



MAGMASOFT®
autonomous engineering

MAGMA CC

Designed to Continuously Improve the Process

HIGHLIGHTS OF MAGMA CC 5.5

- Calculate continuous casting processes for steel using a bow type machine.
- Improved modeling of starting phase for continuous casting processes for Aluminum DC casting.
- Predicting risk for cracks in continuous casting. New results help to understand the crack sensitivity.

MAIN BENEFITS OF MAGMA CC 5.5

- Increased safety by avoiding bleed out and breakthrough.
- Robust and optimized processes by minimizing porosity, inclusions and cracks.
- Reduced cost by avoiding scrap through optimized process windows.
- Effectivity by increasing the productivity and reducing energy consumption.

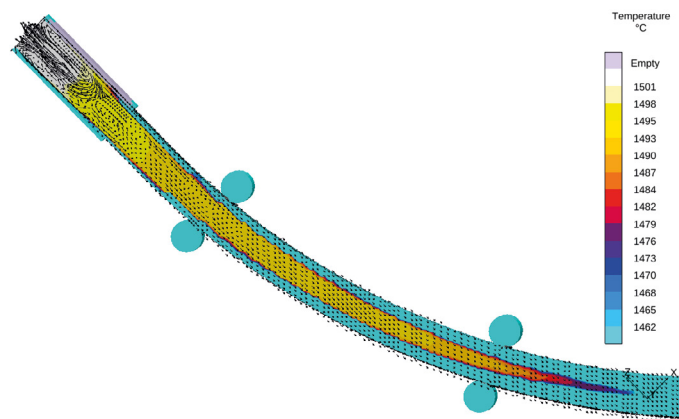
Completely new capabilities are available for the simulation of continuous casting with MAGMA CC. For steel processes, bow type machines are now supported.

During the entire process thermal convection can be modeled. The impact of the flow on the temperature distribution during solidification influences the final product quality. Along with methods to track particles, it is possible to guarantee a reproducible quality with a special focus on inclusions. This helps to improve cleanliness.

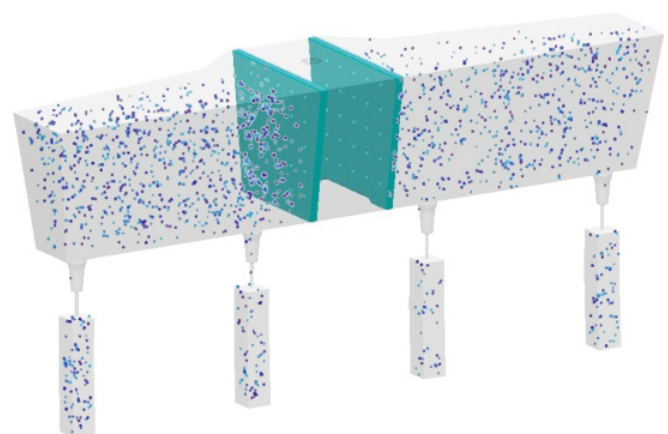
MAGMA CC is a fully integrated and practically relevant turn-key solution. MAGMA CC allows to model the entire process from the tundish through the nozzles until the final strand. Coupled with the fully integrated capabilities of a systematic virtual experimentation (DoE), the software allows to address typical objectives such as

- Optimization of the flow conditions in the melt pool
- Maximize productivity
- Minimize thermal cracks and porosity

Starting in the tundish, the simulation can optimize the flow to avoid inclusions or re-oxidation particles and helps to find the best inner furniture configuration.



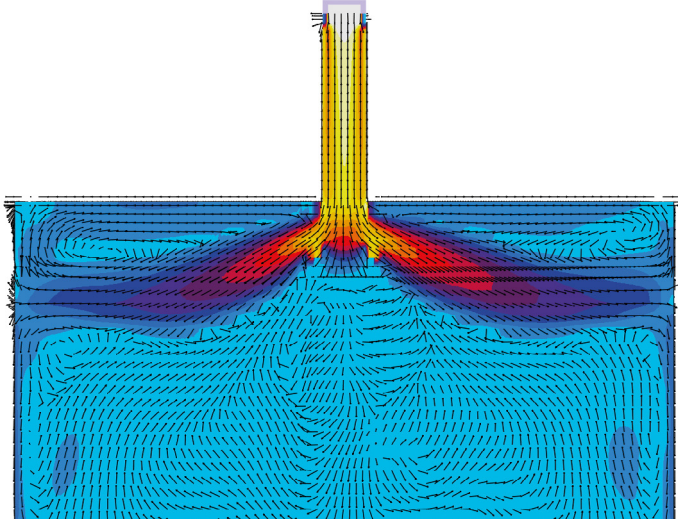
Thermal convection during solidification influences the quality



Modeling of flow, velocities and inclusions in the tundish

IMPROVED NOZZLE DESIGN FOR THIN SLAB CASTING

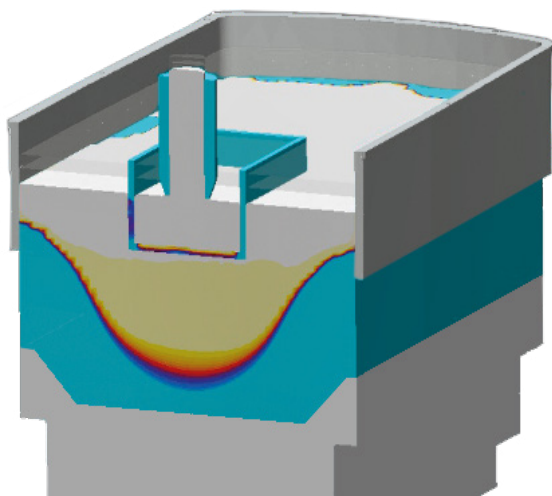
To improve the flow behavior in the mold it is very important to find the best solution for the nozzle layout. Here MAGMA CC can be used to visualize and optimize the flow comparing different nozzles designs autonomously.



Velocity distribution by using a typical nozzle design for thin slab casting

ADVANCED MODELING OF THE STARTING PHASE

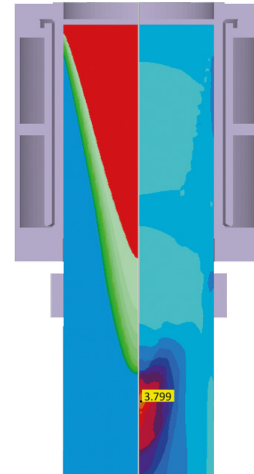
In MAGMA CC release 5.5 the starting phase for Aluminum DC casting was improved with respect to the solidified shell with a variable meniscus of the melt. This allows to change the metalostatic pressure to minimize porosity by an improved feeding behavior.



Solidified shell and sump profile during DC casting of aluminium

ASSESSING CENTER CRACKS

Cracks are a major concern for continuous casting processes. For copper-based alloys, center cracks similar to hot tears may occur. In case of intensive secondary cooling potential risk areas for cracks can be found close to the liquid pool depth (sump depth). New criteria based on stress predictions help avoiding these kinds of defects.

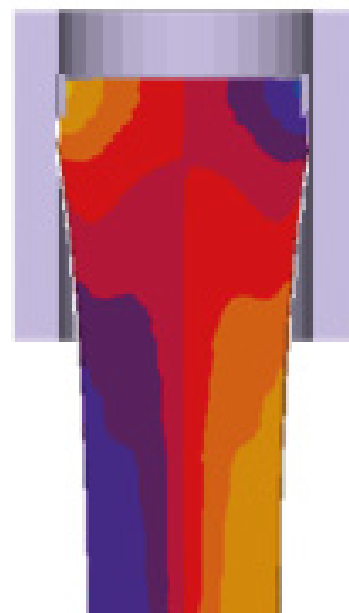


Crack prediction with dedicated stress results based on temperature distribution

QUANTIFYING GAP FORMATION AND DISPLACEMENT ISSUES

The integrated stress simulation of MAGMA CC can be used to predict displacements and resulting gap formation in the primary mold efficiently.

For the Aluminum DC casting process this helps avoiding issues such as butt curl.



Displacement result to show gap formation in the primary mold