National Foods finds closure

The challenges involved in closure application are explored by National Foods' packaging technologists **Llewellyn Stephens** (FAIP) and **Elke Schoellhammer** (MAIP).

EVERY ASPECT OF packaging is a science and the application of this technology is critical when applying closures to bottles to create a sealed package that will prevent contamination and spoilage.

For correct cap application, the sorting and application equipment must not cause damaged or cocked caps, must provide the correct engagement of any tamper-evident features and must create a leak-proof seal. The cap material, thread design, capper head approach angle, top load, application torque and capper head engagement time should all combine to provide a screw cap that can be easily removed by consumers when the product is ready to be consumed. In addition, there also needs to be effective tamper evidence and reseal capability.

A typical dairy or juice bottling line running at 150 bottles per minute only allows a window of 0.4 seconds to get all of these inputs working together to achieve the desired outcome.

Over the last 12 months, the National Foods' engineering, manufacturing, packaging and supply teams have worked closely with Brickwood Holdings to develop and introduce a range of lightweight caps for milk and juice that provide consumer benefits.

Milk closures

National Foods has adopted a new Brickwood-developed closure for all two- and three-litre milk bottles that has been rolled out nationally. The business was looking for a cap that would improve the bottle seal and tamper evidence.

The new Brickwood Slitloc, three-start cap replaced the MBSL cap at the National Foods sites and the Triloc cap (with induction seal) at the former Dairy Farmers sites. The impact for National Foods sites was the changeover from a snap-on to a screw-on cap. It was a significant change for the National Foods operations as the screw-on cap required additional operator skills, testing and changes to capper equipment. For the Dairy Farmers sites the changeover was not as significant because the previous Triloc cap was already a three-start cap.

The Slitloc cap is made of HDPE and weighs 3.1g. It incorporates an extensively tested foam wad for improved sealing and resealing purposes. The three-start bottle design is more rigid and stronger than the previous MBSL cap neck. The tamper band of the Triloc and MBSL caps are injection moulded but the Slitloc cap has a slit tamper band. The control in the manufacturing process of a slit tamper band is much higher, further increasing the manufacturer's process efficiency.

The slit tamper band ensures a clean split of the tamper band from the cap which delivers a better tamper-evidence feature. The tamper band from the Slitloc cap has also been designed to stay locked on the bottle because loose tamper rings have been an environmental issue in the past.

Through the implementation and redesign of this closure an annual saving in material of 16 tonnes per annum could be realised.

Juice closures

The juice closure project began in 2008 and is in the final stages of implementation at four factories on five production lines. The result of this project is that National Foods now has a lightweight 38mm high density polyethylene twin-start closure with a silicon-coated paper for reseal and induction seal, and a break band for tamper evidence.

Trials showed that if the cap was made from HDPE it was easier to remove from PET bottles because friction between the cap and bottle neck thread was lowered.

The silicon-coated paper wad was selected because it makes the cap easier to remove by reducing the friction between the wad and the induction seal on the bottle. Other benefits are that it is made from partially renewable resources and provides good reseal capability.

A single fold-over tab induction was selected because the folded tab would not interfere with the thread and the seal would not open as the cap was removed. Peel seal testing was used to determine the optimum induction activation levels and part of the capital cost for the project included the purchase of measuring units that were able to test the energy the cap was subjected to. Each factory had its capping equipment assessed and new parts were ordered as required. The use of a slit band meant that the number and size of the bridges between the break band and the cap body could be controlled by a knife change. Brickwood installed integrated, state-of-the-art moulding, lining and slitting equipment along with sophisticated vision systems to minimise cap quality issues. Trials were initially conducted at National Foods' Lytton factory before rolling out the approved cap to other factories.

The end results exceeded expectations because in addition to easier removal the cap weight was reduced by 1.9g or 37 per cent. The implementation of this shorter walled closure has also presented the opportunity to remove some of the bottle neck as a further weight-saving option in the future.