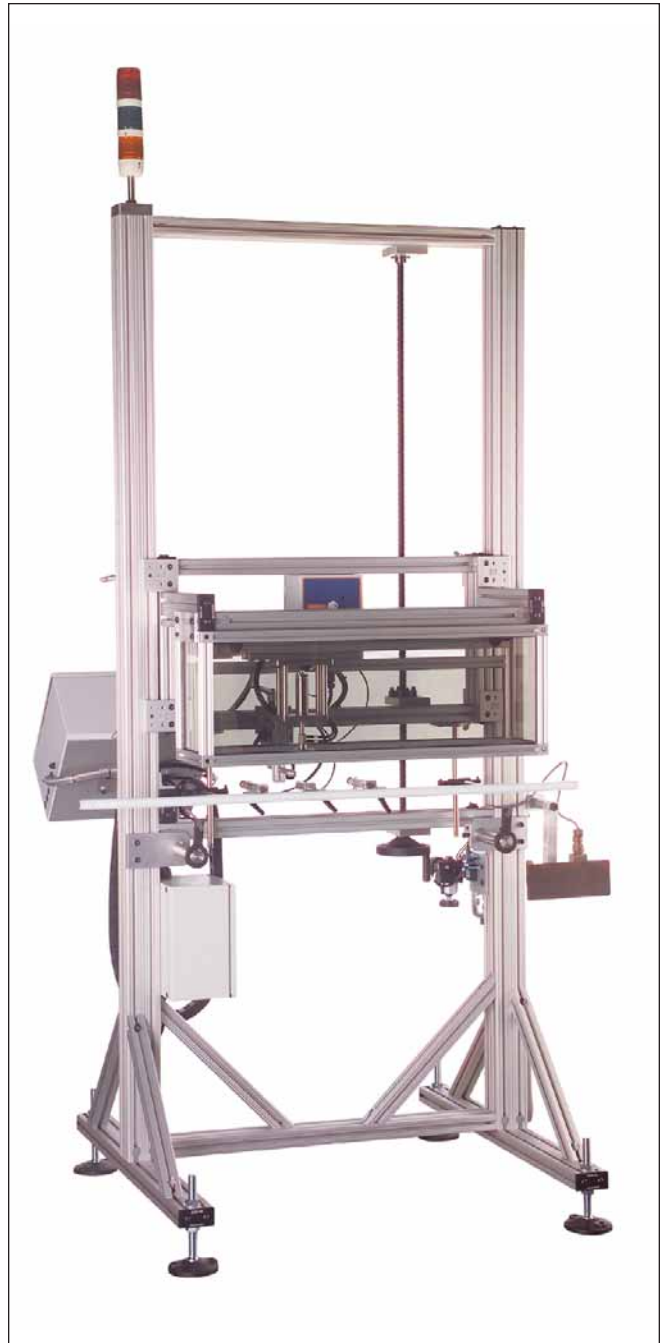


Guide Used in Leak-Testing System For Plastic Bottles

Container leaks can range from mildly annoying to potentially dangerous. To avoid faulty containers from ever leaving the production line, producers have installed testing devices as part of the bottle production process to ensure integrity. As many bottle/container manufacturing systems were pre-existing, a unit able to integrate itself into the existing production line without necessitating a long shutdown or costly re-design was seen as ideal. When Air Logic Power Systems Inc. (ALPS, Milwaukee, WI) developed such a unit, the RS-100 Plastic Container Integrity Tester, it chose the PDU2 linear transmission unit from HepcoMotion (Tiverton, UK) and distributed by Bishop-Wisecarver (Pittsburg, CA). Using the PDU2 eliminated many of the bottle handling issues that could potentially slow production by its ability to move in synch with an existing production line.

Made of aluminum and belt-driven, HepcoMotion's low-maintenance PDU2 profile driven unit forms one part of the ALPS's RS-100. The linear motion PDU2 drives the probe head that conducts the integrity test swiftly back and forth so that it moves with each bottle without disrupting the product flow. The device integrates into existing conveyor systems and works "on demand," testing a bottle when it is sensed by means of a photoeye when it enters the testing chamber (a see-through guard encloses the slide and probe head, keeping hands and fingers out and away from the moving parts). The herculeane wheel technology employed by the guide provides motion, speeds, and acceleration. While its length is manufactured to a customer's specifications, the PDU2's width and height already fit ALPS's configuration for the RS-100, so no redesign of the testing system was required. The carriage plate is designed to accommodate the mounting of a second unit; with the RS-100, a probe head that tests each bottle is attached to the plate (in this application, the PDU2 is installed in an upside-down configuration). Since ALPS began testing its first PDU2/RS-100 unit (which stands 103" tall and is 53" wide), it has logged more than 50 million cycles. The machine is controlled by a touch screen interface to allow ease of use.

Specifically designed for the PET (polyethylene terephthalate) bottle manufacturing industry, pharmaceutical bottles, health and beauty containers, containers for consumables (soda, juice, and water), and chemical containers can all be tested via the RS-100. PET can be semi-rigid to rigid (depending on its thickness) and is lightweight, and is one of the most commonly used plastics, being biologically inert, resistant to impacts, lightweight, transparent, a reliable gas/moisture barrier, and able to keep its shape. In bottle manufacturing, raw PET



The RS-100 Plastic Container Integrity Tester checks for container malformations. Bishop-Wisecarver's PDU2 linear transmission unit is located behind the shaded plastic guard.

pellets or test tube-like preforms are first heated and blown into the intended shape (including the threads for the cap) by means of a blow/injection molder, then conveyed away to cool. The RS-100 tester serves as the second stage of the production line, fitting into the line where the bottles are cool enough to be pressure-tested without their shape being permanently warped by the test. Bottle production accounts for approximately 30% of the global PET demand.

The RS-100 fastens onto each bottle/container by means of the guide-mounted probe head. The probe head extends and comes down, sealing itself onto the bottle, and as probe and bottle run the length of the guide (38.5 inches), the pressure-decay leak test is performed, although with customization, the test can be performed in 150 microseconds. Monitored by computer, the pressure test involves air that is injected into the container and a pressure test is then performed to verify the integrity of individual bottles. The RS-100 typically tests in the range of 40 to 120 bottles/containers per minute, depending on the container size (up to 160 for small containers). Bottles found to have leaks are automatically ejected from the conveyor with an air jet into an adjacent bin and eventually reenter the bottle-forming process. After a successful test, bottles move on to the packaging process. The machine can stop bottle flow if necessary, and prevent untested bottles passing through it. Additionally, the RS-100 features a control downstream diverter for bulk packing of containers. An additional photoeye can monitor downstream bottles for jams as part of a larger system-wide efficiency check.

The RS-100, whose speed may be selected to match its environment, is designed to test directly over an already active continuous conveyor, having a jack height adjustment, no tooling require-

ment (no timing screw) and not necessitating a backlog of bottles prior to installation. The tester automatically tracks, follows, and tests the bottles as they travel through its segment of the production line. Once installed, the tester is programmed to run 24 hours per day, seven days per week as a production-monitoring tool for the plastic bottle blow molding production line. An encoder wheel on the side of the machine is positioned to ride on the conveyor and give input of its speed (so operators can match the slide speed to the conveyor speed), while a status light is fitted to the top of the tester's frame to alert operators of a bottle jam or other malfunction.

By way of the linear guide, a continuous motion approach is used for the probe head to automatically follow and test each bottle as it travels down the conveyor. This bottle handling method, as opposed to stopping individual bottles underneath a fixed probe head, allows a high-speed inspection of conventional and hard-to-handle bottle types up to 10.5". The tester itself, by way of interchangeable heads and seals, can be tuned to the desired level of seal-surface sensitivity, i.e., "short shots" (bottles formed with too little original plastic, therefore having a top too short or otherwise malformed for use) or nicks. The pressure-decay test can detect hole sizes down to 0.0004", even if the rest of the container is adequately formed. The "floating" mount test probe design allows for interchangeable heads and seals if the RS-100 is in a production line where bottles with differently-sized openings are being produced.

More Information

For more information, contact Lori Colivas, Marketing Manager at Bishop-Wisecarver Corp., at loric@bwc.com, or Scott Heins, Sales Manager at ALPS, at scotth@alpsleak.com, or visit <http://info.hotims.com/10958-342>.

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