

Injection molding machine optimization by powerful cooling system

MÜHLBEYER Werkzeug- und Formenbau GmbH is an innovative company specializing in injection molds with high-performance cooling systems for the industry connectors.

The technical characteristics of MÜHLBEYER injection molds are:

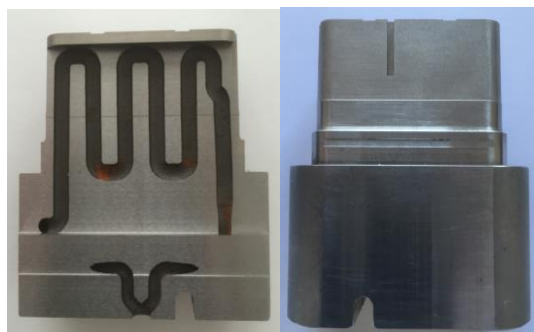
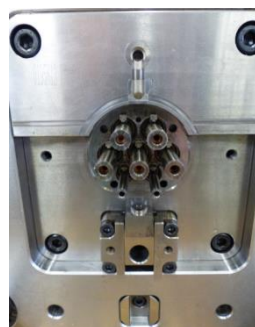
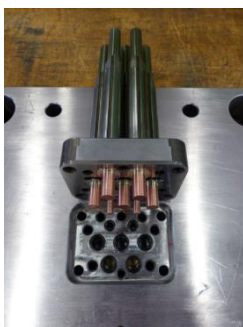
- Optimized temperature control for the shortest possible cycle times (laser sintering, pulse cooling, high-temperature cooling)
- Serviceability
- Longevity
- State-of-the-art coating technologies
- Hot runner systems

For the production of precise injection-molded parts, a precise tool and a tool adapted to the component, a good material preparation and an optimum parameter setting of the injection molding machine are necessary. In addition to the correct choice of the machine-side process parameters in the mold filling and cooling phase, the influence of the temperature of the shaping tool surfaces on the component properties is of great importance.

Depending on the molding material used, properties such as degree of crystallization, warpage, shrinkage and surface texture can be decisively influenced by the mold wall temperature. The greatest challenges to the cooling system lie in the area of narrow webs, double-walled areas, eyes, domes, cylindrical moldings with small diameters and high penetrations. Here, the so-called hot spots occur with common cooling, since large plastic volumes oppose a small tool volume.

In order to achieve optimal mold cooling, the injection molding tool builder has various technologies and materials available depending on the geometry of the injection molding to be achieved:

- Copper pins in high cores
- Spiral cores
- Copper inserts in form inserts
- Copper alloy for shaping components
- Bubbler
- Divider
- Particularly heat-conducting steel for shaping components
- water-filled holding plates
- Direct or indirect cooling
- Vacuum brazing
- Laser sintering technology
- (Pulse) Cooling by means of different refrigerants or with CO₂



Close Contour cooling Dome realized with copper pins - injection eMobility connector

Continuous cooling cores realized with laser sintering technology - injection molding connector strip



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Continuous cooling cores realized with laser sintering technology - injection molding connector strip

The MÜHLBEYER team, together with the customer, selects the qualitatively and economically most sensible cooling system variant.

The realization of high-performance cooling systems requires a high level of expertise and a wealth of experience. When using a variety of materials, pre-treatment, post-treatment and intermediate treatments are carried out, e.g. To ensure the strength of the material and thus to achieve high tool life. For combinations of different materials, the material key is of high relevance. For copper alloys, the outer layer must have at least a hardness of 52 HRC. In the case of particularly heat-conducting steel, the tool component must usually be equipped with a corrosion protection.

The following determinations are made for the thermal tool design C-MOLD from MÜHLBEYER:

- Cooling and cycle time
- Position and size of the temperature control channels
- Temperature profile in the molded part and the mold
- Temperature throughput and temperature medium temperature
- Temperature homogeneity or temperature error at the mold wall
- heat flows
- Pumping, cooling or heating output of the temperature control unit with respect to pressure losses in the temperature control channels
- Simulation and variation of the parameters such as material, temperature, processing variables, etc.

With C-MOLD from MÜHLBEYER, thermally-designed injection molds are realized which make the production of injection molded parts cheaper and safer. Optimized cooling ultimately optimizes the profit. An optimized cooling on the contoured surface of a tool is paid for in three ways:

1 - Reduction of the cycle time by approx. 10-40%

Molds can be removed from the tool more quickly due to faster cooling.

2 - Extension of the tool life

The contouring tool surface is subjected to substantially lower thermal stresses and the tool is thus spared.

3 - Increasing the molding quality

Due to a nearly constant temperature level at the mold surface, the molding quality increases with respect to the surface texture and uniformity of the microstructure, inherent stresses in the molded part, warpage and dimensional deviations which require tool postcorrections are avoided.

MÜHLBEYER Werkzeug- und Formenbau GmbH

Stefan Dürr

Raiffeisenstr. 4

D-74177 Bad Friedrichshall

Tel.: +49 7136 9460 10 Fax: +49 7136 9460 19

www.muehlbeyer.de Email: info@muehlbeyer.de