

Holmfirth in Yorkshire is probably best known as the location for filming the long running television comedy *Last of the Summer Wine*. However it is also home to the successful family-owned dairy Longley Farm; a leading producer of the traditional local speciality: Yorkshire curd. The company has recently invested in two new HRS corrugated tube heat exchangers to remove heat from products during processing as part of ongoing upgrades to its factory.



For nearly 70 years, milk from Jersey cows has been used in Longley Farm dairy products

Longley Farm has been owned by the Dickinson family since 1948 when brothers Joseph and Edgar inherited their Great Uncle's 'typical Pennine farm' including 10 cows. In 1956 they began to make their own cream on the farm. In turn this inspired the brothers to invest in a herd of Jersey cows, as Joseph explained, "The reason we went into Jerseys is because they produce the highest quality milk in protein and butterfat. We found you could make Jersey milk straight into very good yogurt without adding other ingredients."

Today the farm boasts one of the best Jersey cow herds in the country with 300 of its own cattle. The company tops up its own milk production with that from up to 40 trusted farmers around the country and the milk used in its range of dairy products has previously won an award for Best Yorkshire Product at the Great Yorkshire Show, despite the fact that it is always processed into other dairy products.

As well as its Yorkshire farm, the Longley Farm Group also owns Richmond Dairies in northern New South Wales, Australia. Richmond Dairies processes milk to produce a range of dairy ingredients for the food manufacturing industry in Australia and abroad using the company's unique and innovative Fast Freeze Technology.

Among the wide range of fresh and chilled dairy products produced in the Yorkshire factory overlooking Holmfirth, is the traditional speciality of Yorkshire Curd. Longley Farm is the world's leading commercial manufacturer of this uncooked fresh curd product which is the key ingredient in a traditional Yorkshire curd tart. Originally developed by Yorkshire farmers as a tasty way of using up any curds left over from cheese making, today this sweet pastry-cased delicacy filled with currents and egg is often served as a cold treat or a warm dessert.



Longley Farm use HRS heat exchangers to process fresh curds used in Yorkshire Curd Tart

Other more familiar products include butter, cream, buttermilk, yogurt, cottage cheese, crème fresh, sour cream and fromage frais. Longley Farm also makes its own ice cream, which is sold exclusively at its shop in Holmfirth. All products are made without artificial additives, colourings, preservatives or stabilisers and are sold in local shops and some national supermarkets. They have also found favour with restaurants and leading chefs including Jamie Oliver and Raymond Blanc.



HRS tube heat exchangers are hard wearing, require little maintenance and improve product quality

As you would expect in such an environment, the factory operates a number of heat exchangers to remove the heat from processing and manufacturing its dairy products which must be chilled for sale. Most of these heat exchangers are of a traditional plate design, which is fine for simple heating or cooling purposes, but recent upgrades to the lines which produce fresh cream and Yorkshire Curd have seen new corrugated tube type heat exchangers installed. Although the initial capital costs of tubular heat exchangers are higher than the simpler plate alternative, over the course of their operational life they can prove to be much more economical, improving process efficiencies by reusing heat and helping maintain the quality of the end product. These tubular units overcome some of the limitations of plate heat exchangers, such as the relatively high pump pressures required, while also reducing maintenance costs over the life of the unit.

“We have a number of HRS heat exchangers which are integral to our operation in a number of ways,” explained Longley Farm Operations & Technical Manager Konrad Schwoch. “We use what we would consider a standard heat exchanger for cooling processes, but we now have two more sophisticated systems from HRS.”

These new HRS heat exchangers incorporate corrugated tubes which provide a number of advantages over flat plate or smooth tube types. The biggest advantage is that heat transfer is increased, particularly at higher flow rates and in turn this means that less heat transfer area is required, resulting in a shorter, more compact design together associated cost savings due to the design.

This also results in gentle handling of the product during the cooling phase, which is crucial for fresh cream production. “For a cream process we want the cooling profile to be very gentle and we want to agitate the cream as little as possible,” said Konrad. “That was the main reason for using a tubular heat exchanger as it is gentler on the cream and improves product quality.” As he points out, if you ‘beat up’ cream, for example by pumping it over and over, you make butter, which is specifically not what you want in this situation. Maintaining the ideal temperature of the cream throughout the process is also vital for maintaining the quality of the finished product while facilitating its handling in the factory.

Corrugated tube heat exchangers have a lower pumping requirement than other tube-type heat exchangers as their compact nature results in a lower pressure drop during the heat exchange process. This helps contribute to the long operational life and reduced maintenance of the unit, which has advantageous for Longley Farm.

“We buy equipment that we hope is going to last,” commented Konrad. “Therefore the cost and downtime associated with maintenance is a key consideration. You want to make sure that you’ve bought something that is reliable, doesn’t need a lot of maintenance and isn’t hard to look after, is good value for money and lasts a long time. For me the value for money from the tube-type heat exchanger is that it is a more robust piece of equipment: It’s harder to break and easier and cheaper to service; saving money over the lifespan of the unit.”



The compact HRS system sits on a platform above the curd production area

Like all HRS heat exchangers, the corrugated tube units are made from high quality stainless steel which Konrad finds appealing: “Because of the innovation you get from HRS such as multi-tubes and annular spaces, you have a lot more surface area than a traditional tubular heat exchanger. Because of this, and because they have a number of different designs and different applications, the actual size of the new system is smaller than the old equipment it is replacing, making it easier to incorporate into the factory layout.”

The new heat exchanger chosen to improve Yorkshire Curd production is a different design to that used for cream. This time a corrugated tube design which specifically increased turbulence was chosen to help to reduce fouling inside the tubes due to the nature of the product.

While most dairies make curds and whey by adding bacteria to the milk to turn the lactose into lactic acid and stimulate the proteins to stick together for Yorkshire Curd production Longley Farm adds acid directly to the milk, which is the way of making the product.

“Using this traditional method creates a problem when you want to heat or cool the solution,” explained Konrad. “The curd can be very, very small, so when you are pumping it you get curd mixed into the whey portion. When you want to pump it you know you are going to get particulates in it, so need to use a corrugated tube heat exchanger because traditional plate heat exchangers can easily become blocked with the small bits of curd. It’s much easier and cheaper to use a corrugated tube heat exchanger in the long run.”

This unit has been specifically designed by HRS to handle these particulates, even if they reach levels well in excess of those found in normal operation. “Even if things go wrong and there is a lot of curd in the system, which shouldn’t happen, the system won’t become blocked or get damaged,” added Konrad. This confidence that the unit will not need unblocking, together with its robust design and ease of servicing mean that it is not necessary to access the new heat exchanger as frequently as its predecessor. Consequently it has been installed on a platform 3 meters above the factory floor.

A further benefit of the HRS heat exchangers is their energy recovery capabilities. The heat recovered from the cooling process for the Yorkshire Curd is used to warm water which is then transferred to the farm cottages across the road from the factory. The warm water is used to provide heating and hot water to the cottages and, although this is the first time that such an energy efficient scheme has been implemented on the farm, it has been so successful that the new tube heat exchanger on the cream line will soon be connected to the system.

“There’s an advantage to us in recapturing this heat,” explained Konrad. “While it adds another level of complexity to the overall process, in some places we want to heat products and then in other places cool them again and so efficiency is very important overall.” He also praised the level of understanding that HRS has shown when it comes to Longley Farm’s complex requirements: “Although we cool our products with heat exchangers, we need to use a chilled water system as well to take the last bit of heat out to reach the chilled temperature required by our finished products. That’s a relative complex process compared to some other situations, so we need to work with a company that we know understands that and that we can trust to deliver.

“With all our different requirements, including heating and cooling, it can be difficult to automate quite a complex group of processes and not end up with the biggest, most complicated plant in the world. The clever thing has been keeping the heat exchanger solution simple while providing everything we need.”

About HRS Heat Exchangers

Headquartered in the UK, HRS Heat Exchangers Ltd operates at the forefront of thermal technology, offering innovative and effective heat transfer solutions worldwide, across a diverse range of industries. With over 35 years experience, we specialise in the design and manufacture of an extensive range of corrugated tube and scraped surface heat exchangers. All our products comply with the European PED. HRS has a network of offices throughout: Spain, USA, Malaysia, Australia and India; with manufacturing plants in the UK, India and Spain.