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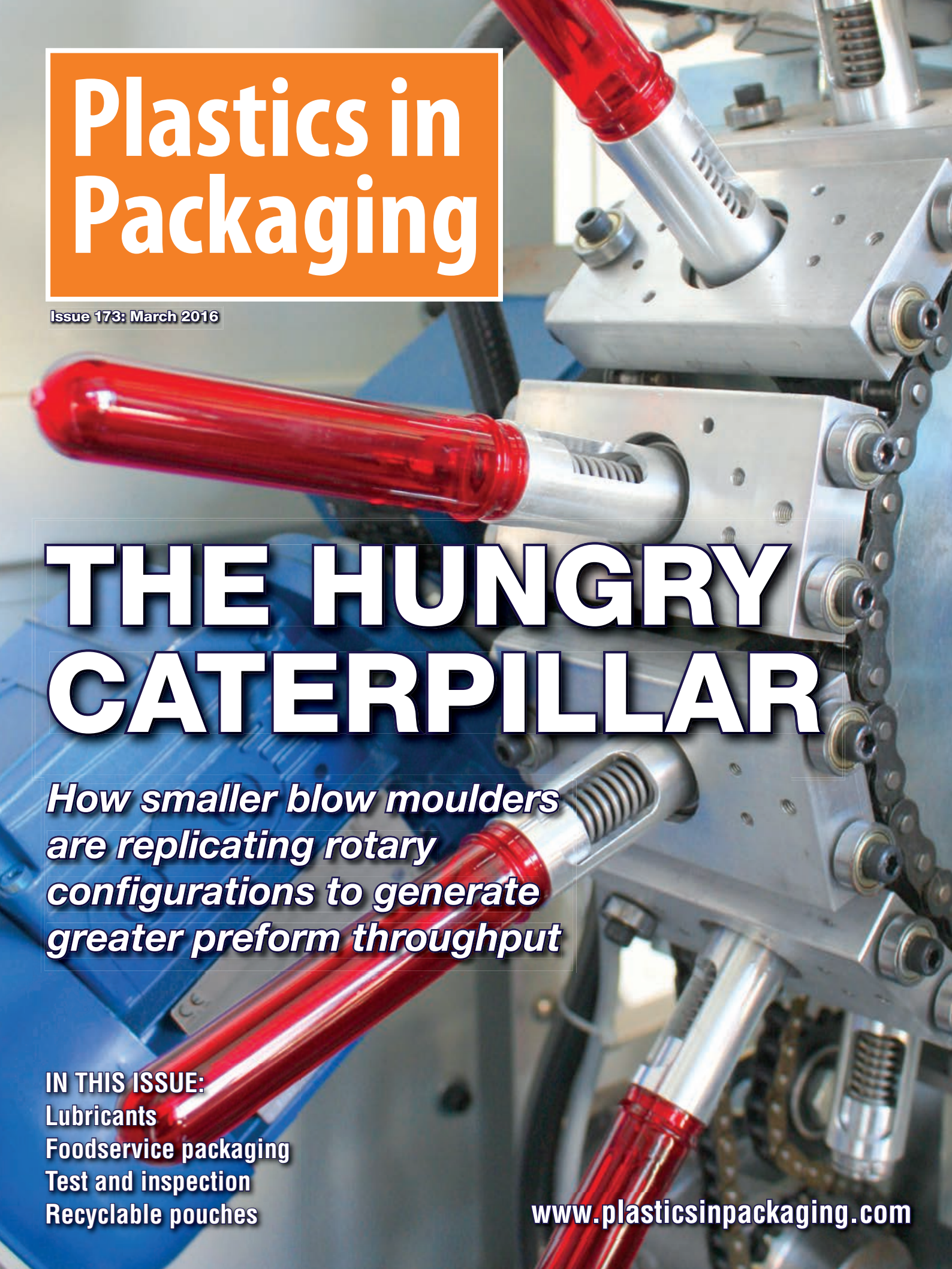

THE HUNGRY CATERPILLAR

How smaller blow moulders are replicating rotary configurations to generate greater preform throughput

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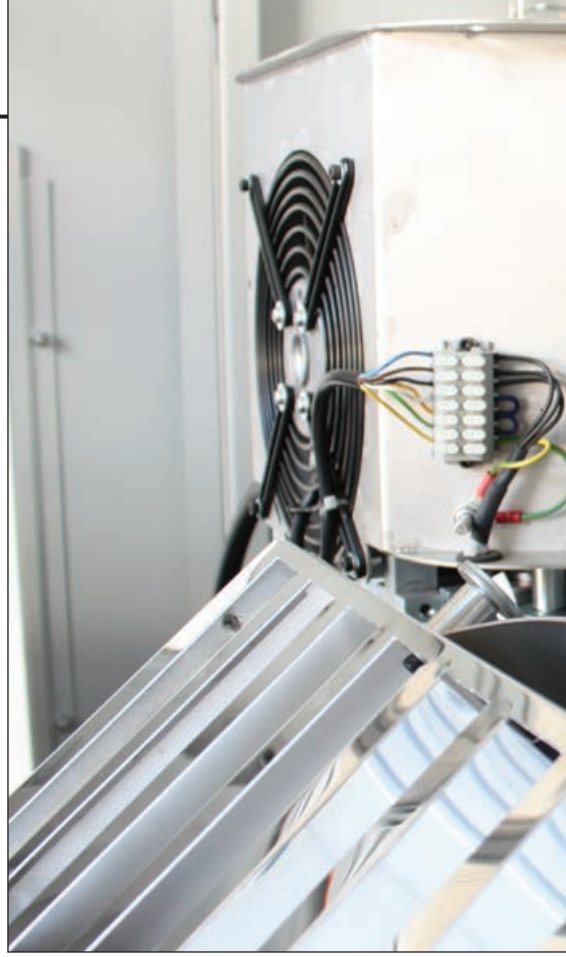
The 'little' machine that can do

Just as smaller automobile engines generally have to work harder than larger ones, higher demands are placed on smaller moulding machines when it comes to their versatility. **Dan Weissmann** reports



Small cavitation machines are typically intended for short runs and therefore must handle a multitude of different products. For such production machines, flexible capabilities and good reliability are a must because – by definition – such operations demand more changeovers and start-ups.

Another desirable feature in such manufacturing environments is the machine's ability to adapt easily to a variety of products and various production modes. And that is exactly what 1Blow, a French company set up five years ago, aimed to provide the blow moulding industry with its machine platform. And behind the brand is a technical team comprising veterans in blow moulding machinery design.

Some 40 machines have been placed into production as the company has expanded its offering from one- to four-cavities boasting outputs of up to 8,000 bottles an hour (2,000 bottles per cavity per hour). A six-cavity machine for wide-mouth container production is currently under consideration.

The single-cavity machine accommodates bottle sizes ranging from 12- to 25-litres while the higher cavity machines are suited to 4- and 5-litre size formats. At the low-end bottles as small as 20cl can be produced.

A variety of finish sizes can be handled up to 70mm diameter on one machine model. An alignment mechanism adjusts the centre-to-centre distance between preforms coming out of the oven to the distance in the blow section where the moulds are arranged linearly. The gripper moving the preforms from the post-oven transfer wheel remains engaged through the blowing step and ejection of the finished blown containers.

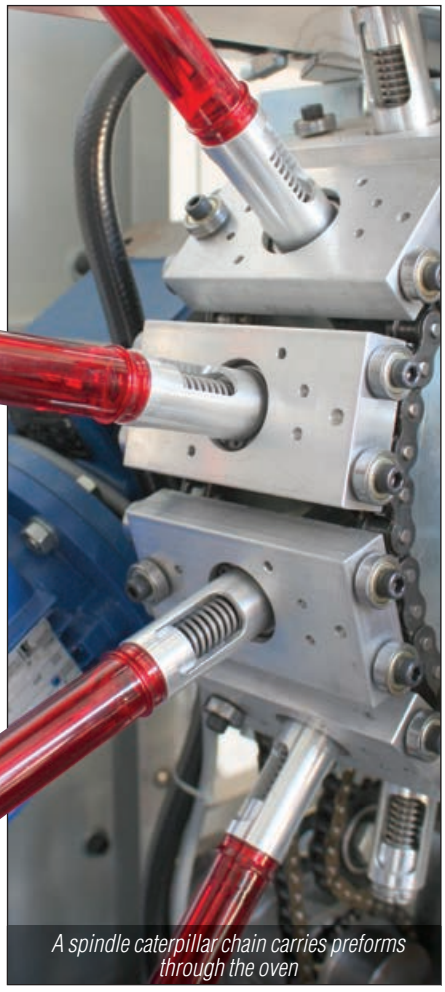
While there are a few rotary machines catering for the low cavitation range, the main competitors in this segment of the blow moulding market are linear machines. While all the functions of a rotary machine vary with the operational rotation speed of the system, movement speed in linear machines is dependent on system design, and specifically the motions needed and the components used. Hence, on rotary machines all process step times become shorter at higher running speeds, while the speed of various steps on linear machines may be fixed.

In addition, time could also be lost when mechanisms on the linear machine reset in preparation for the next cycle. Matching the high-output rate of rotary machines is a must to ensure economically-competitive manufacturing.

To achieve the shortest possible cycle times the 1Blow design maximises the use of a rotary machine configuration, mostly in the handling and loading, orientation and feeding (into and out of the oven) of preforms, but also in the use of a spindle caterpillar chain to carry preforms through the oven. The capacity of the three section oven has been enlarged so that difficult heating requirements – such as heavy wall or opaque colour preforms – can be met.

Five technology kits are used in configuring the machine for special process requirements. The first is neck finish orientation, required if trigger sprayer or pouring caps are to be in a fixed position relative to the shape of the container. The orientation servo driven mechanism uses a thread start as a reference for the rotational orientation of the preform into the blow mould. The use of the thread start eliminates the need for specially-moulded detectable features, meaning that any standard preform can be used.

Another kit provides a solution for the preferential heating of preforms in order to enhance material distribution in oval or oblong shaped containers. Vertical bands along the preform are preferentially heated to enhance higher stretching of the parts closest to the mould, and to provide more material for the areas of the preform that have to stretch to the farthest reaches of the mould



A spindle caterpillar chain carries preforms through the oven

Left: Oven banks receive the preforms.
Above and below: High-precision blow moulding

corners. Additionally, the heating pattern can be offset to improve the processing of off-centre neck bottles.

A third kit provides the necessary components for heat-setting processes, which are used to produce higher heat-stable containers for hot filling or pasteurisation.

The last two kits activate sections of the mould necessary for base inversion, where the push up is blown pointing down from the container base and then forced to the correct final position, or for forming extreme grip recessed handles that are blown in a two-stage process within the blow mould. The same kit can be used to release mould slides, which forms an undercut in the blown product, or similarly activate mould bars, which compress a given section of the product.

Although not packaging related, 1Blow demonstrated how these capabilities were utilised to blow mould a printer cartridge. The part must be oriented correctly in order for it to fit the printer and for all features to engage accurately. Lugs are moulded in the centre of the base where sharp definition is achieved by using base inversion.

All of the mechanical actions on the machine are servo-driven and therefore provide a high level of precision, repeatability and control. When used for base inversion, the servo system makes it possible to break the motion up into increments rather than a single push.

The open architecture of the machine makes it possible to add any of these capabilities to machines which have been already placed into production as easily as in the initial machine assembly phase.

Said David Batten, sales manager for USA and Canada at 1Blow: "An added attractive attribute is the ability of the machines to be fitted with the moulds of most of the common blow moulding machines currently in production worldwide, such as Sidel, Krones, SIDE, Mag-Plastic or KHS. Obviously, this benefit removes another expense in adapting products onto the 1Blow platform."

In today's competitive environment the ability to adapt machines to evolving needs rather than having to invest in new ones – combined with the ability to produce ever more complex parts at high accuracy and reliability and at a competitive cost – is no doubt a valuable asset.

More information from 1Blow, Chemin de Gerocourt, 23 Zone d'Activites des Quatre Vents, 95650 Boissy-l'Aillerie, France. Tel: 33 9800 820 70. Email:sales@1blow.com. Web: www.1blow.com P