

The importance of product identity in heat exchanger specification



⚡ MI Series heat exchangers are often combined with scraped surface units such as the R Series.

When it comes to choosing the right heat exchanger, the biggest factor is the nature of the materials being processed and the client's requirements for the finished product – something that we refer to as the product identity.

By Matt Hale, International Sales & Marketing Director, HRS Heat Exchangers

Different materials have different handling requirements, and while the process being undertaken (for example cooling or pasteurisation) is also an important consideration, product identity is the most important consideration for both the client and our engineers. With materials handled ranging from simple fluids through to complex viscous liquids, emulsions and materials containing large particles which must remain intact, there is no 'one size fits all' solution. That is why HRS produces a range of tubular heat exchangers, from simple multi-tube designs through to scraped surface designs which are capable of dealing with high-fouling materials while maintaining product integrity.

Determine by viscosity

For the simplest fluids, such as milk, smoothies and juices, we have multi-tube designs including the MI Series and the MR Series. As materials become more viscous in nature (such as honey, soups and creams), we then move up through the range using tube-in-tube or annular space designs such as the DTA or AS Series respectively. For the most viscous materials with high fouling potential, you need a scraped surface heat exchanger such as our R Series or patented Unicus Series.

For materials containing particles or pieces, such as compotes or diced fruit, things become more complicated.

As a starting point you would use the DTA Series where the inner tube provides more room for the product to flow without damage. If the product contains particles but is also viscous, then the AS Series is a better solution and less susceptible to fouling. However, it does depend on the size of the particles in the product as the annular space in the AS Series is smaller. Therefore, products with large particles require the DTA Series unless they are very viscous.



⚡ Simpler tube-in-tube heat exchangers, such as the MI Series, are suitable for a wide number of applications.



⚡ Matt Hale, International Sales & Marketing Director, HRS Heat Exchangers.



⚡ Where gentle handling of high fouling materials is required to maintain product integrity, the HRS Unicus Series is used.

Preventing fouling

Nearly all HRS tubular heat exchangers feature our corrugated tube technology which improves heat transfer and efficiency while minimising fouling; where materials are displaying laminar flow corrugations provide little benefit, and so smooth tubes are used. There comes a point where products may be too viscous to be effectively treated in a tubular heat exchanger. When this occurs, a scraped surface unit will be required and when the product also contains particles as outlined above, such as whole strawberries, then the HRS Unicus Series of reciprocating scraped surface heat exchangers provides the necessary combination of gentle handling while preventing and removing fouling as it occurs.

Product handling

While products such as fruit and vegetable mixtures may be the most obvious examples of materials which require such handling, some co-products and waste streams also need such gentle treatment. For example, some of the by-products from meat processing need to be handled gently in order to preserve shelf life – the more such products are handled, the quicker they degrade – and so the Unicus Series is often specified in such situations. Examples where the Unicus Series has been specified for this reason include sauce and marinade manufacturers.

In contrast, some products do not need to maintain the integrity of their ingredients, and in such cases the HRS R Series of scraped surface heat exchangers may be suitable, or even preferable. The R Series features a scraper bar which rotates at around 300 rpm and effectively breaks up or homogenises materials such as mechanically deboned meat (MDM) or jams and sauces.

Combinations

Many systems will use a combination of two or more heat exchangers, for example a simpler system to pre-cool or pre-heat the bulk of the product and then the more specialist system to perform the main process. Many HRS pasteurisation

systems will use an MI or DTA Series heat exchanger, followed by an R Series unit. Alternatively cooling processes may utilise an AS Series heat exchanger before the Unicus to improve efficiency and reduce system costs, as it reduces the size of the scraped surface heat exchanger required. Ultimately the considerations about product identity and preserving product integrity are the same whether you are cooling or heating.

About HRS Heat Exchangers

Located in the UK, HRS Heat Exchangers is part of the HRS Group which operates at the forefront of thermal technology, offering innovative heat transfer solutions worldwide across a diverse range of industries. The company has 40 years of experience in the waste treatment, food, industrial, energy and environmental sectors.



⚡ Where ingredient integrity is not required by the end product, the HRS R Series of rotating scraped surface heat exchangers is ideal.