Stork heat exchange applications.

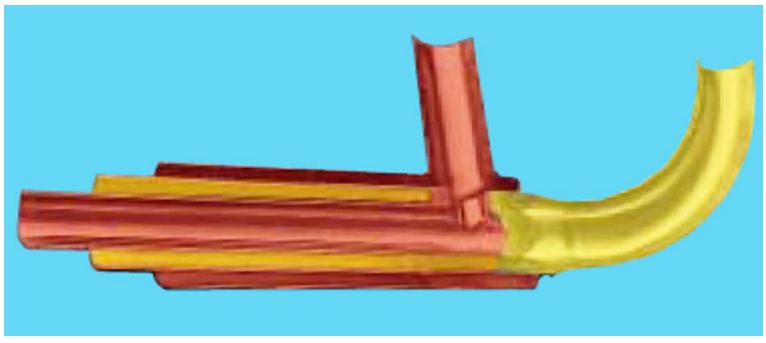
Applications

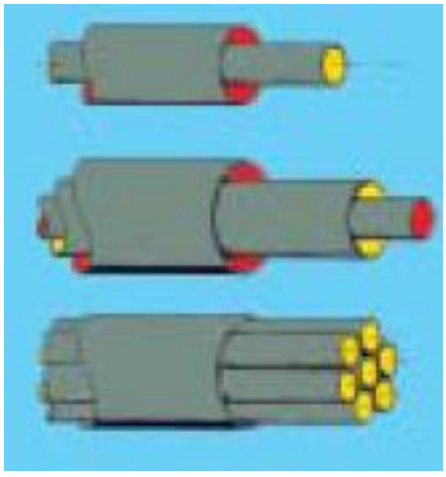
Sterilization, pasteurization, cooling, heating, heatregeneration in Food, Dairy, Pharmaceutical and Bio-chemical industry. For the tubular system stainless steel AISI 316L (DIN 1.4404) is used. For special applications other materials can be selected to conform with specification.

Multi-tube heat exchangers used in high capacity UHT plants

Stork tubular heat exchangers:

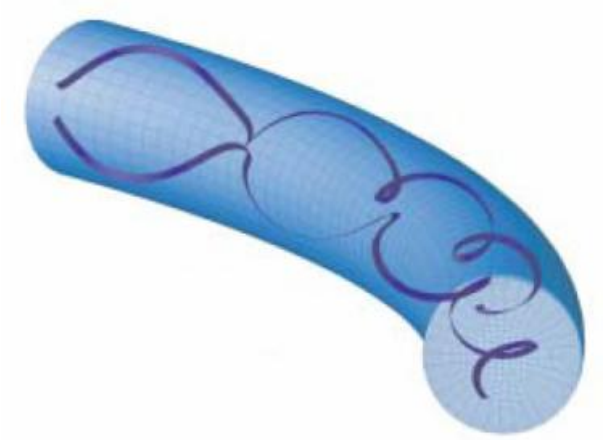
The Stork tubular heat exchanger is the most versatile unit on the market. The design of the Stork tubular flow sterilizer consists of a helical configuration of concentric double-tube, triple-tube and/or multi tube heat-exchanger modules. Operating by the indirect heating principle, each module has its own specific heating, regenerating or cooling duty. The pro-duct channel is perfectly smooth, from inlet to out-let. The full turbulent flow in the product channel with-out dead corners ensures minimum loss of production time for cleaning purposes. The tubes employed are dimensioned to give just the right turbulence, thus ensuring optimum heat transfer for every product handled, even allowing for capacity changes during production. Rapid chemical cleaning without dismantling the system plus the high pressure resistance inherent to the tubes makes the system ideally suited for the handling of high viscosity products or homogenizing the product after the main heater without the need for an aseptic homogenizer.





Triple-tube model

Helical is better



Stork opted for a helical heat exchanger design because this shape offers several major benefits. In the first place, a continuous tube without sharp corners or welded seams or joints minimizes the risk of product accumulation and contamination. That means maximum uptime. Furthermore, cleaning such a system takes much less time and is more efficient. The fact that the tubes are helically coiled also has a beneficial effect on the service life of the heat exchanger, because coiled tubes have better resistance to heat stresses. Lastly, the helical shape has a favorable influence on heat transfer. Fluid that follows a helical flow path experiences a centrifugal force. This means that the fluid not only flows inside the tubes of a Sterideal in a forward direction, but also that a certain degree of lateral flow is created in the tube. Because of this tube side flow, the fluid in the tube will tend to flow in a turbulent manner. A turbulent flow produces a better mixing effect, and that results in a far more uniform heat distribution in the fluid. For low viscosity products such as milk, this produces a demonstrable improvement in heat transfer of 5 to 10%.

The effect on highly viscous fluids, such as pudding and custard, is even greater. Because of their high viscosity, these products will nearly always be in the laminar flow regime as they pass through the heat exchanger. The centrifugal forces in a Sterideal disrupt that laminar flow pattern, resulting in much better heat transfer. This can yield improvements of more than 20%.

This is especially important in the case of products that gelatinize in the heat exchanger. Thanks to the mixing effect, this process is far more effective, so that less starch is required and the product has a more homogeneous composition when it leaves the Sterideal.

The advantages compared with a heat exchanger with straight tubes are obvious:

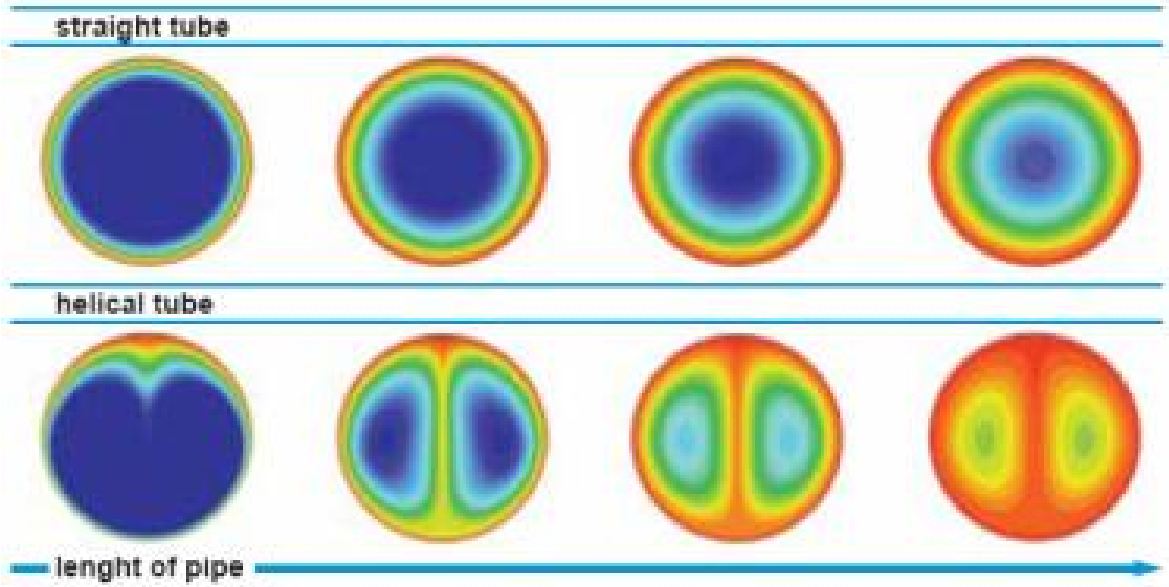
-in a helical heat exchanger the length of the tube can be shorter.

-the dwell time of the product is shorter, so the flavor is better retained.

- for products that have to gelatinize in the heat exchanger, better mixing takes place and the product has a more homogeneous composition.

- as the gelatinizing process is more effective and more uniform, less starch additive needs to be used.

- a helical heat exchanger is more compact, so it takes up a smaller surface area in the plant than a heat exchanger with straight tubes.



The figures above show the heat distribution of a fluid flowing in a straight tube and a curved tube in relation to tube length. The wall temperature is 100ºC, the tube diameter is 0.025 meters and the rate of flow is 1 meter/sec. The situation is shown after 1 meter, 30 meters, 100 meters and 200 meters. Blue, green, yellow and red indicate the rising temperature.