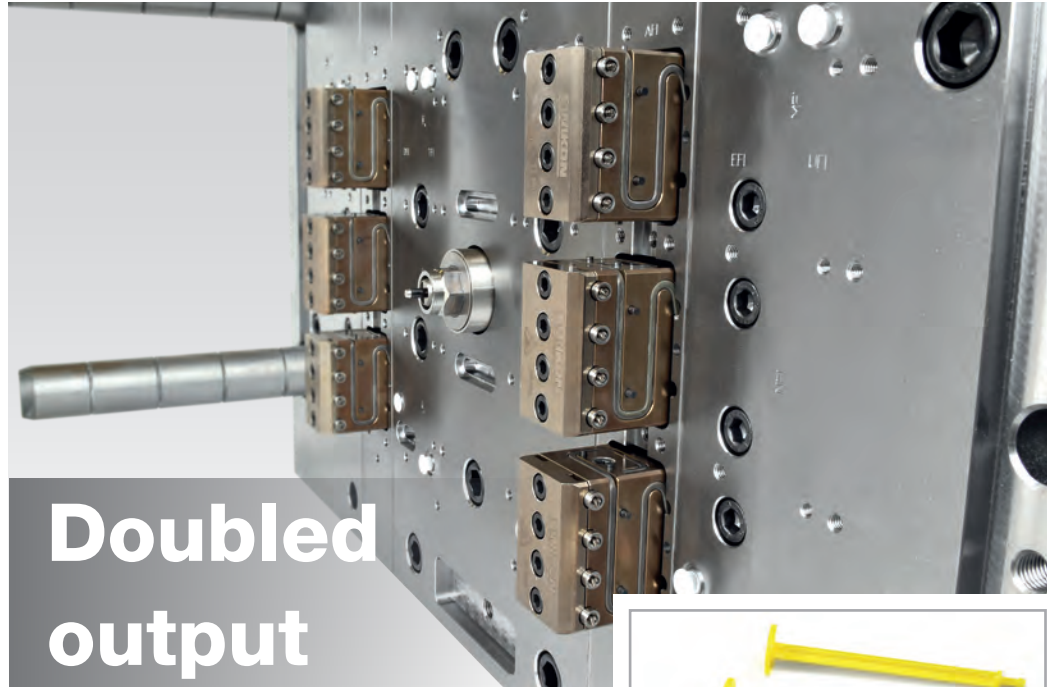


Hotline

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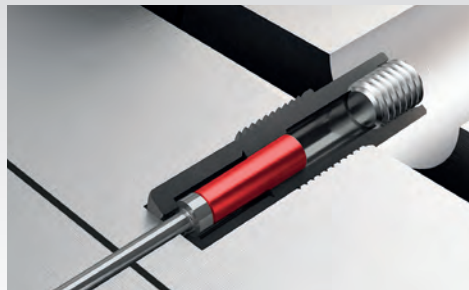
Doubled output

New stack mould concept
for the production of
syringe plungers



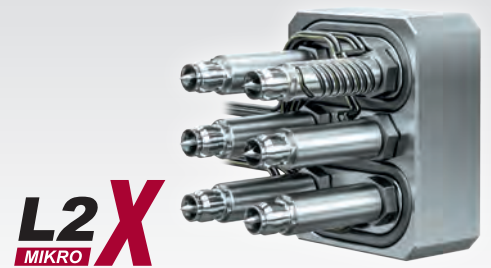
Pages 2 - 4

Enhanced
operational safety



Overload safety device for
synchronous plate valve gate
systems Page 5

More performance
for small machines



High performance hot runner
system with direct nozzle heating

Page 8

For syringes and pipettes

HPS III-MHR111 multi-tip nozzle
for direct side gating

Pages 6 - 7





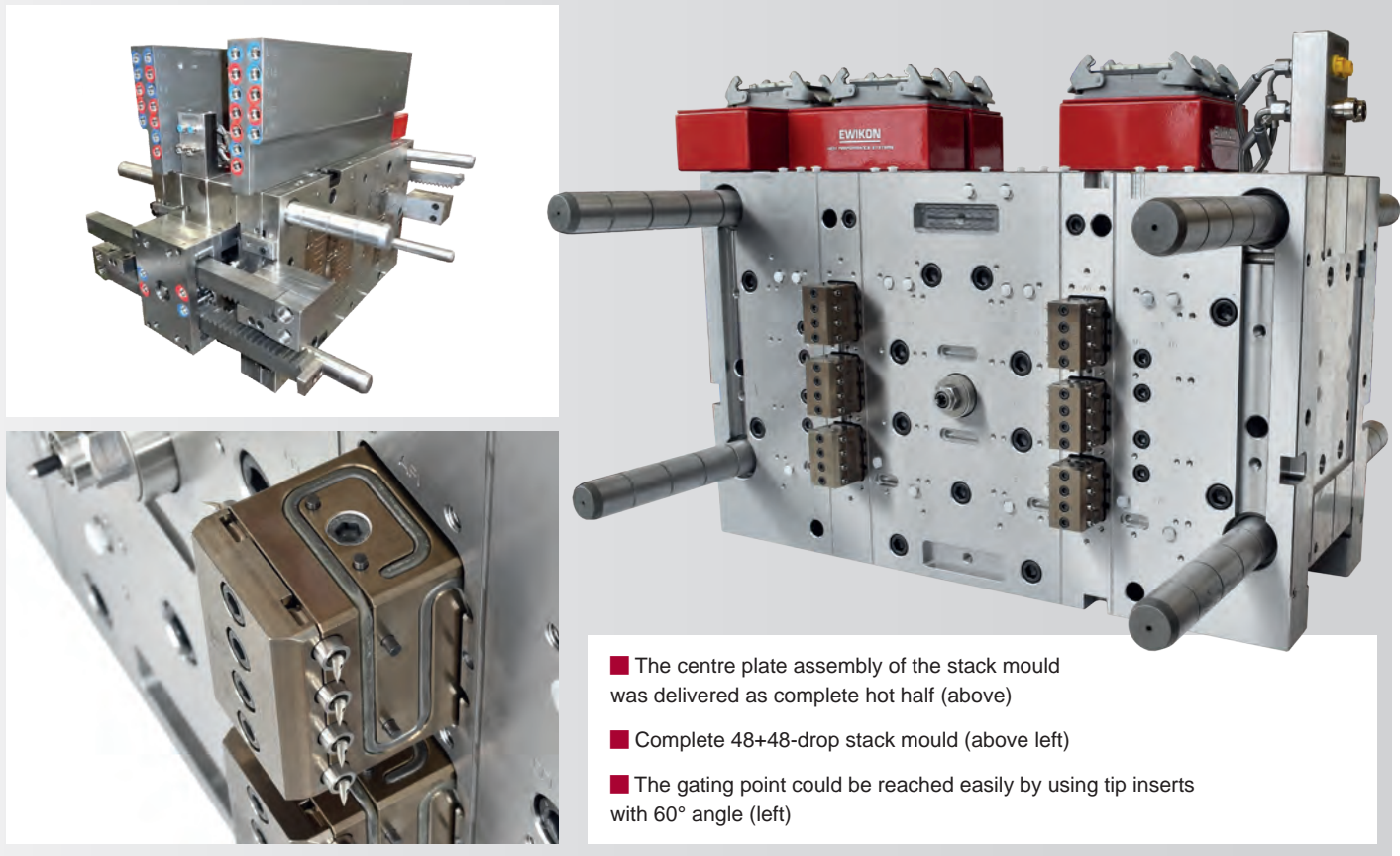
Syringe plunger production

New hot runner mould generation doubles output

Plungers for three-piece disposable syringes are needed in quantities in the billions. When injection moulder MORA had to react to increased volume requirements from their end customer, a large manufacturer of medical products, the existing mould concepts had to be reviewed regarding productivity and cost-effectiveness. As the result mould maker SOFAMI developed a new stack mould concept which features an EWIKON full hot runner side gating system.

The MORA group is specialised in injection moulding of precision parts for a variety of industries including a clean-room production for medical components at the Chambost plant in France. All moulds are designed and built by mould maker SOFAMI which is also a member of the MORA group and located nearby. The end customer for the plungers is a leading manufacturer of disposable syringes.

With increasing quantities requested by the end customer the existing moulds turned out not to be productive enough. Today the PP plunger with a shot weight of 0.35 g is produced with 48 cavity moulds equipped with a partial hot runner system. The parts are symmetrically positioned in the parting line of the mould at right angle to the demoulding direction. The gating point is placed on the plunger head. 8 plungers each are gated from the side with a mini sprue remaining. In order to separate the sprues from the parts the ejection has to take place in two steps. Then in a subsequent working step a sprue separator



- The centre plate assembly of the stack mould was delivered as complete hot half (above)
- Complete 48+48-drop stack mould (above left)
- The gating point could be reached easily by using tip inserts with 60° angle (left)

is needed to separate the sprues from the plungers. “This existing mould concept is close to reaching its capacity limit”, says Serge Leon, Managing Director at SOFAMI, “and apart from that MORA has to deal with the sprue waste and there is always the risk to pollute the parts with sprue particles. So they have to take special care because of the high quality standards of the end customer who does not only purchase the plungers for its own range of syringes but is also a supplier to other syringe producers. The solution was to go for a completely new generation of full hot runner moulds which allows a more efficient production without any sprue waste.” Upgrading to a hot runner solution would have helped to reduce the cycle time and thus to increase the production capacity but MORA and SOFAMI were thinking in long terms and considered further demands. So it was decided to develop a compact 48+48-drop stack mould concept which allows the output to be doubled while still using the existing machines.

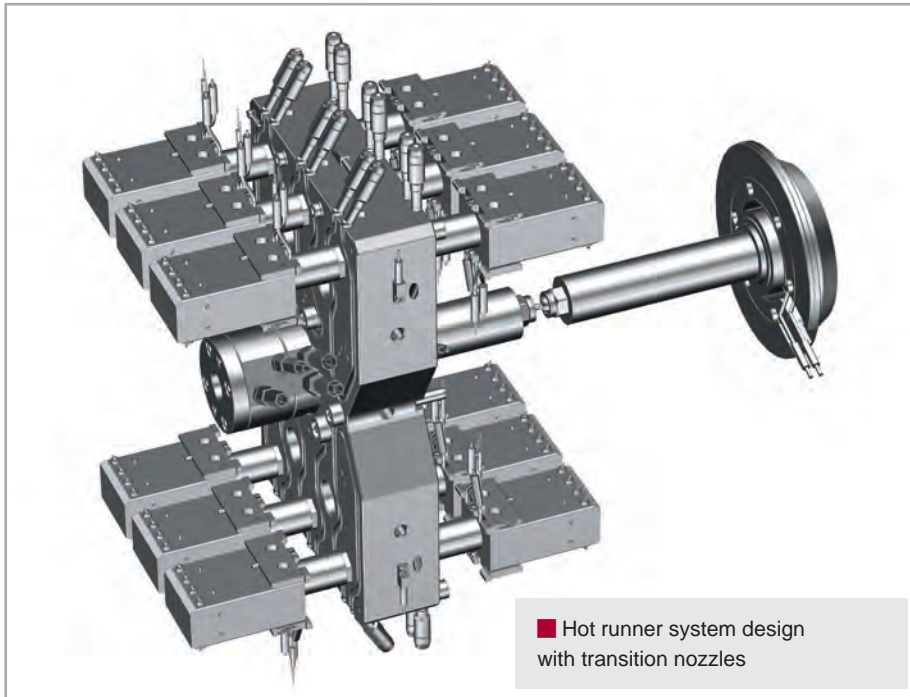
Since the final assembly of the syringes takes place on automated production



■ Cleanroom production at the MORA plant in Chambost

lines where vibrating bowl systems are used to feed the plungers, it was essential not to change the physical and dimensional properties of the part to keep the existing production parameters and if possible to use the same gating point position. When comparing several hot runner solutions for direct side gating the EWIKON HPS III-MH concept convinced with the possibility to use tip inserts that are angled by 60°. Thus, the gate can be placed near the parting line of the mould and the gating point position could be kept without problems.

“We use the HPS III-MH nozzle in its 8-drop linear version with 4 tips positioned on each long side of the nozzle. So we could realize a cavity arrangement similar to the existing moulds”, explains Roger Dufour, Technical Director at SOFAMI, “furthermore, the design of the EWIKON HPS III-MH system where the tip inserts are installed from the parting line of the mould after the nozzle has been installed does not require to split the mould inserts. This was advantageous for the mould stability as well as for the integration of a symmetric



■ Hot runner system design with transition nozzles

“The technical service provided by EWIKON was excellent. The application engineers involved were very professional and worked closely together with the MORA tuning technicians and operating staff to determine the optimal injection parameters and to explain and practically demonstrate the effect of different settings on the system performance”, explains Serge Leon, “for the MORA staff this was very helpful to build up trust and to quickly accept the new technology.”

In total SOFAMI has built two stack moulds to replace four of the currently used partial hot runner moulds. In both cases EWIKON supplied the middle plate as complete hot half. “This has facilitated our work”, says Roger Dufour, “because EWIKON took care of the integration of the complex hot runner assembly with the electric wiring and pneumatic supply pipes. We received an already tested system which was ready for installation. This allowed us to focus on the contour and ejector plates.” The hot half design focuses on utmost maintainability. The tip inserts can be easily exchanged with the mould still on the machine – a general advantage of the HPS III-MH side gating system – but also the mould plate assembly is modular and compact with separate wiring boxes for nozzles and manifolds. Thus, in case of maintenance the nozzle retainer plates can be easily separated from the manifold plates with no need to disconnect the wiring.

The doubled output and the reduced cycle time of the new stack mould solution allowed MORA to take a considerable leap in productivity. The first pilot series with several hundreds of thousands of parts is currently undergoing the final validation of assembly by the end customer. The start of the serial production is expected to take place soon.

cooling layout to achieve a very stable thermal behaviour of the mould.” Each side of the stack mould’s middle plate features six side gating nozzles which are arranged in two rows of three nozzles each with a fully balanced manifold system with melt outlets on both sides placed in the centre. The leakage-free melt transfer from the machine nozzle to the manifold system is realised in the second parting line of the mould by combining two transition nozzles. The middle plate has a valve gate nozzle integrated which is operated by a pneumatic drive unit screwed to the manifold. When the mould opens the valve pin closes to guarantee that

no melt is leaking out into the parting line. The counterpart is an open single nozzle which is placed in the machine-sided ejector plate. In order to achieve an optimal decompression of the system both nozzles feature a special staggered flow channel layout.

From the beginning of the mould design phase to the testing and startup of the mould there was a close cooperation between SOFAMI and EWIKON. This includes Moldflow analyses and extensive technical on-site support. The latter was particularly important since the MORA technical staff was not trained on this kind of system.

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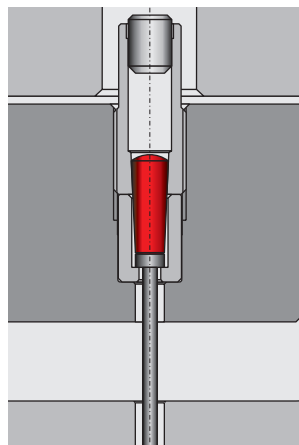
Overload safety device for valve gate systems with synchronous plate actuation

When using valve gate systems where several valve pins are actuated simultaneously by a synchronous plate mechanism a blocked gate - for example caused by impurities in the melt - often leads to damage to the respective valve pin. As a consequence cost-intensive maintenance work becomes necessary.

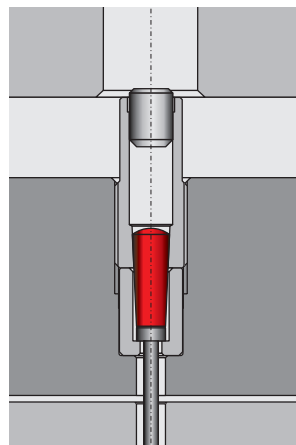
This problem is solved by a newly developed valve pin holding mechanism which features an integrated overload safety device. This device consists of a conical safety pin which is positioned in a matching guide directly behind the head of the valve pin. Here, the self-locking principle is applied. The conicity of the safety pin and the guide is calculated in a way that only when a precisely defined pressure load is reached the static friction between pin and guide is exceeded. Thus, the safety pin is released from its cone and pushed out of the guide. If the pressure load on the valve pin reaches the defined maximum permissible value - for example when impurities in the gate are blocking the valve pin's forward movement - the overload safety device

Functional principle of the overload safety device

Normal operation

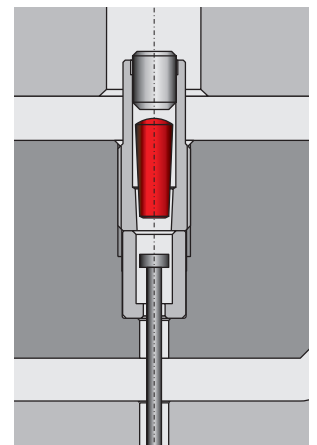


Synchronous plate position: valve pin open



Synchronous plate position: valve pin closed

Overload safety device triggered



Valve pin uncoupled from the synchronous plate movement. No damage to the valve pin

is triggered before the valve pin can be plastically deformed or break. Once the valve pin head has pushed the safety pin out of the guide the valve pin is detached and uncoupled from the further movement of the synchronous plate.

This patent pending technology will soon be available as an option for all new moulds which feature a valve gate system with synchronous plate actuation and a valve pin diameter of 2 mm.

HPS III-MHR111 – Optimized for medical applications

- 1 Slim nozzle body**
More space available for cooling.
- 2 Variable nozzle retainer**
Adaption of the immersion depth to the part length.
- 3 Adapter nozzle**
Leak-proof melt transfer.



NEW within the HPS III-MH product line

Slim solution for the syringe and pipette production

Continuous innovation and development make the EWIKON HPS III-MH multi-tip concept the most advanced solution for direct side gating worldwide. With the HPS III-MHR111 nozzle a new nozzle type specifically designed for the efficient production of long tube shaped parts such as syringes or pipettes in the medical industry is now available.

Enhanced flexibility for the mould maker

The nozzle features a round body which has been reduced in diameter by 15% compared to the standard version. At the same time extended tip inserts are used. Thus, the space available between the nozzle body and the part contour is considerably increased and can be used by the mould maker to integrate an optimized cooling surrounding the cavity as well as an effective mould venting. Both parameters allow a particularly efficient production due to reduced cycle time and improved filling.

Perfectly suitable for long parts

The heated nozzle body is combined with a nozzle retainer which is available in different lengths. This design allows to vary the immersion depth of the nozzle so that very long parts can be positioned without problems. An adapter nozzle feeds the melt into the nozzle body. It sits under the manifold, passes through the nozzle retainer without touching it and ends in the nozzle body. The mouthpiece of the adapter nozzle is pressed against the nozzle body and seals on its face side at operating temperature. This guarantees a leakproof melt transfer.

Unique maintainability

The HPS III-MHR111 nozzle comes in three versions for simultaneous gating of 2, 4 or 8 parts. In addition to the standard tip insert where the tip points in a 90° angle to the demoulding direction a tip insert with 60° angle is available. It allows the gating point to be positioned closer to the parting line of the mould. Like all nozzle types within the HPS III-MH nozzle range the HPS III-MHR111 nozzle features the patented tip exchange technology for a unique ease of maintenance. The tip inserts are easily exchangeable on the machine from the parting line with no need to dismantle the mould.



■ Mouthpiece of the adapter nozzle with sealing surface on the face side



■ Tip insert with 60° angle



NEW!

More process reliability
due to direct nozzle
heating. Ideal for
technical resins.



L2X High performance hot runner system **MIKRO** for small injection moulding machines

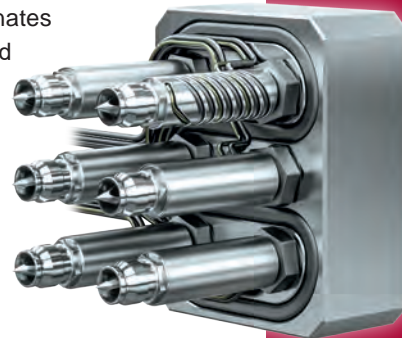
The new EWIKON L2X-Mikro hot runner system is especially designed for the production of small parts with shot weights from 0.05 g on small injection moulding machines. It allows the process-reliable processing of a broad range of materials including technical resins. The system is available in 3 standardised compact layouts with 2, 4 or 6 nozzles and fits the most commonly used mould sizes for small injection moulding machines. Furthermore, the extremely compact manifold dimensions of only 61 x 48 mm enable the problem-free integration into even smaller mould designs as for example for Babyplast[®] micro injection moulding machines. The very compact system layout is a general advantage for applications with small shot weights. Since the total flow path lengths in the systems can be kept very short and there is only a small melt volume which needs to be exchanged thermally sensitive materials can be processed without any problem.

The slim hot runner nozzles feature a powerful direct heating. Despite the small outer diameter of only 10 mm and the flow channel diameter of 3 mm a compact coil heater with thermocouple has been integrated into precise cutouts in the melt-

bearing pressure tube. This design enables a very stable heating with minimized loss resulting in an even temperature profile along the whole length of the nozzle and an improved heat input in the gate area. Thus, the constantly high thermal performance which is required for the process reliable processing of technical materials is guaranteed. The nozzles have a leakproof screw connection with the manifold. The L2X connecting technology with special connecting nut allows to freely rotate the nozzle until the screw connection is finally tightened. Thus, a precise positioning of the connection cables is possible. The required installation space is minimized.

The hot runner system is delivered optionally as complete hot half or as ready-to-install unit with pre-installed nozzles. Since the leakproof connection between nozzles and manifold eliminates the need to have a defined preload to seal the system a simple and time-saving drop-in installation is possible.

■ 6-drop system



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