



Wooden drums and stainless steel tri-compartmental vessels are installed in the tannery. These suit the processing needs of each different leather type.

Tannery of the Year: Artículos de Piel Los Favoritos (B'Leather), Dominican Republic

The Bermúdez family has been creating jobs and promoting exports in the city of Santiago in the Dominican Republic for nearly 160 years. The family has been in the leather business since 1940 and now focuses exclusively on the export market, making finished leather for big-name footwear and automotive clients.

Businesses in Santiago in the Dominican Republic, Santiago de los Caballeros to give it its full, traditional name, are used to fending for themselves. It's an industrial city, home to garment manufacturers, rum and tobacco companies, footwear manufacturers and, to supply them with leather, a tannery, Artículos de Piel.

Artículos de Piel, with its brand B'Leather is part of a wider industrial group owned by the Bermúdez family (the source of the

B in the brand's name). The family arrived in the Dominican Republic from Venezuela in 1848 and set up a distillery to make rum, using a natural resource, the sugar cane that abounds on the island the country shares with Haiti, to make a high-class product that is desired all over the world. The grandfather of current company president, Aquiles Bermúdez, decided in 1940 that he too could use a natural resource, cattle hides and goatskins, to make another desirable product and a tannery was born.



From a technical point of view

(1) Overview of operations

The Bermúdez family began leather-making with the processing of bovine hides and goatskins in the 1940s. In the late 1980s production changed to the manufacture of higher quality shoe upper leathers for export. The maximum capacity is now one million square-feet per week of mainly shoe upper leathers and heavy substance suede splits, although automotive and furniture leathers are also produced. The present input is 16,000 wet blue hides per week, mainly manufactured in the US. Originally located in the outskirts of Santiago, the tannery is now surrounded by housing.

(2) Manufacture and processing

Since 2007 manufacture has been based on wet blue bovine leathers. However, the plant includes a fully operational soaking/liming department comprising four drums and an elevated whole hide fleshing machine. These are kept in full working order, including services, and used periodically to ensure that everything is in full working order. This plant serves as insurance in case of need at any time, and gives an option for future expansion of production.

In the tanning department there are four Olcina tanning drums of size 3.5 x 3.5 m, and speeds of rotation four and eight rpm. These have the capacity to couple-up with the output from the soak/liming drums. All of the soaking/liming and tanning drums have been fitted with peripheral collection troughs and drainage to enable segregation of the wastewaters into different waste streams. The sulfide drainage arrangements include a collection sump for aeration, and there is the possibility of chrome collection and regeneration in the future. Water is supplied to the tanning drums using a Huni Aquamix system, although this has not been extended to the soaking/liming drums as these are not in use at the moment. The tanning drums are used continuously, however, for wetting back wet blue and for the addition of sort-assist to optimise sorting gradings.

Wet blue deliveries are received into three storage areas. There are normally 60 hides per pallet, and after wetting back and samm/setting the hides are carefully inspected by a sorting team of 12 people using two sorting tables. This sorting is continuous and each hide after inspection is marked according to five different grades for shoe upper leather. Blue samm-setting is followed by area measurement, then splitting to substance. The hides may be sided for shoe upper leather at this point, or left as whole hides for automotive or furniture manufacture. The whole hide flesh splits are graded and measured for thickness, with the heavier weight splits trimmed into croupions for manufacturing suede upper leathers within the tannery. The thinner splits are sold in the wet blue state.

Considerable care is taken at blue splitting to ensure accuracy. A sample hide is taken every 30 minutes and measured for thickness at 32 points. This is recorded and expressed in the form of a graph to establish if the accuracy of the machine remains within defined limits. This enables



SATRA grading systems are used to assess quality at the wet blue sorting operation.



Grain splits are sided for shoe upper leathers after blue splitting. The cutting blade that is used for siding leathers is fitted into a stainless steel siding frame and thus avoids the use of hand knives.



After dyeing/retan, the samm/setting of side leathers is followed by wet stretching/staking before vacuum drying.



the tannery to split as close as 0.2 mm to the required shaving thickness, thus minimising waste and optimising use of raw material. Over and above substance measurement and hide stamping after shaving, both sides and hides are similarly monitored at each of the five shaving machines for additional control, with the information continuously fed back to the operatives.

There are nine Olcina wooden drums, and five Dose stainless steel tri-compartmental vessels in the dyeing department. These are all elevated, and serviced from an overhead mezzanine. Liquid additions are via stainless steel feed hoppers, using Prodomix liquid chemical dosing and Aquamix water systems.

One of the wooden drums is fitted with shelves, the rest with pegs only. The internal structure of the Dose vessels is conventional with extended pegs in each section. These variables enable the right degree of mechanical action to be applied to specific leather types and to meet technical needs.

To maintain cleanliness, all of the stainless steel vessels are washed using an automatic spray wash after each load is discharged. The wooden drums are washed once per week, then swab-oiled to maintain condition.

After dying/retan, side leathers are samm-sett, then conveyor-fed into a Cartigliano wet staking-stretching machine. After vacuum drying using two five-plate machines, drying is completed in the roof area using an overhead pole-drying conveyor. As the ambient temperature is approximately 30°C throughout the year, no extra heat is required. Whole hides are toggled, but also side leathers where additional firmness is required.

Softening is provided by conventional vibration staking machines, but also by four milling drums. These are all fitted for auto water spray, temperature and relative humidity control, and chemical additions for special effects, all managed by microprocessor.

FINISHING DEPARTMENT

The finishing department is equipped with one Gemata Jumbo roller coater, and three single machine drying cabinets. There are six spraying cabinets, and bridge-linkages can be made between roller-coating machines and spraying lines as appropriate. Three ram presses and a roller press are also installed to enable a wide variety of finish applications. In particular, many blends of waxes and oils are applied to leathers at different application levels to develop a wide range of waxy textures and pull up effects. ☉



Side leathers after vacuum drying, and suede splits as croupons in the crust and dyed states are hang dried using pole conveyors.



The finishing plant is spacious and enables free movement of the different types of leathers between machine operations.



Combinations of waxes and oils at different levels of application are applied using roller coating machines.



Tannery of the Year Americas 2011: Finalist

Self-sufficiency drove the citizens of Santiago to build and run their own airport; it is still a private concern. It also drove widespread support for free zones, in which industrial operators can devote themselves to exports without worrying about duties, either on any material they bring in or on anything they produce for customers overseas. There are free zones in many parts of the country, enough for them to have their own business association (it has 572 members; Aquiles Bermúdez is its president).

Just as with the airport, a consortium of manufacturers in free zones around Santiago is currently engaged in developing a new container port at a place called Manzanillo, close to the border with Haiti. The capacity of the existing port in the area, at Puerto Plata, is limited and large loads often have to sail all the way round to the capital, Santo Domingo, which is several hours away from the tannery by road.

Manzanillo makes sense, particularly because Artículos de Piel now brings all its raw material in from outside the Dominican Republic, mostly from the United States. Local hides offer less quality because cattle are smaller, are slaughtered young, are subjected to harsh heat and humidity when out in the fields and often suffer scarring from ticks or barbed wire. In recent years, hides have come in as wet blue rather than raw. The tannery has its own beamhouse, but wet blue imports suit its production demands at the moment. A carefully planned and executed maintenance programme has kept the Artículos de Piel beamhouse in good working order and the company will be able to switch back to processing hides from the raw any time it likes. The focus of its finished leather is still strongly on footwear, although a more recent move into automotive leather continues—a partnership with GST AutoLeather that the companies set up in 2004, with Artículos de Piel supplying crust hides to specialist finishing and cutting plants in Mexico.

Around 70% of the tannery's output goes into footwear, with the other 30% aimed at the automotive market. Aquiles Bermúdez talks about the two markets as having "totally different economic cycles". Footwear is part of the non-durable goods world, while cars are durable goods. From 2004, when the joint-venture with GST AutoLeather, began until 2008 the



Office and reception areas to the main tannery.



This open-air eating facility for the workforce, fairly near the plant, has just been completed.

automotive market was very stable, then the downturn hit it "like a hurricane", in the assessment of the company president. He believes the automotive market is now growing again. Footwear, meanwhile, is more stable and more dependent on individual consumers.

Big names

Clients are mostly big-name brown shoe brands based in the US: Rocky Brands, Timberland, Wolverine World Wide, Sperry,

San Antonio Shoe, Allen-Edmonds and Sebago are all on the list. More recently, the company has begun to export its leather to European shoemakers, too, especially in Italy, where multi-brand manufacturer Zeis Excelsa has become an important customer. There are clients in the Dominican Republic, but they are the outsource manufacturing partners of some of these footwear companies and they, too, operate in free zones. Deliveries from the tannery to these factories, from one free



From a technical point of view

(3) Co-products and solids management

- All low-substance wet blue flesh splits are loaded onto pallets, then sold for manufacture elsewhere.
- Thick wet blue flesh splits are trimmed into coupons for in-house manufacture as shoe suede leathers.
- Waste leather trimmings are compressed and deposited as waste.
- Shavings are compacted into blocks and go to landfill. Plastic covers from wet blue deliveries are extensively used to cover pallets and protect batches of leather throughout manufacture.
- When these covers can no longer be used, they are sold for use elsewhere.
- Buffing dust is compacted and discharged in a local landfill.
- Screenings and solids from the effluent treatment plant are collected in a dumpster then taken from site for landfill.
- All solid waste is segregated on site into paper and plastic bags, containers, wood, metal and so on. There is also a secured area where hazardous products are stored. This includes oils, contaminated waste or spillage, electrical goods that might contain mercury and so on. These materials are removed from site by a licensed contractor for possible recycling, or disposal as required by legislation.

(4) Water treatment and environmental management

(a) RAW WATER

All of the water is abstracted from the main municipal supply.

(b) EFFLUENT TREATMENT

At present, all of the wastewater discharges from manufacture are delivered to reception sumps through drainage pipes.

However, in the event of the tannery recommencing the processing of raw hides in the future, provision is in place for the segregation of sulfide containing effluents and delivery to a sulfide aeration plant. This is not in use, but regularly tested being equipped for venturi aeration and fully operational.

Similarly, although chrome tanning is not taking place, provision has been made in the tanning department for the collection and separate treatment of chromium-containing wastewaters.

The whole effluent treatment system has been designed with the full knowledge and approval of the municipal water authorities and environmental authorities of the Dominican Republic. This includes a protocol that is displayed at the major points around the plant. This states that if the main submersible evacuation pump breaks down, or there is overload, or a hurricane, then an alarm is set off in the tannery and no more wastewaters can be discharged from process. It provides instructions for bringing into use the permanently fitted standby pumps, and for repairs.

The reception sump is set below ground level, and is bunded to contain an overspill of effluent to prevent site contamination in the event of power loss. As a final measure, at the highest level in the bunded area, an overflow is built in for discharge to the main sewer.

After receipt, the effluent is fed through a scraper screen to



Laboratory facilities at the Artículos de Piel tannery.



The tannery is surrounded by housing and has a river down one side, although there is no discharge or abstraction from this source. The site is clean, with no odour. Irrigation for the manicured grass comes from the main water supply, not treated effluent.



All of the sludges from the effluent treatment plant are dewatered using an elevated belt press.



remove all solids greater than 1mm size. This is set in the bunded area, and all drainings from the solids collection container drain back to the reception sump.

The effluent is then pumped into an equalisation and balancing tank, where fine solids are maintained in suspension using an array of diffusion aerators. The mixed effluent is then drawn off at determined rate, then automatically dosed with aluminium salts and polyelectrolytes. It is possible to control the pH with diluted sodium hydroxide solution, but this is not required as the pH is between 7.0 and 7.5.

The effluent is then delivered directly into a diffused air flotation tank (DAF unit). The solids are removed from the surface using an automatic surface scraping mechanism, and the treated effluent is discharged to the main sewer.

The sludges from the DAF unit are pumped to a sludge thickening tank, then dewatered after dosing with polyelectrolyte using a belt press, and finally deposited into a dumpster.

The whole effluent treatment plant runs automatically from a central control building. All of the pipework, valves and flanges in this effluent treatment plant are the same size and easily identified, and are easily accessible for maintenance to enable rapid repairs. There is a heavy use of stainless steel, and all points of hazard are highlighted in yellow. Each piece of equipment—chemical tanks, poly-electrolyte tanks, the DAF unit, sludge thickening tank, belt press, dumpster area and pipe work—is individually bunded for containment in the event of spillage. There is heavy use of drainage gullies, all covered with stainless steel mesh, with return to the primary collection sump.

The existing effluent plant is designed to treat a volume of 1,200 cubic-metres of effluent per day, although the present intake is approximately 800 cubic-metres per day. The tannery has the capacity in terms of volume to increase production but, however, the weight of COD discharged is at the permitted limit. Any increase in volume must be supported by additional effluent treatment to maintain or



Reed beds are under evaluation for secondary effluent treatment to reduce the COD, and if successful, land is available for a full scale plant. A reduction in COD load from the present maximum level would in turn enable an increase in production.

reduce the COD current load. For this reason the tannery is investigating reed bed technology as a form of secondary effluent treatment. Two pilot reedbeds have been constructed and are under investigation. If successful, then the company has a suitable area next to the tannery where full size reedbeds could be installed.

(e) ENERGY

- The steam generating plant comprises two boilers of 250 HP and 300 HP, with heavily insulated steam pipework. The fuel is heavy oil, but the boilers are currently being converted to dual-fuel so that they can operate on natural gas for more cost-effective energy generation; the change could perhaps deliver a 10% saving in energy costs.
- There is a very significant oil storage capacity on site to ensure security of manufacture. Ⓢ

zone to another, incur no duty, but careful scrutiny makes sure that exactly what customs officials record as leaving one duty-free facility arrive intact at the other.

Prominent US footwear brands began to bring part of their production to the Dominican Republic in the 1980s. There was a programme to promote industrial activity in the Caribbean Basin, with Puerto Rico at the heart of the initiative. Part of the work on footwear went to the Dominican Republic quite quickly. There was a shoe industry there already, serving only the domestic market, but making a skilled workforce available at much lower labour rates than in the US. Further training increased the availability of labour.

"Speed to market is a major attraction to the US brands," says Artículos de Piel Los Favoritos director Manuel Mena. "It takes

one-and-a-half days for a container ship to get from here to Miami. New Jersey is three or four days away and Houston five days." He insists that if it's true that these US companies first came to the Dominican Republic to gain tax advantages, they have stayed because they receive good products at good prices from good suppliers who offer a substantial geographical advantage compared to competitors in Asia.

A million square-feet a week

The tannery has the capacity to produce one million square-feet of finished leather and crust every week. Numbers have been down slightly because the automotive side of the business has been affected by the blows the Japanese economy has suffered in 2011. The Bermúdez Group is confident this part of the business will come back

very strongly. The workforce currently numbers around 300.

As mentioned, raw material coming into the tannery is all wet blue at the moment, with the company sourcing hides from the US and South America. Its preference is for bull hides, although it buys cow hides, too, although never calf. At the moment it is bringing in around 16,000 hides a week on average.

Market adjustments

"I would say we haven't had a problem with our suppliers of hides, chemicals or machinery," Mr Mena says. "On the price of hides, the price is volatile, but we work with our suppliers to secure material. When we need to protect them we do, and they protect us when we need it. The market is the market, and it adjusts itself. Sometimes



Typical range of soft leathers manufactured by Artículos de Piel.

it doesn't adjust as quickly as we would like, but we are here for the long term; we are consistent buyers and we are not jumping around from supplier to supplier. Our view is that you have to be loyal and you have to be fair to your suppliers."

With regard to chemicals and machinery, the principal attribute that sets apart the good suppliers for Mr Mena is a commitment to research and development. Some invest heavily in this area, he says, while others appear to him to offer less innovation in their product range. "We want to use less water, less energy and for the tanning process to take less time," he says, "and we would like research and development efforts to concentrate on making that possible. Our industry as a whole has faced criticism because it generates a lot of waste. Tanners are looking for an answer to that."

The basics of the machines in use at Artículos de Piel are the same, he insists, whether the equipment comes from the most expensive suppliers (the European, principally Italian ones) or from less expensive competitors from Asia or South America. "We have mainly Italian machines in our tannery, and I think they will last longer, but long enough to justify the difference in price? This is a question we are asking ourselves at the moment."

Aquiles Bermúdez explains that it's not just price that matters. He says: "A splitting machine will split hides, but what technology is in there to give you the quality you need? Technology and reliability and performance matter too." He explains that until the 1970s, the company was able to buy most of its machinery from the US. The next generation came from Europe. "I would say we don't have a feel for the market in Asia yet," he says. "I want to do some homework on it and maybe let that market mature a little before trying it. After all, we don't buy machinery every day. We are a regional tannery working for customers in the Americas and Europe, so we have less contact with Asia, but we do have competitors there and the capital expenditure is clearly less for them." He points out that machines depreciate over time, and what tanners have to keep an eye on is the yield. If they get the yields, they will feel they don't need to change their machines. "But it's important to keep looking," Mr Bermúdez adds. "Machinery from Europe is very expensive and the euro has gone up steeply. Last year, when the euro was lower, we did buy some new machines. But the world is changing and these are difficult times for Italian companies. There have been mergers and acquisitions, leaving customers wondering

what will happen with spare parts or with research and development. So we will find out more about Asia.

Lean principles

The people at Artículos de Piel love the material they make, but they also love numbers, according to Mr Mena, and measure everything they can. He explains: "We are big advocates of lean manufacturing and of just-in-time. Everything we make is made to order. Nothing is made for stock, and that means we have to offer service, quality and speed. Like other tanneries, we buy our raw material, wet blue, by weight but we sell our finished leather by the square-foot, so everything is a transfer of yields." Accreditation under the Leather Working Group programme (silver level) and the ISO 9001:2008 guidelines have given the company confidence that it is achieving a good balance between quality and service. Artículos de Piel speaks highly of the Leather Working Group and of the help the programme has given it in its efforts to produce leather using less energy and less water, and of the cost savings that can result from this.

All products are handled with kanban cards and a detailed barcode scanning system; these help the workforce match hides to orders as they flow through the tannery. Scanning the barcode on an operator's identity tag also provides data on the efficiency of each person. But as well as working efficiently, the company encourages its workers to develop their knowledge and love of leather. A phrase Mr Mena uses when talking to new team-members is that they have to learn "to listen to the leather"; the leather will talk to them, and if they learn to listen, they will do well."

Demand cycles

According to company president, Aquiles Bermúdez, customers are talking about increasing their production. The shoes the tannery's footwear clients make are more brown than white, in other words their product ranges are being less affected by the trend in athletic footwear of using increasing amounts of synthetic substitutes for leather in their material mixes. Sales of cars at the high end of the market, with leather upholstery, are increasing. There is much to say about leather's natural



qualities, he believes. Its breathability, its ability to take the shape of a person's foot in a shoe, its sustainability (a story the synthetics cannot match, try as they might).

Competition among tanneries across the world continues, of course, but changes in the situation in China are adding to Mr Bermúdez's optimism. "The Chinese government has developed the infrastructure across the country and is now beginning to motivate the consumption of goods there," he says. "And the reality is that consumption is going on. Chinese consumers are buying more and more, at every price-point, including luxury. I've seen it and I've been impressed. There are now more LVMH stores in Shanghai than there are in New York City. But there is an increase in manufacturing costs there, and we are levelling the difference and our proximity to the Americas and Europe gives us an opportunity to keep growing."

Social concerns

When the Bermúdez family set up its rum venture in 1852, the distillery was outside the city of Santiago. For practical, as well as what we have come to call corporate social responsibility reasons, the family built homes near the site for its workers. Because the idea was a success, it did the same thing for the first workers in the tannery in 1940. Many of the tannery houses are still there, although few Artículos de Piel Los Favoritos employees live in them now and the city has swallowed the area up during a series of expansions that have taken place, but it is still known as the Ensanche Bermúdez, or the Bermúdez district, a testimony to the level of care the company has shown for its workers.

Aquiles Bermúdez describes the Dominican Republic as "a mature country", one with clear labour laws. "We try to do our job within the law," he explains. "We don't want to put our customers, the company or the investment we have made in it at risk by cutting any corners. We have been in the leather industry for three generations and we have workers who have been with us for 40 years. We believe in investing in our workers' capabilities. There is a formal training programme and we make sure they have medical health insurance."

He talks briefly about efforts the company has gone to in aid of people beyond the boundaries of the tannery. "We've been helping people who came from the countryside to the city and ended up living in shacks beside the river," he says. "There were areas that needed careful maintenance for environmental reasons so we've been buying land and promoting the transfer of these families to safer lands, places where there are proper utilities and no risk of flooding. We give them the title for the new land so that they can then enter the financial system; they have the right to sell that property and this enables them to raise capital."

He relates this modestly and in a matter-of-fact way and neglects to point out a plaque on the wall, which was presented to Mr Bermúdez in March 2009 by an organisation called The Office for Community Development. It recognises Aquiles Bermúdez for what it calls "his

contribution to the development of communities in Santiago" and goes on to refer to him as "a tireless fighter in the defence of the most needy".

What he does admit to being proud of is the length of time his family has been in the city of Santiago and the amount of good it has done for the local people through the generations. "We are an industrial family," he says. "We are creating jobs and helping the country develop. Personally, I am proud of that. We believe in what we're doing. We take the design of new leather and the adoption of new technology very seriously. We have to be creative and innovative and to have very good controls and metrics. This industry is complicated. The raw material changes with the seasons and is affected by the weather, but we have to try to control all these variables in our processes while, at the same time, making the processes more environmentally friendly." 🌱

Accreditations and Control

Awards achieved by both the company and the employees are displayed in the board room. These include:

- SATRA leather grading awards for individual personnel
- certificates of training, awards for ISO 9000 for 2004 and 2008 9001 from 2008
- certificates for lean manufacture
- Free Zone Exporter of the year in 2011 for innovation, jobs generation, and continuous increments to the added value of products from the Dominican Republic.
- various internal audits all for employees and the company
- In March 2010, Artículos de Piel achieved silver rating according to the LWG protocol. 🌱

