Pushing the boundaries of cavity numbers with upgrade moulds

For many years, multi-cavity moulds represented the state of the art in injection moulding technology. The moulds manufactured by MHT AG in Hochheim, Germany, produce a large number of preforms in a single cycle. Their spectrum ranges from 2 to 192 mould cavities. However, injection moulders don't allow for a free selection of the number of available cavities: The machine imposes clear limits on the mould design. The purchase of a new machine to increase output is often not a real option.

A patent-pending mould family upgrades the Sacmi IPS400 and IPS 300 machine utilisation.

So what alternatives are available to injection moulding companies to increase their production output in a significant way? Many years ago, MHT was the first mould manufacturer to introduce an upgrade for all common 3000 kN and 4000 kN PET systems. Exclusively for MHT's partner Sacmi, MHT designed a patent-pending upgrade mould family that maximises the machine utilisation of the Sacmi IPS400 as well as the IPS300 – the novel Nano mould series.

A Nano upgrade for mould manufacturing

For the first time, these upgrade moulds make it possible to operate a Sacmi IPS400 with a 144-cavity mould and a Sacmi IPS300 with a 128-cavity mould. This represents a new milestone in maximum machine utilisation. In order to realise the Nano pitch mould cavity spacing of 45 mm x 111 mm, the developers came up with an entirely new stack design. The greatest challenge was implementing all mould nest components in a significantly reduced space. Despite the minimised dimensions and the attendant thinner wall thicknesses, MHT offers users durable components, as usual. This is, among other things, guaranteed by the use of a material specially adapted for this application. In combination with this, MHT also relies on the guaranteed utilisation of the many advantages of a cavity with locking cones on both sides, the so-called core- or care-lock design. If the clamping pressure is distributed across two cones, users benefit from reduced component wear and a finer mould separation line. The development team also focused on effective heat dissipation in all its moulding components. Optimum cooling, even in the smallest space, is the basis for short cycle times and high-quality preforms.

Reducing the ecological footprint

In the preform design, the new mould design offers clearances up to 30 mm in the support ring diameter, up to 26 mm in the outer thread diameter and up to 21 mm in the body diameter of the preform. This ideally positions these new upgrade moulds for many lightweight applications currently finding their way into the beverage industry all over the world. Even during transport, the upgrade moulds yield a reduction in CO_2 emissions. Due to the reduced mould cavity distance, the weight of a 144-cavity upgrade mould is reduced to that of a 128-cavity standard mould. The loads on the machine remain constant due to the comparable total mass of all moving parts. This in turn has a positive effect on the cycle time.

During production, the numerous cavities in a small space contribute to energy savings during each injection moulding cycle. All in all, 12.5% more preforms are produced in the usual production area. For the hot runner, this means less heating energy per preform, shorter flow channels and a lower pressure reduction. Producers can optimise their ecological footprint and reduce production costs at the same time.

For precise melt guidance to the cavities, MHT relies on the latest generation of hot runners. Thanks to the cooperation with Sacmi, the OptiRun is receiving sufficient hot runner zones. Operators benefit from uniform heating of the melt with the associated increased process stability. Test results indicate a lower and uniform AA level (acetaldehyde level) in the PET. The cooperation between Sacmi and MHT offers IPS300 and IPS400 operators with a desire for higher output a comparatively cost-effective solution. Looking to the future, MHT aims to develop additional Nano upgrades in order to generate maximum output despite limited machine sizes.

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