



Quantum leap: the secret to optimum heat exchanger configuration

BEVERAGE, HEAT TRANSFER

The complexity of selecting a tailor-made tube heat exchanger is made simple by Quantum. This software tool doesn't just do thermal calculations, it designs the unit down to the last nut and bolt, based on your specific requirements.

Quantum is a selection and design tool for the complete range of Tetra Pak® Tubular Heat Exchangers including product-to-product (P2P) designs. It is based on knowhow compiled over more than 20 years by Tetra Pak. Just as an example, it can import data from Tetra Pak's database containing readings for 8,000 different fluids used in the food industry.

"To respond to any request for a heat exchanger, especially for P2P tube heat exchangers, you need to know the fluid composition," says Inge Kristensson, Application Specialist in Heat Transfer at Tetra Pak.

Kristensson uses Quantum to do thermal calculations based on the rheology of a specific fluid. The heat coefficient varies depending on the fluid and whether it contains particles or not. The software even takes into account the average room temperature in the plant, as this affects performance.

Details make a difference

Quantum will go as far as making a mechanical design showing the exact placement of the tubes in a unit. The heat exchanger will be split into sections with tubes configured to meet the specific fluid requirements and temperature profile.

As the actual data from the wide range of products in Tetra Pak's database is accessible to the Quantum program, should a dairy want to process cream with a fat content of 30%, the program can pull up figures based on cream with the same fat content and rheological behaviour.

What about juices, of which there are many, which all perform slightly differently? Mango juice, for example, has relatively short fibres, but they hook together to become long chains. Such factors need to be taken into account for tube selection.

If a customer has a completely new product or their own formulation has specific additives, they are welcome to send a sample in confidence to Tetra Pak for lab testing. Subsequently the product can be run in a Quantum simulation.

Right tubes, right results

"The benefit for the customer is that our simulations are so accurate that we do not need to over-dimension the unit," says Kristensson. "The heat exchanger is designed to perform a specific task with exactly the right number of tubes, and this can save the customer money."

If, after installation, the customer wishes to run a different product in the same heat exchanger or change one of the parameters such as capacity, they should consult with Tetra Pak first to check that the design is suitable. If necessary, Tetra Pak can recommend an upgrade or rebuilding of the existing heat exchanger.

Apart from maximizing efficiency, Kristensson believes a major advantage of Quantum for Tetra Pak's customers is that it performs the selection process from beginning to end. "You start with the fluid and end up selecting the tubes and deciding on the design, all with the same software," he says. "We can give an exact price calculation because we have a detailed specification of all the parts needed."

With 10,000 different parts to choose from for a Tetra Pak tube heat exchanger, given the large number of tube bundles and connections, it is a lot more complicated to design than a plate heat exchanger. Nevertheless, Quantum makes the selection process simple and fool-proof.

To learn how to optimise your operations through Quantum:

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