STOCK innovative sterilization solutions

SURDRY Food Safety Solutions

CLEMSON UNIVERSITY

Faribault Foods SINCE 1895

STOCK's Oscillating Motion Steam-Water-Spray Sterilizers

STOCK America is pleased to introduce a new line of Oscillating Motion Sterilizers to the Food Industry. The retorts are manufactured by SURDRY Sterilization Systems and are offered in both 1400 and 1700 millimeter diameters, up to six cube positions. Our vision was to provide the industry an optimized technology solution utilizing intermittent oscillation, a new concept in sterilization, to overcome viscosity by controlling deflection angle and dwell time of the product. The ability to influence recipe variables provides full control over heat transfer to the product and more uniformed heating which results in decreased process times, exceptional product quality, and increased throughput. By combining oscillating technology with our award winning ICON Sterilization Management System, STOCK America is able to provide a controllable, predictable, and repeatable thermal process saving our customers both time and money.

Prior to agitation technology, the thermal processing industry used static retorts for sterilization. With a motionless product, heat penetration was unreliable resulting in inconsistent product quality and, very often, product burn. Agitation was introduced to promote convection heating. Like stirring a pot on the stove, the product can be heated homogenously to avoid overcooking, or burn, and yielding a higher quality product.

Agitation has gone through its own evolution with three methods: end-over-end rotation, linear horizontal motion, and continuous oscillation becoming industry norms. Linear horizontal motion method moves the product from reciprocating front to back using the energy from accelerating and decelerating to create agitation. However, energy required to produce effective agitation compromises product integrity, both contents and packaging, and it also reduces the life of the machine. Continuous oscillation, Surdry's previous method, rocks the product back and forth like the pendulum of a clock. The oscillating motion generates less stress on the product and sterilizer, but lacks predictability through changing product viscosities.

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STOCK America has taken oscillating motion technology a step further. By creating dwell time for the product at an established angle, intermittent oscillation uses gravity and package headspace to provide agitation for varying viscosity products. STOCK's award winning ICON^{SMS} control systems allows user flexibility to adjust both the angle and dwell time which gives the system the ability to optimize the process for any changes in viscosity and particulate profiles. The efficiency of the machine coupled with the guidance of STOCK's innovative software results in a thermal process second to none.

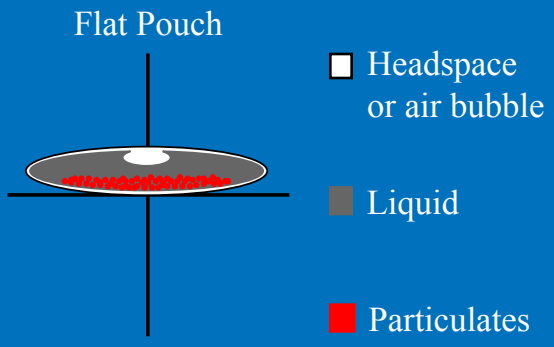
Faribault Foods has researched this technology in the Cryovac Retort Lab in the Department of Food, Nutrition and Packaging Sciences at Clemson University, featuring Surdry's AO-142 sterilizer with intermittent oscillation and extended dwell time. The research team, headed by Dr. Scott Whiteside, was able to explore and analyze recipe variables for numerous products including baked beans, red and white meat chilies, and macaroni and cheese.

"Although skeptical at first as to the effectiveness of adding dwell time to continuous oscillation to improve heat transfer, thinking that more oscillations would be better and adding dwell time would reduce the total number of oscillations, there was no doubt adding dwell time showed improved heat transfer on some products. The beauty of the system is that it relies on basic gravity to move the 'bubble' in the pouch through the product and by adjusting the dwell gives the "bubble" time to pass through the product which promotes mixing. The other advantage to the system is that it is entirely adjustable and can be set to operate in the traditional continuous oscillation mode if that is best for the product. Having this feature will no doubt allow for optimization of the thermal process in oscillating type retorts."

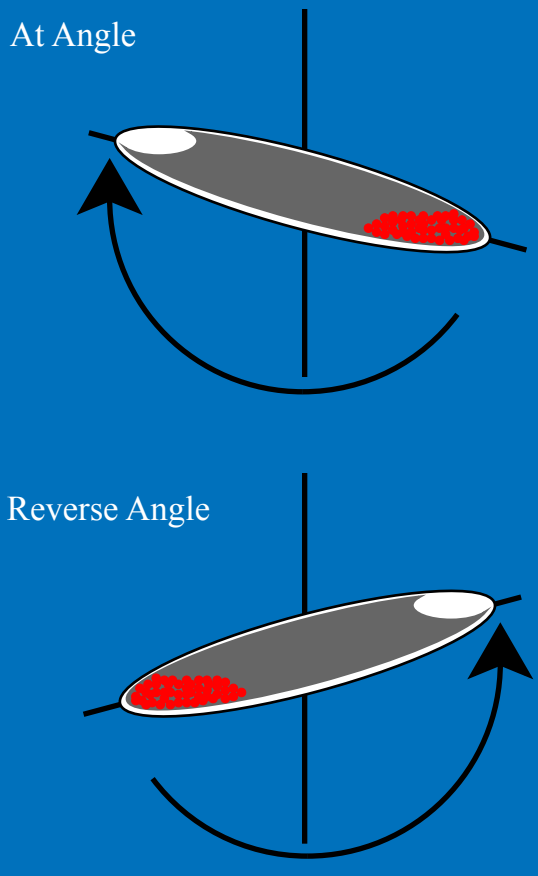
Jim Nelson,
Executive VP of R&D
Faribault Foods

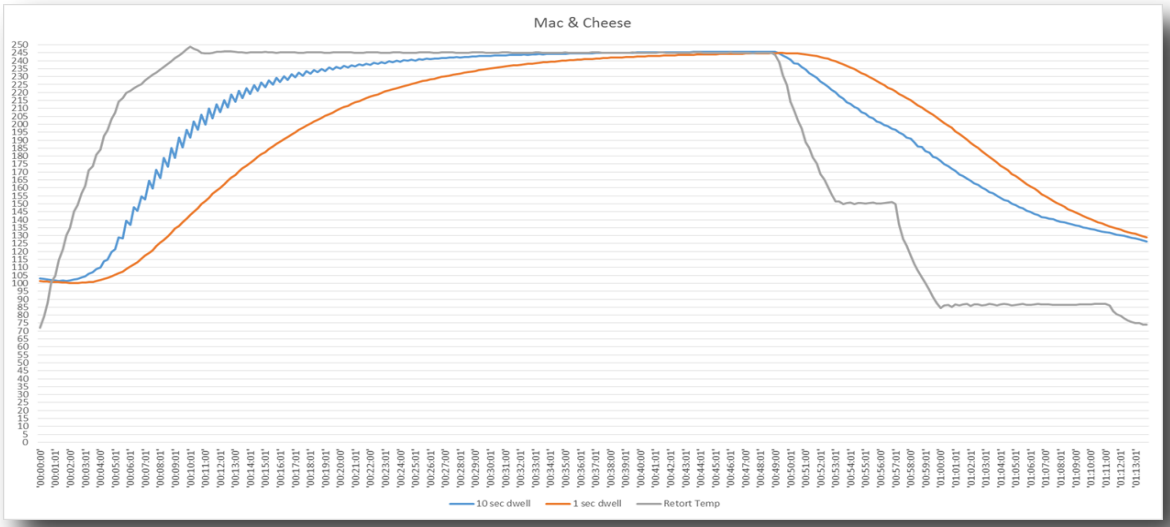
Intermittent Oscillation

Oscillation rocks the product back and forth much like the pendulum of a clock. The swinging motion generates less stress on the product and the sterilizer.



By creating a dwell time for the product at an established angle, intermittent oscillation uses gravity and package headspace to provide agitation for high viscosity products.





Graph 1. Temperature (°F) versus time for retort, 30 second oscillating dwell time and 1 second dwell time for mac and cheese product.

Utilizing STOCK's ICON^{SMS} control system, the team was able to pinpoint the optimal process for various product viscosities. Dr. Whiteside notes, "Based on our work here at Clemson University, we have recognized two primary benefits of extending the oscillating dwell time of the Surdry Retort system. They are quicker heating of certain high viscosity products and greater product formulation flexibility. We have observed that various food products that typically would not respond well to the traditional oscillating motion often exhibit faster heating due to the ability of the Surdry retort system to extend the holding dwell time beyond 1 second. This allows sufficient time for certain high viscosity food products to move in the container and therefore providing more even and often quicker heating. In addition, the extended dwell time gives product formulators more flexibility to produce a broader variety of shelf stable food products than with just traditional oscillating technology."

The research and development team at Clemson concluded intermittent oscillation provides food and thermal processing developers an increased capability to develop new innovative thermal processes. Dr. Whiteside added, "Intermittent oscillation's greatest benefit is that it provides processors with another tool in their toolbox creating new and innovative products that could not be done with previous technology."

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Dr. Scott Whiteside, Ph.D.
Clemson University