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# Technology Offers Gentler Processes For Pasteurization And Sterilization

Technology developers provide means to deliver minimally processed products without compromising food safety.

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Once an animal is slaughtered or produce is harvested, microbes go to work and deterioration commences. Louis Pasteur figured out this dynamic 155 years ago, setting in motion development of the pasteurization and sterilization technologies used today.

Pasteurization garners the most interest. The reason, as bank robber Willie Sutton understood, is because that's where the money is: If two identical products are displayed in a grocery store, the refrigerated one will sell for a premium over the shelf-stable version. Microfiltration and high-pressure processing (HPP) expand the pasteurization tool kit, but there is no shortage of innovation in sterilization technology, too.

The 21st Century seemingly left retort in the rearview mirror, relegating this shelf-stabilization method to the ashbin of history. Overcooked and over-processed are common criticisms of retort. Canners have tried to rehabilitate retorted food's reputation by lowering levels of salt and other preservatives, but long come-up and cool-down times in conventional retorts inevitably result in destruction of vitamins and other nutrients.

Agitation can shorten process time, and engineers have devised various approaches, such as rotating food containers on their axes. One of the earliest ideas envisioned agitating the entire retort vessels and was patented by Frank Gerber, founder of the baby food company.

A more realistic approach is rapid back-and-forth motion of the basket that holds the food containers. In 1993, process engineer Richard Walden began working on such a system, eventually winning multiple patents and bringing the technology to market through partnerships with retort manufacturers in Europe and North America.

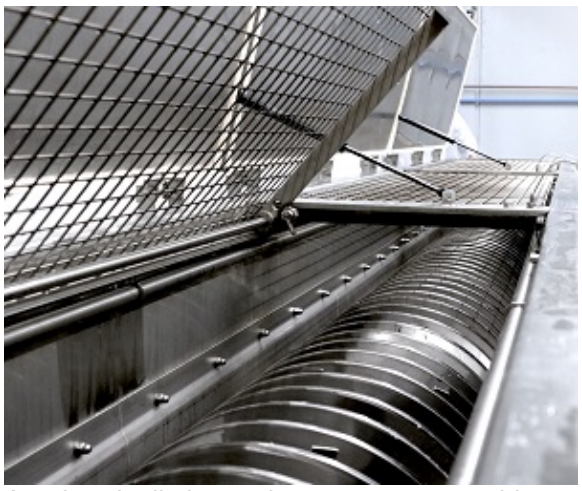
Walden christened his system Shaka and partnered with Allpax Products Inc. to build a U.S. production-scale unit. The machine generates about 2 Gs of force as it completes 150-170 back-and-forth strokes of 6 inches every minute. Only one basket can be processed at a time, though Waldon calculated throughput could match an eight-basket static retort, depending on product viscosity, thanks to shorter processing times.


Rapid back-and-forth motion of the retort basket speeds processing in the Shaka system, which is gaining renewed interest thanks to the expiration of licensing fees. Photo: Allpax Products Inc.

Shrinking batch time translates to energy savings, though the greater benefit is improved product quality. The concept drew interest from a number of major food companies and copackers, but a licensing fee tied to the number of containers processed prevented all but a handful from ordering a Shaka retort from Covington, La.-based Allpax (www.allpax.com). “It really turned off processors early on,” says Greg Jacob, vice president and general manager.

However, the process patent expired in October 2015, “and there’s new interest from people who want to get involved with the technology,” according to Jacob. A partnership with the Louisiana State University School of Nutrition and Food Sciences, where a Shaka R&D unit has been installed, promises to expand the scope of applications and formulations.

Louisianans are particular about their crawfish and shrimp, but retorting seafood usually results in rubbery food. Not so with Shaka. “The process time is so much shorter that shrimp has a good, fresh taste,” says Jacob. Shelf-stable guacamole doesn’t exist, but he thinks Shaka could produce such a product. And agitation is so vigorous, it might be possible to put packages of chickpeas or sweet potatoes into a machine and have a container of hummus or sweet potato puree emerge.



An electrically heated worm screw provides thermal transfer to powders and particles moving through the Spirajoule pasteurization zone, with injected dry steam bringing

treatment up to sterilization temperatures.
**Photo: Safe Sterilization USA**

Beverages and other low-viscosity products are poor candidates, given their already short retort cycles, and pouches and other containers can pose process challenges (rectangular cans, on the other hand, are ideal). But as long as there is some liquid and head space to promote agitation, the system offers distinct advantages. “With the market evolving and the focus on fresh and better nutritional value, we’re in an interesting position with Shaka,” Jacob says.

## Nutrient retention

Gentler processing also is the proposition with Spirajoule, a technology that has gained a foothold in food. Three North American companies are applying it to sterilize seeds, grains and other foodstuffs. Engineers at Safe Sterilization USA (www.safesteriliationUSA.com) modified Spirajoule for use with powders, as well.

Spirajoule relies on an electrically heated screw conveyor to thermally treat powders and particles as they move through the processing zone, inactivating yeast and mold cells. Dry steam usually is injected into the zone to further lower total plate counts, unless the product is hydroscopic and prone to lumping from the steam.

“When the steam flashes on the particles, it inactivates all the microbes,” explains Mayur Desai, an engineer and owner of Safe Sterilization as well as Bioactive Resources LLC, a supplier of nutraceutical ingredients. The companies are based in South Plainfield, N.J., with a recently opened tolling operation in Reno, Nev., expanding its ability to serve the organic ingredients market.

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