



Tannery of the Year: Bojos Tanning, Santiago, Dominican Republic

Bojos Tanning is a company that can trace its history back for almost a century, but perhaps the most dramatic event in that 100 years occurred in 2007 when flood waters wiped out the business completely. The Bojos company could have walked away, but decided to stay and fight for its future instead.

Luis José Bonilla Bojos points to the roof of the tannery he runs in Santiago in the Dominican Republic and says: "That's the level the water reached, about five metres." As the managing director of the company, now called Bojos Tanning, he represents the fourth generation of the Bojos family that set the business up in the second decade of the twentieth century. Juan Bojos, great-grandfather of the current managing director, inherited an import-focused footwear components business. During World War I, importing sole leather became impossible and by 1918, the last year of the war, Mr Bojos had decided that the only way forward was to acquire a small tannery in Santiago to make his own sole leather, and the Bojos business we know today

was born. In 1929, José Bojos, the current managing director's grandfather, started work at the small tannery and began to bring in new technology. An in-house footwear manufacturing operation also prospered and the company enjoyed strong growth in the 1980s and 1990s.

At the end of 2007, with thoughts turning to celebrations of the company's ninetieth anniversary the following year, disaster struck. "We disappeared and took two-and-a-half years to recover," Mr Bonilla explains. "The company had to start all over again." What happened was that on the night of December 11-12, a rare out-of-season storm, Tropical Storm Olga, made landfall near Santiago. Fearing that a dam at Tavera would be unable to contain the



heavy rainfall, the authorities decided to open the floodgates and more than 6 million litres of water per second poured into the Yaque del Norte river, leading to severe flooding. There were more than 30 fatalities and thousands of people had to leave their homes at short notice. Luis José Bonilla remembers his shock at receiving a phone call towards the end of December 11, and of driving to the tannery, which is in Bella Vista, one of Santiago's successful Free Zones, in the Bella Vista district, in the early hours of December 12. No one there was hurt, but many hundreds of thousands of dollars' worth of raw material, finished leather and machinery was destroyed by the flood and it looked as though the 90-year-old business was ruined. Within days of the enforced closure, Christmas bonuses were payable to the full workforce and there were no records or documents or computer systems available to confirm the amount each person was due to receive. The company had no choice but to ask the workers (and across the group there were 2,300 of them at the time), how much their individual bonuses were worth and to take their word for it. Later, when the effects of the flood eased and the company was able to recover records from the finance ministry, these showed that the tannery workers had told the truth. Meetings with government representatives and insurance companies to try to reach a resolution went on for many months.

"It was very tough," Mr Bonilla says now, "but I was able to keep a key team on the payroll. We all used to come every day, just to see keep seeing each other face to face, although we couldn't touch anything until the insurance companies had finished with us. I had two choices: to walk away, and I think no one could have blamed me, or stay and continue. I chose to continue, perhaps against all logic. I had a great team and all that history, and I felt that family tradition was pushing me to start again."

New wet blue perspective

To start again meant a change to the new name and stepping away from footwear manufacturing. It also meant moth-balling the Bojos beamhouse and running from wet blue instead. This was the quickest way the company could recommence production, Mr Bonilla explains; holding out to process from raw again would have taken more capital, more investment and more time.



A landscaped area is adjacent the tannery, with a covered area for lunch breaks. Also in this area is a medical centre, and old tannery machinery mounted on plinths, ornamental paths and flower beds.



Leathers are mainly aired off after vacuum drying to finalise drying using overhead pole drying conveyors. The drying of firmer leathers also takes place using a TIAC unit.

The company maintains the drums and wet-end machinery and will be able to start beamhouse production again when it wants to. Another option would have been to continue with shoe production using someone else's leather. "But I don't feel like

a shoemaker," the managing director says. "I have always been a tanner and I wanted to go back to basics. Beamhouse operations would have meant more investment in everything and, after two years, we just wanted to get going."



From a technical point of view

(1) Overview of operations

Bojos Tanning is located within the city of Santiago, Dominican Republic, near to the Yaque del Norte River at the site where it was founded in 1918. The tannery processed raw hides to the finished state until 2007 when it was almost completely demolished by a devastating deluge of water released from the Taveras Dam that flooded the tannery.

After two years the tannery reopened processing mainly from the wet blue to the finished state to produce a broad range of leathers for shoe upper leathers, suedes and finished splits.

Approximately 70% of the shoe upper leathers are finished at 1.8 mm and above, and 30% at 1.0-1.4 mm as full grain plain leathers, embossed and tumbled leathers as corrected grain, nubuck, oiled, waterproof and washable leathers. Around 10% of the leather is vegetable tanned, and approximately 10% the total production is for upholstery and leathergoods. The tannery also processes wet blue splits for suedes and lining leathers.

When manufacture recommenced in 2009, 30 people were employed, but this has now risen to some 225 people, who from an input of 1,100 hides per day produce 1.3 to 1.5 million square-feet of leather per month.

(2) Manufacture and processing

Hides are purchased in the wet blue state from mainly the US as steer hides, Brazil as Zebu type hides, with a small volume from Uruguay. Of these hides, 40% are lime split, the remainder at full thickness. All suppliers are certified to the standards of the Leather Working Group, so that all of the leathers manufactured by Bojos are completely accredited.

On entering manufacture, the hides are opened, then loaded onto a conveyor for grading and stacking into six categories. These are then held until required, then wet back using a through-feed wetting back vessel. This is an elongated drum mounted on rollers, and constructed with shallow shelves, angled to create a helical spiral. On slow rotation, the



Hides take one hour to wet-back the graded wet-blue stock, as they pass through the wet-back machine.



On out-feed, the wetted hides drop onto a wooden container fitted with wooden slats to support the hides at optimum level for the operatives. The water draining into the base of the container is recirculated within the operation and provides considerable water savings.



Three of the six drums originally used for soaking, liming and tanning. Together with a fleshing machine and a lime splitting machine this plant is being held in mothball following the extensive flooding experienced by the tannery.



Hides are conveyor-fed to the blue splitting operation after samming flesh side up to maximise setting action. They are turned 90° for belly to belly splitting on Zebu hides to minimise damage to the hump area.



hides move from the open loading end to out-feed over a period of one hour. The wet-back water is continuously recycled, being drained and refilled once per day.

After unloading onto pallets, the hides are sammed using a through-feed Bause samming machine. They are offered grain-side down to maximise the setting action, and then delivered by conveyor to the feed of a splitting machine operating in tandem. On receipt, the hides are turned grain-up by the operatives, with the Zebu type hides turned by 90 degrees so the splitting is performed belly to belly. This presentation enables a better extension of the hump peculiar to these cattle and thus minimises splitting damage. The hides are sided on out-feed, and the flesh splits that are produced graded and palletised. The shaving takes place on four shaving machines, and as they are stacked down they are blue trimmed.

The dyeing department comprises 17 dyeing drums of two different widths. These are of conventional construction and fitted with a mix of shelves and pegs, and are used with loads of 1,500 square-feet and 3,000 to 5,000 square-feet per drum respectively. All of these drums are elevated and serviced by an overhead mezzanine. The chemicals are stored and weighed in a separate area of the mezzanine; all offers of chemicals are manual, and the water feed is automated. The floor beneath each drum is covered with polythene before the leather is dropped from the drum to avoid staining, followed by stacking onto pallets.

All of the processes used have been rationalised to take the minimum time, ensure consistency, and minimise waste and power requirements. There is also a separate pilot plant comprising 11 drums of different sizes to produce samples of between one and eight sides.

Because of the very wide range of leathers produced in terms of colour, type and texture, the movement of goods is managed by forklift trucks and palletised batches of leather. However, the movement through machine operations is rationalised as far as possible, so that as leathers are samm-set, the same pack may be wet staked and stretched and vacuum dried to make manufacture as lean as possible.

There are two out-feed samm-setting machines. One is dedicated to split production, and the other to full grain leathers. The full grain leathers can also be samm-set a second time using a Bause through-feed machine, although this is mainly used as a single operation.

A wet stretching-staking machine is used on lightweight leathers before vacuum drying. Part of the production is then wet stretched and staked a second time, and the drying completed using either an elevated pole conveyor system, or a through-feed TIAC condition and drying unit. Part of the production is also toggle dried, with some of the leathers previously wet stretched and staked. One feature of this operation is that the sides are positioned at one side of the swivel toggling frames, and on unloading are placed at the opposite side—this is only a small point of detail, but causes a smoother movement of goods. There are also seven tumbling drums used within this complex variety of drying and handling techniques.

After crust inspection, the leathers are finished using four reverse roller-coating machines, and three single-cabinet, low-pressure spraying machines, all fitted with steam-drying units. These are positioned in pairs and arranged so that the feed end of one machine is set next to the out-feed end of the



One of the two out-feed samm/setting machines as shown is dedicated to suede split leathers. The second machine is used for setting full grain leathers, and in conjunction with a through-feed Bause samm/setting machine.



Leathers awaiting toggling are stacked behind the operative to the left. Dried leathers on removal from the frames are stacked to the right. This simple technique has improved the efficiency of leather handling.



Shows the through-feed vibration staking operations which is used in conjunction with the seven tumbling drums.



second. This means that if a second coat is required the movement of goods is minimised. There is a single through-feed rolling machine and three ram presses. There is also considerable flexibility with the workforce in this area. Work breaks are often shifted to enable better management of the production demands and make the best use of plant, energy and machinery.

(3) Solids management

- Wet blue trimmings from both grain and splits (shoulders and necks) are sold to China.
- Shavings are deposited to landfill as there is no commercial outlet in the Dominican Republic.
- All other waste is segregated outside the tannery. Barrels and containers are washed and either sold, reused in the plant, or returned to the original providers of chemicals.
- Cardboard containers are opened and flattened, then recycled by an outside company for repackaging.
- Solid waste from the effluent treatment plant is removed from site by a specialist company and deposited at a licensed waste site together with other industrial waste.

(4) Water and environmental management

All of the water used within manufacture is provided by the municipality. The water used in manufacture has been minimised, and there is no recycling other than at the wet blue wet-back stage. Here the use has been lowered from 323 cubic-metres per week when using drums to 7 cubic-metres per week using the wetting back vessel. The average water consumed stands currently at 32.55 litres per square-metre of leather produced.

After effluent treatment to legally required parameters, the effluent is discharged to the main sewer for further treatment together with domestic sewage from the city.

The effluent is treated over a six-day week. All of the waste waters from wetting back wet blue, retanning and dyeing finishing and housekeeping are delivered to the effluent treatment plant via a single gully.

The first step of the operation is to pump the wastewaters from a collection sump to a self-cleaning screen to remove gross solids. This is situated on top of a settling tank that provides three settling cones for settling solids, and also provides automatic surface skimming to continuously wipe grease and floating solids from the surface. These solids are fed into a trough, then flow to a sludge thickening tank.

The supernatant from this first settling then flows to a balancing tank to homogenise the effluent. Mixing is provided by cavitation aerators mounted in pontoons and the retention time is two days. The effluent is then dosed with aluminium salts and polyelectrolytes for coagulation as it is pumped to two settling tanks. The supernatant from this clarification stage is discharged to the main sewage system.

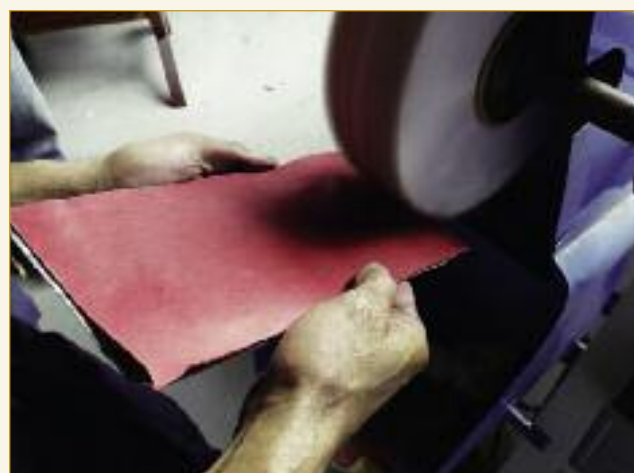
The settled solids are mixed with the skimmed solids and precipitates from the first settling stage, then fed to a belt press for dewatering. The tannery keeps a daily analytical record of the volume and composition of the offer to the effluent treatment plant, and the after treatment. Every three months, samples are taken by the local authorities for verification of the in-house analysis by an independent certified laboratory.



All of the leathers are checked to standard at crust sorting. Substance measurements are taken at six points across each side.



There are three ram presses used for plain and embossing effects. The production runs are managed to minimise plate changes, although this is rationalised to ensure rapid plate changes as required.



There is a separate finishing plant for sample leathers equipped with spraying frames. Photograph shows polishing of trial leathers within this unit.



The three settling cones where the primary effluent is first subjected to flotation and settling. Gross solids are first removed using a self-cleaning screen on top of the plant. The effluent treatment area is bunded, and flower beds have been created within the area.



The sludge thickening tank where sludge from the initial flotation and settling, and settled sludge's following chemical dosing are blended to release water. This concentrates the sludge before offer to the belt press for dewatering.

Transparent panels have just been installed in the roof to provide natural light throughout the factory, and considerable sections within the walls are open to maximise light and ventilation.

Steam generation and hot water supply is provided by heavy fuel oil as there is no natural gas available. Some propane is consumed, and the electricity supply is comes from an external

provider. The electricity use is carefully managed, and if certain limits are exceeded then additional charges are imposed on the company, and this has optimised manufacture. The energy use for each of these sources is monitored in the wet blue, retanning, drying and finishing areas, and the energy use for all leather is calculated at an average of 16.38 Megajoules per square-metre. This can also be expressed for individual types of leather. ☉

A number of clients maintained contact during the downtime and promised to place orders as soon as the company started producing leather again. "Family and employees were the most important factors," Mr Bonilla says, "but this support from customers, including Girza, Wolverine, Minnetonka, Timberland, Rocky Brands and others, was a big motivation."

The first trials for the new production set-up ran in November 2009, with 30 people involved and full production from wet blue was up and running in 2010. There are now 230 people working at the new Bojos Tanning, processing 1,300 hides per day, achieving an output of between 1.3 million and 1.5 million square-feet of finished leather per month. Around 60% of the wet blue the tannery uses at the moment comes from South America, from Brazil, Uruguay and Mexico, among others. The other 40% comes from the US. All suppliers are accredited by multi-stakeholder organisation the Leather Working Group (LWG). Bojos Tanning knows them well and knows how they source their raw material. "They are stable suppliers," says chief operating officer, Daniel Correa. "And this

gives us a real guarantee that the wet blue we buy is right for each article we make."

His managing director holds firm to the notion that strong relationships with suppliers are essential. "Without trust and good communication, it would be impossible," he says. "I can't afford a situation in which I might have a few surprises in every container [of wet blue] that I open, so to be able to trust and have a high level of communications with my suppliers is fundamental."

People first

Bojos Tanning has its own gold rating from the LWG and is also certified by testing body SATRA. There is a strong commitment to providing technical and soft-skills training within the company; it delivers an estimated 400 hours' training per year across the board. In 2011, it became one of the first tanneries in the Dominican Republic since a new law came into force in 2010, and the first company of any kind in Santiago, to receive certification from the country's labour ministry for care of the workforce. Recruitment focuses for the most part on the communities closest

to the tannery. "We have been here a long time," the managing director says, "and are known in this neighbourhood to be a serious employer with high standards. To work for us gives people a certain standing in the local community."

He points out workers who were there in the time of his grandfather, "people who were working here and knew me when I wore short trousers". He also points to an open-door policy inside the tannery, with people coming from the shop floor to the management team's offices whenever they have an idea or a personal worry to share. Mr Bonilla says around 90% of ideas for improving the workflow in Bojos Tanning have come from these exchanges. All of these things combine, the company believes, to keep worker turnover low.

The company also holds a national certificate as a 'green company' under an initiative called Quisqueya Verde (Quisqueya is an ancient word for the island of Hispaniola, which contains the Dominican Republic and its neighbour, Haiti, while 'verde' means green). Relations are good with local and national authorities: Bojos Tanning was part of a



Part of the tannery has open walls to provide both natural light and cooling within the tannery. There is also wide use of shrubs and flowers around the premises, including this area set between the wet blue processing area, the offices and the finishing department.

minister-led delegation that travelled to Macau in March 2014 to present the Dominican Republic's case as a good location for footwear production to Asian and global brands (see below). Local universities also appreciate the tannery's openness towards students who frequently pay visits to see how theories around industrial engineering or business administration play out in practice. "Once, one of the students who came was the son of someone I know," Mr Bonilla recalls. "My friend called at the tannery one day and asked if he could see around too because his son had told him we have something spectacular here."

In praise of Free Zones

Luis José Bonilla is president of Santiago's Free Zone Association. He is also vice-president of a spin-off training and consultancy body called Capex and is a past-president of the Santiago Chamber of Commerce. Across the country there are currently 56 Free Zone industrial parks, in which 552 manufacturing companies operate, importing materials, making finished goods and exporting them (often to the US, which is only five days away by container ship) in a customs-free environment. The Cibao region, which

includes Santiago, is home to 16 of these industrial parks, with 122 companies operating in them. There is a huge opportunity in the region, and in the country as a whole, in footwear, according to Mr Bonilla. Many prominent footwear brands and outsource shoe manufacturing groups believe in the Dominican Republic and the access, lead-time and cost advantages it can offer to companies with a market presence in the US through the DR-CAFTA free trade agreement, which came into effect in the Dominican Republic in 2007. A free trade agreement with the European Union has also been agreed, but awaits ratification. Europe is between 12 and 14 days away by boat, which represents a saving of around 50% in terms of time compared to many shipments from China. In 2013, the country's footwear output was 14 million pairs and export revenues of \$425 million. The footwear industry currently supports directly 14,000 jobs, a total that doubled between 2009 and 2012, and the Free Zone community is confident of creating thousands more jobs in the next few years as new manufacturers, including Taiwanese groups Hong Fu and General Shoe, come to the country. Anticipated output is of 20 million pairs per year in three years' time. Thirty companies

are in the Dominican footwear supply chain at the moment: 11 shoe manufacturers, 16 component suppliers and three tanners, one of which is Bojos Tanning.

"Retailers in the US want suppliers to be closer," Mr Bonilla says, "and we are near our customers. They want to be able to reduce lead times and react quickly. We are seeing that in our orders. We used to have around 90% black leather in our production. Now we have a much wider range of finishes and colours. Consumers want something new, and they want it fast. We are supposed to have a minimum order, but what can I do if one of my biggest clients puts in an order for a small quantity of hot pink, or cherry red or purple leather? If the customer only wants 2,000 square-feet, I can't say that my minimum order is 4,000 square-feet. I have to be able to do it; I have to be able to offer that flexibility."

Change to embrace

Here, too, openness is important and goes hand in hand with the flexibility. This flies in the face of the recent experience of many tanners. "Tanners have put up walls," says Mr Bonilla. "We have turned the production of leather into an enigmatic business. People didn't want to admit they were tanning leather because they were afraid of being held to blame for pollution and contamination and everything that was bad. This has left our industry with a high price to pay; we have been criticised unfairly. We should have united to give a faster and better response to this. We have new technology, that we are creative, that we are more environmentally friendly now and more sustainable. We have to put up a proper fight. We have to be competitive."

He thinks this is a responsibility that the whole leather value chain has to share, including suppliers, who need to keep thinking about the best ways to innovate. Specifically, he harbours fears that some in the leather chemicals sector have given up on "investing in a new era" for the leather industry. "Tanners are asking for new technology," he insists, "and these companies ought to respond. Their offering ought to change."

With regard to machinery manufacturers, he says European manufacturers, in particular those from Italy, have given "excellent and magnificent service, quality and



One of the children's centres that Bojos Tanning helps run in Santiago for the children of Free Zone company employees.

durability". But he says the debate for him now is about the benefits of durability.

Thoughts on the future

Luis José Bonilla describes leather as "a very noble product" and something that will continue to be valued. People will continue to buy and sell meat, he says, so the hides will be there to process. "It's part of life," he says. But leather's ability to stay competitive is linked to its ability to innovate, he says. It's up to the industry itself, in his opinion, to keep the value of leather high in the mind of the consumer. "Either we give consumers what they want, or someone else will," he insists.

Initiatives in the community include support for Acción Callejera Fundación Educativa, an education fund specifically for street children. It works to give children at social risk access to education, helping them move away from a life of begging or theft. One local boy even worked in the tannery for a short time, upon completing his schooling, although he has now left to go to university. "Education is a vehicle for development," Mr Bonilla says. "The better educated our people are, the more prosperity and development we will have."

And where better to start than with the youngest children? A programme is in place

in Santiago to offer pre-school care and learning to the children of workers in the companies in the city's Free Zones. Not only is Luis José Bonilla playing a prominent role in promoting the idea, but his wife, Patricia Lama de Bonilla, is a very active president of the programme. There are currently three centres in different parts of the city at the moment and more are planned. There are around 150 children in each, with ages ranging from just 45 days to six years, which is when children in the Dominican Republic start primary school. The centres open at six o'clock in the morning and stay open until six o'clock in the evening, and the children can have breakfast, a morning snack, lunch and an afternoon snack there. They learn to read and write, make a start at learning English and at using computers, and all of this is funded by the companies in the Free Zones, with parents paying nothing. The system has been in operation for 20 years and has benefited many children.

Professional opportunities

In addition, care-givers at the centres have used the experience to go onto professional careers in education. "This has happened in the case of about 40 people over the years," says Josefina

Hernández, the programme's director. "It's been a real added bonus in a programme that is really all about the children, but is also a wonderful example of how companies, employees and the government, because we have the backing of the government now, can all co-operate to do something good."

Luis José Bonilla thinks deeply about this aspect of his work, and has done for a long time. Once, when he was making a speech as president of the Santiago Free Zone Association, he told his peers that knowledge will make a business innovative and creative, qualities, of course, that he wants Bojos Tanning to have. But for a business to be truly great, he thinks the key quality is humility. "I don't mean humility in the sense of meekness," he says. "I just mean a desire to serve, to give good service to clients, for example. But at the same time, if you are going to ask people to come to work for you and stay with you, you have to show them that you are committed to them and that means, sometimes, showing humility. This does nothing to detract from your strength or your leadership, quite the reverse. We have to speak to one another person to person; we have to learn from one another." 🌐

Control and Accreditations

LABORATORY SERVICES

The laboratory provides a full range of chemical and physical analysis for its range of leathers both to in-house standards and those demanded by customers. Analysis as COD, suspended solids, pH, nitrogen, phosphorous and colour is also provided for wastewater feed to the effluent plant and for the treated effluent.

ACCREDITATION AND AWARDS

Approval and accreditation includes:

- Staff accreditation to SATRA standard areas for wet blue, crust and final grading and laboratory services.
- Gold Award from Leather Working Group 2012.
- Certified SATRA membership 2013