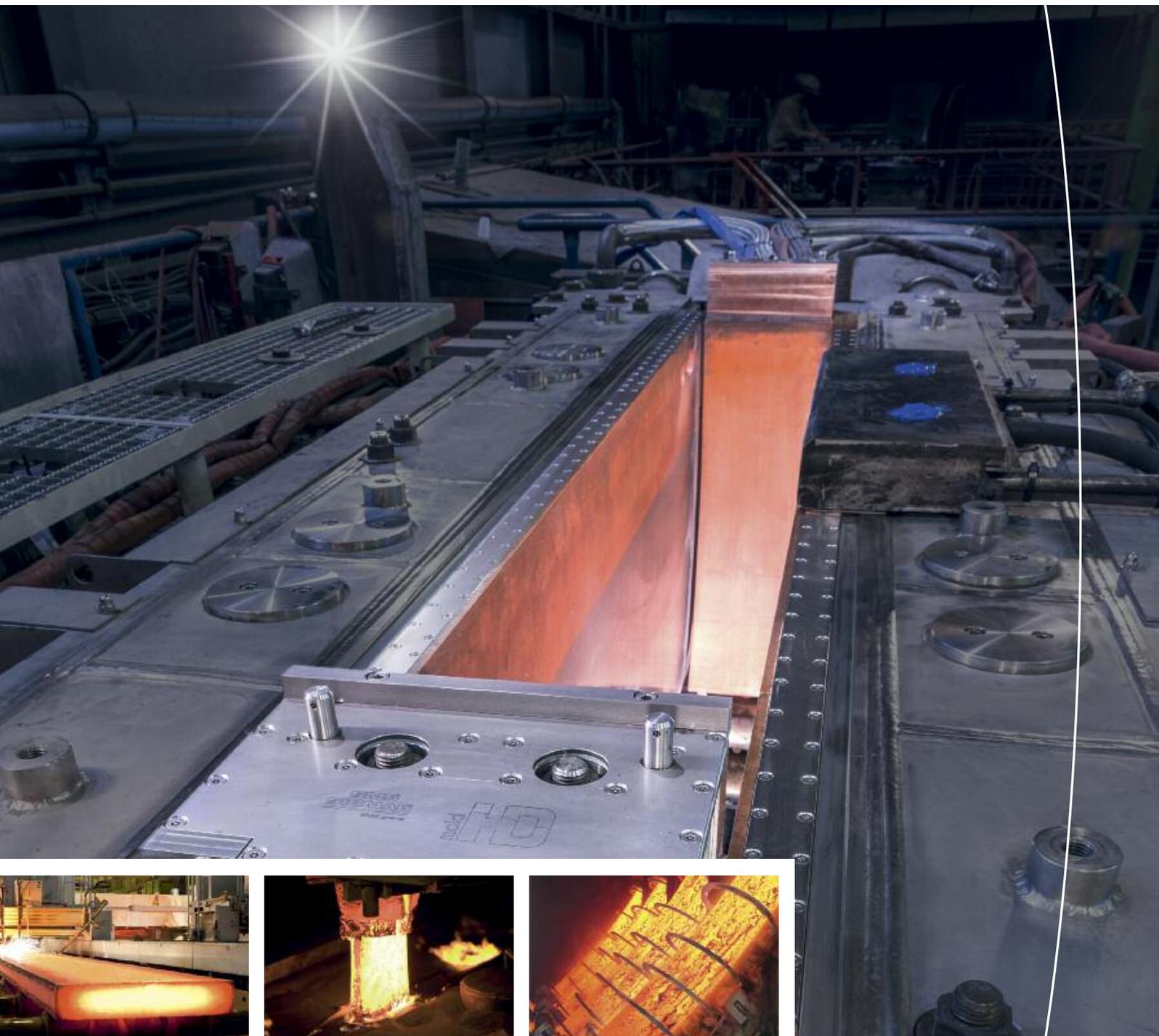


HD mold

High definition – high performance



HD mold

Excellent plant protection and prime product quality

The challenge

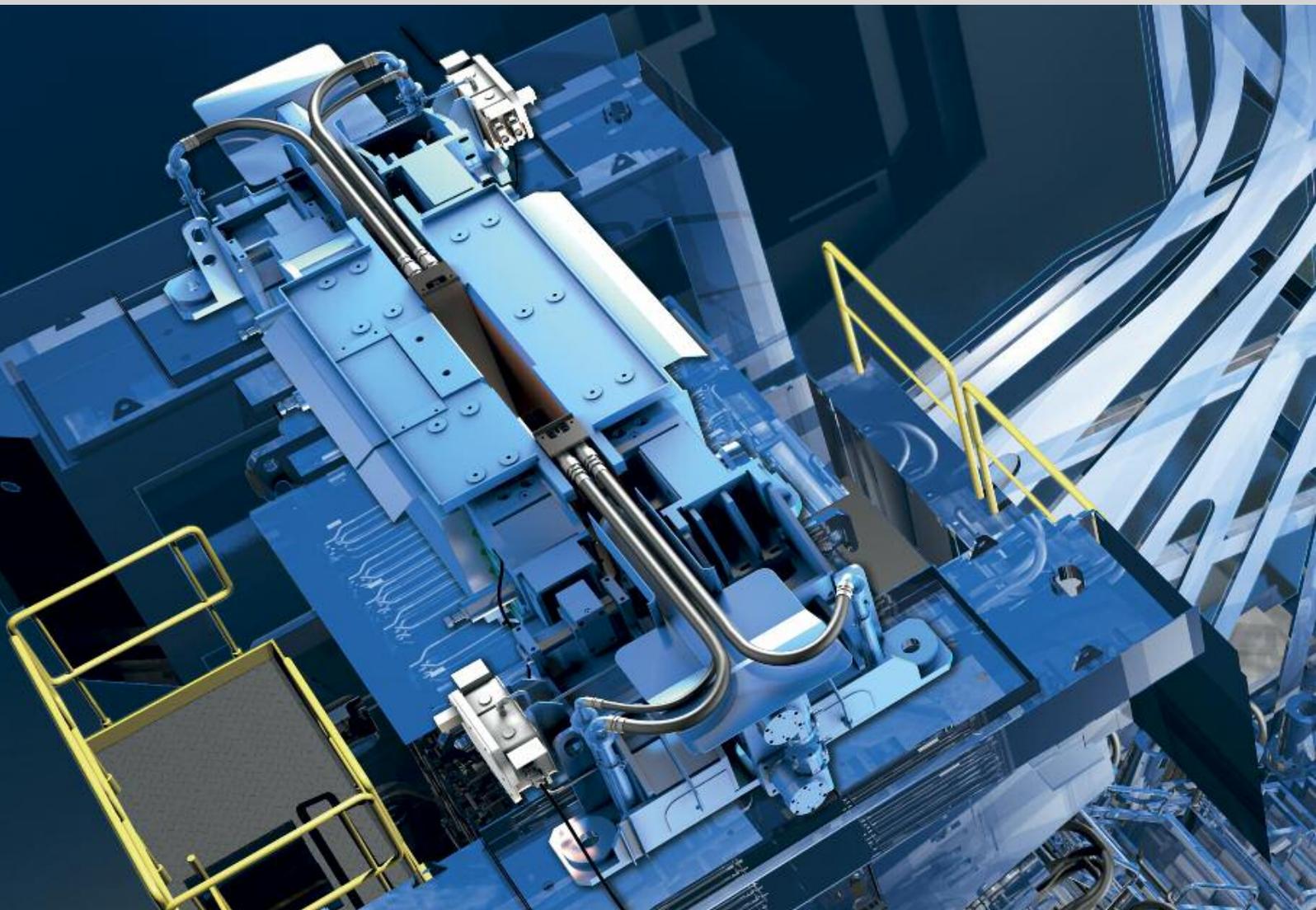
The continuous casting process has developed over the last few decades to a high technological level. The HD mold, developed by SMS group, reproduces temperature data in high quality and provides a new insight into the processes taking place inside the mold. With the SMS group's HD mold an optimum balance is achieved between breakout prevention rate (each breakout creates costs more than Euro 250,000) and alarm/slow down rate (costs incurred of over Euro 1,000 in each case). ROI is less than six months.

The SMS group solution

The use of the HD mold is essential to increase plant availability and to improve product quality for all kinds of new casting machines and for modernizations. The basis for successful temperature measurement is a reliable sensor installation for the rugged environment. Two kinds of sensors are available: Thermocouples (TC) and Fiber Optical sensors (FO) as well as mixed. A high variety of HD mold assistants is available. The assistants guide the caster operator and help him to focus his time on other caster duties.



Ergonomical user interface including online process data and temperature mapping of the four copper plates



Function	Machine protection	Quality and yield	Product development	Thermo-couples (TC)	Fiber optics (FO)
Breakout Prevention Assist				●	●
Mold Temperature Assist				●	●
Taper Assist				●	●
Longitudinal Crack Assist				30 cm	4 cm
Clogging Assist				●	●
Bulging Assist				●	●
SEN Lifetime Assist				●	●
Friction Assist				●	●
Level Assist					●
Solidification Assist					●

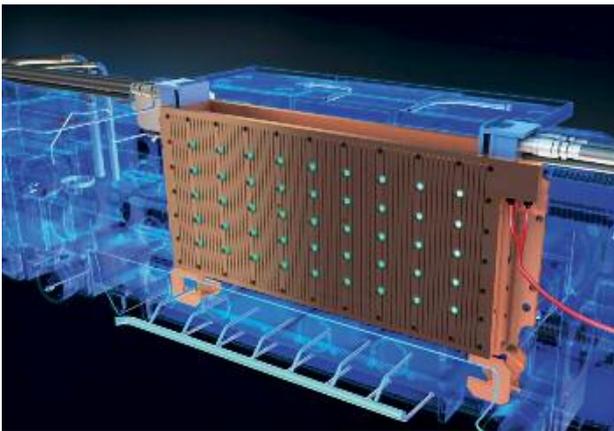
HD mold Assistants

Breakout Prevention Assist		<p>Breakout Prevent Assist serves for sticker detection and breakout prevention to protect the machine and increase plant availability.</p>
Mold Temperature Assist		<p>Mold Temperature Assist provides 2D and 3D information on the heat removal distribution, SEN alignment, stirrer effect and contact between the strand shell and the copper plates.</p>
Taper Assist		<p>Taper Assist evaluates the contact behavior of the strand narrow face and the mold copper so as to optimize the narrow side profile of the cast product (on narrow face fiber optical sensors are recommended).</p>
Longitudinal Crack Assist		<p>Longitudinal Crack Assist detects depressions, cracks and bleeders in depressions so as to ease post-processing.</p>
Clogging Assist		<p>Clogging Assist detects the agglomeration and washing-out of non-metallic inclusions in order to inform about increased casting risk and decreased product quality.</p>
Bulging Assist		<p>Bulging Assist identifies the source of mold level fluctuations (bent rollers, free surface waves) which lead to surface defects. Maintenance is made easy and information is generated about quality decrease.</p>
SEN Lifetime Assist		<p>SEN Lifetime Assist supports the operator in maximizing the yield, thus pushing casting to its maximum limits.</p>
Friction Assist		<p>Friction Assist supervises the oscillator movement and displays asymmetrical energy consumption. This provides information about abnormal conditions.</p>
Level Assist		<p>Level Assist (using fiber optical sensors) evaluates the shape of the meniscus across the mold width, without the influence of casting powder. Early detection of mold level to enable automatic start of casting.</p>
Solidification Assist		<p>Solidification Assist (using fiber optical sensors) identifies the well lubricated area inside the mold. Best practice of casting powder behavior is obtained so as to achieve prime surface quality.</p>

HD mold^{TC}

The conventional solution for temperature measurement uses thermocouples which are typically arranged in rows and columns. The use of “sheathed thermocouples” is most common. They are inserted through the fixing bolts of the copper plates and are therefore restricted to the number and the mechanical positions of the bolts.

Temperature signals are digitalized close to the mold and transferred via high-speed bus connection to the HD mold server (SMS group patent).

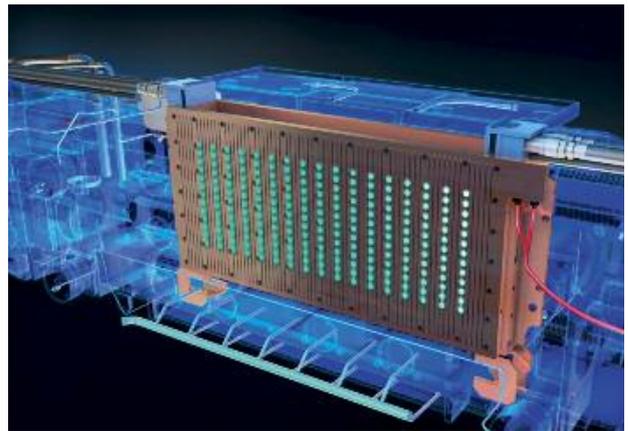


Special features of the HD mold^{TC}

- Auto-adaptive algorithms, avoiding breakouts from the first heat onwards
- Independence from steel grades, absolute temperatures, casting powder, different coating materials and different copper plate thicknesses
- Sticker detection rate over 95 %
- Safe detection of longitudinal facial cracks ≥ 30 cm
- Evaluation of casting powder effectiveness
- Automatic detection of poor thermocouple signals and their consideration
- Flight recorder for analysis of historical data
- “Event monitoring” for statistical evaluation of different casting events
- Modular extendable software design
- “Plug & Work”
- Suitable for modernization of any type of continuous casters

HD mold^{F0}

SMS group offers a revolutionary improvement in signal acquisition using optical fibers. With more than 500 measuring points, the density is higher than with the thermocouple system. The higher density of measuring points in the HD mold^{F0} is realized along the full height of the mold. The position of the measuring points are freely to be chosen. Direct visualization of the local strand shell thickness and of the respective thicknesses of the liquid and solid mold powder layers is only possible with HD mold^{F0} optical fiber technology. This enables a much deeper understanding of the process to be achieved.



Additional features of the HD mold^{F0}

- High-resolution display of temperature profile
- Sticker detection rate up to 100 %
- Improvement of alarm rate > 30 %
- Identification of well lubricated area inside the mold (working range of mold powder)
- Total electromagnetic insensitivity
- Perfect signal dynamics
- Safe detection of longitudinal facial cracks ≥ 4 cm
- Maintenance-free design
- Cabling with expanded beam connector for rugged environment (no swapping of signals)
- Free sensor arrangement in terms of height and width

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