Tannery of the Year:
Wickett & Craig of America, Curwensville, Pennsylvania, US

Specialist veg-tan leather producer Wickett & Craig is almost 150 years old and has survived a move from Canada to the US and several changes of ownership. The tanning company is now forging its way into new growth markets for veg-tan while continuing to serve customers in its traditional areas of focus.

Specialist veg-tan leather producer Wickett & Craig of America has been based in the US state of Pennsylvania since 1990, but its roots are Canadian and it still has strong ties to that country, specifically to the city of Toronto. In 2017, Wickett & Craig will celebrate the 150th anniversary of its foundation, the company president, John Lee, explains. He represents something of an unbroken thread linking the operation in the small Pennsylvanian town of Curwensville to the company's previous location in Canada's biggest city; he has more than 40 years' service under his belt and moved south when Wickett & Craig left Toronto.

He explains that the city authorities in Toronto acquired substantial parcels of land around the Lake Ontario waterfront as part of its ultimately unsuccessful bid to host the 1996 Olympic Games. Atlanta and Athens beat Toronto in the final rounds of voting, which took place in September 1990, but Toronto's bid beat those of three other cities during the process and had reached an advanced enough stage for city hall to feel the need to snap up land for the proposed Olympic Village. Wickett & Craig had been making leather on a piece of that land since the 1860s. Compensated for its loss, but homeless, it crossed the border and moved into a former cheese factory in Curwensville. It was no longer in the hands of the founding families by then and had become part of the Dominion Tanners group. Vice-president for operations, Chin Min Lim, also has links to Wickett & Craig's days

in Canada. His career later took him into technical sales for BASF and work at the Salz tannery in Santa Cruz, California, from where he moved to Pennsylvania.

Neighbours, not rivals

A town of only 3,000, Curwensville already had a tannery, Howes Leather, when Wickett & Craig moved in. Prasad Inaganti, now the chief operating officer of Wickett & Craig, came to Curwensville in 1993 but to work "across the street" for Howes leather corporation. Mr Inaganti completed his education as a leather technologist in his native India, but has spent his whole working life in the US, arriving in 1971 to work for calf leather specialist A. F. Gallun & Sons in Milwaukee and, except for a two-year hiatus when he worked for leather chemicals firm Rohm and Haas, he stayed with Gallun until it closed in 1993. After three years in Pennsylvania, the owners of Howes Leather allowed Prasad Inaganti to complete a leveraged buy-out of the company and he owned and ran it until 2003.

The closure of Howes coincided with another change of ownership at Wickett & Craig. Both Curwensville producers had found life challenging in the early years of this century when a large proportion of North American tanning capacity moved offshore. Dominion Tanners went into receivership in August that year and Wickett & Craig found new owners in the shape of Toronto-based hide processor Bank Bros & Son Limited.

Vertical integration

"When Dominion went bankrupt, Wickett & Craig was one of only two divisions in the whole group that was still profitable," explains Barry Bank, who is principal of the tanning company and of its parent group. "It was buying 100% of its raw material from us and the bank that was handling Dominion's receivership got in touch to suggest we acquire the tannery." He thought this vertical integration idea made sense from a business point of view.

Areas of common interest

His view is that the leather industry as a whole suffers because of a lack of synergy and a lack of co-operation among companies. He accepts that competition is keen but believes it should be perfectly possible to identify a series of areas of common interest for which rivalries can be put to one side to allow different players to work together for the benefit of the whole sector. In his eyes, the most obvious example is the leather industry's poor track record in advertising and public relations. The way it presents itself to the public is a prime target for improvement, he feels. "Advertisements in important consumer magazines and websites could put across strongly the message that leather has unique qualities. This is something that would benefit everyone. People have to understand that leather is not a commodity and that who makes it and how they make it are important factors. The Holy Grail would be for consumers to know you and demand your leather, but the only successful example there has ever been of this was [Rolls-Royce supplier] Connolly," he says. Practising what he preaches, he is about to embark on what he refers to as "a very ambitious project" to improve the Wickett & Craig brand, saying that everything the company has done in this area up till now has been "not nearly as good as the leather we produce".

He believes the leather sector has much to learn from the diamond industry. It has a clear system for grading and certifying the colour, cut, clarity and carat of any stone, rendering redundant disputes about whether one diamond is better than another. He also thinks the leather industry, collectively, should "chase down" counterfeiters. There also should be a programme of delivering education about leather to people in retail companies who sell shoes and leathergoods. Even in exclusive stores selling exclusive women's bags, for example, expert knowledge of leather is thin on the ground. It's up to the leather industry to change that, Mr Bank thinks. "Some actions would benefit everyone in the industry, and those are the things we should focus on," he says.

Finished products made in the US from local raw materials are enjoying a resurgence: authenticity is in demand.

Right hides for the right customers

What Bank Bros is able to offer John Lee, Chin Min Lim, Prasad Inaganti and their team are hides that are pre-sorted using a proprietary technique, allowing them to identify with a decent degree of accuracy quality raw hides that Wickett & Craig needs for its customers. "My hypothesis was and is that we will be successful if we can get the right hides to the right people. We grade our raw hides specifically for particular customers and particular finished products. We regard this as one of the benefits of the synergy we have created."

Wickett & Craig processes 400 hides a day, specifying that these must be jumbo steer hides from North America. Bank Bros

From a technical point of view

(1) Overview of operations

Wickett & Craig of America is based on the outskirts of Curwensville in the centre of the US state of Pennsylvania, where it has operated since the year 2000. The company employs about 100 people, currently processing about 6,000 salted hides per month as vegetable-tanned side leather.

Approximately 85% of the leathers are 4.0–5.0 mm. Uses include bridles, harnesses, reins and riding saddles, gun holsters, dog leads and collars, safety and numerous craft applications. Approximately 50% of this production is drum-stuffed as finished leather and there is a small quantity of finished leather based on wet-white tannage.

(2) Manufacture and processing

All of the wet salted hides consumed are from large cattle, typically Charolais, Simmental and other heavy breeds. The green fleshed and salted steer hides weigh between 35-38 kg., yield over 2.4m^2 per side.

The hides are soaked in a set of three wooden covered paddles using a 300% water float. This is followed by a short unhairing and liming process designed to loosen but not dissolve the hair to keep the pelt clean. The paddle is drained and refloated, and the hair, being of no use, is screened from the float at the effluent treatment plant. The liming stage is completed with lime only, the whole process being based on a 24-hour cycle.

After dumping from the paddles the hides are then delivered by line conveyor to the fleshing operation. They are then trimmed, mechanically sided using a conveyor feed, trimmed again and stamped for traceability. These full-substance and unsplit sides are loaded into trucks that are lifted by forklift for loading into four covered paddles with a 300% float for an overnight white liming. This process is followed by deliming and bating based on carbon dioxide, with a small amount of ammonium sulfate. The sides are then washed, followed by a treatment stage in preparation for a Calgon-based pretannage in the main pit-tanning system.

The sides are discharged from the base of the paddles into

The deliming processes take place in a row of four elevated paddles. The hides are lifted by forklift in a container to the service walkway. The safety guard slides on the guard rail slides to one side to enable access to the load as in turn the container fills the opening.

Sides after deliming and preparation for vegetable tanning are discharged from the paddle base into stainless steel dumpsters. The sides of these containers are raised to retain the pieces and allow fast water removal. These sections are removed as required and ease the stacking down of the sides.

Sides are hung within these hanging frames, then manipulated by hoist into the first of the pits as part of the tanning process.

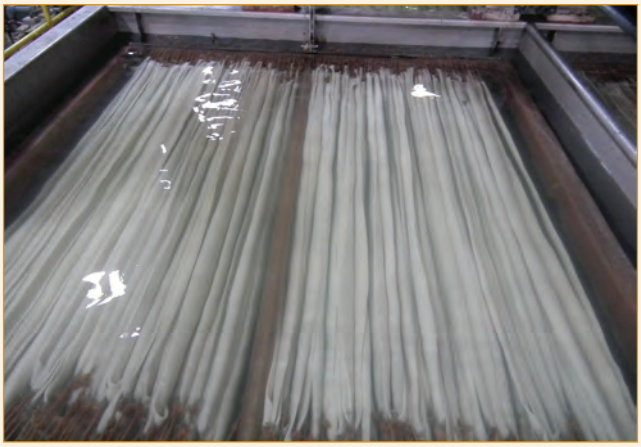


Image shows hides suspended in the first pit undergoing Calgon pretanning before colouring and the main vegetable tanning process. The frames suspending the sides are gently and continuously rocked to keep the sides separate and avoid the development of kiss marks.

stainless steel dumpsters (all fittings, pegs, hooks and handling equipment are stainless steel to avoid staining). They are then stacked flat, before being carefully suspended – including an inspection to avoid any folding or contact between sides - in a hanging frame for the single pit-tanning process that Wickett & Craig performs. Wickett & Craig still uses age old pit tanning with overhead crane system for moving leathers. The pit tannage allows it to tan hides without distorting the collagen fibre matrix, producing firmer leather. This takes place in three stages:

- First, a Calgon (polyphosphate) pretanning process in six pits for 16 hours.
- Transfer to a second set of six pits for a light tannage of the grain with dilute vegetable tanning solution. This is known as the colouring process where they remain suspended for 12 hours.
- Transfer to a third set of pits for tannage where they remain suspended without removal or transfer for a period of 14 days.

This is different to the counter-flow system, and the tanning baths from these pits are all maintained at the same concentration and content. The bath is continuously drawn from these pits, made up to strength in a hopper, adjusted to 90°F and re-distributed within the system. Analysis of the tanning liquors through the whole system is under continuous laboratory control.

The tanned hides are finally rinsed still suspended in the hanging frames in a pit using clean water and phenolic agents to remove loose tannins, taking a further 12 hours. During all of these pit-based operations the hanging frames are gently rocked to ensure movement of the tanning bath between the sides and avoid kiss marks.

The sides are removed from the hanging frame, then wrung and sorted for quality grading and for maximum substance, then split. The flesh splits are air-dried, tension-free, over a period of one or two days for subsequent sale in this condition.

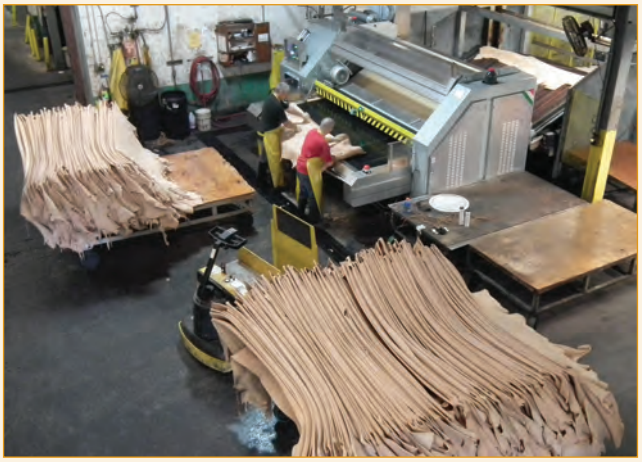
As only a single tannage is used, different retannages are operated to suit the individual leather types. For preparation, the heaviest leathers are tied butt to neck to assist uniformity in dyeing, then retanned in two wooden drums designated for black dyeing and two other wooden drums used for standard light colours. In addition, there are six smaller fibreglass drums that are used for specialty retannages and dyeing.

The wringing and setting operations are performed on two pairs of machines. One of each is used exclusively for black and other dark shades, the other used for natural and light colours.

Approximately 50% of the leathers – mainly the two heavy substance ranges known as English bridle and harness leathers – are sammed then drum-stuffed in traditional wooden drums using a pre-heated blend of waxes and grease at a high temperature for 45 minutes. After unloading they are set and dried.

Most of the leathers are toggled dried, but the three main drying units are not enclosed in a cabinet; they remain open in a single drying room. The air is recirculated through a dehumidifying unit that controls the relative humidity to a constant 65% and temperature at 22°C to dry in three days. This is critical in controlling both the colour and temper of the leather, and to avoid migration of tannins. A separate drying unit of similar size and construction is reserved for drying

A considerable quantity of vegetable tanning agent is required in the preparation of tanning solutions. Each bag is cut and emptied into this dispensing unit that incorporates a powerful air suction unit to avoid any release of vegetable tanning dust into the air.



Hides are rinsed and drained, then detached from the frames used within the tanning process being and offered to the setting operation.

50% of the leathers produced are dyed to shade, samm/set, then drum stuffed with hot waxes and grease. Traditional side loading drums are used for this operation.

black leathers.

The leathers are then lightly finished. This includes the glazing of aniline waxed leathers, and some light spray finishing. Many of the orders are for relatively few sides, so there is heavy demand for hand spraying in small spraying booths.

Many leathers are finished on both the flesh and grain sides, so papers are employed to protect the reverse side in spraying operations. In particular, the feed arrangements to the spraying operation include a bolster feed arrangement to avoid drag lines on the flesh side (as illustrated).

With some leather – especially for gun holster use – the sammying and conditioning is critical prior to finishing to achieve the firm temper.

REUSE OF WATER

- Within the management of the vegetable tanning operation, part of the tanning bath at the completion of tannage is taken and reused within the colouring stage as preparation for the main tannage.
- Air cooling of the motors driving the two samm-setting machines is not efficient in the summer. Cooling is therefore provided by heat exchangers, and this consumes approximately 2.5m^3 of fresh water each day. This water is delivered to the dyeing department, stored and used as warm water as part of the final wash following dyeing and retanning.
- Approximately 2,000 litres of water is recovered from the dehumidification drying operation. This is pumped to the beamhouse and tanning departments where it is used for washing machinery and work areas.

SAFETY ISSUES

- Hides and sides are added individually to the fully floated paddles when they are running for soaking and deliming. Both operatives manually loading these pieces have to wear a whole body safety harness fitted with a secured safety lead to prevent them from falling into the paddle.
- To avoid accidents during the many trimming operations involved with heavy hides, none of the knives used have pointed tips. These are purchased either with rounded or square-cut knife ends.

(3) Solids management

- Trimmings from limed hides, fleshings, bags, shavings and small trimmings following the trimming of dried vegetable tanned splits are deposited in controlled landfill sites.
- Plastic barrels and containers are cleaned and reused or given away.
- Wooden pallets are reused or given away by collection to serve as kindling where homes are heated by burning logs.
- The dewatered tannery sludge is chrome free, and high in stabilised protein and vegetable tanning precipitates. The sludge is designated with a beneficial use permit for applicaton on agricultural lands as well as for remediation and land recovery following open-cast strip mining. Samples are analysed by accredited external laboratories to ensure consistency of this material.

One of the three 180 frame toggle drying units located in a single drying room. Each unit is open sided, and the temperature and relative humidity within the whole drying room is controlled using a single dehumidifying unit to maintain a low-temperature drying operation.

Often leathers are buffed and treated with a sealing coat on the flesh side. To prevent drag marking of the flesh areas, this feed belt (running at the same speed as the feed strings) is used to offer the sides to the spraying operation.

Glazing as a final stage of manufacture of heavy substance aniline drum stuffed leathers.

(4) Water and environmental management

[a] WATER

All water used within manufacture is provided by municipal supply. After effluent treatment to legally enforced limits this water is returned to the Susquehanna River.

[b] EFFLUENT TREATMENT

Approximately 650m³ of waste waters are processed each day. Within the operations, the waste waters are divided into two stream:

- Discharges from soaking, unhairing liming and residual from tanning operations.
- Remaining wastewaters.

Both of these streams are screened separately using wedge wire screens set on a mezzanine, with the screenings dropping into containers at ground level.

The streams are then mixed together in a balancing tank of 1,000m³ capacity where they are aerated using diffusers to homogenise and oxidise the sulfide content. The volume in this tank is maintained at a level of around three metres in depth to create the best uniformity of the effluent as practical, and this is pumped at a constant rate from this vessel over 24 hours. The effluent is then chemically dosed with aluminium salts and polyelectrolyte, subjected to primary clarification, with the supernatant fed continuously into the secondary treatment tank also of 1,000m³ capacity. With approximately 1.5 days' retention in biological treatment, the effluent is fed at constant rate for secondary clarification, then discharged from site. Before discharge the effluent is monitored for volume, and sampled continuously over 24 hours for analysis on site and by an independent test house. In addition, samples of the effluent undergoing secondary treatment are taken to monitor the bacterial species in the laboratory to maintain consistency within the component of the operation.

[c] ENERGY

There are two steam-generating boilers running on heavy oil. The smaller 450 HP boiler is used most of the time, but at times of high demand the larger 650 HP boiler is brought into use, and this provides greater fuel efficiency. A gas burning hot water unit is also used for the provision of hot water for processing. All of the electricity consumed is provided by state supply.

Due to the high organic content from vegetable tannage, the filter press dewaters the sludge to approximately 30%. The volume produced is 6m³ per day, and this is dropped from the mezzanine-mounted press into a truck placed below the press.

The area around the effluent treatment plant has been landscaped to soften the profile of the primary and secondary treatment tanks.

is not the only supplier, just as Wickett & Craig is far from being Bank's only customer. Barry Bank says it's an advantage for the tannery to have access to Canadian as well as US hides. "The quality of the raw material in Ontario is very high," he says. "In the US, Black Angus cattle predominate because that's the kind of meat people prefer. The hides are good, but not great, in my opinion. In Ontario, we prefer continental breeds such as Limousin, Simmental and Charolais. Our cattle are non-branded and the husbandry is on a European model with smaller herd sizes and the cattle spending the winter in barns and being generally well looked after."

His view is that a reduction in quality has occurred in the US over the last 25 or 30 years. The move to Black Angus cattle instead of once common breeds such as Herefords is one of the reasons for this. Another is a decline in husbandry standards and "all manner of hide defects" are on the rise because of that, he claims. Chin Min Lim makes the point that good connections between Wickett & Craig and its main hide supplier allow the tanning team to give good feedback on the sorts of defects it sees on the hides when the hair comes off and the tanning process gets under way. This has helped Bank improve quality considerably.

Market demand

The tannery's output is around 35,000 square-metres of finished leather per month. Prasad Inaganti says he and his colleagues recognise the importance of the raw material they source. "Customers want sides with a thickness of between 4 and 5 millimetres, so we have to buy hides that can produce these articles, and we have to buy select grades," he points out.

Equestrian leather, for bridles, saddles and skirting, accounts for 60% of the demand

Wickett & Craig operates in a small community and aims to treat its workers as "family".

that Wickett & Craig is experiencing at the moment. The figure for this market used to be higher, but the economic downturn in 2008 put a lot of people off the expensive hobby of horseriding and many have yet to come back. "This encouraged us to search for new customer markets," says Mr Lim. The new markets it has found include high-end leathergoods, which now account for another 40% of demand, and specialty security products such as holsters. An even newer venture is in the world of footwear; the tannery has developed a waterproofing treatment for full-grain veg-tan leather, which is attracting the attention of a number of prominent footwear designers and brands. There have also been interior design projects, with leather wall tiles at the headquarters of a major bank in New York the most prominent. Future ambitions include completing more interior design projects and Wickett & Craig is also confident it could produce "amazing veg-tan leather for car interiors". This prompts a reminder of the recent headlines about electric car company Tesla coming under pressure at its shareholders' meeting in June because one participant complained about how difficult she found it to have the company include a vegan-friendly interior as part of her order. Mr Bank says he believes companies like Tesla should adopt a veg-tan-leather-only policy in its interiors because "it's much more in keeping with their ethos" than chrome-tanned leather.

"We now make a lot of customised leathers too," says Mr Inaganti. "There's a lot of interest in that: As the customized leathers saves the customer's finishing expense by eliminating several steps in his operation." Other areas of interest are the Amish communities that live and work, without the aid of modern conveniences, in Pennsylvania and the surrounding region. They have a need of leather for their own work and travel, which depends a lot on horses, but they are also adept craftspeople and some of them have made a business out of producing artisan leathergoods. Wickett & Craig has also developed a market for offal—tanned splits as footwear linings instead of sending to landfill. That not only saves land fill expense but increases the sales revenue.

Authenticity is in demand in the mainstream consumer products sector too. A number of heritage US brands, most of them more than 100 years old, are enjoying a renaissance in popularity. In Prasad Inaganti's view, consumers are tired of "cheap imports that offer no durability and fail to fulfil people's needs". Not all, but a segment of the market wants something better and is prepared to pay a premium for it. The products are of high quality and proudly proclaim that they are made in the US. Wickett & Craig's perception is that this is really striking a chord with consumers, and not just in the domestic market because these brands are also popular in Japan and other Americanophile countries. Domestic producers are beginning to be able to be a little more competitive compared to rival tanners in China or other parts of Asia, the company believes, and there's more to this than just rising labour costs in China. Freight, too, is becoming more and more expensive and can undo any production cost advantage that export market-focused manufacturers in Asia still hold.

A workforce of local people

Most of Wickett & Craig's 100 employees live in Curwensville, or at least within 15 kilometres of the town. Chin Min Lim says: "It's a small community, and we aim to treat people like family. We care for one another." The company pays 85% of its workers' healthcare costs and contributes generously to all fundraising initiatives, either for individuals (real-life cases have included helping families get back on their feet following a house-fire) or for the town. There is an education programme in place to encourage workers to go into tertiary education, with the company giving workers time off to study and paying their college fees (provided they achieve good grades). There is further proof that the tannery is a good corporate citizen because it is able to share its location without complaint or controversy with all the children in the local area; it is located only 250 metres from the site of Curwensville's elementary, junior high and senior high schools.

There are also company policies to recycle and reuse as much water and dyestuffs as possible and to buy as much material and equipment as possible for the tannery from local suppliers, including local small hardware stores. Pennsylvania is not short of water, but Wickett & Craig knows it makes good environmental sense to manage its water resources responsibly too. Because veg-tan hides hold larger volumes of moisture than chrome-tanned leather, the company has found that an operation it carries out with a massive dehumidifier can collect a surprisingly large volume, almost 2,000 litres of moisture per day as a load of hides dries out. It uses that water to mop the floors of the factory.

The company has invested heavily in

Wickett & Craig has become accustomed to hearing its customers compliment the quality, durability and beauty of the veg-tan leather it is producing.

keeping its environmental performance high. Barry Bank says the tannery strives to keep the water the tannery discharges well below regulatory requirements before discharging into the nearby river, the Moshannon Creek (which flows into the Susquehanna River). He also retells the tale of the representative of a prominent US luggage and briefcase brand visiting the tannery and, upon leaving, being amazed to see local people fish in the creek, downstream of the tannery. He admits that it took hard work to establish high levels of environmental standards. "One of the first things we had to do when we took over the company was improve things like wastewater treatment," he says. "Now, I would say we do a great job on the environment."

In mid-August 2015, the company arranged a celebratory lunch, bringing in special food to allow the workforce to celebrate having gone a whole year without any downtime because of accidents. It's the second time it has gone a whole year accident-free; the celebration is to show its workers that the company is grateful to them for taking care over the way they work.

Set apart

Asked what he thinks sets Wickett & Craig apart, company principal, Barry Bank, says vertical integration between a hide trader and a tannery is very unusual and different from the other forms of vertical integration the industry has seen (between packers and tanners and between finished product brands and tanners). He then points once again to what he calls the tannery's "extreme environmental friendliness" and its commitment to working as closely as it can with its customers, with a standing invitation in place to all of them to come and see the tannery and witness close up how their leather is made. "We are always looking for new ways in which our customers can use veg-tan leather," he adds. "We need to find new outlets and expand our business. We know there have been applications in the past in which people have tried to use veg-tan and it hasn't worked. We want to know about all those projects; we'll find out why they failed and we'll use the knowledge we have to try to make them work now."

He is optimistic about the future—hides will continue to come in, he insists, adding that he doesn't believe a decline in beef demand among western consumers will have any great effect. He even thinks it's "not an unreasonable hypothesis" to suggest that cattle slaughter and beef production could go up if the meat packing industry in China, for example, invests in new abattoirs and other up-to-date infrastructure. Demand there and in many developing economies is strong. "If automotive demand for finished leather remains strong, too, there will be cannibalisation from footwear into automotive," he continues. "What remains of the leather footwear sector will be high-end shoes."

The final points he makes is that the quality of Wickett & Craig's finished leather sets it apart too. "That's not just my opinion," he says. "It's something we hear all the time from our customers, that we are producing incredible leather: it has quality, beauty and durability. What we have to do now is start doing a much better job of promoting ourselves."

Safety is high on the agenda of this tannery. All of the knives used are either rounded or square cut to avoid a sharp point and the possibility of injury by accidental stabbing.

Control and laboratory services

For control of the tanning process, the laboratory provides analysis of the vegetable tanning solutions. Daily analysis includes:

Barkometer, pH, % ash, total solubles and insoluble, tans and non-tans, purity and water.

Final leathers as grain, middle and flesh splits are tested for hide substance, moisture, oil, total and insoluble ash, degree of tannage, pH and organic acids.

Physical tests include tensile strength and elongation, and other specific customer requirements, and the potential for bacterial and mould growth.