

Hotline

October
2016



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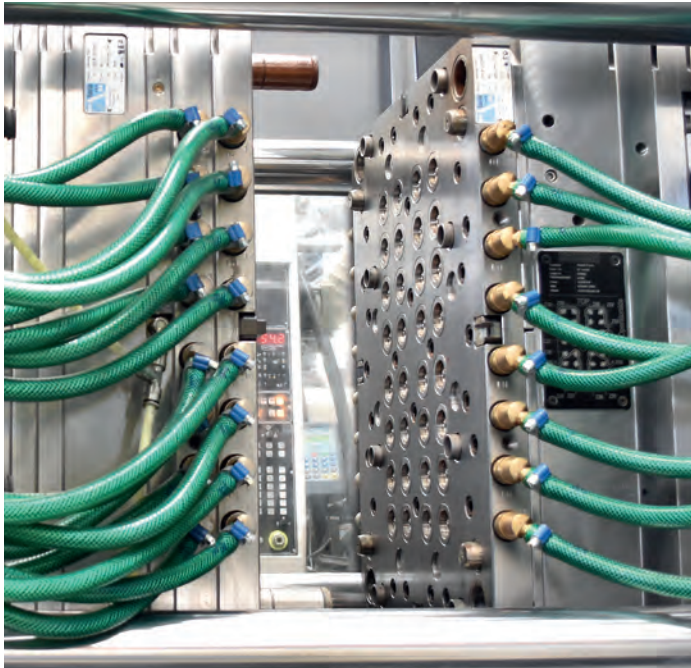


Valve gate solutions for complex trigger sprayer parts

Precision gating in confined spaces

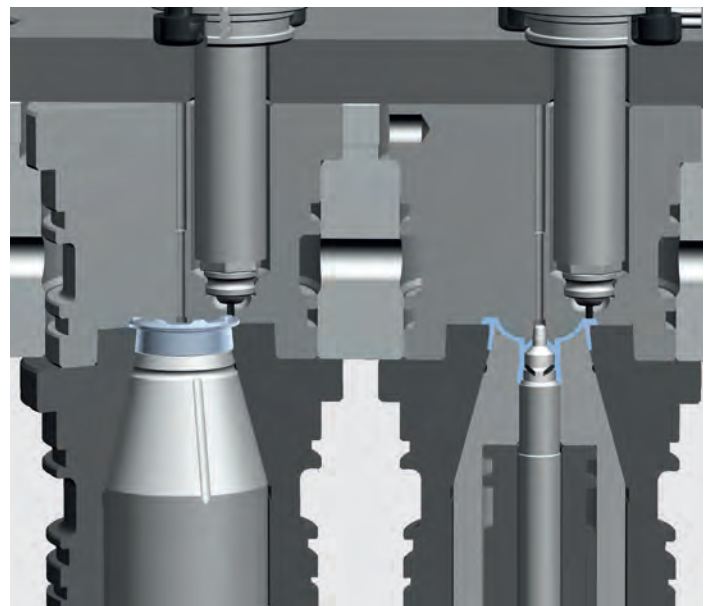
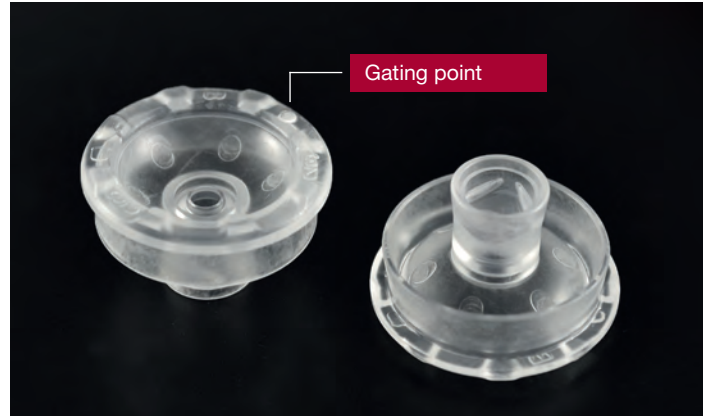
When planning multi-cavity injection moulds for the spray nozzle and the central valve of the pumping mechanism for a new trigger sprayer version packaging specialist Guala Dispensing, hotrunner supplier EWIKON and the mould makers ABAZIA and BLT had to find solutions for a cost-effective mass production with high process reliability. While the application requirements for the two demanding parts were different hotrunner valve gating proved to be the method of choice in both cases.

The TS5 spray system is the newest and most innovative product in the extensive Guala Dispensing range of trigger sprayers. Besides its attractive and ergonomic design it features an all plastic pumping mechanism which offers pre-compression functionality for drip-free dispensing as well as a consistent droplet size of the spray jet and a high chemical resistance which allows to process a wide range of liquids. Considering the quantities needed, 32-drop multi-cavity moulds were designed for both components, valve and nozzle. To ensure a most cost-effective production with zero waste, no additional work steps and low cycle times, direct gating with a full hotrunner system was obligatory. Right from the beginning of the concept phase Guala Dispensing worked in close cooperation with hotrunner specialist EWIKON and their trusted mould makers ABAZIA and BLT which have long-term expertise in demanding



Valve, material EVA

- 32-drop production mould (above).
- The part is gated on the outer ring (above right).
- The slimline design of the HPS III-S nozzle requires a bore of only 12 mm for installation. This allowed mould maker ABAZIA to optimise the cavity cooling and venting (right).



packaging applications. After discussing the technical demands it became obvious that both moulds require valve gate technology in order to achieve a high process reliability, optimized cavity filling and a perfect gating point quality without any gate marks.

The valve which is made from EVA is an essential component of the pumping mechanism. It holds the ball to prevent liquid from moving back into the bottle, seals the pumping mechanism against the housing of the sprayer and also features a flexible dome which acts as a return spring. To fulfill these multiple tasks the valve with a shot weight of only 0.35 grams has to be produced with very tight tolerances. “We had to guarantee a high shot-to-shot consistency among all 32 cavities without any uneven filling or overpacking”, says Maurizio Bistolfi, Engineering Manager at Guala Dispensing. “Especially because some of the functional surfaces have very small wall



- HPS III-S nozzle with 3 mm flow channel diameter and compact coil heater. The outer diameter is 10 mm.

thicknesses. Even small deviations in filling of the cavities can affect the function here. An example is the dome-shaped part which has to perform a defined elastic deformation during operation. When we discussed the options with EWIKON we decided to go for a valve gate system with synchronous plate operation where all valve pins open and close simultaneously – a new but promising solution to us.”

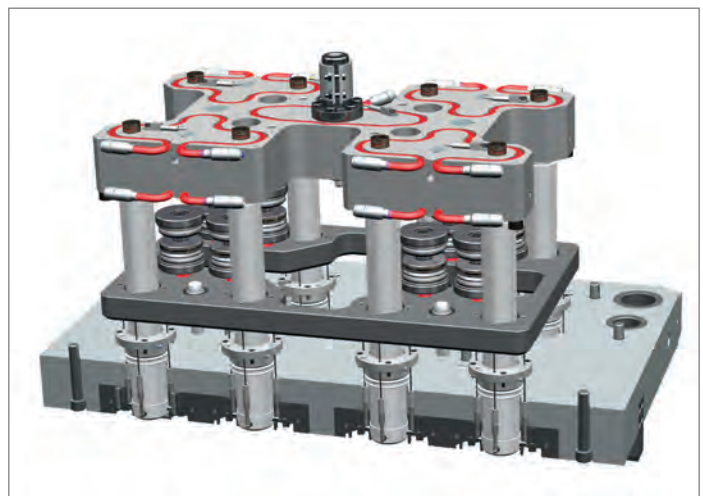
The version that was finally chosen features a pull rail actuation for the synchronous plate which is operated by a pneumatic drive unit attached to the outside of the mould. This actuation principle does not only allow a particular smooth valve pin operation but also leaves the option to upgrade to an electric servo drive unit for even more precision in valve pin positioning and movement.

Mould maker ABAZIA paid special attention to a perfect surface finish, proper cooling and appropriate venting of the cavities. Due to the complex shape of the valve with openings on both sides the only option to place the gating point was in a decentral position on the outer ring. By using the EWIKON HPS III-S nozzle in its most slimline version the gating position could be reached easily. It features a flow channel diameter of 3 mm, an outer diameter of 10 mm and a high and constant heating power due to compact coil heaters.



Nozzle, material HDPE

- Gating point position on the front side of the part (above).
- Since the available space is restricted by core inserts using the valve gate version of the HPS III-MH multi tip nozzle was the only option to reach the gating point (above right).
- Hotrunner system design. The valve pins are actuated by a synchronous plate which is positioned between nozzle and manifold (right).

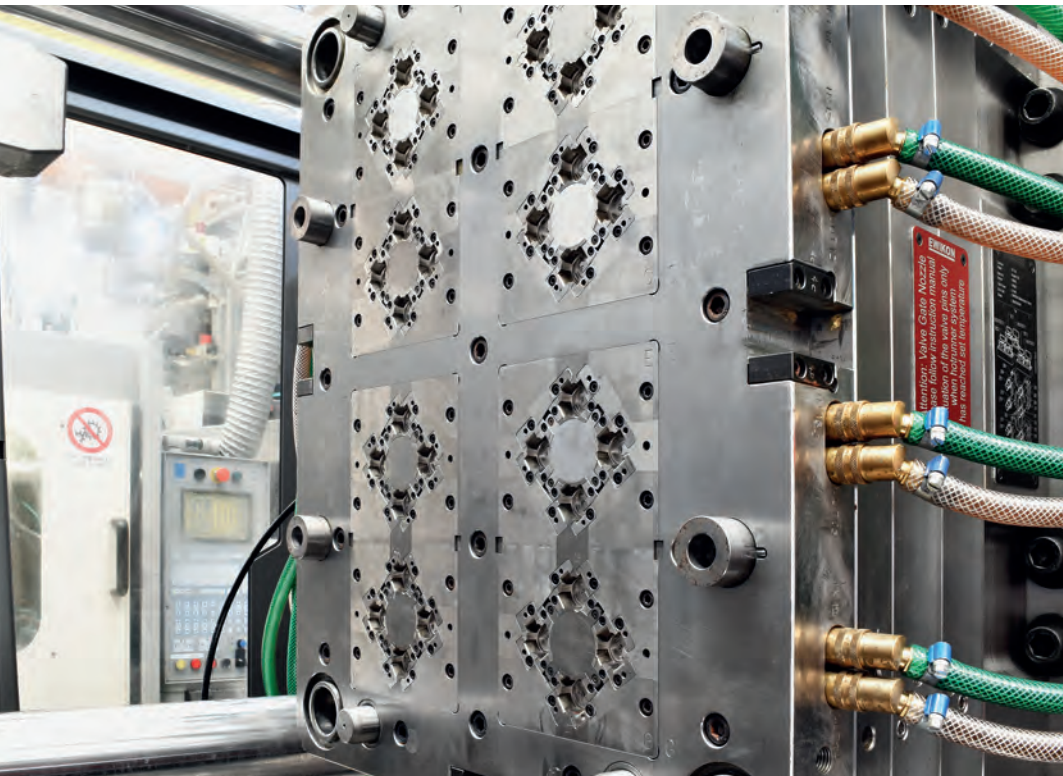


The nozzle requires a bore diameter of only 12 mm for installation. “A big advantage for us”, explains Gianni Racioppa, Technical Manager at ABAZIA, “because the minimum space needed for the nozzle made it much easier to integrate an optimal mould insert cooling. At the same time it allowed us to place a central cavity venting in an ideal position opposite the central core insert and only 6.5 mm away from the gating point.”

The nozzles feature front installation technology and are easily accessible for maintenance or replacement by removing the cavity plate from the fixed half of the mould. They are installed in four groups each with eight nozzles aligned in two rows and are fed by a fully balanced HPS III-T manifold system with streamlined distribution elements. This technology allows a compact manifold design with flow channels at different levels and – despite the relatively low distance of 47 mm between cavities – a perfect balancing of the system.

The second part, the nozzle, is made from HDPE. It features a precision bore in the centre which turns the stream of liquid delivered from the pump into a homogeneous, fine spray jet. Moreover, when rotated by 90° it closes the spray bottle to prevent an accidental release of liquid. Since the nozzle is an important part of the spray head design the optical appearance is an important factor. Depending on the end customer’s preferences the part is available in a multitude of colours. Due to cutouts on all four sides of the nozzle body - a patented design feature - the “ON” and “OFF” positions are clearly recognisable for the user. “This kind of part is normally perfectly suitable for side gating”, explains Bistolfi, “but since four slides per cavity are required for the cutouts it was impossible to place the gating point at the side of the part. So we had to use a valve gate system to guarantee a consistently good gating point quality.” A suitable gating point position on the front surface of the nozzle was determined with the support of a Moldflow analysis

conducted by EWIKON. However, reaching it turned out to be a challenge. “The complex part geometry also required three replaceable core inserts to be positioned on the hotrunner side of the mould in direct proximity to the gating point. Two of them are needed to form slots where additional components can be snap-fitted with the finished part, the third one is placed in the centre and holds the pin which forms the bore opening. Thus, the available space was heavily restricted so that even a very slim valve gate nozzle could not be integrated. The only feasible option was to use the EWIKON HPS III-MH multi tip nozzle in its valve gate version”, remembers Felice Causone, Technical Manager at BLT. This innovative concept uses the body of a HPS III-MH nozzle for side gating and – due to its compact design in the gating area – allows valve gating in very confined spaces. The melt is fed laterally through specially shaped heat conduc-



■ 32-drop production mould for the nozzle. 4 cavities are grouped in one mould insert. The HPS III-MH valve gate nozzle is placed in the centre.

system without dead spots in the flow channels could be achieved in a most easy and effective way. As a supporting measure to speed up colour changes even more, the concept allows easy manual cleaning of the gate area by removing the heat conductive elements of the nozzle. They are easily accessible via the split face of the mould by simply removing the nozzle's central cover. For disassembling and reassembling them EWIKON has integrated a special mechanism which allows to move the valve pin to a maintenance position just outside the heat conductive element.

In order to fine-tune the concept and to sort out possible weak spots BLT realised a 2-cavity test mould with all features integrated before building the final production mould. Meanwhile another 8-cavity mould for a special version of the nozzle has been added.

EWIKON delivered each system as a package consisting of the complete hot half and a matching high precision HPS-C-PRO+ controller system. This allowed both mould makers, ABAZIA and BLT, to focus on the complex cavity design and considerably facilitated the integration of the hotrunner system. After a problem-free start-up both moulds started the serial production in January 2015.

tive elements while the gate is positioned in demoulding direction. The valve pins move outside the hotrunner system parallel to the nozzle body and are actuated by a synchronous plate which is positioned between nozzle and manifold. Each valve pin is guided by a combined guiding and sealing element before crossing the heat conductive element without contact. Since the sealing elements are positioned in the cooled mould insert near the gate a leakage-free operation and a minimum load on the valve pin are guaranteed. The nozzle is used in its radial version with

four melt outlets. A total of eight nozzles are positioned in two rows. For mould maker BLT this solution was ideal in many aspects. Four cavities could be grouped in one mould insert with the EWIKON nozzle in the centre. This simplified the cavity cooling and allowed a compact integration of the required complex slide mechanism. The system layout also proved to be helpful for the required frequent colour changes. Since a part of the melt distribution is already integrated into the nozzle the main manifold layout could be kept simple and a perfect natural balancing of the

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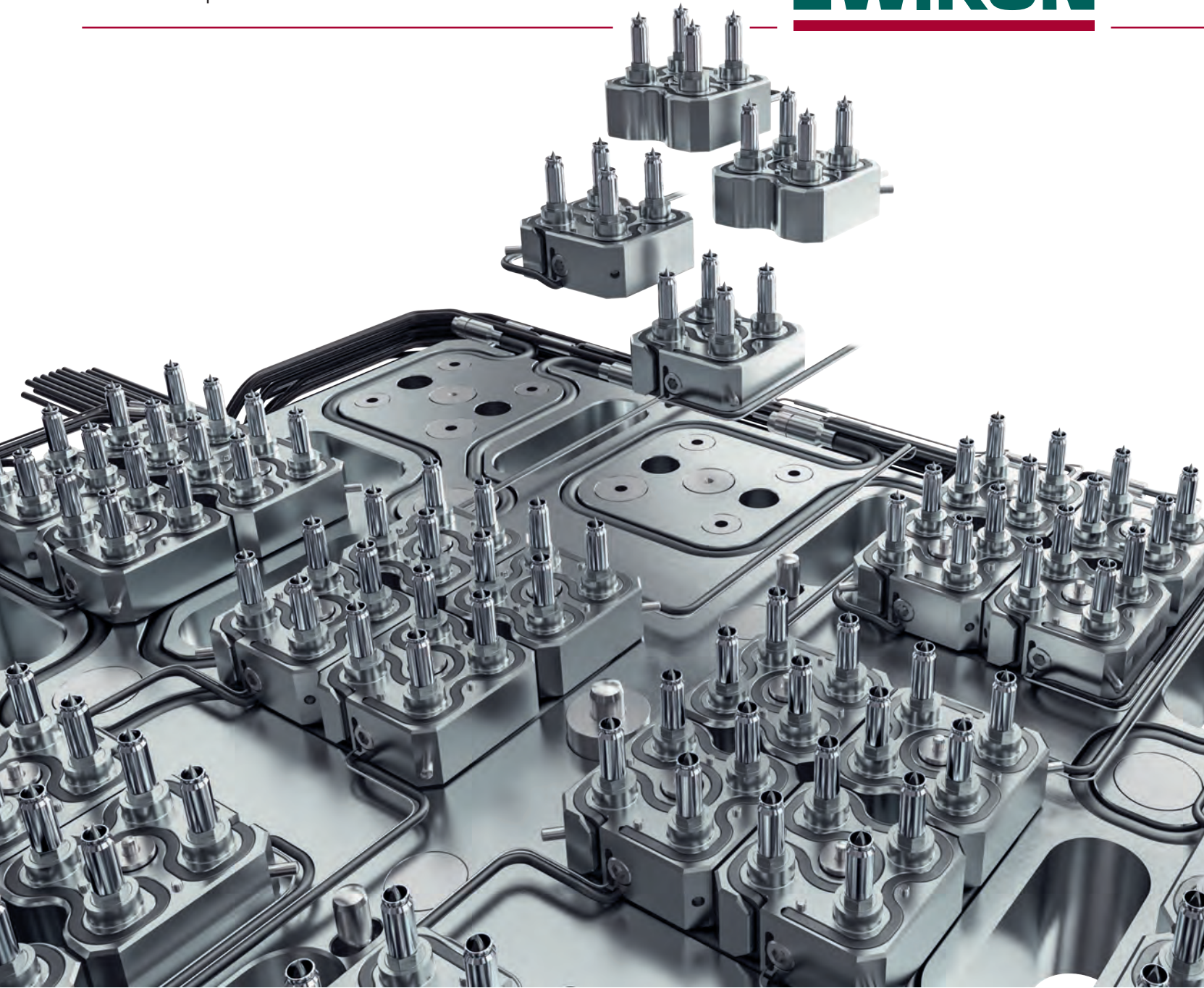
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EWIKON micro-manifold technology

Standardised up to 192-drop

The solution for the process-reliable processing of polyolefines in compact and very stable high-cavitation moulds. Target sectors are the packaging and medical industry where an efficient large scale production of parts with small shot weights is required.



Standardised design

High-cavitations mould designs are based on standardised 16-drop clusters with 4 micro-manifolds each.

Complete hot halves are available in the following versions:

16-drop	32-drop	64-drop
96-drop	128-drop	192-drop



Compact and stable

With only one control zone per micro-manifold the amount of cables and thus the space in the manifold frame plate which is required for wiring of the system is considerably reduced. Furthermore, no flexible cables are installed in hot areas. A part of the saved space can be used to integrate additional support sleeves or domes into the plate. Therefore, mould designs with micro-manifold technology are not only particularly compact but also very stable.



Cooling supply

The cooling supply with transition to the mould inserts is directly integrated into the hot half. This facilitates the layout of the cavity cooling.

Product features + Benefits

- Micro-manifolds with four screwed-in heat conductive tip inserts each and very homogeneous temperature profile for the process-reliable processing of polyolefines
- Easy design of moulds with up to 192 cavities based on standardised 16-drop clusters combined with a bridge manifold
- Fully balanced flow channel layout with short flow path lengths, reduced pressure loss and minimised residence times
- Only one control zone required per micro-manifold. Considerably reduced control expenditure
- 30 mm distance between cavities within a micro-manifold
- High maintainability. Easy exchange of tip inserts after removal of the mould inserts
- Reduced space requirement for electric wiring allows very compact moulds with maximum stability
- Cooling supply integrated into the hot half with transition to the mould inserts

Micro-manifold technology for your application?

Test it!

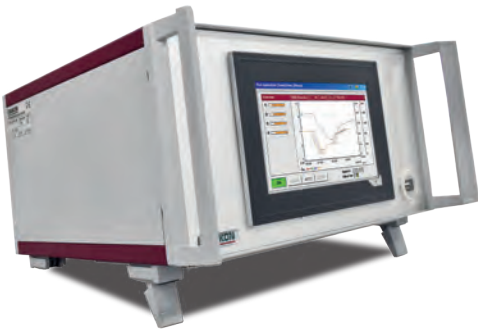
You are planning a high-cavitation mould and would like to know if micro-manifold technology is a suitable solution for your application? In our technical centre we offer you a 16-drop test mould with a given geometry which is equipped with micro-manifold technology. This allows you to test your specific material and to evaluate the process suitability as well as the gating point quality. Our experienced application engineers will support you in any aspect of your project.



Please contact your EWIKON sales partner in order to fix a date and time.

The next generation

EDC-PRO controller for electric drive valve gate systems



With EDC-PRO EWIKON introduces the next generation of controllers for the precise operation of valve gate systems with electric linear step motors. Up to 32 drive units can be controlled in automatic or manual setting mode. In addition to the well-known extensive options for individual valve pin control and positioning the per-

formance and the functionality have been furtherly increased. The response time has been considerably reduced resulting in a cycle of only 2 milliseconds for scanning of signal inputs and activation of drive units. An extended motion profile now allows to access 6 valve pin positions within one moulding cycle so that more complex sequences of the valve pin movement are possible. Furthermore, the new controller is suitable for operating different sizes of drive units at the same time, thus giving the mouldmaker more freedom of design. Due to configurable network parameters the controller can be easily integrated into company networks. To enable a more intuitive operation and to enhance the ease of use for the operator a new touch screen concept featuring a high resolution display has been integrated.

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