



Precision in details for injection-molded parts

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What do lab-on-chips, seats for solenoid valves, isolators for connectors or impellers for fuel pumps have in common? They are all made in polymers out of precision injection-molding and they bear small features. Addressing the challenges of miniature parts is the daily business of CG.Tec injection, founded 20 years ago with this specific target.

Mold making: a key success factor...

How to inject parts that are smaller than a plastic pellet and weigh less than a milligram? Although micro-injection machines are now available on the market, the plastic processing technology is not the only success factor. Tool construction is of the utmost importance as well. Designers usually face a dilemma when they consider placing the injection gate, ejectors, the parting line and vents on the tiny part surfaces – all the more as some surfaces are functional and should bear no mark from the manufacturing process. The experience of the mold designer plays a key role in the part quality.

As finding mold-makers for precision parts on the French territory has become a pain, CG.TEC has integrated mold-making as a service to customers. The company is meanwhile equipped with high-precision EDM means and micro-milling centers, so as to achieve multiple cavity molds with very low dimensional dispersion.

...for precise and miniature features

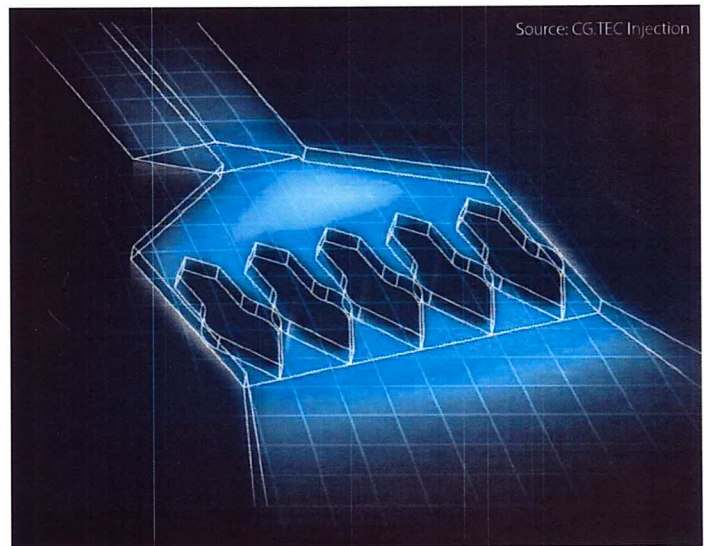
However the trend for miniaturization has some limits for the molds, plastic behavior and metrology: traditional molds are assembled with 5-10 μm total gap in the best case. Combining the mold precision and the polymer shrinkage upon injection-molding makes it difficult to achieve tolerances below

15 μm . All the more as measurement means have their own precision. 3D measurement machines, wherever applicable, have precisions of 1.5-3 μm .

When it comes to micro-features, CG.TEC is in a position to manufacture parts with filtration channels measuring a few micrometers. It operates a 16 cavity-mold for a PEEK pin with through holes of 1/10 mm, each one spaced by 1/10 mm. In a number of projects the company also achieved PEEK tubes and parts with thicknesses of 2/10 mm. Another example: in the framework of the national research project CONPROMI, channels measuring 7 μm over a height of 50 μm were obtained in a Lab-on-chip. This success was rewarded by a golden micron at the 2014 Micronora exhibition in Besançon.

The automation level being part of the quality

Since CG.TEC transferred its production in own premises in 2011, the company has carried out a heavy investment plan with the latest electrical injection machines equipped with 6 axis robots. The trend to target 0 ppm for large scale automotive products has paved the way for automated online controls with cameras and handling robots. Where injection-molding was the only



know-how of CG.TEC in the late 90s, it has integrated a multi-disciplinary team to offer quality parts and added value.

The company, who celebrates its 20th anniversary in 2017, locates in the French micro-tech region, on the border to Switzerland. This territory, named Franche-Comté, historically produced watches and has a strong industrial know-how focused on precision parts. Manufacturing operations were carried out on a private level, when farmers produced toys or glasses at home during winter time. Sub-contracting has meanwhile become a source of revenue for companies, who take advantage of their international location. CG.TEC strongly benefits from this setting at the cross-roads of European development centers like Lausanne, Grenoble and South Germany.

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