SPX

EDITORIAL

October 2012

The Premium Benefits of Steam Infusion UHT Treatment

UHT, or Ultra High Temperature, treatment uses high temperature for a short time to kill micro-organisms in a food or beverage product. It is widely used in the dairy industry where products can easily lose their nutritional value, flavour and appearance as micro-organisms multiply. These organisms thrive at certain temperatures but if they are not present in a product, it can be stored for many months without the need for refrigeration. This state is known as ‘commercial sterility’.

UHT processes are designed to achieve commercial sterility. They use heat to treat the product killing viable micro-organisms. This aseptic processing also requires equipment and packaging to be sterile, achieved with chemical or other sterilisation treatments.

There are many technologies available for the UHT treatment of products. Direct heating methods, such as steam injection or steam infusion, mix the heating steam with the product. Indirect heating methods, such as plate or tubular heat exchangers, keep the product and heating medium separate with a stainless steel barrier between them.

The choice of direct or indirect heating and the system utilised depends on many factors including product specification, viscosity and sensitivity to high temperatures. Along with the quality of the raw materials used, the system chosen has a big impact on the characteristics of the final product. Steam infusion is one of the more expensive options to install so why and where should you use it? Customers who try steam infusion tend to want to use it again. So what is the big appeal?

Steam infusion and steam injection are both direct heating systems. Steam injection injects steam into the product to be treated and steam infusion adds the product to the

steam. The steam must be high quality, culinary steam and not contain any off-flavours that could change the taste of the product.

The Steam Infusion Process

Product is pre-heated and then pumped into an infuser, which is a pressure vessel with cones at either end. A steam infusion chamber typically has multiple nozzles through which the product is distributed and enters a steam atmosphere in a number of jets without hitting the wall of the vessel until it reaches the bottom cone.

Product heating is almost instant (typically 0.2 seconds) due to the latent heat of vaporisation of the steam. The steam dilutes the product but is later removed in a vacuum chamber as the product cools.

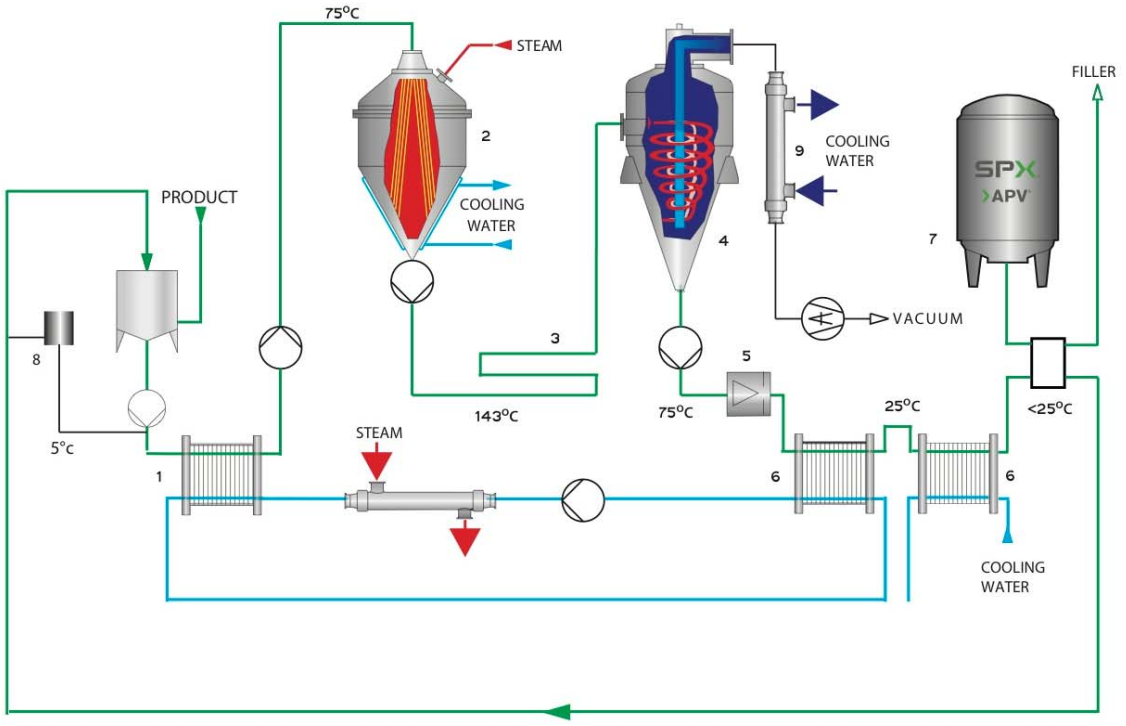
The steam infusion chamber provides instant, gentle heating – achieved because of the short time at high temperature and a low-pressure differential between the product and the steam. This gives exceptional results with minimal chemical change to the treated product compared with other conventional UHT systems. The short time at high temperature helps a product to maintain its fresh taste while providing exceptionally high bacteria kill rate for long shelf lives.

A cooling jacket on the bottom cone keeps the wall temperature below the product temperature and limits any burn-on and fouling. If the product leaves the infusion chamber through a pump mounted directly below the chamber, this ensures sufficient pressure in the holding tube to keep a well-defined, single-phase flow, which is substantially free from air and steam bubbles. This is important to ensure precise control over holding times and temperature – both of which greatly impact the final quality of the product.

Flash cooling takes place in a vacuum expansion vessel with precise control to ensure the correct amount of water is removed and the product is not diluted or concentrated from its original state.

Steam infusion can be used for many products including milk, creams, puddings, ice cream, baby food, condensed milk, processed cheese and sauces. The latest technologies in aseptic packing solutions also enable its use for cosmetics – providing a natural, advantageous alternative to preservatives, oils or alcohol. Steam infusion produces high value sterilised cosmetic lotions, creams and gels and, in the same way as it keeps the fresh taste of a food product, preserves product characteristics such as emulsion, perfume, colour and smoothness.

UHT Infusion Plant (schematic)



1. Plate preheaters
2. Steam infusion chamber
3. Holding tube
4. Flash vessel
5. Aseptic homogeniser
6. Plate coolers
7. Aseptic tank
8. Sterilising loop
9. Condenser

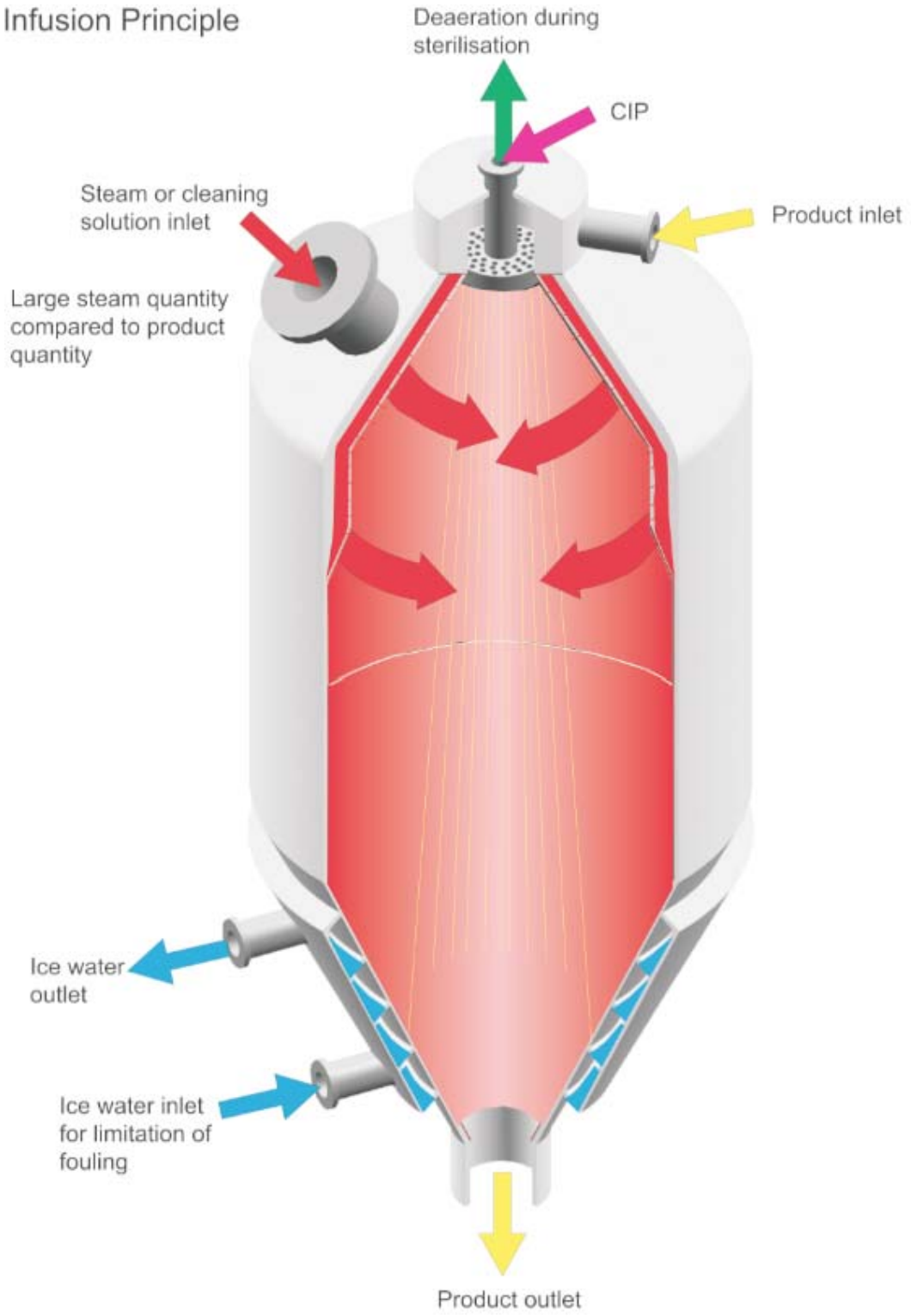
Steam infusion UHT – premium products and high production efficiency

Using gentle heating of steam infusion sterilisation causes minimal heat degradation compared with other UHT processes which helps to protect essential components such as vitamins and results in outstanding quality, fresh tasting products. It provides the necessary kill rate for commercial sterility and can handle a wide product viscosity range – covering fluids from milk through to creams and lotions.

The cooling jacket on the steam infusion chamber minimizes product foaming or fouling and the system is a closed loop. This leads to longer run times than some alternate technologies, with less frequent clean in place (CIP) cycles needed. The speed of the process along with the time between cleaning ensures that productivity is enhanced.

This technology also brings with it process flexibility. A steam infusion steriliser may have a capacity from 150 l/h (with pilot plants) up to 44,000 l/h. It can handle a wide range of products and viscosities ranging from thin soya milk to thick custards and puddings.

Another indirect benefit of a steam infusion system is the level of noise it generates. The process is quieter than a steam injection system, providing a more pleasant working environment for the plant operators.


Infusion Principle
Deaeration during sterilisation
CIP
Steam or cleaning solution inlet
Product inlet
Large steam quantity compared to product quantity
Ice water outlet
Ice water inlet for limitation of fouling
Product outlet

Summary

UHT technology is designed to produce commercially sterile products. With steam infusion, the distribution of a product through the infusion chamber in thin jets ensures very rapid and controlled heating. The extremely short holding time gives the required commercial micro-organism kill rate while guaranteeing high product qualities with fresh tastes and low chemical degradation. The technology keeps fouling minimized which leads to less frequent CIP requirements and in turn equates to longer running times and better production efficiencies.

Steam infusion is the process of choice giving the finest results for premium products with demanding quality requirements. The proof of the pudding really is in the eating when it comes to assessing this technology – no wonder, therefore, that those who try it tend to stick with it.

About the Author:

Gorm Kjaerulff is Technical Sales Manager - UHT & Thermal, SPX Flow Technology.

About SPX Flow Technology:

The SPX Flow Technology segment designs, manufactures and installs highly engineered solutions used to process, blend, meter and transport fluids, in addition to solutions for air and gas filtration and dehydration. The segment supports global food and beverage, dairy, pharmaceutical, oil and gas, energy, and industrial markets. SPX (NYSE: SPW) is a global Fortune 500 multi-industry manufacturing leader with over $5 billion in annual revenue, operations in more than 35 countries and over 18,000 employees. For more information, please visit www.spx.com.

About SPX:

Based in Charlotte, North Carolina, SPX Corporation (NYSE: SPW) is a global Fortune 500 multi-industry manufacturing leader with over $5 billion in annual revenue, operations in more than 35 countries and over 18,000 employees. The company's highly-specialized, engineered products and technologies are concentrated in three areas: Flow Technology, infrastructure, and vehicle service solutions. Many of SPX's innovative solutions are playing a role in helping to meet rising global demand for electricity, processed foods and beverages and vehicle services, particularly in emerging markets. The company's products include food processing systems for the food and beverage industry, power transformers for utility companies, cooling systems for power plants; and diagnostic tools and equipment for the automotive industry. This

description of SPX does not contemplate the pending sale of the Service Solutions business. For more information, please visit www.spx.com.

Milk strings in the infusion chamber