

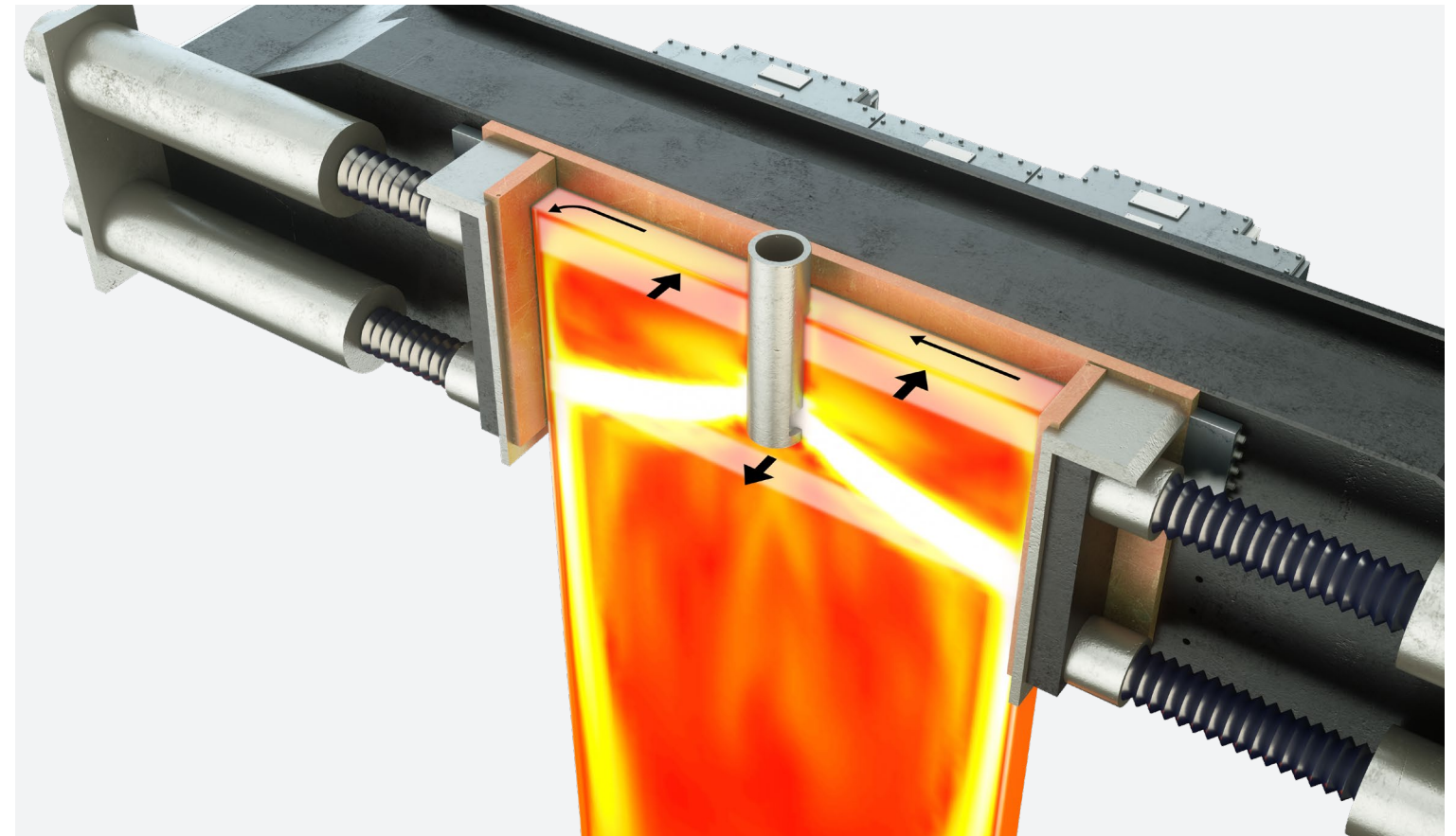
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METALLURGY PRODUCTS

FC Mold for conventional slab casting

Unique technology contributes to process optimization



- Higher productivity and end-product quality, and lower operating costs
- Typical reduction in defects 50%
- Significant reduction in reject and/or downgrade ratio, in some cases by 80%

The latest generation of the FC Mold has three independent magnetic fields delivering simultaneous electromagnetic stirring and braking in the mold without the need for repositioning. Suitable for continuous casters operating at all speeds, the FC Mold provides a broad range of process improvements that help enhance productivity and product quality, and even allow for increased casting speed.

For over 75 years ABB Metallurgy Products have been committed to the development of electromagnetic products, services and solutions that contribute to optimization within the metals industries. Developed for conventional slab casting in collaboration with industry partners, the Flow Control Mold (FC Mold) is proven to deliver measurable process improvements for casters operating at all speeds, for both new installations and upgrades.

State-of-the-art technology
Conditions in the near-meniscus area are crucial to determining end-product quality and have a significant effect on both productivity and overall operating costs. Results from more than 40 installations worldwide show that the FC Mold consistently improves surface and internal quality, can allow for a higher casting speed and gives a return on investment typically within 1 year.

Simultaneous stirring and braking in the mold from one fixed position
The latest generation of the FC Mold generates three independent magnetic fields; one AC field controlling optimal flow speed at the meniscus for all casting conditions, and one superimposed DC field to dampen meniscus fluctuations. At the bottom of the mold, along the entire slab width, a second DC field minimizes downward flow, helping gas bubbles and inclusions to float up to the meniscus instead of being trapped in the solidifying steel. By applying AC and DC fields in the mold's upper region simultaneously, or smoothly transitioning between the various magnetic field intensities, meniscus flow speed can be better controlled and dampened. Mold powder entrapments are virtually eliminated. Other results include reduction in inclusions, final product defects and reject ratio. Only using the FC Mold can meniscus flow speed be controlled, and penetration depth minimized simultaneously from one fixed position without the need for repositioning.

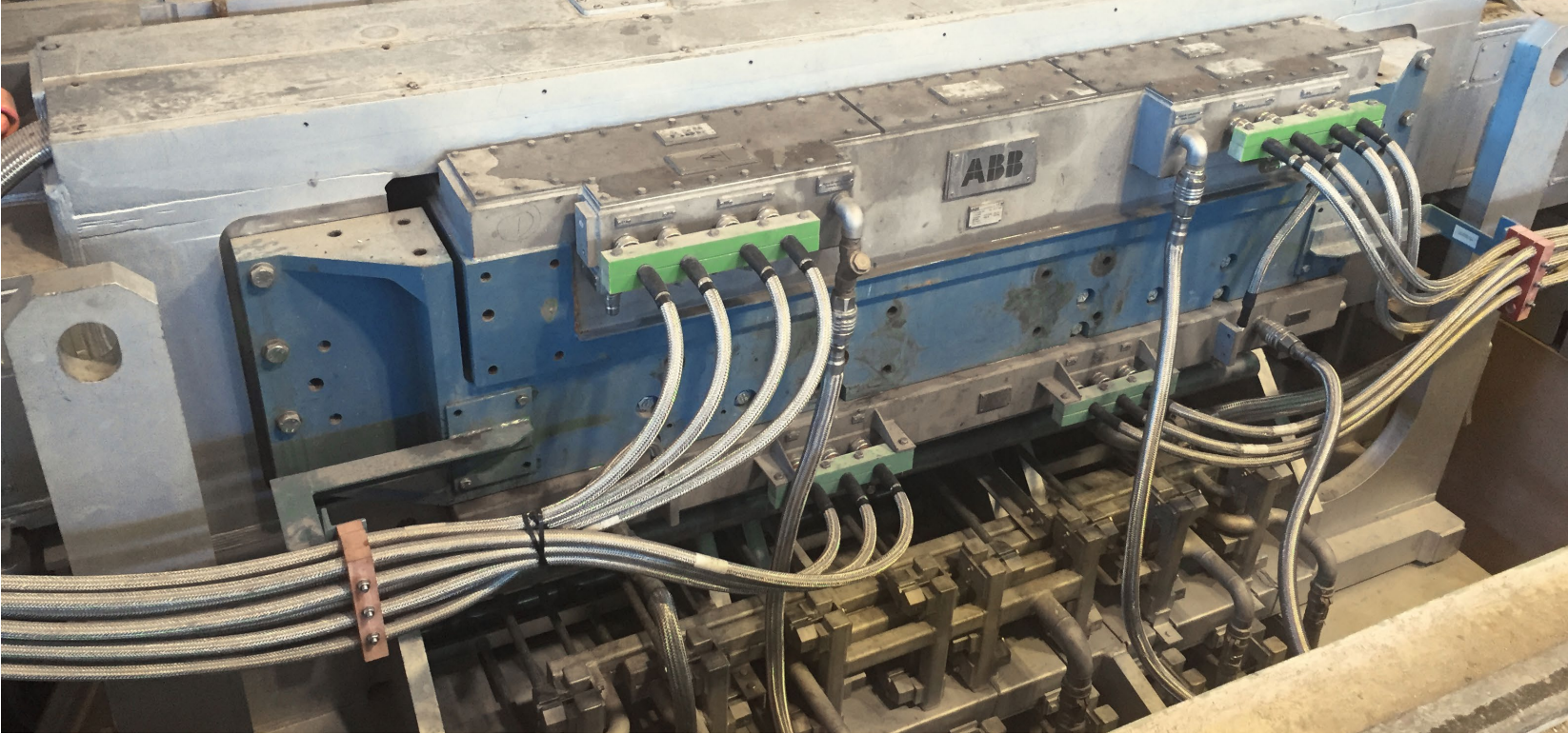
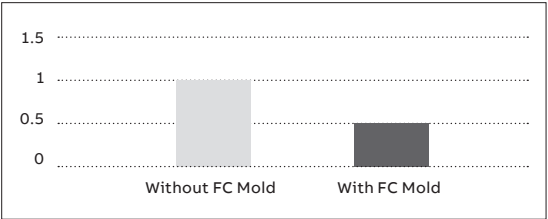
Process benefits

Improving surface and internal quality
Proven to consistently improve quality, the FC Mold's leading technology reduces both surface and internal defects by at least 50% including fewer mold powder entrapments, blow holes and longitudinal cracks.

Reducing reject ratio and downgrades
By significantly lowering the number of inclusion defects, the enhanced surface quality offered by the FC Mold reduces both the reject ratio and the necessity for downgrading. In some cases the FC Mold has helped to reduce the reject ratio of final products by up to 80%.

Higher productivity and lower costs
Casting speed can often be limited by surface quality issues. The FC Mold reduces and/or eliminates such issues and a higher casting speed can therefore be achieved. This, coupled with a lower reject and/or downgrade rate contributes to improving productivity and reducing operating costs.

Typical reduction in sliver-type defects for cold rolled coils.



FC Mold G3 installed on a slab caster

Smarter, safer and more practical

Features
Automatic, adaptable process control
Based on both numerical simulations and in-depth process know-how from over 40 installations worldwide, the FC Mold's control package automatically and seamlessly adapts to a wide variety of casting conditions. The ability to make adjustments to magnetic field strengths and configurations further contributes to enhancing operations.

Shortening mold change time
The FC Mold is equipped with automatic quick connectors (AQC) to allow for smooth, safe and quick connection to, and disconnection from, the mold and power supply. The AQC can compensate for horizontal mold misalignment of up to $\pm 35\text{mm}$, and a pilot circuit automatically disconnects the power supply when the couplings are not fully connected.

Installation requirements
To avoid magnetic interference and ensure maximum FC Mold performance, part of the mold should be made from non-magnetic material. Lower solid front cores made from magnetic steel should also be built into the mold.

Low maintenance and long lifespan
The FC Mold has no moving parts and, like all electromagnetic products from ABB, is designed and constructed using high quality components to withstand the toughest of conditions. The result is a worthwhile investment, short payback time and minimum maintenance.

Improved process control with OptiMold Monitor®
The OptiMold Monitor® is the latest development in mold temperature measurement. With over 4000 fiber-optic sensor points per complete mold, spatial resolution is more than 20 times greater than conventional temperature measurement systems. Sensor data is analyzed and can, together with OptiMold Control, be used to optimize performance of electro-magnetic stirring/braking devices and achieve real-time, online process control.