



A full range of footwear leathers are produced by Lefarc, but also leathers for luggage and leathersgoods.

Tannery of the Year: Lefarc, León, Mexico

Run by a fourth-generation León tanning family, Lefarc is committed to providing quality finished leather from quality raw materials to meet the needs of demanding footwear and leathersgoods brands in Mexico and beyond.

You are never far from a tannery in León, Guanajuato, but the 10,000 square-metre site that Lefarc now occupies in an area in the north of the city is some distance away from the main industry cluster close to the new common effluent treatment plant; the CEPT is in an area that has come to be called Santa Croce, taking its name from the Santa Croce Sull'Arno cluster in Italy. It has no beamhouse on the site but has a stake in a wet blue and wet white plant ten kilometres across town called Curtec. The buying department for raw materials works at Lefarc, ordering brine-cured or raw hides on the open market.

Lefarc is a family firm. The name comes from the initials of the

three brothers whose father set up the business: Luis Ernesto (LE), Fabián Alejandro (FA) and Roberto Carlos (RC) Collazo. Their father, Luis Ernesto senior, moved the operation into its current corporate set-up in 1994 and to its current location in 2000. At that time, tanners were being asked to leave their traditional locations in the centre of León and space had become available when the logistics firms that had originally set up in this location moved to new industrial sites close to the highway network. The nearest houses are 100 metres away. As the tannery is ten kilometres from the CEPT, Lefarc is setting up its own water treatment operation. At the



moment, effluent goes into special sewerage pipes for transportation to the effluent treatment plant. León has between 500 and 600 tanneries (although few are big) and this system works, but Lefarc wants to be more self-reliant and make progress on its own. Quality manager, Andrés Montes, explains that the on-site treatment plant will begin working at the start of the autumn. He regards it as a natural step along the path of continuous improvement. "Lefarc has a vision to be one of the best tanneries in the world," he points out.

Part of the plan is to give the treated water to the city for use in keeping public green spaces irrigated. Water is expensive here and it's difficult and costly for the authorities to keep parks and gardens flourishing. With the leather industry such an important component of the city's economy, it seems right and fitting that tanneries should make contributions of this kind to public life. As well as the plan to give treated water back to the city to use, Fabián Collazo serves on the board of city taskforce looking at waste management in León, promoting recycling of domestic waste and setting up sorting centres to make sure that as little as possible goes into landfill.

The industry has a long established history here. Silver and gold mines in the state of Guanajuato attracted people seeking their fortune as long ago as the sixteenth century. By the nineteenth century, when Mexico claimed independence from Spain, the mines of Guanajuato were the source of about a fifth of all the silver in the world and there are still more than 80 active mines for the precious metals today. Miners and prospectors always needed good boots, so leather workers and footwear makers from Spain found demand for their skills in the area and passed their techniques on. Around 70% of all Mexican-made shoes are produced in the state of Guanajuato today.

For the love of leather

A display on the company's mission and values hangs in a prominent position at the entrance to the tannery, exactly where the workers clock in and out for their shifts. The company values work as an acronym, the first letter of each one (in Spanish) spelling out the name Lefarc: loyalty, effort, training, love, respect and commitment. The one for love reads: "I will do what I do with love." This is an unusual thing to see in a tannery, but most in the industry will have heard



Marcos Hernández is 85 years of age. He has worked with Collazo family in the tannery business for 55 years, and continues to carry out a full day's work.

comparisons between making leather and making wine or cheese, other activities in which a little love can improve the finished product no end. There is a famous Mexican novel and film called in English Like Water For Chocolate, in which the main character, Tita, uses cooking as a way of connecting with other people and passing on her feelings to them. Her catchphrase, when describing her recipes, is to say at the end of the list: "And, of course, I add lots of love." Lefarc is bringing the same idea to making leather. Marcos Hernández is the living embodiment of love for the work that goes on in the tannery. He is 85-years-old and works on the staking machine. He has been part of the workforce at the different tanneries the Collazo family has run for 55 years and refuses to retire. "For me, to live is to work," he says, laughing. "And I've told them: if I don't turn up one day, it's because I've died."

There are several shifts: one starts at seven in the morning and goes on until four o'clock in the afternoon, another begins and ends an hour later and a third starts just before four in the afternoon and continues until one o'clock the following morning. Currently, 111 people work in production and 29 in administration at the site.

Materials management

Purchasing manager, Jorge Guerrero, says Lefarc is processing between 4,000 and 5,000 wet blue hides each week. "But we have the capacity to double this when the

demand is there," he says. Most of the hides that arrive in the beamhouse of partner tannery Curtec are brine-cured, with between 90% and 95% of these coming south of the border from the US. Around 2% arrive from Ireland and the rest is locally sourced. "The proportions change," says Mr Guerrero, "but it's safe to say we mostly work with brine-cured US hides. One of the things we look out for is to see if a hide that comes to us from the US initially crossed the border from Mexico for slaughter as US cattle. This is happening, but we can usually tell because you see the tick marks. We don't like that. We could buy material like that directly from a supplier in Mexico if we wanted to. We prefer hides from cattle fed and slaughtered in the USA." Curtec handles bovine and pigskin hides. Roberto Carlos, is running a separate retanning plant to process pigskin.

Another of the brothers, Luis Ernesto, sales director for Lefarc, explains that there are two main reasons for maintaining an interest in a wet blue plant. "We don't want to become too dependent on a supplier that might go out of business leaving us high and dry," he says. "Plus, this set-up allows us to have control of the raw material."

In Jorge Guerrero's opinion, the relationship between Curtec and Lefarc is running well. Curtec has other customers and supplies roughly half of the hides it processes to Lefarc, all of them wet blue and a few wet white. "They give us priority," the purchasing manager says, but he makes it clear that this



From a technical point of view

(1) Overview of operations

Lefarc tannery is located in León, about 10 km from the main city tannery cluster. The main production is for footwear leathers, manufactured from the wet blue to the finished state. The tannery consumes 1,800 hides per day as sides, employs 140 people, was established 18 years ago and has been on the present site for 12 years.

Almost all of the wet blue (95%) used by Lefarc is tanned under contract by Curtec, being situated within the León tanning cluster. Lefarc is the majority shareholder in this company (47%) with two other partners. The input at Curtec is 1,500 bovine hides and 1,500 pigskins/day; it employs 50 people, and was established 11 years ago.

(2) Manufacture and processing

CURTEC TANNERY

About 60% of the bovine wet blue processed by Curtec is used by Lefarc tannery, and there is continuous liaison between the two units.

Hides are received fresh, but mainly in the brined or salted condition, and generally from Texas in the USA. On receipt, a specimen pallet is opened to see the condition of the hides. This assessment takes into account the level of flay damage, putrefaction, but also the colour of the grease – green or white. Green indicates mainly outdoor cattle, where more grain damage might be expected than with indoor cattle; the condition of the hair is also taken into account, as hair in poor condition indicates that there may be problems with that hide. If the sample is substandard, then other pallets are opened, and if unsatisfactory the whole delivery is returned.

When accepted, each hide is weighed, and then broken down into six different weight ranges to make up input loads. One person from Curtec records the weight of each hide and designates the category, with a second inspector from Lefarc overseeing the operation and counting the hides.

The processing drums are set in a row comprising six soak/liming drums, and six used for chrome tanning. The water feed is automatic, but all of the chemicals are weighed and added manually.

After samm/setting, each batch is wrapped in polythene and stored before delivery to Lefarc.

LEFARC TANNERY

The tannery only purchases grain split leathers, mainly at 2.2 – 2.4 mm substance. These wet blue are sorted into five quality grades to specification as set down in the grading manual, then each input load is measured to provide the area required. The batch is then wrapped in cling film and stored pre-shaving. On shaving, every 10th side is measured for thickness at five specified locations, and on this base the machine may be recalibrated.

The dyeing department comprises eight wooden drums manufactured by Olcina, and three polypropylene by Italprogetti. These are of different sizes to suit the different mechanical needs of a range of different input weights. All of the water supplies are by aquamix, but all of the chemicals used



The soaking/liming and tanning drums are set in an L-shape within Curtec, and serviced by a rear mezzanine. All chemical additions are made manually, with automatic water supply.



On shaving, every 10th side is measured for thickness in areas specified in the production manual. Machine adjustments are made as required based on these measurements.



All of the chemicals are weighed and added to the drums manually in the dyeing and retanning area.



are weighed and added manually.

There are two samm/setting machines: one for whiter and pastel shades, one for darker colours and black. The stacked leather from the dyeing area is placed on an elevated platform by the samm/setting machine, dipped into a water bath, and then samm/set. This is to be followed by wet stretching/staking (the machine has just been delivered), then either vacuum drying followed by airing off on a pole conveyor, or toggle dried. The drying conveyor is located so that it runs over the drying units to make best use of warm air from these machines. However, the conveyor also runs through a drying cabinet so that the drying can be supported if required.

There are seven Italprogetti milling drums, and these are in two different sizes to accommodate different load weights. This is followed by toggling using horizontal/expanding frame feed through units.

Approximately 40% of the production is corrected grain leather, and of the full grain 80% is wax and oil finished.

One roller coating machine is dedicated to hot wax finishing, and one to oil application. There are four combinations of roller coating machines, drying tunnel and spray machines. One of these combinations is in a separate area dedicated to white leathers, the other three for water based finishing.

Final sorting and grading uses SATRA grading for Timberland designated leathers, but other customers have their own standards.

(3) Waste management: by-products and solids

- Fleshings and trimmings are sold for gelatine manufacture.
- Dewatered solids after chrome precipitation are sold and used to regenerate new chrome tanning materials.
- Shavings and blue trimmings are collected from site, and then processed to create hydrolysate and recover chrome.
- Empty chemical barrels are used in-house for holding segregated rubbish, with surplus barrels/containers washed and sold.
- Used cling film and plastic is sold for recycling.
- All general solids – metals, wood, paper, cardboard, etc. are stored and sold or recycled as appropriate.

(4) Water and environmental management

[a] RAW WATER

The water supply used by Curtec is treated water from the León CETP. The water used by Lefarc is from municipal supply.

[b] EFFLUENT TREATMENT

The effluent from both Curtec and Lefarc is screened and discharged for treatment by the León CETP. This is managed by León municipality, and was specifically designed to treat the effluent from all of the tanneries in the León cluster, and some tanneries that are in outlying areas. Charges are made by the municipality according to volume and strength of the effluent discharged.

Curtec: All of the used chrome liquors and chrome containing washings are separated from the main effluent, screened, and then delivered to the chrome precipitation plant. This is a new installation and operates by precipitating the chromium from solution by mixing with lime, followed by



After retannage/dyeing, the sides are discharged into containers, then manually stacked before offer to the samm/setting operation.



All of the leathers are aired off after vacuum drying. This operation is supported by forced air drying within cabinets enclosing part of the conveyor line if required.



Hot waxes and oils are applied to about 25-35% of the leathers in finishing by roller coater.



There are four spraying machines used for finishing. One machine is installed in a separate department and used for finishing white leathers only.



Many different effects are developed by combinations of finish applications and milling. In this example, part finished leathers are being stressed by hand.



The solar array at Lefarc provides almost all of the hot water to operate the retanning/dyeing department. This hot water can be supported or made up to temperature by direct steam injection if required.

settling of solids, then dewatering using a filter press to form a cake of about 40% solids. The supernatant from this operation is used within the tannery for washing machinery and work areas. There are only two of approximately 500 tanneries in the León cluster that separate chromium from the effluent before discharge to the CETP.

Lefarc: At present the effluent is delivered to the León CETP using a pipeline dedicated to tannery effluent. However, an on-site effluent treatment plant has been installed by Italprogetti and is about to be commissioned. Here, all of the effluent will be homogenised and balanced with compressed air used for mixing, and the effluent will then be chemically dosed with aluminium sulphate and settled.

It is planned that the settled solids will be taken to the León CETP where they will be anaerobically digested to produce methane. The supernatant will be used within the tannery for washing purposes, within the spraying machines to absorb overspray, and for irrigation of the plants and ferns that have been planted around the treatment plant. The majority of the water will be sold to the municipality by tanker load for irrigation of flower beds and trees within the city.

León CETP: Both domestic and industrial effluents are received for treatment at this facility via separate pipelines and are treated as separate effluents. The domestic effluent is subjected to conventional treatment, with all of the sludges produced digested in an anaerobic plant to produce methane.

The tannery effluents have been fully treated on this site for approximately four years. On receipt they are screened, settled, homogenised and balanced, then aerated to oxidise sulfides. The effluent is then dosed with aluminium salts and poly-electrolyte, and then settled to remove the precipitates formed. The supernatant is then subjected to conventional activated sludge treatment.

The sludges from both chemical dosing and biological treatment are dewatered using five Peligro belt presses set in two lines, with the solids removed using two belt conveyors. Both sludges are dewatered separately, being pressed on alternating days.

The sludges from chemical dosing have a high chromium content, and are mixed with primary solids. There is no use for this sludge, and it is deposited on site on a sealed membrane.

The sludges from the activated sludge treatment are anaerobically digested at 35°C in a methane producing plant with a capacity 2,500 m³ over a 20-day period. This plant is specially built to treat sludges generated from the tanning industry. The methane gas is stored in a gasometer, but is being burned off at present as the high hydrogen sulfide content makes it unsuitable for burning in a heat/energy recovery plant, although techniques to remove this component are under consideration. The sludge that remains after digestion is dewatered, and then deposited on site with the chromium containing solids.

Between 1250-1500 l/sec of municipal effluent is treated generating 1,200 m³ of dewatered sludge/month at this site. In contrast, the tanneries produce 150 l/sec of effluent, but produce the same volume of sludge, most of which cannot be used because of the high chromium content. The tannery effluent as received is 5,000/3,000 mg/l COD/BOD, and after



isn't a privilege he takes for granted. "Curtec is our supplier, but we buy the hides and we own them all the way through."

When he places an order for hides, he shares the programme with Curtec's technical manager, César Esparza, and its general manager, Óscar Ruiz, whom he regards as colleagues. "I can let them know when hides for Lefarc will arrive and ask them to save one drum for us," he explains. He calculates that it takes a maximum of seven days for the brine-cured hides to go from the border to delivery at Lefarc as wet blue for retanning and finishing, but that it's often six. "This is almost just-in-time," he says. "It's sometimes a day's journey from the border [it's 1,000 kilometres to Laredo, Texas] and then the hides go straight into wet blue processing. Day one would be transportation from the border, and by day six, the hides are split and delivered to Lefarc."

In terms of hide suppliers, Mr Guerrero explains that he maintains direct contact with meat companies; he doesn't work with agents because, while they offer to deliver hides when you need them, the quality will be more variable and the price will be higher. "The tension is still there, sometimes you give and sometimes you take. Last year was really tough in the margins, for example, and this year there has been a bit of a bubble. But the relationships are good, and this is what really matters to us because it helps us close deals at a good rate. It's better to have that natural conflict and solve problems directly with the packers."

Carefully chosen customers

Tanners often hear from raw materials suppliers that it's not that hides are too expensive, just that leather is too cheap. In Mr Guerrero's experience, the best way round this is to choose clients well. "With the suppliers, you have to buy," he says. "But your client may not always buy from you, depending on the season. So you have to decide who are your best clients, the ones who share information and help you plan and help you with pricing and cash-flow. We are trying to be lean, to do this without buffer stock, so the flow of information, materials and cash matters very much."

Sourcing chemicals is another story, he insists, describing the relationships in this part of the supply chain as completely different. His first priority is product quality: he wants to receive the same quality each time he buys a particular leather chemical.



The Lefarc Logo is the rhino. This image appears throughout the tannery and offices, and has been chosen due to its strength and determination as a representation of the company philosophy.

Service is next. "We are always innovating," he says, "and the good suppliers give us whatever they have that's new to allow us to develop new techniques. We talk to them about what they are planning that can help us develop new leathers one or two years down the line." Price is in third place. Leather chemicals suppliers that can fulfil the first two criteria will be competitive on price, Mr Guerrero says, although the same may not hold the other way round; Lefarc never decides on price first, he insists. Almost all of the machinery in the tannery is from suppliers in Italy, although some of the drums are Brazilian. Once again the tannery welcomes dialogue with suppliers on new machines and new techniques that they have in the pipeline, and naturally it also insists on high levels of service and maintenance of the equipment.

While he has intimate knowledge of the current trend in supply chain relationships, in which big brands rely heavily on suppliers but sever contracts without hesitation if something goes wrong, it's not a culture he admires, or one that he would like Lefarc to adopt. "Our system is human," Mr Guerrero says. "It's about relationships. If I have a problem, I want to be able to tell the suppliers and to be able to ask for their help, but if we ask that of them, they also have to be able to ask it of us. Sometimes we have the power and sometimes they do. The other way is very punitive."

North-south-north

Most of Lefarc's raw material comes from the US, as we have seen. And most of the company's finished leather makes the return journey, going into fashion, casual or work footwear for prominent brands including Timberland, Wolverine World Wide and Calvin Klein. Another specialism is leather for western-style boots, with brands such as New York-based Frye, HH Brown from New England and Lucchese from El Paso, Texas, all among Lefarc's customers. "You don't see many people wearing boots like these in León," says Luis Ernesto Collazo, "but you do see them in northern Mexico. Much more to the point, this cowboy look has been very fashionable in the US." In total, 80% of the tannery's output goes into footwear, with belts, bags and small leathergoods swallowing up most of the rest. Mr Collazo says that a small amount has begun to go into high-end artisanal furniture-making and interior design applications for a company called Mobiliario de Sucesso, another part of his family's group of companies.

Within the footwear segment, some of the most important local León brands are also on the customer list, buying Lefarc leather to make women's fashion boots and men's dress shoes. In leathergoods, local brands also feature as users of Lefarc leather, including up-and-coming Guadalajara-based fashion label Jessica Torres and Saddleback, which makes its bags and other leathergoods in León. Saddleback is an interesting story. Founder and chief executive, Dave Munson, was a volunteer English teacher in southern Mexico some years ago. He says he developed a picture in his mind of "the perfect bag", strong and sturdy and made from rugged, heavy, rustic-looking, full-grain leather. One day, he walked into a leather workshop in Mexico and asked the craftsman in the back if he would make the bag from a drawing. Later, when he returned to his native US, he says people crossed the street and came out of office buildings to compliment him on the bag and to ask where they could buy one. So he returned to Mexico and had the same craftsman make more of the bags, which he then took back to the US to sell and Saddleback was born. "It's tricky making the selection of leather for Saddleback," says Luis Ernesto Collazo, "but it's a great company. It sells all its bags in the US, but still has its factory here in León."



From a technical point of view



This chrome precipitation plant at Curtec has been recently installed. Out of the 500 tanneries in the cluster, only two have installed these systems to make use of chrome recovery and as part of providing advantage for the CETP.



The effluent treatment plant at Lefarc is about to be commissioned. It is intended to provide treated waste waters suitable for washing purposes in the tannery, and for use by the municipality for plant irrigation and washing purposes.

treatment this is reduced to a 300/70 mg/l COD/BOD respectively.

Almost of the treated water (municipal and tannery) is mixed and then used for crop irrigation as the level of salinity is not detrimental to crop yields, or discharged to river. Originally it was intended to provide a blend of treated and sterilised municipal/tannery wastewaters for the tanners in the cluster to use as raw water, but the high salinity of the tannery effluent has prevented this. However, treated and sterilised municipal wastewaters are being provided via new pipelines as raw water to 84 of the 500 tanneries.

[c] EMISSIONS

All emissions from the finishing department are wet scrubbed before discharge to atmosphere.

ENERGY

Solar panels are used to provide hot water to the dye/retanning department. This comprises solar 60 panels each 2.5 x 1.0 m², and operated by recycling the water between these panels and a hot water storage tank where the temperature is raised to approximately 75°C. If the hot water supply is not to temperature when required, there is steam addition from the adjacent oil-fired boiler plant. As



At the León CEPT, belt presses are used to dewater the sludges following tannery effluent treatment. Chrome containing sludges are securely deposited on site, but biological sludges are further processed to generate methane.

hot water is withdrawn, the system is topped up with cold water feed into the solar units. The system has operated for approximately five years and was part funded by a government grant. ☉

No substitute

Mexico represents a good option as a source of leather for all these customers, the Lefarc director says. Mexico can only compete by adding more and more value, he insists; to try to compete with the sources of cheaper synthetic substitute materials would be pointless. "This applies to our footwear as well as our tanning sector," he continues. "Quality materials, plus high levels of design and a fashion focus are the future of our shoe industry. Big international brands

that are interested in sourcing shoes from Mexico only want leather shoes. We know that the cost of making shoes here is not cheap, but if the buyers choose leather shoes, Mexico is competitive. This is a personal view, and I don't know for a fact that it's true, but I also think we are seeing huge growth in traditional handmade footwear production in the US. And they are using Mexican leather." He points out that demand to use the pigskin his brother Roberto Carlos is producing as footwear

linings has doubled in the last year. He also insists that for tanneries such as Lefarc to source cheaper hides when the price of US material goes up would be a mistake and a compromise on their "respect for quality".

His view is that leather "is and will continue to be a product without substitute". He is grateful for the strong level of support that the industry in León receives from local and national governments, thanks to the high number of jobs that the leather sector sustains there, in good times and in



bad. "And that is taking into account how small some of the tanneries are," he adds. "Some are tiny. But we know they all manage to make a living. We can tell because any time we have, say, an old fleshing machine that we have stopped using, we can always find someone to buy it from us. It's like an eco-system, from big operations to small, family-run workshops making baby shoes." Local support means support from the city of León and from the state of Guanajuato, including in the form of courses in administration, innovation, quality and so on that represent good value for money, in his opinion.

Company history

He represents the fourth generation of his family to work in the industry. His father was one of three brothers working with his grandfather in the family business that his great-grandfather had founded. Eventually, there were three different tanneries in the group, one of which evolved into Lefarc, with the change of location and name coming when the current directors entered the industry in the early 1990s. At first, they tanned to crust, selling their product to other tanners in the area, including to their uncles. Then, after the move, which took place in 1994, they began to invest in more up-to-date machinery but took a big hit later that year with the devaluation of the peso. "We bought in dollars," he recalls. "However, we soon realised that the situation made us competitive in export markets and we managed to find a regular buyer in Italy for our crust and we started to earn in dollars too. That's what got us out of debt."

Soon after, companies in the US began to recognise that they had a source of quality, low-cost production on their doorstep and



Design, Development & Engineering (DDE) Department

Lefarc feels that its design, development and engineering (DDE) department is one of its strengths. The company describes the department as a powerful driver of innovation and a source of competitive advantage. The department produces new sample books for each spring-summer and autumn-winter fashion season.

About 80% of Lefarc's production comes from trend ideas developed in house.

leather output in León grew enormously. "There were buyers for all of it," Luis Ernesto Collazo says. "There would be trucks lined up ready to ship the leather as soon as it came out of the tanneries." Today, 40-45% of Lefarc's output goes for export, while a further 30% goes to buyers in Mexico who are outsource footwear manufacturers for the export market. The other 25% stays in Mexico and is used by local high-end brands as described above.

Mr Collazo describes relationships with the workforce as good and says the company pays maximum attention to the safety and training of the workforce. The company pays for teachers to come in several times a week to help members of the workforce who, for whatever reason, left school before completing their secondary education to complete their studies at the

end of their shift. There are birthday announcements, internal football tournaments and company outings once or twice a year. He believes that the quality of the finished leather and the type of customers the company serves give the best possible testimony to the work that Lefarc is doing. On the tenth anniversary of the company in 2004, it introduced a new logo, with a rhino to represent the views and the ambitions of the Collazo family and of the people who work with them. "We like the rhino as a symbol," the sales director concludes, "because we want to keep going and to keep growing. The rhino has tremendous strength, and when he makes up his mind to do something, nothing can stop him. We know we will trip up every now and then, but when we do, we will get back on our feet and continue the fight." 🐘



Cleaning stainless steel plates in the laboratory prior to finish adhesion testing.

Control and accreditations

Each batch of wet blue received from Curtec is checked for chromium content, and for tensile strength using Baumann or Trouser Tear test methods. Similarly all packs of work are tested before dispatch as routine. However, crust leathers have their own requirements such as grease extraction and Measer tests for waterproofness before entering finishing when required. In addition there are softness measurements, crocking, wicking and up to 22 different test methods certified by SATRA performed on finished leathers, according to customer specifications, and as routine, both adhesion and rubbing tests.

APPROVAL AND CERTIFICATION

- Gold rated to the standards of the Leather Working Group 2012
- SATRA Grading Award to the standard of Timberland Company 2011
- SATRA Accredited Laboratory. 22 Certified Test Methods.