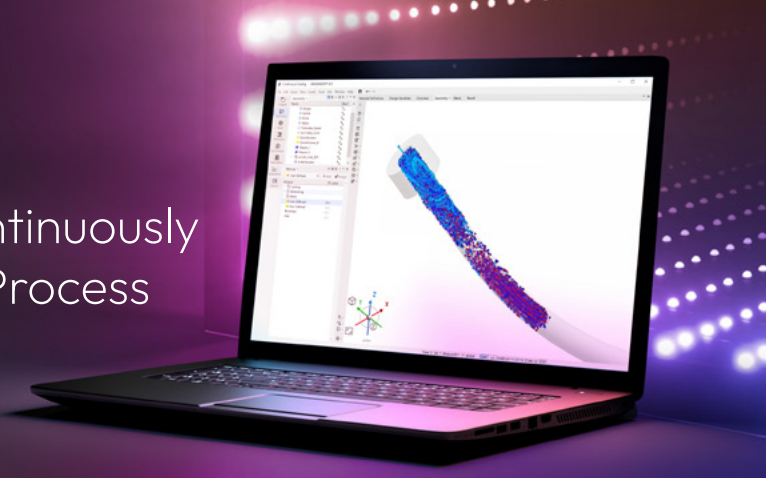
MAGMA CC 6.0

Designed to Continuously Improve your Process



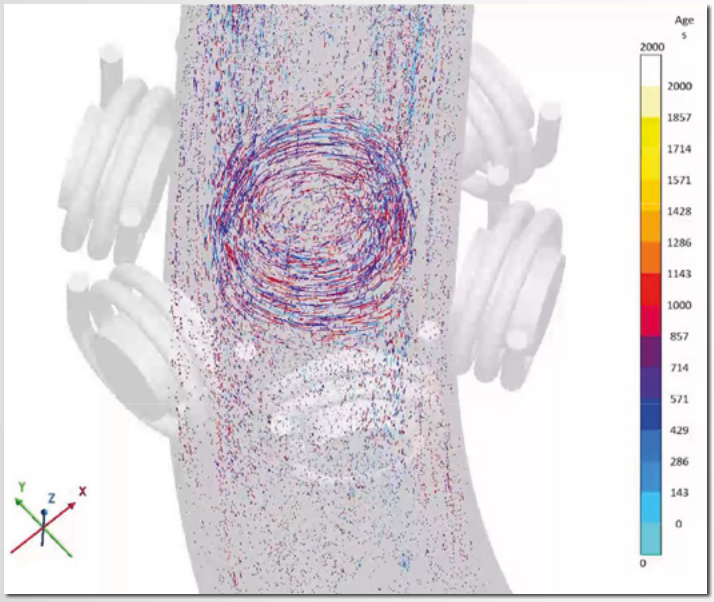
HIGHLIGHTS OF MAGMA CC 6.0

- Influence of electromagnetic stirring and braking on fluid flow
  Available and validated for MAGMA CC Steel
- Thermomechanical coupling
  Consideration of air gap formation to continuously update local HTCs
- Representation of moving geometries in Result Perspective

MAGMA CC 6.0 offers:

- Thermomechanical Coupling
  Considering Air Gaps to Update Heat Transfer Coefficients
- Electromagnetic Stirring / Braking
- Solving the 3D Maxwell Equations and Impact of Flow Behavior
- Effects on Flow in the Strand
- Representation of Moving Geometries

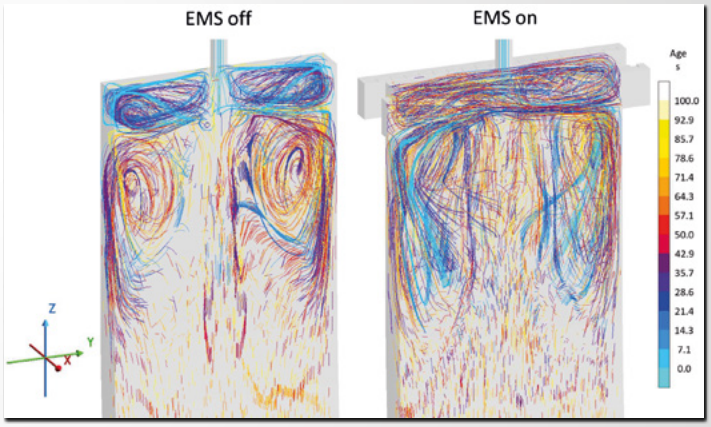
ELECTROMAGNETIC STIRRING / BRAKING



Flow tracers in the strand liquid pool under the rotating magnetic field impact

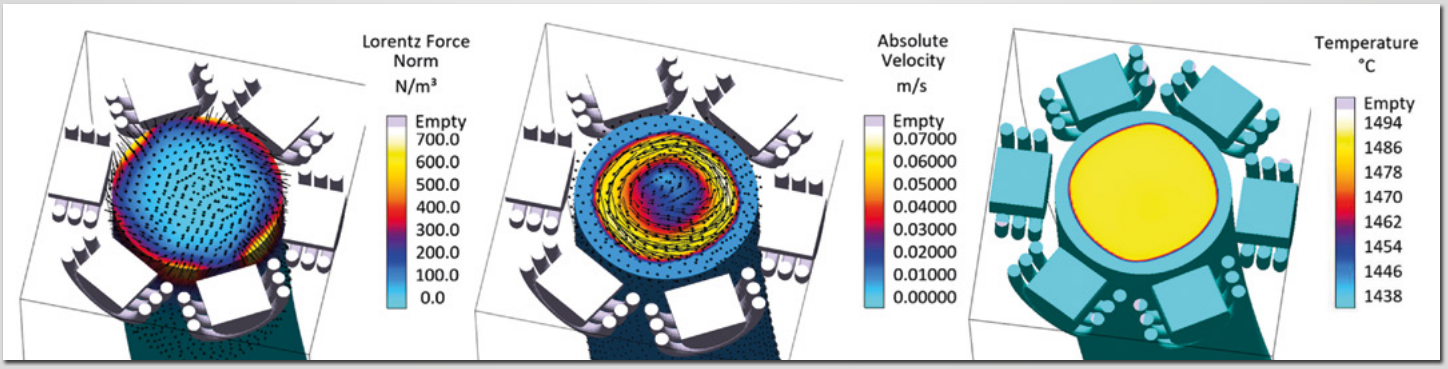
Electromagnetic stirring (EMS) are widely used to optimize the product quality in continuous casting processes of steel

- Finding robust processes by optimizing flow conditions influenced through EMS

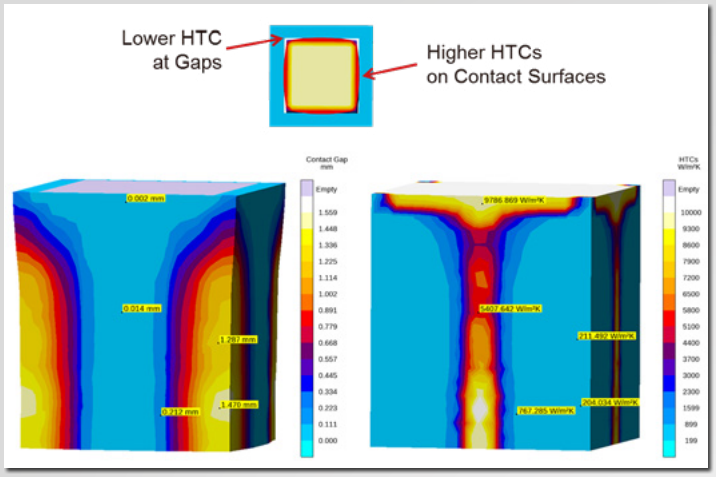


3D streamlines of melt flow during the slab casting with and without EMS

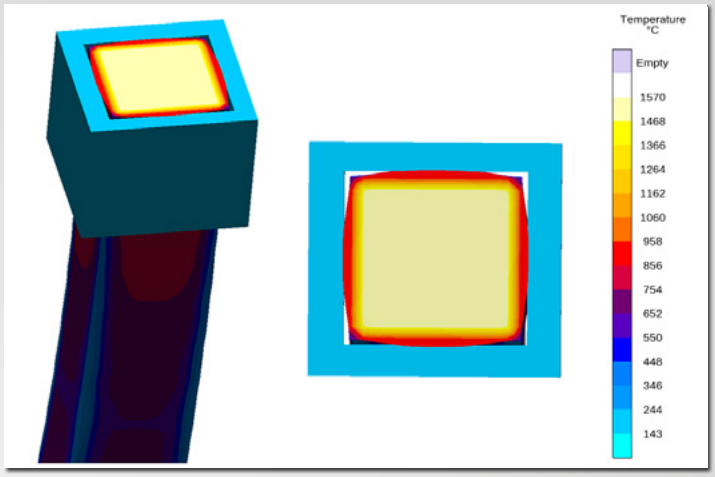
- 3D Electromagnetic field and Lorentz forces calculation
- Liquid metal flow calculation under the EMS and thermal convection
- Effect of EMS on the temperature distribution
- Assessment of the shell thickness growth and solidification under the EMS impact
- Forecast of the metallurgical length and optimal EMS equipment placement
- Optimal stirrer position and control parameters



EMS of the round bloom casting: Lorentz forces (left), velocity field in the strand liquid metal pool (center) and solid liquid interface (right)



Considering Air Gaps to Update Heat Transfer Coefficients



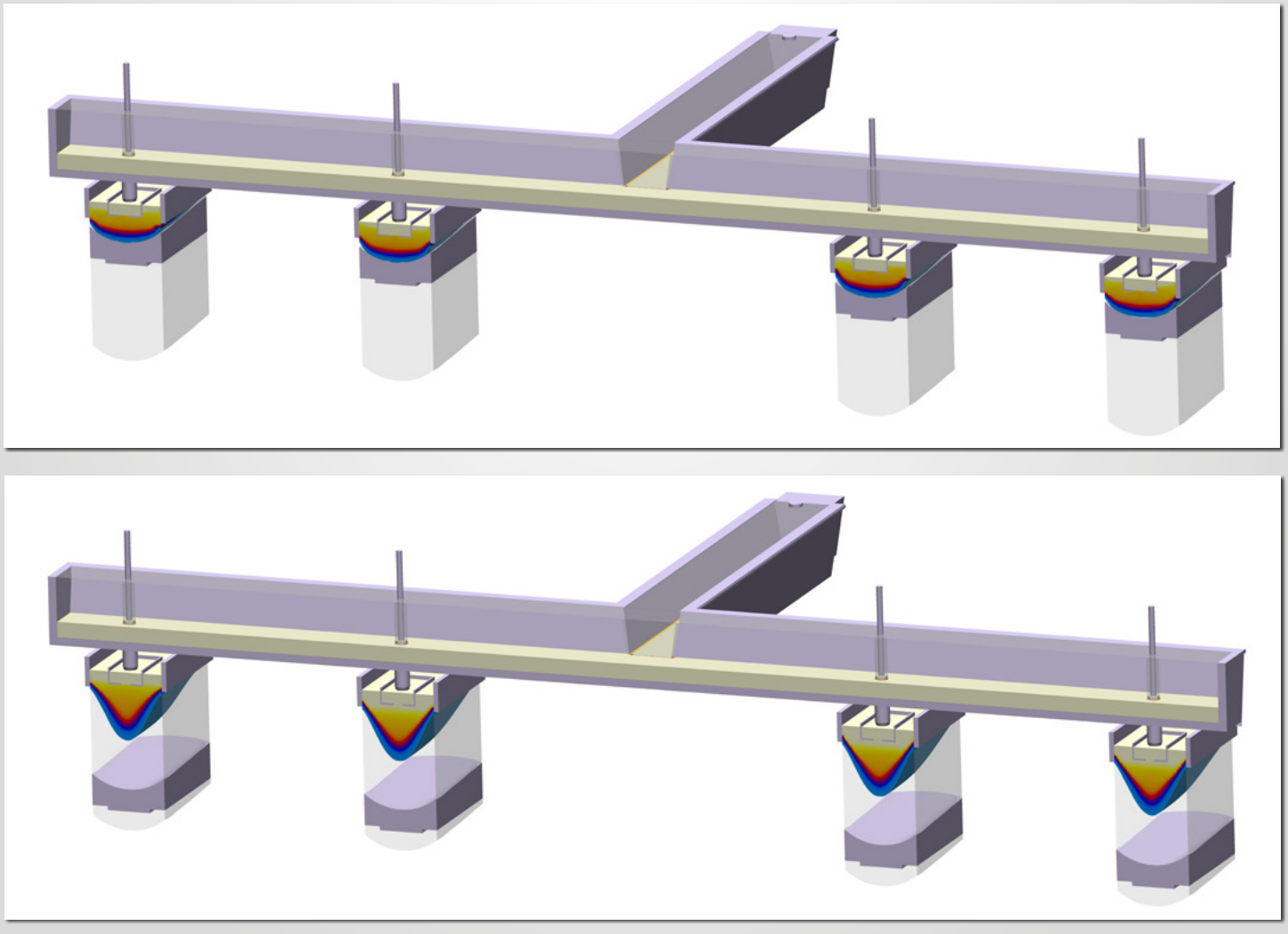
Air gap formation in square billet casting

THERMOMECHANICAL COUPLING

- 3D air gap formation data allows to use an accurate heat transfer coefficient for strand to mold heat transport calculation
- Determination of strand deformation with an integrated stress calculation
- More accurate prediction of thermomechanical based defects (hot tears, cold cracks etc)
- Calculation of stresses and deformation in strand as well as in mold material
- Distortion function helps to visualize actual air gap formation

REPRESENTATION OF MOVING GEOMETRIES

- Exact representation of starting ingot or dummy bar positions through the full casting cycle
- Better understanding of the starting phase and the growth of the solidified shell
- In case of DC casting of rolling bars it can be used to optimize the starting ingot design and the interaction between strand and start ingot



Withdrawal Process Showing the Starting Ingots Movement

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