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Pipette tips – Precision in high quantities

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Innovative Mold Technology in a Compact Cluster Design

Especially under the effect of a global pandemic, identifying infected people at an early stage has proven an effective measure for breaking the chains of infection and stopping the spread of easily transmissible diseases. Identifying these people requires testing capacity on an industrial scale that can test as many people as possible, with or without disease symptoms, in a short period of time. A small but important plastic part in these testing systems is the pipette tip, which is used to take liquid samples and accurately transfer them into corresponding test devices.

Requirements for pipette tips

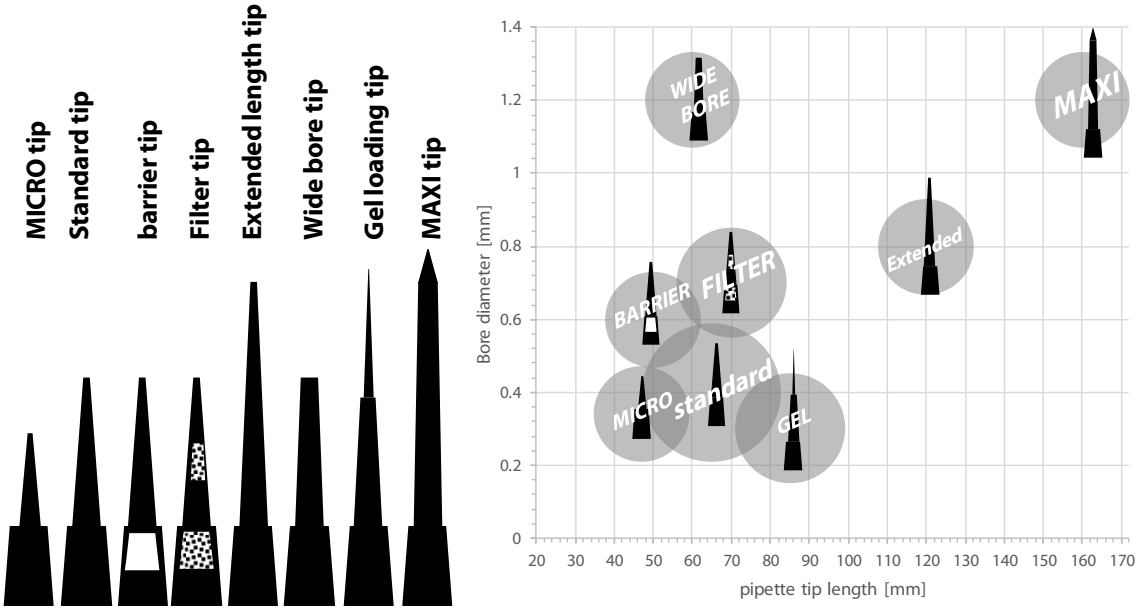

Image 1: Overview of pipette tips

Pipette tips differ in their shape and size, depending on the intended purpose. As a sensitive part in the measurement system that is in direct contact with the sample, and that can influence the measurement, pipette tips need to meet high standards:

- exact dimensional accuracy to be able to pick up the smallest amounts of liquid, just a few microliters, and transfer them precisely
- flawless concentricity for precise positioning when using pipette robots
- freedom from burrs in the tip area, which can falsify the measurement result due to surface effects, such as adhesion
- purity to avoid contaminating the sample

Pipette tips are a challenge for industrial production because they are required in large quantities with the highest quality. This challenge is transferred to the tooling manufacturer, which needs to ensure high-tech and reliable solutions for the demanding component geometry with thin walls and long flow paths.

Schöttli AG supplies pipette tip molds in the 8-series cluster design, a hot runner system with lateral gating for the efficient and reliable manufacture of high-precision pipette tips, a system which has been proven for over 30 years. Thanks to the compatibility of the SCHÖTTLI 8-series cluster design with standard pitch circle diameters, SCHÖTTLI molds can be integrated into existing automation solutions without being modified. Moreover, the SCHÖTTLI mold concept offers maximum productivity and the highest level of reliability. For maintenance work or adjustment, the cores of individual clusters can be removed from the clamped mold in the injection molding machine (cleanroom production) and precisely set.

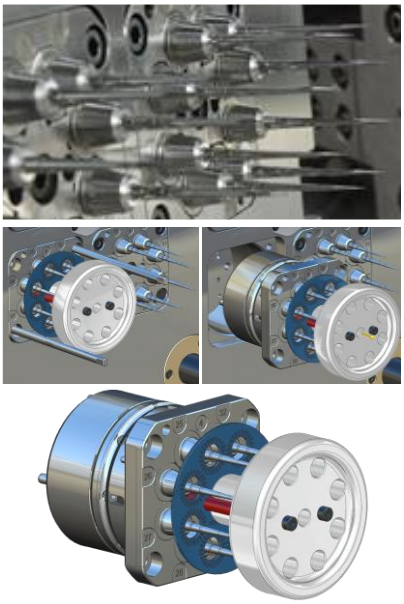

Image 2: Positioning of the pipette cores

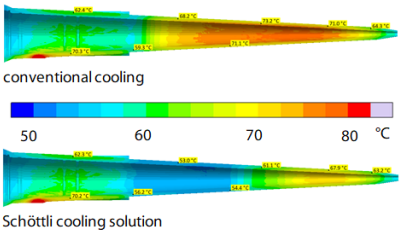

Image 3: Uniform heat dissipation thanks to efficient cooling

Cluster design - Adjustment and maintenance

By accumulating production tolerances of different components, and the true installed position within the molding assembly, it cannot be ensured that the pipette core is in the center of the cavity. There is also the injection pressure during the filling phase, which causes the core to deform and leading to different shrinkage on the plastic part, thus reducing the concentricity of the pipette tips. The innovative SCHÖTTLI adjusting mechanism makes it possible to easily set the concentricity in a precise manner ensuring it is optimal. The cluster design offers additional advantages such as, uniform water flow through the smallest holes, as well as having the ability to accurately adjust the pipette cores on the workbench in an assembly-friendly manner without removing the mold from the injection molding machine.

Core cooling at the highest level

Efficiently cooling the plastic molded part requires innovative solutions in mold cooling to ensure the fastest cycle times, and the highest product quality. A good thermal balance reduces the physical component distortion and is a crucial quality requirement when it comes to the concentricity of the pipette tip. Cooling the smallest diameters in the core tips and a near-contour cooling of the mold inserts ensure a homogeneous and efficient heat dissipation for maximum performance.

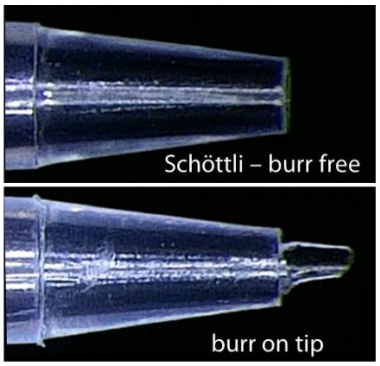

Image 4: Burr formation on the pipette tip

Getting a handle on burr formation

The thin walls and diameters in the tip area require a reliable solution to produce burr-free parts, with simultaneously optimal cavity venting. High-precision and engineered mold components, combined with the reliable SCHÖTTLI hot runner system, ensure a stable manufacturing process with the highest product quality. With the innovative SCHÖTTLI solution, core bushings can be directly and easily changed while the mold is installed in an injection molding machine.

SCHÖTTLI as a partner for producing pipette tips

SCHÖTTLI AG, a HUSKY Company, offers safe and efficient solutions for complex applications in the medical and pharmaceutical industry. With its own pipette test mold, SCHÖTTLI offers the possibility to perform material tests or implement special customer designs. It does not matter how high the requirements for the mold are – SCHÖTTLI molds offer high part quality and permanent reliability.