EWIKON

Customer information from **EWIKON Heißkanalsysteme GmbH**

Hotline 2/2010

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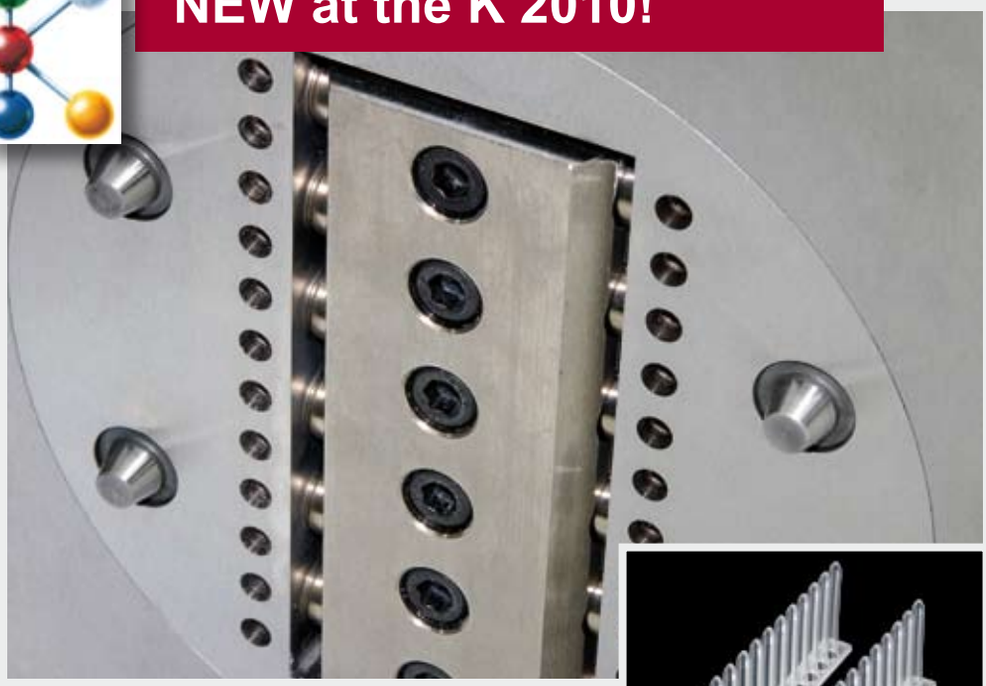

Ultra-compact multi-point valve gating solution

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LINDAL Group

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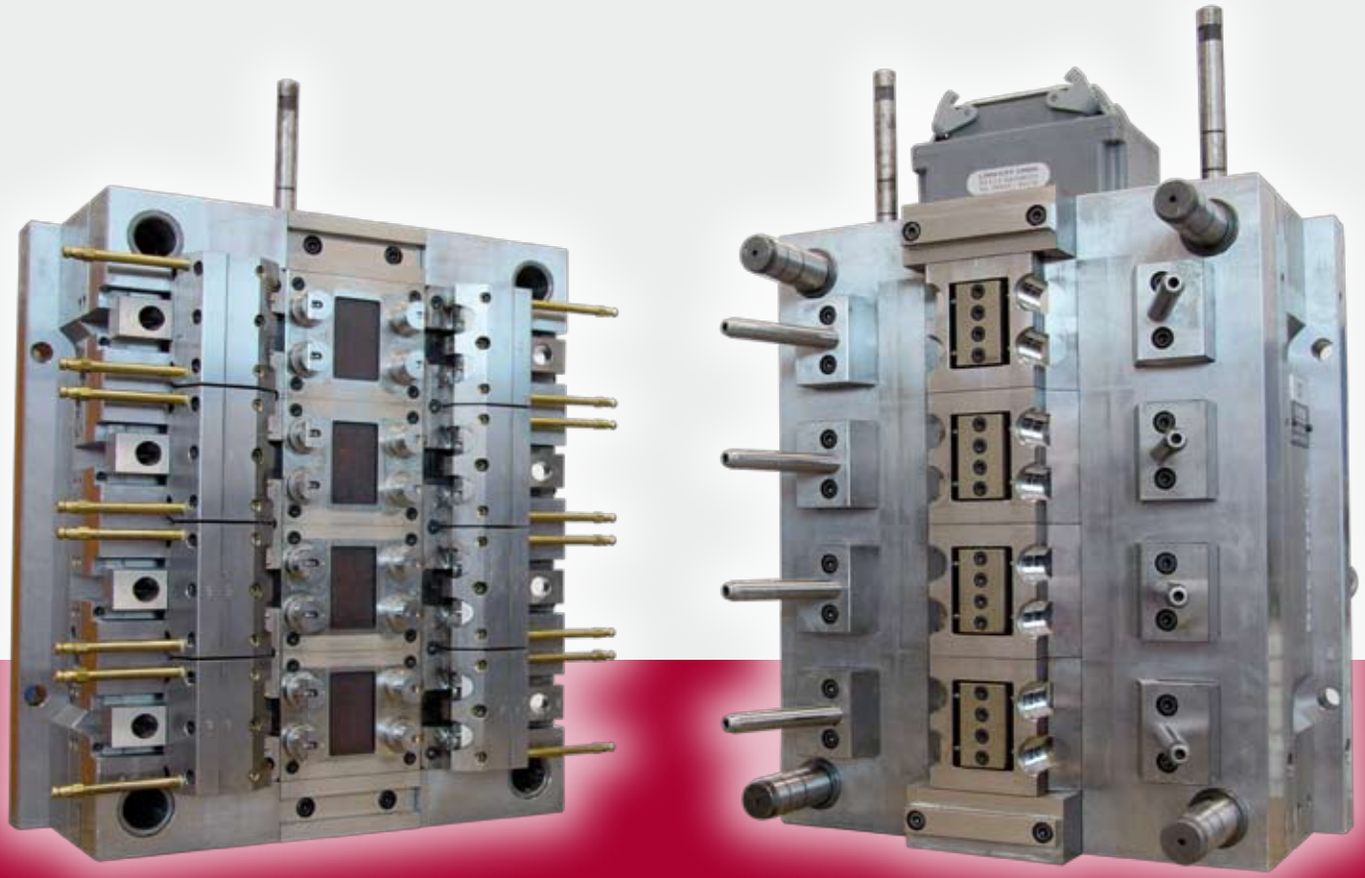
Hotline 2/2010
October 2010



Efficient production

33% faster cycle time with direct side gating

Lindal, an aerosol specialist operating on an international level, uses side gating technology to produce spray heads and inhalers. The semi hotrunner systems often used up to now enabled a cost-efficient mould layout but were an insufficient solution for the large-scale production - especially regarding the existing sprues and subsequent problems such as reuse of regrind material.
For the production of a spray head for asthma sprays a direct side gating solution with full hotrunner system combining a simple mould layout, easy maintenance and high productivity has now been realised.

Leonhard Fischer & Co. GmbH located in Bad Oldesloe is responsible for mould making within the Lindal group. In 2008 already when a 4-drop test mould for side-gating a spray head was designed the company searched for a maintenance-friendly alternative for the tunnel gates used until then.
The EWIKON HPS III-MH nozzle that was about to be launched at that time complied with all requirements. “However, the EWIKON nozzle was only designed for the radial arrangement of parts. But as the part contained a lateral opening for a nozzle insert a slider mechanism was required. Therefore, we preferred a linear arrangement of the parts because of the mould costs”, recalled Lutz Maske, Head of mould making at Lindal. EWIKON reacted quickly to the customer demand and developed a prototype of a linear nozzle version within only a few weeks. The serial version based on this prototype was intro-

The HDPE spray head has an 90° angled outlet. For demoulding the part a slider mechanism is required.

View on inner geometry of the part with valve opening.

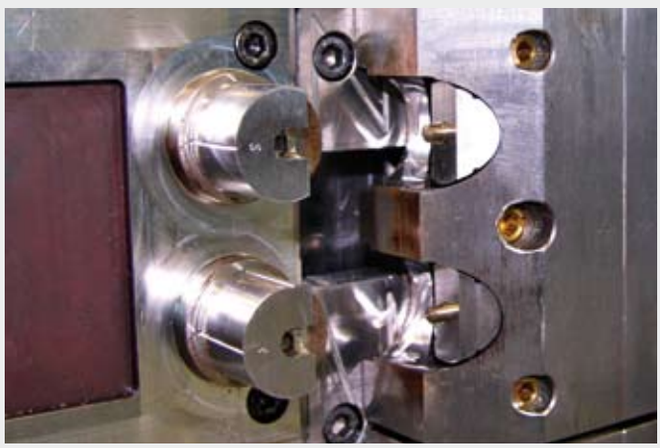
duced some months later. The prototype was assembled in the test mould and has been used so far.

Linear cavity layout reduces mould costs

On the basis of this positive experience Lindal decided to use an EWIKON nozzle for side gating when designing a new 16-drop full hotrunner mould for the production of a spray head for asthma sprays made of HDPE with a shot weight of 3.5 grams. The article is side gated in a 90° angle on the side wall. The mould replaces a semi-hotrunner solution with also 16 cavities.

Priority objective of the new design was a considerable reduction of cycle time which was 21 seconds for the old mould. Furthermore, the new design had to offer the option to switch off single cavities during production and to clean a blocked gate quickly on the machine.

As the outlet of the spray head is angled by 90° a sliding mechanism had to be integrated in order to be able to demould the part. As cleanroom production was also part of the technical specifications hydraulic actuating units could not be used in order to avoid any contamination with oil or aerosols. Consequently, the slides positioned on the ejector side are moved mechanically via angled bolts. The slider contour has a changing device for the dosing pin which forms the valve opening of the produced part. Therefore, different versions of the spray head to be used for different dose quantities can be produced without great efforts. On the hotrunner side four linear HPS III-MH nozzles with four tips each are arranged in-line. This results in a compact two-row cavity layout enabling a cost-efficient design of the sliding mechanism. A straight and fully balanced manifold provides the nozzles with melt. The flow channel layout is also fully balanced inside the nozzle where each gate is fed via its own melt channel. This guarantees an even filling



Mould contour on the ejector side with slider mechanism. The dosing pins are exchangeable.

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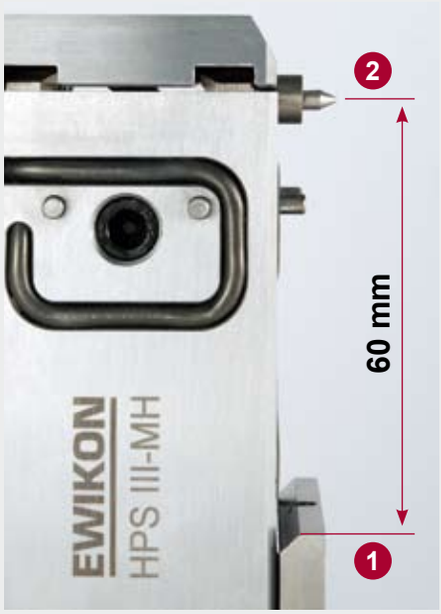

Bars (1) fix the nozzle in the mould and limit the length of the nozzle body influenced by thermal expansion to 60 mm. Thus the position of tips (2) only changes minimally during heat-up. Round gates with good vestige quality are possible (below).

behaviour. In addition, two heaters ensure a very homogeneous temperature profile in the nozzle body.

Round gates for excellent vestige quality

Two laterally flange-mounted bars fixing the nozzle in the mould limit the length of the nozzle body influenced by thermal expansion to 60 mm. Consequently, the positional change of the tips in the gate can be controlled any time and round gates up to a minimal diameter of 0.4 mm become possible. For this particular application the gate diameter is 1.2 mm. The required overall length of 129 mm is only achieved by using an adaptor. It is variable in length and positioned behind the bar.

Easy maintenance from the parting line of the mould was most important when designing the nozzle. The patented assembly procedure for the tip inserts makes it very easy to replace them on the machine and at the same time meets several of the specifications defined by Lindal. After demounting the end cover flange the tip can be removed in a combined rotating and tilting movement. “This principle does not only allow quick routine maintenance”, says Lutz Maske, “but also meets our demand for simple cleaning, if a gate is blocked by impurities, for example foreign material. After removing the tip insert concerned it is very easy to clean the gate area mechanically. The downtimes are minimal." Also, a cavity can be switched off completely without any problem thanks to the easy accessibility. Instead of a tip insert a blind insert without melt bore is used in this case.

The mould was designed and built in Bald Oldesloe. Even the trial took place in the in-house technical centre. The realised cycle time of 14 seconds and an improvement of 33 % fully met Lindal’s expectations. All other required product characteristics were checked for proper function on-site including a simulated cavity switch-off. “All features promised by EWIKON were fully suitable for practical use”, explains Lutz Maske, “and the mould has produced perfect parts almost from the first shot.” After the trial had been finished the mould was transferred to the final production site in Italy where 15 million parts per year have been produced without any trouble on a 120 ton machine since May 2009.

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With 700 employees and global presence the Lindal group is one of the leading manufacturers of valves and spray heads for aerosols. A broad range of standard products is complemented by customer specific solutions for all industries. The product range is completed by customized assembly and handling machines for the aerosol producing industry. Leonhard Fischer & Co. GmbH is the mould maker of the Lindal group and is located in Bad Oldesloe, Germany. 50 people are employed for designing and manufacturing injection moulds and special machinery. The company has an own R&D department as well as a fully equipped technical centre with two electric injection moulding machines for mould tests and trials with a holding pressure requirement up to 150 tons.

www.lindalgroup.com

NEW product!

A new valve gate version within the HPS III-MH multi-tip nozzle range allows distances between cavities as close as 9 mm. This opens up new possibilities for the production of medical parts.

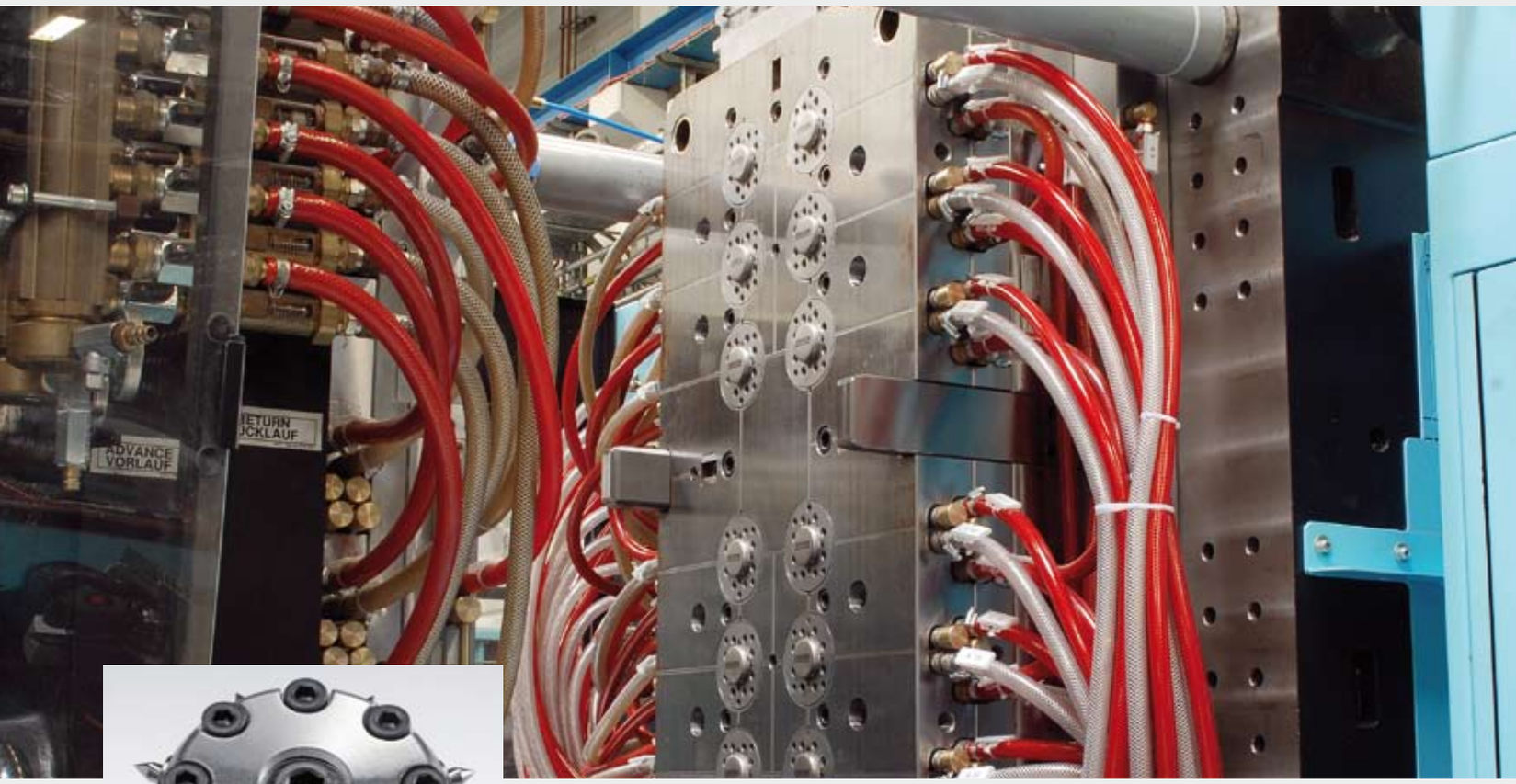
Ultra-compact multi-point valve gating solution

The new valve gate version has been developed for applications where multi-point valve gating with minimal distances between the gating points is required, for example the production of transparent micro sample tube strips in the medical industry. To guarantee an even filling of the part an ideal solution is to place a gating point on the bottom of each tube.

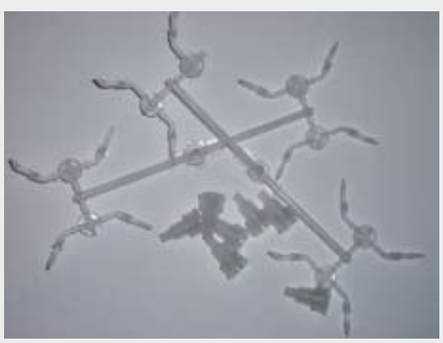
To demonstrate the performance of the new system a 2-drop test mould was designed. The part produced is a sample tube strip with twelve tubes. Each tube has a gating point placed on its bottom. To achieve the required distance of only 9 mm between the gating points the nozzle body of a linear HPS III-MH single tip was enlarged so that six melt outlets could be placed on each of the long sides. Each outlet has a specially shaped heat conductive insert and feeds two valve pins which run parallel to the nozzle body. This allows to arrange twelve valve pins in a row with the required close distance. The flow channel layout in the nozzle body ensures a perfect natural balance of the system which - if ever - in case of use of conventional slim nozzles could only be realised with highest technical efforts. The valve pins are actuated by a synchronous plate and are guided and sealed close to the gate in the standard mould insert. As with all versions of the HPS III-MH nozzle the maintenance or replacement of the heat conductive inserts is possible from the mould's parting line with no need to dismantle the system. To access the nozzle only the nozzle sided contour plate has to be moved to the ejector side of the mould.

The part a sample tube strip has twelve gating points on the bottom of each tube (above)

Each of the special heat conductive inserts distributes the melt to two valve pins (right)



HPS III-MH with 8 tips (above).
Parts from the 96-drop hotrunner mould (below) and from the production with partial hotrunner (lower). The sprue waste required additional peripheral equipment.



More flexibility - enhanced productivity

96-drop mould for mass production in the packaging industry

MeadWestvaco (MWV) is one of the world's leading suppliers of packaging solutions. At MWV's manufacturing facility in Hemer, Germany, components for dispensers and sprayers for the home and garden market are injection-moulded and assembled on fully automated production lines. Except for a few purchased parts all components are manufactured in-house. For the mass production of a tube retainer an ambitious 96-drop hotrunner solution replaces existing production moulds and adds efficiency to the manufacturing process.

The tube retainer which guides, seals and fixes the flexible tube that protrudes into the bottle is an important component of the sprayer. The part has a shot weight of 0.5 gramm and is used in almost all sprayer versions produced in Hemer. 550.000 parts are required per day. Until recently the tube retainer was produced by using three older moulds equipped with partial hotrunner systems, two of them with 48 and one with 64 cavities. For removal

of the sprues handling systems were installed. For recycling additional grinders were needed to re-granulate the sprue waste. In terms of figures the moulds running with a cycle time of 15 seconds occupied 2 ½ injection moulding machines. "This kind of production was no longer appropriate", says Andy Peter Brinkschulte, responsible for injection moulding process optimization, "because it blocked valuable machine capacity. Furthermore, maintenance and spare parts for the old moulds and the peripheral equipment turned out to be more and more cost-driving." A solution to produce the daily requirement of tube retainers in just one mould without the need for additional peripheral equipment was required. MWV decided to design a 96-drop full hotrunner mould in co-operation with a Chinese mould maker. To meet the demands a cycle time below 11 seconds was needed. "That was a demanding task", explains mould-shop supervisor Heinz-Jürgen Johannsen, "because the part geometry required side gating. We needed an excellent cooling of the cavities as well as a perfect filling with balanced melt streams because the part must be produced with high dimensional stability." This because the tube retainer contains several sealing and fitting surfaces with close tolerances which are important for proper function of the finished dispenser as well as for the following assembling process. Since further processing is fully automated dimensional deviations will inevitably lead to part damage and therefore to assembling process faults.

Efficient hotrunner technology for an advantageous mould layout

EWIKON supplied the hotrunner system. "In the early stage of the project EWIKON launched a new solution for direct side gating", remembers Johannsen, "and it was exactly what we were searching for. One nozzle can gate 8 parts directly, allowing a very compact mould design. At the same time a maintenance-friendly operation with easy replacement of tip inserts was promised. Another important feature was that the installation was possible with no need to split the cavity insert. That gave us freedom for an optimal design of the cooling layout in order to realize the demanded cycle time. However after discussing the project with EWIKON and our mould maker we decided to build an 8-drop prototype mould first before tackling the large production mould."

To integrate the calculated cooling channel layout the cavity insert was made of two parts. After milling the recesses for the cooling channels they are connected by vacuum brazing before machining

View on mould inserts from the moulds parting line (upper pic). Inner geometry of the mould insert (below)

the part and gating contours. The first trial of the test mould was in April 2009 and the hotrunner solution won over. In June 2009 the design for the production mould started. It features 12 HPS III-MH nozzles with 8 tips each in radial version. To control the thermal expansion EWIKON recommended to use a segmented manifold system design.

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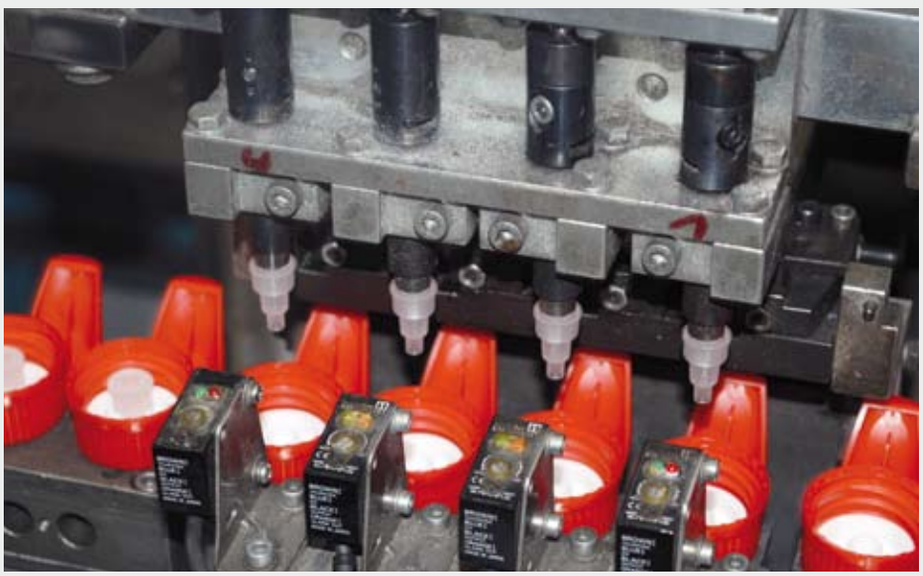
To guarantee a trouble-free processing on a fully automatic assembly line (below) and a proper function of the sprayer (right) the part must be produced with high dimensional stability. The picture at the bottom right shows a conical surface on the part which has an important sealing function.



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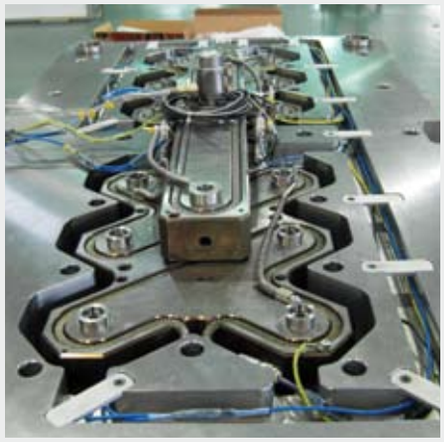
On a first level two fully balanced manifolds are placed each of them feeding six nozzles. A bridge manifold placed on a second level distributes the melt to the 6-drop manifolds. All hotrunner components were installed on-site in China by an EWIKON application engineer. The trial of the finished production mould was a pleasant surprise for all persons concerned. "Normally the balancing of the system as well as the opening behaviour of the nozzles are crucial points in such high-cavity side gating moulds", says Heinz-Jürgen Johannsen, "but we were absolutely impressed by this solution. At the second shot all cavities were filled equally. This is an exceptional performance and an indicator for a good temperature profile of the nozzle as well as a perfect flow channel balance." The cycle time of 10 seconds fully met the expectations. The excellent mould trial results were validated when the mass production of the tube retainer started in Germany at the end of February. Ever since the mould produces without any problem on an Engel-Speed 280 ton injection moulding machine four days a week in three shifts. 800.000 tube retainers are moulded per day. Only two times a tip insert had to be removed to clean the gate. "Both times impurities in the material caused the problem", explains Johannsen, "the hotrunner system works trouble-free. The tip insert removal is easy because the nozzle is accessible by just opening the mould. In theory all tip inserts can be easily exchanged this way. There is even the option to shut down cavities by inserting tip inserts without melt bore to maintain production in case of cavity failures. But at the moment all these features are nothing more than a nice-to-have for us. We have never needed them." The new full hotrunner solution does not only enhance productivity and process reliability but also allows a more flexible use of the injection machines. Compared to the previous solution there now is only one machine required to produce the tube retainers needed. The machines that needed to be occupied additionally can now be used for the production of other components. If necessary even more machine capacity can be made available by pre-producing parts for a longer time than the regular four day production time. So also the production machine can be used for other purposes.



Manifold layout: Two 6-drop manifolds are fed by a bridge manifold.

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