international brands and shoe factories, including those owned by Pou Chen subsidiary, the Yue Yuen group. "PrimeAsia China was built as part of an ongoing vision and philosophy that is still in place today," says PrimeAsia chief executive, Jon Clark. "Having our tanneries and our marketing offices in the same regions of the world that our customers operate in is critical to the supply chain, and for us this region of southern China continues to be an important area of leather consumption for our major customers even with the recent shoe factory capacity shifts." The Pou Chen group used to have 44% of its production in Guangdong; the figure today is 34%. It now has 8% of its footwear manufacturing operations in inland China, with other operations in Indonesia and Vietnam. "Pou Chen has been in operation for 45 years," says Mr Hsu. "For years, it focused on getting bigger and now the group employs 520,000 around the world. But there has been a change. Now the company says it wants to become not bigger but better." Within the group, PrimeAsia China is one of the companies leading this mind-set change.

Demand shifts

PrimeAsia includes among its clients some of the biggest-selling footwear brands in the world: it makes leather for major sports brands including, adidas Group, New Balance, Nike, Puma and Under Armour. Key casual footwear customers are Clarks, Rockport and Wolverine World Wide. Vice-president of sales and marketing, Jon Hopper, says PrimeAsia China's business has gone through a substantial change over the last six years. "If you go back six years the top three sports-lifestyle brands accounted for 60% of our capacity with the remaining 40% being accounted for by our casual customers," he says. "We have seen an enormous shift in PrimeAsia China's product mix; it's now 10% sport leathers and 90% casual leathers." He explains that there are three factors driving this change.

The first is that sport brands have shifted away from China a large portion of the production of the heritage footwear that uses leather, moving it into Vietnam and Indonesia. "This has forced us to move production of these leathers to our Vietnam facility," Mr Hopper says. The second factor is



Approximately 900 people are accommodated within these dormitories. They are provided with a full range of facilities that includes a library and a comprehensive food/general purpose store.

that, overall, leather demand has decreased as the sports industry has moved towards the running category, which uses lighter-weight materials. The final issue is the increased cost of leather.

This is in the context of an expansion of sports footwear brands' volume during the last six years. Unfortunately, the growth that the sport shoe industry has seen over the last six years has not resulted in growth in side leather volume. More and more sports shoes are using non-grain leather materials. "Weight has become such a powerful marketing tool," the PrimeAsia sales vice-president adds.

Chief executive, Jon Clark, adds that the leather industry has seen tremendous demand fluctuations in the last several years especially in the footwear leather segment. These changes have been the result of several factors ranging from the cost of leather as a raw material to new innovations and technologies in shoe making. "The key for PrimeAsia is to understand that demand drivers will always be fluid," he says, "and it is our responsibility to be constantly innovating product, technologies and systems to be flexible enough to create demand in this ever-changing environment. There is no question that there is an inherent value to leather from both an aesthetic and a performance standpoint, and what we have seen lately has been a tendency for some footwear brands to be quick to move away from these values. Our job is to create leather that adds value to

the end product and in turn creates demand for our customers. This is what PrimeAsia does best and this is what will continue to drive demand for our company."

Jon Hopper agrees that leather continues to give a perception of value to end consumers; automotive brands, for example, have done an excellent job of nurturing this. In the longer term, he is sure demand for leather in footwear will remain healthy, especially on the casual side of PrimeAsia China's business. These lifestyle leather shoes are likely to receive a strong boost from the Chinese domestic market too, he thinks, as tastes among Chinese consumers continue to change.

"I'm optimistic about a rebound after that," Mr Hopper says, "and about leather continuing to be the primary material for many footwear brands. PrimeAsia China has been designed from day one to be in a position to run multiple types of leathers; from totally aniline all the way to fully pigmented, from very tight vacuum-dried leather to soft-pebbled, full-toggled leather and everything in between. This capability of being able to flex the product mix and handle increased complexity has helped us manage the segment changes we have seen as we have moved from a tannery that produced 70% pigment leather four years ago to 10%-15% pigment leather today."

Supply chain partners

PrimeAsia China believes in continuing to expand and invest in areas of growth



From a technical point of view

(1) Overview of operations

PrimeAsia China is located within a major industrial complex in Dongguan, Guangdong Province. It's at the point of a triangle, equidistant from provincial capital Guangzhou and Hong Kong, about 90 minutes by road from each. The tannery began full production in 1999, and at that time, with approximately 25,000 shoe manufacturing units within a 100 kilometre radius of the plant, was at the centre of both the Chinese and global footwear industry.

The tannery consumes approximately 70,000 hides per month in the wet blue state: about 70% are from North America, 20-25% from Brazil, and 5-10% from Australia. There are four to five main suppliers, and this small select group is viewed as essential to maintaining and improving supply. The average monthly output is approximately 3.5 million sq. ft, and the leathers finally used as 20-30% athletic and 70-80% casual footwear in a full range of colours. The majority of these leathers is mainly in the 1.4-1.6 and 1.6-1.8 mm range, although leathers are made up to 2.2-2.4 mm, and down to 0.8-1.0 mm thickness. The tannery employs approximately 1,150 people, with about 50% of the workforce female.

(2) Manufacture and processing

All of the wet blue received are wet back using two drums and four paddles. Pallets of hides are opened and loaded individually onto a feed line with delivery to the selected vessel. After soaking, the hides are dropped to the floor, and then loaded onto a second feed-line for delivery to the samm/setting operation. As the hides are removed they are measured, and then sorted into four quality grades, with a second sorting for substance as required.

Splitting is accurate using Linta whole-hide splitting machines set at 0.2 mm over shaved substance. The flesh splits are weighed individually and graded into heavy and lighter substance pieces for sale. The hides are sided, stacked as left and right sides, and then offered to shaving operations.

The leather is always at the optimum level for feeding into the operations, as each batch is elevated to meet the operative's needs. Workers, women and men, can easily manipulate the pieces and operate within this department. After shaving, each side is placed on a stainless steel table, stamped with an identity in the neck area, then hand brushed to remove shaving dust.

A pilot dyeing department comprises 35 stainless steel drums of differing sizes to dry between one and 40 sides. The pilot dyeing and finishing departments employ 120 people full time, and the maximum monthly sample capacity is 48,000 sq. ft/month.

The main dyeing department comprises 13 conventional drums, and nine deep-shelf, slow-revolving polypropylene drums. These were installed recently and manufactured by Huni, and it is planned to replace all of the wooden drums with these new vessels.

After unloading onto stainless steel pallets the leathers are submerged in stainless steel tanks filled with water before being



All of the wet blue stock is soaked until fully wet back. After unloading from the paddles and drums onto the floor area, they are hooked onto a line conveyor to the samm setting operation where they are opened in preparation for machine feed.



This section of the pilot plant comprised 10 stainless steel drums. In an adjacent area drums of various sizes are fitted to enable production of batches from single pieces up to 40 sides.



After dropping the load from the new deep shelf drums into trucks, the sides are individually stacked and placed on stainless steel horses.



fed to a Bauche samm/setting machine, directly linked to a Cartigliano wet staking/stretching machine.

The leather is then delivered to vacuum drying, and this is followed by airing off on a pole-conveyor line set high within the roof area. Alternatively, leathers after wet staking/stretching are transferred to a Cartigliano TAIC drying unit. Here the leathers are held flat and retained between nylon lines in the extended state, then passed through a drying and conditioning tunnel, with direct feeding to a conventional vibration staking machine for softening.

There are four more through-feed vibration staking machines in the plant, and both wooden drums and Erretre milling drums are used for softening and special effects. However, this area and the adjacent buffing department are being re-organised to expand the buffing facilities, and this includes the replacement of the wooden milling drums so that the milling equipment is identical.

In addition, there are four traditional expanding frame toggling units of the same size that can be used either for first time drying, or for drying leather after dry milling.

The layout of the finishing department is divided by lanes for movement of goods into three areas. There is a single area for colour-matching and mixing finishing products for application. This area includes spray booths for finishing materials, areas for blending products, booths for colour-matching test samples, and a central area for bulk weighing chemicals that is floored with stainless steel and banded to retain any spillage. This area serves both pigment and aniline finishing areas.

One area is for pigment/assisted finishing of mainly corrected-grain leathers. This comprises six spraying machines each with a single drying unit. These machines are set in pairs in tandem, and if required they can be linked together to serve as a double-head unit with drying cabinets. The department only applies finish by spray, and includes four roller presses by Yurim Machine Mfg Co. Ltd.

Another area is for full grain, nubuck, and waterproof leather finishing. There are two lines for applying oils and waxes: one dedicated to light applications, the other to heavier applications (it incorporates preheating leathers before application to assist wax application and penetration).



As part of coloured samm/setting, the sides are removed from stainless steel troughs and floated with water to avoid compression. This operation is followed by wet staking/stretching.



After samm setting and wet stretching, sides are loaded into the TAIC drying and conditioning unit. The leathers are held flat and conveyed forward with return several times at different levels to utilise the internal volume to its full capacity, before vibration staking.



Vacuum drying is an alternative drying method that is employed following samm/setting and wet staking. After partially drying, the sides are placed onto a pole conveyor for the final drying phase.



All of the leathers are inspected in the crust condition. There are four teams in total, and each comprises four people; the teams inspect every side for grain break.



This photo shows the interior of the oil swabbing machine. After heating the leather grain using infrared heaters, the leather is roller-swabbed with hot oil. The level of offer is controlled by the machined roller that offers precise quantities of oil to the swabbing roller.



There are two Starprint machines by Gemata that create a variety of tipping effects on oiled leathers.



This picture shows the air inlet system in one of PrimeAsia China's submerged bio reactors, which forms part of the tannery's extensive effluent treatment system.

(3) Solids management

- All of the shavings are mixed into concrete. There is a plan to have an external company manufacture the shavings into leatherboard.
- All of the solids after sludge dewatering from the effluent treatment plant are removed from site by a licensed company and disposed of according to regulations.
- All of the general waste is segregated at its source. The chemical containers are washed and stored in designated areas before collection and returned to the chemical suppliers.
- All of the wooden pallets are recycled as far as practical. On disposal they are macerated into chips and either used for bio-energy or incinerated for energy recovery.

(4) Water and environmental management

[a] RAW WATER

Water is provided by municipal supply.

[b] RECYCLING

There is considerable water recycling within this plant. The effluent treatment is to a high standard, and coupled with a low salinity due to manufacture from the wet blue this has enabled 58% of original fresh water input to be replaced with the end-of-pipe effluent. Within the plant this water supply is identified by painting the feed lines green, and recycling occurs in four different ways:

- All of the water used for wetting back wet blue stock as it enters production is "green" (recycled) water.
- Adjacent to the dyeing department there are holding tanks for "green" water, and this provides 50% of the water used within retanning/fatliquoring processes.
- All machinery, felts, scrubbing waters for emissions and overspray, and for general housekeeping use "green" water.
- There is further recycling within the wet back department. The floats discharged from the soaking vessels are screened to remove fibre and fine suspended solids, then held in a collection sump. This water is recycled for wetting back subsequent loads of wet blue two more times.

Once these different operations have been completed, all of the wastewaters are discharged directly to the effluent treatment plant. New green water storage tanks are being installed at present to increase the percentage of water that can be recycled.

[c] EFFLUENT TREATMENT

Over and above the recycling of water associated with the wet-back of wet blue stock (*re: Section 4b*), all of the wastewaters are discharged directly to the effluent treatment plant. The capacity of this plant at 4,000 m³/day is greater than the volume discharged, now standing at approximately 1,000 m³/day.

The effluent is first screened to remove coarse solids, then delivered to a balancing tank to regulate the flow and homogenise the effluent. The effluent is then dosed with aluminium sulfate and polyelectrolyte and delivered to primary clarification to settle both the suspended solids that have passed through the initial screening and precipitates.



All of the treated effluent receives filtration through activated carbon columns to remove residual colour. Approximately 50% of this water is reused within the plant, the balance discharged as treated effluent.

The main parameters for wastewater discharged from site and recycled for use within leather manufacture.

Component	Treated effluent mg/l	Parameter Required mg/l
pH	6.8	6-9
Suspended Solids	18	60
COD	59.5	90
BOD	13	20
NH ₃ -N	1.35	10
Chroma (colour)	5L	40

The analysis given was determined on 10 September 2012 and typical, the effluent was virtually colourless, and the presence of other components was negligible. Approximately 50% of the treated effluent is of a sufficiently high standard to be recycled and reused in leather manufacture.

The supernatant is then delivered to biological treatment, where it is retained for six hours, followed by secondary clarification.

The biological sludges are then pumped back to the primary clarification plant for settling/mixing with the solids from primary treatment. The mixed solids are taken from this area to a centrifuge for dewatering. The sludge from this operation, at about 20%-25% solid content, drops via a chute into a container for removal from the site.

The supernatant from the biological treatment is then subjected to tertiary treatment using a Fenton reaction designed to improve the biodegradation of components within the wastewater that are resistant to conventional biological treatment by chemical oxidation. This is followed by clarification and then filtration through columns of activated carbon to remove colour. The effluent is sampled for analysis to limits determined by local authorities: part of the treated effluent is then recycled for use in manufacture (re: Section 4b), and the volume that is discharged from site is measured using a flume.

[d] ENERGY

- There are oil-fired boilers on site for providing steam, but these have not been used for two years as surplus steam is purchased from a company on an adjacent site.
- Air is continuously removed from within the building via ducting as part of ventilation using extractor fans. As the air is emitted it is used to turn two turbines to recover energy. There are also small wind turbines located around the premises.
- The air compressors are cooled using heat exchangers, and the hot water that is recovered used for domestic purposes within the factory dormitories.
- A variable-speed pump is fitted to supply cold water for processing. This provides constant pressure on demand, and avoids the use of the motor running at 100% capacity when not required.
- The deep-shelf/slow-revolving drums installed use approximately 40% of the energy conventional drums use and minimise noise within the department. ☺

including efficiencies. "Efficiency gains have allowed us to offset much of the cost increases seen in recent years," Jon Hopper says. "We have seen the value of analysing and understanding our own energy, water, and waste data. We've been able to use less power, less water, less labour and so on. Like any company, we have limited resources, but now we are using them as best we can. We're a much different company now."

He says PrimeAsia's ability to navigate the challenging raw materials supply chain owes much to the knowledge and skill of his colleague, senior vice-president Art Anker. "We don't always get it right," Jon Hooper says, "but we miss the mark a lot less than many others." He admits that there are times ("now is one") when the company carries

more inventory, in the shape of wet blue, than it would like. "We are a good customer," he continues. "We have contracts with suppliers from whom we take a minimum delivery every month. So stocks can build up, but we have never failed to fulfil a contract and we have never left a container on the docks and we never will. We take responsibility for what we have agreed. As a result, when hides are in short supply, we know we will be at the head of the queue."

At the moment, about 70% of the wet blue hides coming into the tannery are from North America, 25% from Brazil and the rest from Australia. There is a general feeling among the members of the tannery team that the quality of the hides has gone down in the past two years. For example, there are

significantly more vein marks on the hides coming from North America now than in the past. "We'd like our suppliers to recognise that this is happening and adjust their processes as required to make sure they continue to supply a superior product," says Jon Hopper. "We prefer long-term, meaningful relationships and we have regular monthly meetings with some suppliers to discuss improvements. They are very receptive."

Preferred suppliers

With regard to suppliers of leather chemicals, Mr Hopper says PrimeAsia China looks for companies that focus on the environment and a sustainable future. He explains: "Everyone we buy from at the



moment is a preferred supplier. But we want to formalise that and include an assessment of their future vision. We have sent questionnaires examining this to all our chemical suppliers. We rely on them to develop new technologies and become more sustainable to help us get to where we need to go. We want our preferred suppliers to be genuinely innovative. We don't want them just to repackage last year's products and give them a new name."

Footprints programme

PrimeAsia views its sustainability programme as a key element of present and future success. Upon taking up her position a year ago, environmental manager Sarah Swenson, quickly started developing a new programme she has called Footprints. This calculated the footprint of different types of leather in the company's catalogue, analysing carbon emissions and the consumption of water, chemicals, and manpower at each stage of the production process. This project had third-party verification from research and testing services provider SGS. All PrimeAsia leathers in production are footprinted now.

The exercise has also involved looking upstream because PrimeAsia believes 87% of its footprint can be attributed to activities upstream. About 8% is from activities within the tannery and about 5% from transportation, which is mostly due to transporting wet blue across the ocean. PrimeAsia's calculations included taking 7% of the carbon from the lifecycle of cattle since this is the economic value of the hide compared to the overall value of a steer, most of which is in the meat. This has sparked an ongoing debate because some senior representatives of the global leather industry insist that tanners need only start their carbon calculations when a hide leaves the abattoir.

She points out that her methodology is based on a series of international protocols now being widely used by many industries and scientific organisations around the world: UNESCO's 2010 report on water, ISO 14044, PAS 2050 and the SimaPro energy database inputs are all part of this. Ms Swenson then developed a leather rating system that combined all four footprints (carbon, water, chemical and manpower) to give a score for each of the leathers in the range, allowing customers to compare individual PrimeAsia leathers. To give an individual score to each of the leathers in the



Drying conveyors are used extensively throughout the tannery. These systems are complex, and are only fully appreciated when they are not fully loaded with sides.

range, she created a weighted formula that attributes 35% to carbon emissions, 35% to water use, 10% to chemicals for finishing, 10% to dyestuffs and 10% to manpower in the tannery. In 2012, the average score is 3.12. "A leather with a 2 is resource-friendly, while a rating of 5 or 6 means a particular type of leather is less resource-friendly," she explains. "PrimeAsia has set a sustainability goal of reducing carbon emissions, water usage, and waste creation by 30% per square-foot of leather in five years. We needed to start measuring these categories through a footprint programme to create a baseline from which to measure progress. Collaboration with suppliers will help us meet our goals since they control a large portion of our footprint. Customers will have access to our numbers, and can use them to compare leathers. The data will also keep a record, showing how PrimeAsia is working towards its sustainability goals and collaborating with suppliers."

On the subject of the debate her calculations have caused, she describes PrimeAsia China's actions as taking the middle path. She explains: "We are not taking responsibility for everything; most of this is down to the meat industry. But we buy the hides. They are not free. They have an economic value and we choose to take the economic value because our industry has not set another standard." Her colleague Jon Hopper says there is no right or wrong here, but says PrimeAsia's belief is that it's

time for the industry to "stand up and make a decision" on carbon footprint. "In the absence of a wider, collaborative decision for the whole industry, this is our line in the sand," he says. "If the industry comes up with a position, we will go along with it. We'll change our numbers. A couple of strokes on a keyboard and we can adjust our numbers to whatever the industry decides to do. But if customers are going to make a choice between tannery A and tannery B based partly on carbon footprint, everyone needs to use the same standard and there isn't a standard out there at the moment. Our system could apply to multiple tanneries. The Leather Working Group could adopt it. I don't think we would have any objection to sharing it. If another tannery is prepared to invest in the collection, measurement and verification of the required data, the rest is just maths."

Chief executive, Jon Clark, says his group is "determined to be an outlier in our industry" when it comes to exploring energy and resource challenges. "The drive towards alternative energy has been a major focus for us," he says, "and will continue to be as we look to create efficiencies and focus our business plan towards long-term sustainable operations." He is convinced that a path of environmental stewardship is not only good for communities and planet, but is also "imperative for a healthy bottom line". He says: "Efficiencies in energy, water, chemical and human resources have been a large



piece of the drivers for investments over the past several years and as a result, we are driving towards an overall smaller environmental footprint in our operations."

Career path

It's correct to describe most of the people who work in PrimeAsia China as economic migrants. Huangjiang, Dongguan and Guangdong Province are not their homes; there are people from neighbouring provinces such as Jiangxi and Hunan, as well as from more distant parts of China, including Anhui, Hubei, Shandong and Sichuan. Chief operations officer, Michael Hsu, makes no bones about how difficult it can be to manage the business when people who have gone home for the Lunar New Year holiday fail to come back to the tannery.

His view is that the best way to keep people is to make sure they can have a career in the company, not just a job. "Usually if people stay for the first five months, they stay a long time," Mr Hsu says, "and we have decent numbers who have been here for more than ten years." Phil Chou, a young man from Hubei Province who started out in the trimming and inspection department, has been working in the tannery for more than 13 years. Kevin Qi, from Hunan, is now supervisor of the crust department; he worked his way up over the same length of time.

Mr Hsu feels it makes little sense to do as some companies insist on doing and pay only half of each worker's annual bonus at the start of the new year holiday, with the promise that they will receive the other half when they return. "A lot of factories have taken to doing that," he acknowledges, "but it's Pou Chen's policy not to follow. Our agreement with the workers is to pay them their bonus at the end of a year's work and we do what we have said we will do. And in any case, if people want to leave they will, they'll come back to get the rest of their bonus and the next week they'll be gone."

Work-life balance

PrimeAsia China was recently audited by the Leather Working Group and maintained its gold status despite an increase in the rigour of the audit. Water usage decreased by 9.6% compared to the previous audit 18 months earlier, and energy by 6.6%. The tannery also received the 2012 Huangjiang 'Safe Production Advanced Enterprises Industry Medal' showing its commitment to safety and the environmental focus of the



facility. It went on to win the 2012 Guangdong Clean Production Enterprise, a sign that its actions are being noticed at a high level. The facility is now in the running for the national award.

PrimeAsia China also won recognition from Nike for achieving the highest score on the footwear brand's Materials Sustainability Index with a score of 20. More than 1,000 Nike suppliers were rated, and the average score was minus-three.

These commitments go beyond ISO14001, ISO9001, and OHSAS18001 certification and show that the company has a high level of commitment to producing quality leather and to taking care of its employees and the environment of the community in which the facility operates.

Other recent employee activities have

involved visiting a nursing home in Huangjiang, and a team of company volunteers picking up litter from a nearby park. There is a formal feedback system that allows workers to speak up if anything is concerning them, and on the health side, a free annual health-check for each person. At regular times, different professionals come onto the site and offer haircuts and services to repair shoes or cell phones at no cost to the workers. At least one staff member in each section is trained in first aid, and all employees go through emergency and fire safety training. Environmental manager, Sarah Swenson, states: "Volunteering and giving back to the communities in which we operate will continue to be an ever greater focus within the company. We believe in making our communities better places to live." ☺

Control and accreditation

LABORATORY SERVICES

There are 18 people employed full time on leather testing. The range of tests is comprehensive, and many are to individual customer standards. The main tests performed are for water resistance, tensile strength and flexing. Master samples are kept within cabinets in the laboratories together with working samples. All leather related data is being kept in a separate room in fire proof walk-in cabinets. There is a separate laboratory that serves the water treatment plant. ☺



Many customers have their own specific test methods. These methods are displayed with each machine, with the machine often dedicated to a particular company.