

Victorinox and HEITEC: Free melt moving in total synchrony

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Free Flow nozzle series allows melt to flow to cavity undivided

Probably everyone has seen or held one of these in their hands at some point: The world-famous Swiss Army Knife with its red colour and characteristic inlaid Victorinox logo. But these multi-functional tools are more than just ingenious devices - they are collector's items and investments that are also manufactured in limited-edition special prints and colours. To meet Victorinox's high quality requirements, the HEITEC Free Flow nozzle series was used because it can effectively prevent the appearance of visible weld lines on the handle pieces. "We place particularly high demands on the aesthetics, haptics, printability, and gloss of the grip scales," says the Director of Plastics Manufacturing at Victorinox AG in Ibach/Switzerland, in summarising the special features of the injection moulding application. This is where Victorinox's requirements met the capabilities of HEITEC's Free Flow nozzle series.



Top-quality surfaces: The grip scales for the world-famous Swiss Army Knife by Victorinox are made using Free Flow nozzle technology from HEITEC. It allows the melt to flow close to the cavity undivided..

This nozzle series was developed in 2013, and unlike the conventional valve-gate nozzles, it makes it possible to direct the melt to the cavity in an undivided flow. The Free Flow nozzle combines low-stress injection moulding and a homogeneous melt flow in the hot runner system. This ensures for example that no visible weld lines will be created on the moulded part.

Chemnitz University of Technology conducted research on this technology and was able to present powerful evidence of its benefits at HEITEC's technology forum held.

Significant reduction of injection pressure

The injection pressure needed to fill the cavity is reduced significantly because the runner is no longer narrowed by the needle cross-section. All wearing parts of the Free Flow series are very easy to replace. These benefits convinced Victorinox to go with Free Flow nozzles for the latest generation of moulds. "When it comes to technology and quality, we always want to be state-of-the-art," says the responsible development and design manager at Victorinox.

Important findings from field trials

A four-cavity trial mould equipped with the corresponding pressure and temperature sensors was tested in field trials at HEITEC's in-house technology lab as well as on-site with the customer, and demonstrated all benefits as expected. This allows Victorinox to process their plastics materials such as Cellidor (CP) and the copolyester PC-TG at the lower end of the required temperature range

without risking an increased loss of pressure in the system.

Critical: Designing the injection point

Another critical aspect of this application was the design of the injection point. It must be possible to produce it with a consistent, reproducible height and quality.

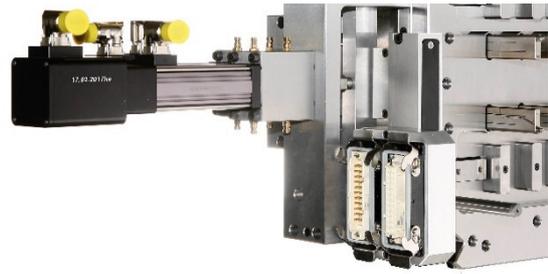
In order to ensure the benefits of the simultaneous opening and closing of the injection points, a desmodromic controller was used in combination with HEITEC's mechanical Syncro Valve drive. This drive contributes significant advantages to the injection mould and the entire injection process. The needles move 100% synchronously both when opening and when closing. At the same time, it is possible to replace or retire needles directly on the machine if there is damage to the cavity or the needle. To prevent any such damage, the path of each needle is also limited mechanically. Another significant advantage of the Syncro Valve drive is that the dimensional stability remains unaffected because the large-surface recesses needed for plate actuator drives are not required. In the case of Victorinox, this meant that we were even able to arrange two drives behind each other and thus actuate both

the needle and the ejector unit in the hot half.

The mechanical Syncro Valve drive can be pneumatic, hydraulic, or electric. In combination with the VLD electric motor and the VDC valve gate drive controller developed by HEITEC, it provides the perfect solution. And by the way, this solution is also highly suited to clean-room applications.

The VDC valve gate drive controller is able to control and monitor the positions of the needles in the process with a precision of 1/100 mm. It also monitors the force load limits. If the configured monitoring limits are reached, the system outputs warning and/or shut-off signals.

The VDC controller communicates with the injection moulding machine using the familiar interfaces.



The HEITEC mould design: Proximate media connections and electrical connections, interaction between tried-and-tested components Free Flow nozzle, Syncro Valve drive, VLD motor, and VDC control equipment.

Impressive in mass production

All of these features are proving their worth in the first production moulds that HEITEC supplied to Victorinox as 'hot halves'. They are used to manufacture various sizes of grip scales. The mould design is such that, from the smallest to the largest grip scale, all can be manufactured using one family mould. However, Victorinox wanted to make doubly sure: For each size and shape of grip scale, at least one production mould was made. More 'hot halves' are already in production or final assembly at HEITEC – using the tried-and-tested components Free Flow nozzle, Syncro Valve drive, VLD motor, and VDC control system.

"All moulds were sampled on newly procured injection moulding machines and introduced in the fully-automated manufacturing line. The systems are equipped with various insertion and removal heads

for the robots and change automatically. The separation of the Victorinox logos is also done automatically," explains the Director of Manufacturing. All moulds come with quick-change systems for the electrical and media-carrying connections. In other words, highly automated manufacturing cells.

"At Victorinox, we always strive to improve on the technical standard and use the best technologies the market has to offer. This solution with the HEITEC components came out really well," adds process engineering manager. "We are very satisfied with the solutions provided by HEITEC. The company has always responded superbly to new challenges and has been able to quickly present solutions that work. But what we also appreciate is HEITEC's support along the entire value creation chain. From their customer support staff to their developers and field service technicians, we were always absolutely satisfied with the service we received."

"The demands of putting ourselves in a good position for the coming years cost us more than a few hours on development and design," says the manager. "But we are quite proud of the result."

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