Out of the Mouths of Babes

THE RIGHTING OF A MISCONCEPTION ON HEAT-SEALING TECHNOLOGY FOSTERED A NEW WAY TO TRANSPORT AND DISPENSE WATER.

BY SEAN RILEY

BOSwater water bags made with BIB Packaging KN3000 using TOSS Technology.

The BIB Packaging system challenges the water industry to eliminate the water jug used for decades to transport and dispense water for home, office and industrial use.

The project started with the Victoria, B.C.-based company's recognition that the water bottles or jugs widely being used are cumbersome, expensive to manufacturer and difficult to maintain. They are as expensive to transport empty as they are full and they have to be refillable to recoup the initial costs from the manufacturer. When they get back to the bottler they need to be sanitized before being refilled. Thousands of gallons of water are needed for cleaning and it all goes right down the drain along with the pollutants used to clean the bottles. Storage at the bottlers' facility and at the customers' takes up thousands of square feet regardless if they are full or empty. People use the bottles for all kinds of things from ashtrays to piggy banks before returning them to the bottler, creating a chance of contaminants surviving the cleaning process. The elimination of the water jug as we know it would reduce the industry eco-footprint in a very large way while also protecting the consumer from potentially contaminated water.

Ken Nicolle, the owner of BIB Packaging, and Bob Polan, international marketing man- ager, were discussing the problem in Nicolle's garage one day when Nicolle's daughter came out feeding Nicolle's grand-daughter from a baby bottle. The bottle had a bag inside that collapsed as the baby drank the milk. As Nicolle's daughter explained, bottles were hard to clean and the interior bag eliminated the task almost entirely. "That's just what we need!" Ken said. The idea of water in a bag was born.

BIB Packaging started buying bags and filling them by hand, leaning them on a custom made conveyor and running them through a rotary sealer. The first bag slid into a second bag and a conventional heat press sealer was used to seal the second bag. Nicolle invented a custom-made water cooler that would spike the bags and dispense the water and BIB Packaging began to test the market. As the system was proven and gradually accepted, it was time to in- crease production values.

"Buying the bags already made was ex- pensive and filling them by hand was far too much work," Polan says. "We needed a machine that would do it all. Make bags from rolled stock, fill them automatically and seal them on the fly." From there, a second bag needed to be created that the first bag would drop into. Finally, the second bag needed proper sealing.

Designing a f/f/s machine capable of double bagging drinking water proved to be quite a task but what Nicolle and his partners found to be most challenging was getting the bags to seal consistently.

In their efforts to achieve quality heat seals, BIB Packaging had invested thou- sands of dollars in various heat-sealing methods ranging from constant heated bars to conventional impulse heat sealing. Different materials were also tested and retested yielding little to no success. "The design process didn't happen overnight," says Nicolle. "It actually took multiple designs to get BIB Packaging's KN3000 to work the way it does today. Things really came together quickly once we solved our heat sealing issues."

Heat sealing success arrived in the form of TOSS Technology.

"Having exhausted much time and money, our desperate search for a repeatable heat sealing solution finally led me to the people at TOSS," Nicolle says.

TOSS Machine Components, Inc., Nazareth, Pa., specializes in Variable Resistance Controlled (VRC) heat sealing systems. Designed around the principals of impulse heat sealing, TOSS VRC Technology controls the sealing process with instantaneous feedback required to attain the desired sealing temperature within milliseconds and regulates the selected temperature and sealing time with repeated precision.

åNicolle's perception of impulse heat sealing was that it yielded inconsistent results. "To make matters worse, I believed any attempts at temperature verification were difficult due to the rapid change in temperature of the heat seal band," he says. "[Becan's] thorough description of their VRC technology helped to dispel any preconceived perceptions I may have had. When he explained how easily one could verify the temperature accuracy of the TOSS system, I was eager to put it to the test."

Impulse heat sealing, the principal on which TOSS VRC Technology is based, has been around for many years. Early forms consisted of using a fixed amount of power for a predetermined time. This, however, proved problematic because the temperature of the sealing surface gradually crept upward with each successive heating cycle and, consequently, manual adjustment of the sealing parameters had to be made during the working day. Later attempts to control the process with the aid of thermocouples yielded some improvements, but the inherent errors associated with the shifting position of the thermocouple along with the lag in response time led to inconsistent sealing results.

TOSS's VRC Technology provides flawless control of the heating element without the need of thermocouples.

To thoroughly understand the VRC technology one must understand Ohm's Law. VRC centers on the fact that any change made to the electrical resistance of the heat sealing element is directly proportional to its change in temperature. When the electrical resistance of a known heat seal band material is constant over a considerable range of voltage, then Ohm's Law, R=V/I can be used to accurately control the behavior (temperature) of the heat seal band.

TOSS Technologies' closed loop VRC system consists of a temperature controller engineered to measure and control the changing resistance of a known material. This material, TOSS Alloy 20, maintains a stable thermal coefficient of resistance which allows the controller to accurately regulate its temperature from a range of ambient up to 500 degrees Celsius.

"[Nicolle's] story of his failed at- tempts at heat-sealing perfection with the use of antiquated technology is one we've grown accustom to hearing at TOSS," Becan says. "With a full under-standing of his predicament, and belief in his vision, TOSS agreed to loan him a system so that he could test our VRC technology on his machine."

Polan was amazed with the results as the TOSS system performed as described.

Today, the KN3000 has a foot print of 5 ft. x 5 ft. and is capable of producing bags of 125 ml, 1 L, 1.5 gal. and 3 gal. At its full capacity, a single operator could run a dozen 3 gal. machines at one time, each producing up to 400 bags per hour for a total of 14,400 gal. of water. The KN3000 is equipped with touchscreen controls that can be remotely controlled for easy maintenance and software up- dates. It also uses film that is biodegradable, recyclable and free of BPAs.

The KN3000 is being adapted for use in disaster response in a mobile unit and BIB Packaging is in discussions for worldwide distribution of its packaging systems. The company credits a good portion of its success to TOSS, "which has been with us from the very beginning. The way I see it, TOSS has become a valuable partner to BIB Packaging and we will never go anywhere else," Polan says. "[Nicolle] is currently working on another machine to install a fitment to smaller bags for packaging and dispensing water and TOSS is right there with him creating the sealing equipment needed to make it work."

Sean Riley is the editor of *PMT*.