MAGMASOFT® 6.0

The Right Tools for the Complete Permanent Mold Casting Process

HIGHLIGHTS IN MAGMASOFT® 6.0

New capabilities and new algorithms provide a better and more accurate representation of the complete permanent mold casting process for:

- Following and evaluating entrapped air in the gating and casting during pouring
- Generation and transport of core gases during filling and solidification
- Effects of melt surface tension and wetting
- Accurate description of the pouring conditions for the casting
- Heating of the mold before starting production
- Influence of flow through cooling lines on local heat transfer from the die
- Effects of electrical heating cartridges and Variotherm control on the die thermal balance
- TAG meshes for an accurate representation of the casting contour and fewer elements with mesh coarsening

YOUR BENEFITS

The right tools for decision making in casting and tooling design, optimizing casting layouts and production processes:

- Faster and more robust decisions due to an easier assessment of entrapped air in the casting
- Shorter development times through an improved understanding of entrapped air and core gases on casting quality
- Time savings in tooling layout by a better understanding of the heat balance in the die
- Higher productivity due to optimal preheating of the mold before producing the first casting
- More quickly achieve optimized casting layouts and processes through shorter calculation times

FOLLOW THE METAL FLOW FRONT AND VENTING OF GASES

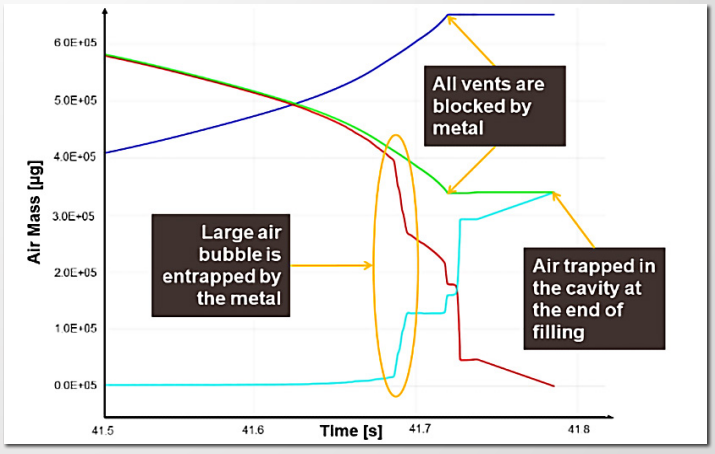
An accurate description of the flow front shows entrapped air in the casting system.

An accurate description and understanding of the processes involved in mold filling and solidification regarding the metal flow front and entrapped gases plays a decisive role in casting quality. Identifying areas where air is entrapped in the cavity during the filling process allows an optimized gating design and an effective placement of vents.

Gases which cannot be vented result in porosity in the casting, shown with the new 'Air' result.

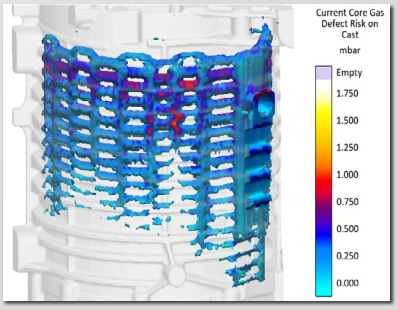
AIR AND CORE GASES MADE QUANTIFIABLE

The combination of what were previously several results for entrapped air into a single result 'Air' in kg/m³ makes the evaluation and comparison of different layouts easier.



Quantitative evaluation of the venting situation in the die.

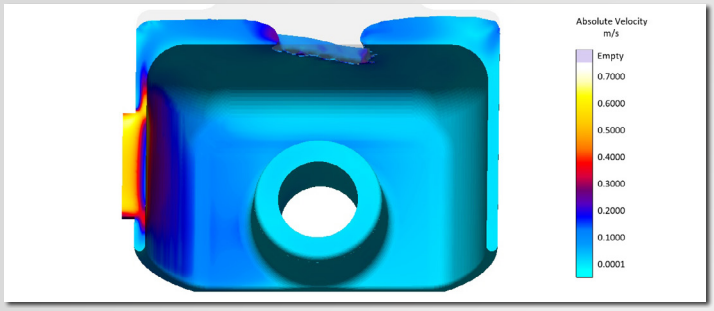
In addition to a 3D visualization, curves show the effectiveness of the venting design in evacuating gases from the cavity.



Transport of core gases and the danger of core gas defects

SURFACE TENSION AND WETTING

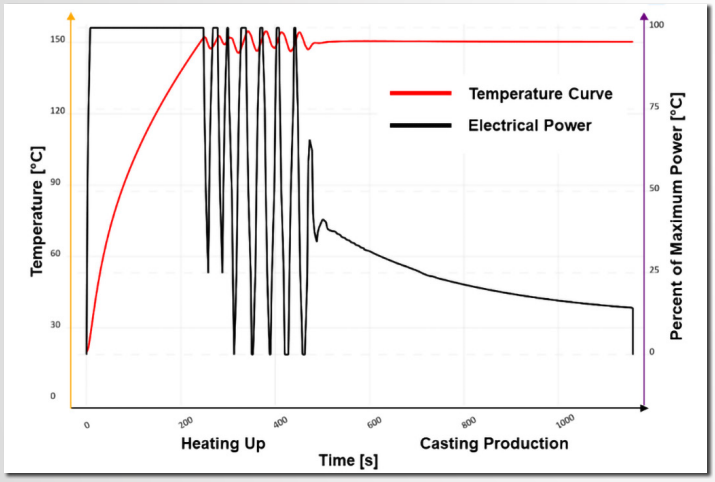
The surface tension of the melt as well as the wetting between the metal and the mold during pouring can play a decisive role in die filling. These effects can optionally be considered and evaluated for optimizing gating layouts.



The effects of surface tension and wetting between metal and mold influence filling of the die.

OPTIMAL LAYOUT OF DIE THERMAL CONTROL

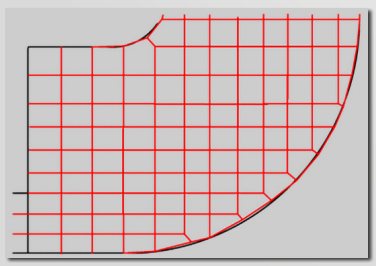
The thermal control of the die plays a vital role in the quality of the casting and the productivity of the casting process. MAGMASOFT® 6.0 provides all the tools needed for the layout of cooling and heating lines (considering the flow of water or oil), electrical heating cartridges and Variotherm control (two different temperatures for the medium when cooling and heating). This reduces the number of iterations when designing tooling and thus saves time and money.



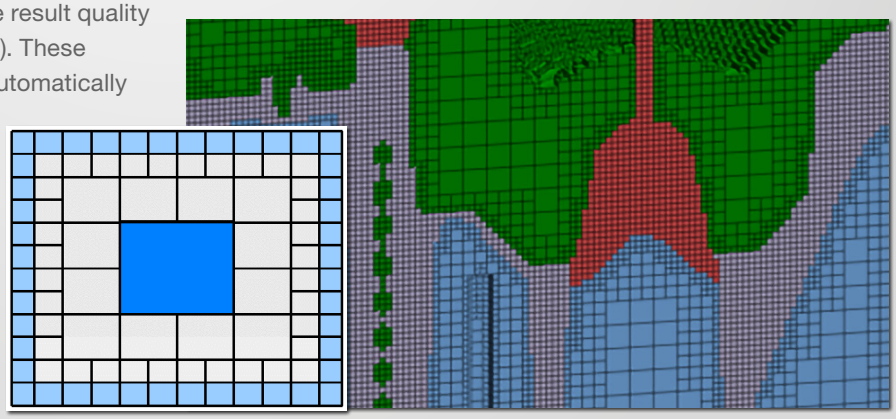
Heating up of the die, including the effects of heating cartridges (black line).

INNOVATIVE MESHING TECHNOLOGY

MAGMASOFT® TAG meshes enable a precise mapping of the contour between the casting and the mold. TAG meshes can be refined or coarsened locally as required to improve result quality or optimize computation times (composite meshes). These meshes are generated robustly, quickly and fully automatically within seconds for permanent mold castings.



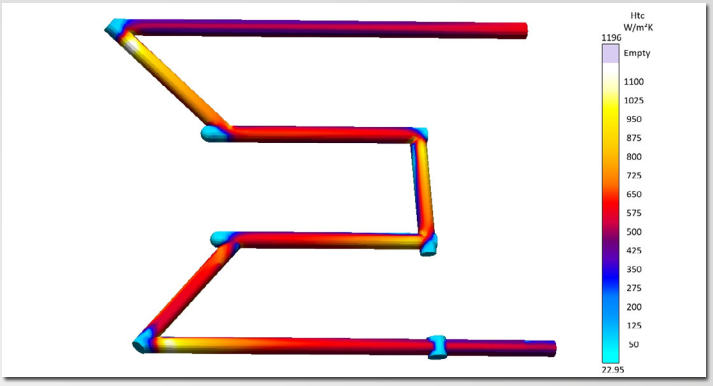
TAG mesh for an accurate representation of the casting geometry.



Mesh coarsening allows an optimal balance between result accuracy and computational times.

FLOW IN HEATING AND COOLING LINES

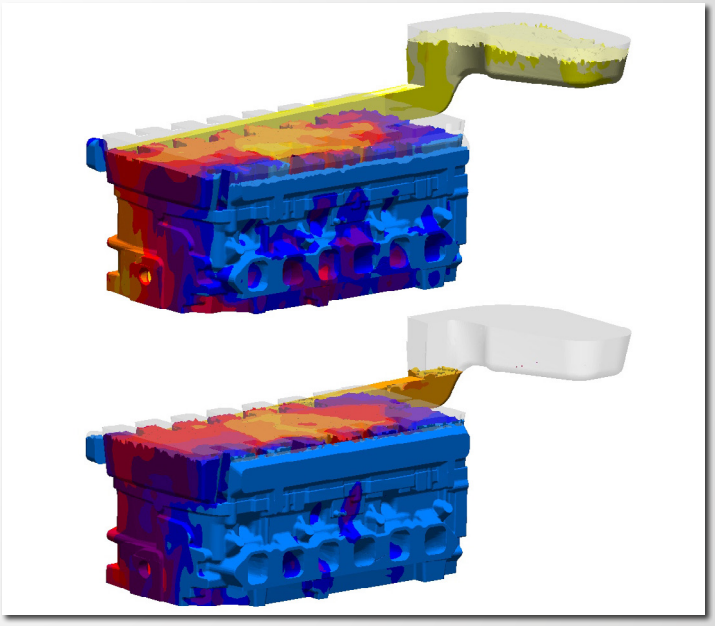
The flow in the heating and cooling lines can be simulated to account for the influence of the flow locally on heat transfer from the die.



Local heat transfer coefficients calculated based on the flow conditions in cooling and heating lines.

ACCURATE FILLING CONDITIONS

The pressure conditions and the resulting flow pattern during filling of the die, which also ultimately influence the temperature field during solidification, are decisive criteria for the design of the gating system. Mistakes made here, or a simulation that doesn't show the real conditions accurately enough, inevitably lead to defects. MAGMASOFT® 6.0 offers the option to exactly simulate the filling conditions, including the levelling of the metal surface in the pouring basin and cavity after filling.



Temperatures and melt front at the end of pouring (top) and after levelling of the metal surface (bottom).