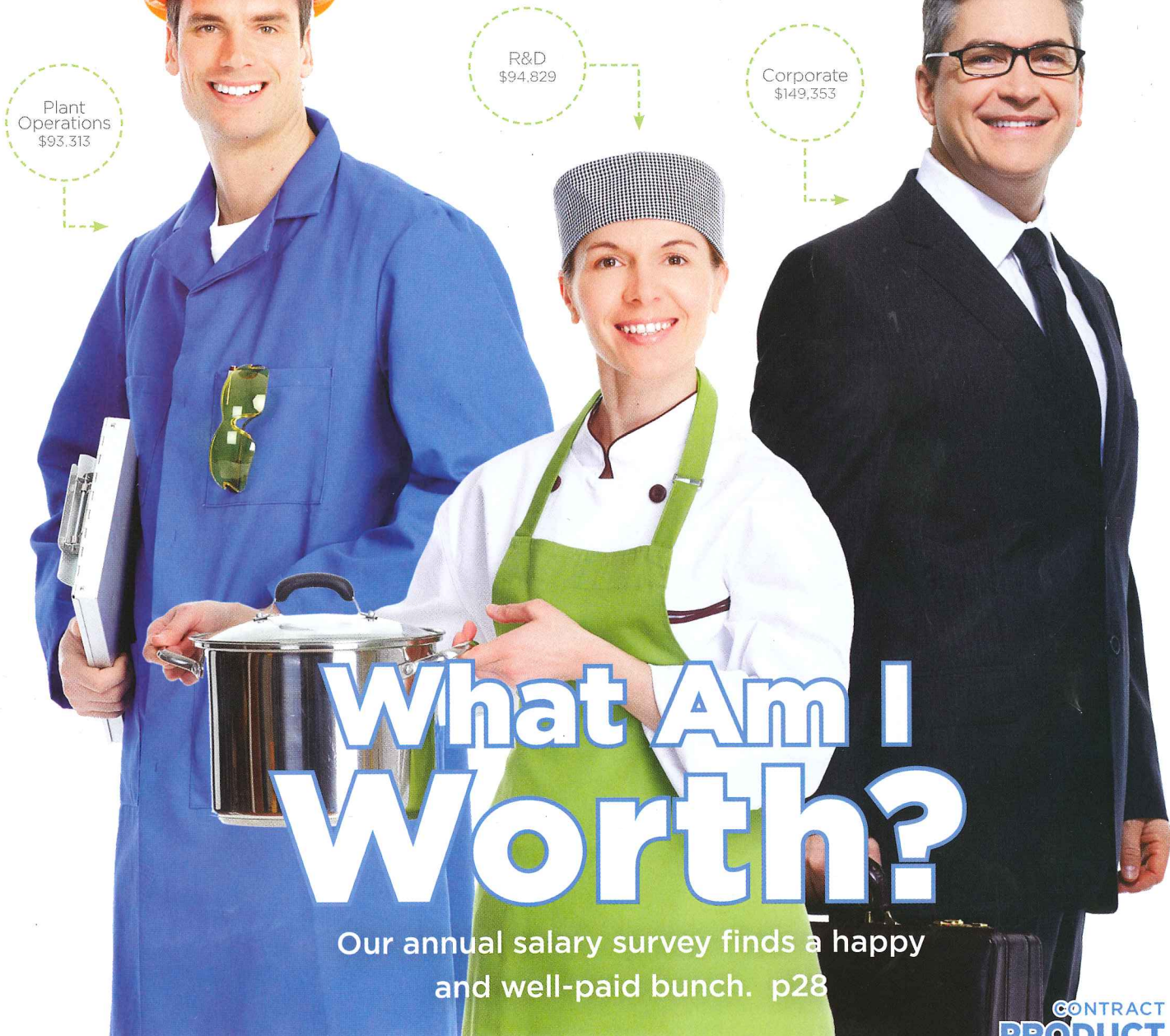


FOOD PROCESSING

FOOD & BEVERAGE • FROM REPT TO DELIVERY • PRESENT TO FUTURE • FOODPROCESSING.COM



What Am I Worth?

Our annual salary survey finds a happy and well-paid bunch. p28

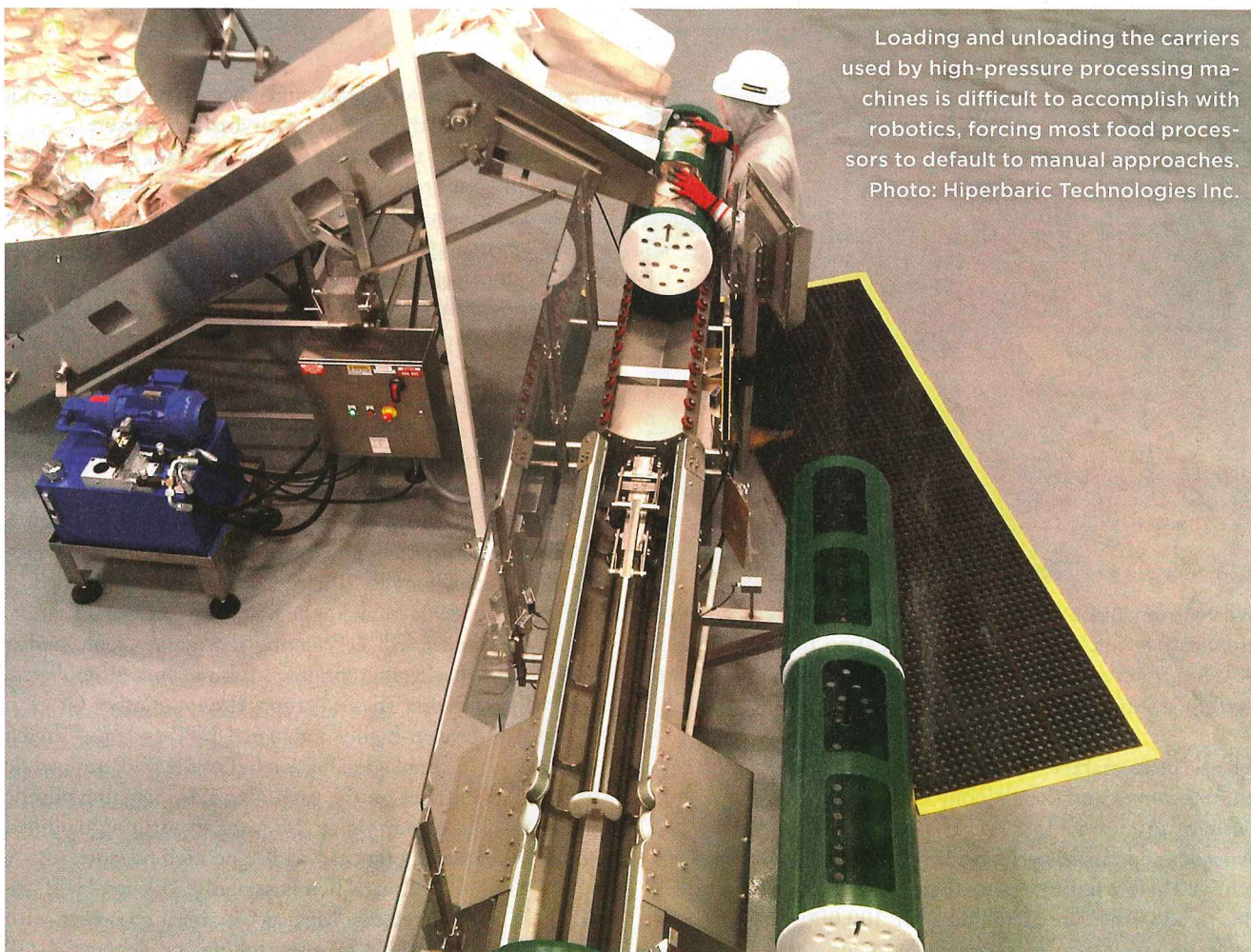
CONTRACT PRODUCT DEVELOPMENT
p35

COOL NEW WAYS TO PASTEURIZE
p51

AUTOMATE YOUR PEOPLE
p59

PutmanMedia®

JULY 2014
189-FPI
000016395
FRANK T. YOUNG
MANAGER
WASHINGTON STATE UNIVERSITY
1945 FERMIUM LN
SCHOOL OF FOOD SCIENCE-6376
PULLMAN WA 99164-0001
PR000942
P0008
#BXNCFZ *CNR-KT LDT**C-000 MKX CWRLL M
#18002266482-5#



Loading and unloading the carriers used by high-pressure processing machines is difficult to accomplish with robotics, forcing most food processors to default to manual approaches. Photo: Hiperbaric Technologies Inc.

Pasteurization Without the Heat

Nonthermal pasteurization isn't always permitted by regulation, but kinder, gentler treatments are being commercialized.

By Kevin T. Higgins, Managing Editor

To borrow the language of prize fighting, if food sterilization is a KO, then pasteurization is a TKO – germs and viruses may be dazed and confused, but some will get off the mat and live to fight another day.

Both commercial sterilization and pasteurization are used for food preservation, of course, and both rely on thermal treatment to inactivate all or most bacteria, spoilage organisms and enzymes that degrade products over time. The difference is that sterilization destroys spore formers and renders food shelf stable but also degrades a product's nutritional value.

With the interest in healthy eating, that tradeoff tilts the balance in favor of pasteurization, particularly in North America, where a well-established cold chain can maintain product temperatures below 40°F from the point of processing to home consumption.

Dialing down pasteurization's thermal input would result in even more nutritional foods and beverages with longer shelf lives.

Food scientists have researched numerous novel technologies that promise effective but gentle pasteurization: radio frequency, ultraviolet treatment, pulsed electric fields and ultrafiltration, to name a few. The most viable, however, is high-pressure processing (HPP), the now-industrially hardened technology that uses hydrostatic pressure in the 87,000 psi range to essentially squeeze the life out of microbes and viruses without affecting the food itself.

To distinguish HPP from conventional thermal pasteurization, one of the main suppliers of the technology has started referring to the process as “pascalization,” a salute to Blaise Pascal, the 17th Century physicist who lent his name to the measurement of pressure and vacuum. Pressure of the magnitude found in HPP vessels long has been used to squeeze oxygen out of high-performance metals, but it was not until the mid-1990s that the technology was used commercially in food.

The first several machines were purchased by Don Bowden,



Washington State researchers are adapting a microwave sterilization unit for use in pasteurization under the name MAPS, an acronym for microwave assisted pasteurization system. Photo: Washington State University

who went to market with HPP-treated guacamole under the names Avomex and then Wholly Guacamole before selling the business to Hormel in 2011. His first vessel held 17 liters of avocados and ran 20 cycles before a valve failed – then ran another 20 before failing again. Today’s machines hold up to 525 liters and vessels are guaranteed for 100,000 cycles, though valves and seals require more frequent maintenance.

Industry understanding of HPP and the 5-log bacterial reduction it delivers has grown enormously, particularly in North America, where the majority of operating systems can be found. As recently as six years ago, food professionals who visited Bowden’s operation wrestled with process fundamentals.

“They want to see the bubbles coming up, and that’s not the case,” noted Fernando Portales, an engineer at Bowden’s former Fort Worth, Texas, firm. The extended shelf life and food safety assurance delivered by the technology made it popular for ready-to-eat meats. Now HPP is being applied to wet salads, juices and beverages such as coconut water, where flavor improvements over aseptic processes are driving sales gains.

We’re No. 1

Declining operating costs for HPP are drawing scores of processors to the technology. Most of the world’s installed base of approximately 300 presses are in North America, either as tolling services or a combination of own-product and third-party processing to fill up production schedules.

As the core systems become more robust, improvement efforts have shifted toward more efficient loading and unloading and expansion of packaging options.

When Sandridge Food Corp. (www.sandridge.com), Medina, Ohio, commissioned its first HPP press in 2010, it also installed a packaging line to fill inner-seal containers. Rigid cups with snap-

on seals still are used for coleslaw and other wet salads that are not HPP processed, but those lids don’t survive high pressure.

A second HPP unit came on line last fall, and pouched products like Sandridge’s new Layered Selections of minimally processed medleys such as black-eyed peas, couscous and corn are being pasteurized (see new Rollout product on p23). Inner-seal cups continue to be used, as well.

“Pouches work great,” asserts John Becker, Sandridge’s senior director-marketing, but the firm would like more options. “More and more packaging companies are seeing the need (for HPP-compatible containers) and are addressing it.”

Sandridge’s machines were fabricated by Hiperbaric (www.hiperbaric.com), a Spanish firm with offices in Miami. All North American presses currently operating were built either by Hiperbaric or Avure Technologies Inc. (www.avure.com), a Middletown, Ohio, company that was spun off from HPP pioneer Flow Technology in 2005. Flow partnered with ABB in Sweden in the 1990s to make the first commercial HPP units.

A third supplier will be entering the market soon, and it is focusing on packaging options. Multivac Inc. (us.multivac.com) partnered with Thyssen Krupp Group, another German company, to develop highly automated HPP systems. Thyssen Krupp’s Uhde Technologies division builds the HPP unit, while Multivac concentrates on the packaging side. Stepping outside its vacuum-pack comfort zone, Multivac is pursuing modified atmosphere packaging that can withstand high pressure.

According to Multivac’s Ben Eastman, a 350-liter HPP system has been delivered to a Mexico City meat processor, with integrated product filling to case packing components. A fall start-up of the system is anticipated.

CHIC Group has supplied HPP systems in China and is eyeing North America. The company established a beachhead here in 2012 before withdrawing, but a spokesman says the company hopes to relaunch later this year under the name FresherTech.

Material-handling challenges

Cylindrical baskets carry packaged products in and out of the pressure vessel in both the Hiperbaric and Avure systems, and expediting loading and unloading is an engineering challenge.

“Robotics is not the answer,” believes Dan Rack, Avure’s director-engineering, citing end-of-arm tool design and the multiple package sizes and shapes as arguments for manual loading and unloading.

A robotic casepacker could be modified to fill the cylinder, suggests Jim Okos, director-process engineering at Stellar (www.stellar.net), though he agrees manual loading remains the best option, particularly for copackers and tolling providers. Besides overseeing the installation and support system for one client’s press, the Jacksonville, Fla.-based engineering firm has evaluated several operating HPP systems and has concluded easing the physical strain of loading and stabilizing the loaded carriers is a better solution than robotics at this time.

Customized racks and lifting devices for the baskets are the most cost-effective approach, adds Okos. “We live in a con-

tinuous world,” but HPP is necessarily a batch process, he says, and avoiding double handling is the most productive route to increased efficiency.

Both Hiperbaric and Avure guarantee vessel performance, with the expectation they will perform well over 100,000 cycles. Avure's Rack believes some are still working after more than 1 million cycles. He also cites redundant safety systems, including elongation sensors that monitor expected movement of the press during operation. If unexpected twisting or skewing occurs, the safety system automatically shuts down the machine.

Advanced controls have resolved pressure variance problems in older models, allowing processors to shorten hold times. Improvements in intensifier pumps help the machines reach set-point pressure faster, further reducing cycle times. More reliable seals and other components are helping to reduce maintenance costs, which constitute about one quarter of a system's lifecycle cost, according to Jaime Nicolas-Correa, director of Hiperbaric's North American operations.

And machine capacity keeps ratcheting up. Both companies in the past year introduced 525-liter units that can process about 7,000 lbs. of product per hour. Avure moved intensifiers from a separate room to the top of the 525-L model, resulting in reduced pressure drops and less maintenance.

Avomex operated eight machines for juice pasteurization before abandoning that application several years ago. Its process involved filling the pressure chamber with the juice instead of water, then aseptically packaging the product. Today's resurgence in HPP for juice was helped when companies started minimally processing the juice prior to packaging and then batching the containers into HPP carriers.

Not your mama's microwave

If HPP is the star of new pasteurization technologies, microwave is its understudy. Microwave processing is not new to the food industry, of course; there probably are still a few Litton units processing bacon crumbles and pizza toppings. But the variability of microwaves at 2450 MHz results in uneven heating,

making it difficult to validate reduction in vegetative cells for pasteurization.

Changing frequency resolved the uneven heating problem at Washington State University, where a research team led by Juming Tang validated microwave sterilization of low-acid food at 915 MHz in 2009. Tang's team now is adapting the

technology for pasteurization.

Whereas the sterilization process heats food to 120°C/248°F, pasteurization is achieved in the 70-90°C range, explains Tang, a professor of food engineering (www.microwavepasteurization.wsu.edu) at the Pullman, Wash., school. “System design is different” than for sterilization, he

Just like
Garlic Bread,
Sprayon goes
from the oven
to the freezer.

Unlike “White Mineral Oil”, Sprayon's new line of NSF H1 rated, high performance food grade lubricants are engineered to perform under the most demanding temperatures. From oven to freezer, Sprayon keeps your equipment running at peak performance.



GET YOUR FREE SAMPLES
& SEE THE DIFFERENCE



Learn more at
FoodGrade.Sprayon.com
or text SprayonFP to 75309

Download any QR reader app and use your smartphone to scan the QR Code to the left.

PRESERVE. PROTECT. PREVENT.™



Sprayon's new line of Food Grade Lubricants are NSF® H1 Rated for incidental food contact



adds, with no need for pressurization, and it has been shown to be effective against both pathogens and the human norovirus.

Viral infection of food is a growing cause of recalls, and the USDA's National Institute of Food and Agriculture provided a \$5 million grant to Tang and collaborators to demonstrate microwave pasteuriza-

tion's effectiveness as an intervention. Of particular interest are leafy greens such as spinach in frozen foods.

An undisclosed food company has been using a pilot system on a limited range of products for the past 18 months and providing feedback. "They are very happy with the results," Tang reports.


"We're ready to host more companies to do additional testing with us."

Pasteurization is achieved in 2-3 minutes and requires less energy input than conventional thermal processes, resulting in lower operating costs. Organoleptic evaluations suggest quality outcomes are superior with microwave.

Researchers believe validated microwave pasteurization could allow some frozen foods to move to the refrigerated cold chain, reducing distribution costs. It could also position the technology for the chilled foods market, which is strong in Europe.

Two European companies offer competing systems that rely on steam and microwave energy to extend the shelf life of fully cooked refrigerated foods, but it is unclear if either has submitted to FDA review. Curwood/Bemis announced a partnership with one of the firms, Sweden-based Mic-Vac, in February 2013.

As food manufacturers well know, technology that boosts quality but adds cost is a tough sell. Back to HPP, Sandridge's Becker notes, "There's a cost to it, and not all of our customers see a value, so all of our products don't go through (the process)."

Extending shelf life, on the other hand, adds economic value. In Sandridge's case, HPP expanded product distribution from a 500-mile radius to nationwide. And whether a processor uses HPP, microwave or another emerging technology, pasteurization that extends shelf life and reduces the need for preservatives and acidifiers can be a game-changer in today's market. 

ISO 21469 Certified

What does it mean to you?

Human health and personal safety are important issues in the food processing and packaging industry. That is why Summit Industrial Products made it a priority to become an ISO 21469 Certified facility. Summit's raw materials, additives, lubricants, equipment and facility pass annual inspections by NSF International to maintain their ISO 21469 Certification. Equipment leaks are going to occur, so the challenge is to select the right lubricants to minimize product contamination. Summit food grade synthetic lubricants have been developed, tested, and industry accepted to be safe, and reliable, while enhancing equipment performance. By going through the detailed ISO 21469 certification process with the NSF – as opposed to the self-certification by those companies who are "compliant" – Summit products offer the confidence of knowing without a doubt that the lubricants in your machine meet the highest standards of hygiene and cleanliness.

Problem Solving ISO 21469 Certified Summit Food Grade Lubricants



Summit
Food Grade lubricants are
manufactured in their
Tyler, TX USA
ISO 21469 certified facility

Summit Industrial Products

For a distributor in your area call:

800.749.5823

www.klsummit.com

Correction

Our June story on explosion protection in powder handling misrepresented the product line of Flexicon Corp. (www.flexicon.com). Positive pressure and vacuum conveyors for dilute material phases (not all material phases) long have been part of Flexicon's product portfolio. And rather than "recently adding flexible screw conveyors for fragile and brittle products susceptible to damage in dense phase conveying," the firm introduced flexible screw conveyors in 1974, but recently added tubular cable conveyors for fragile and brittle products. We regret the errors.