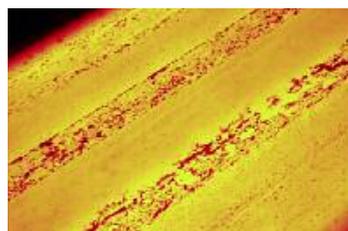
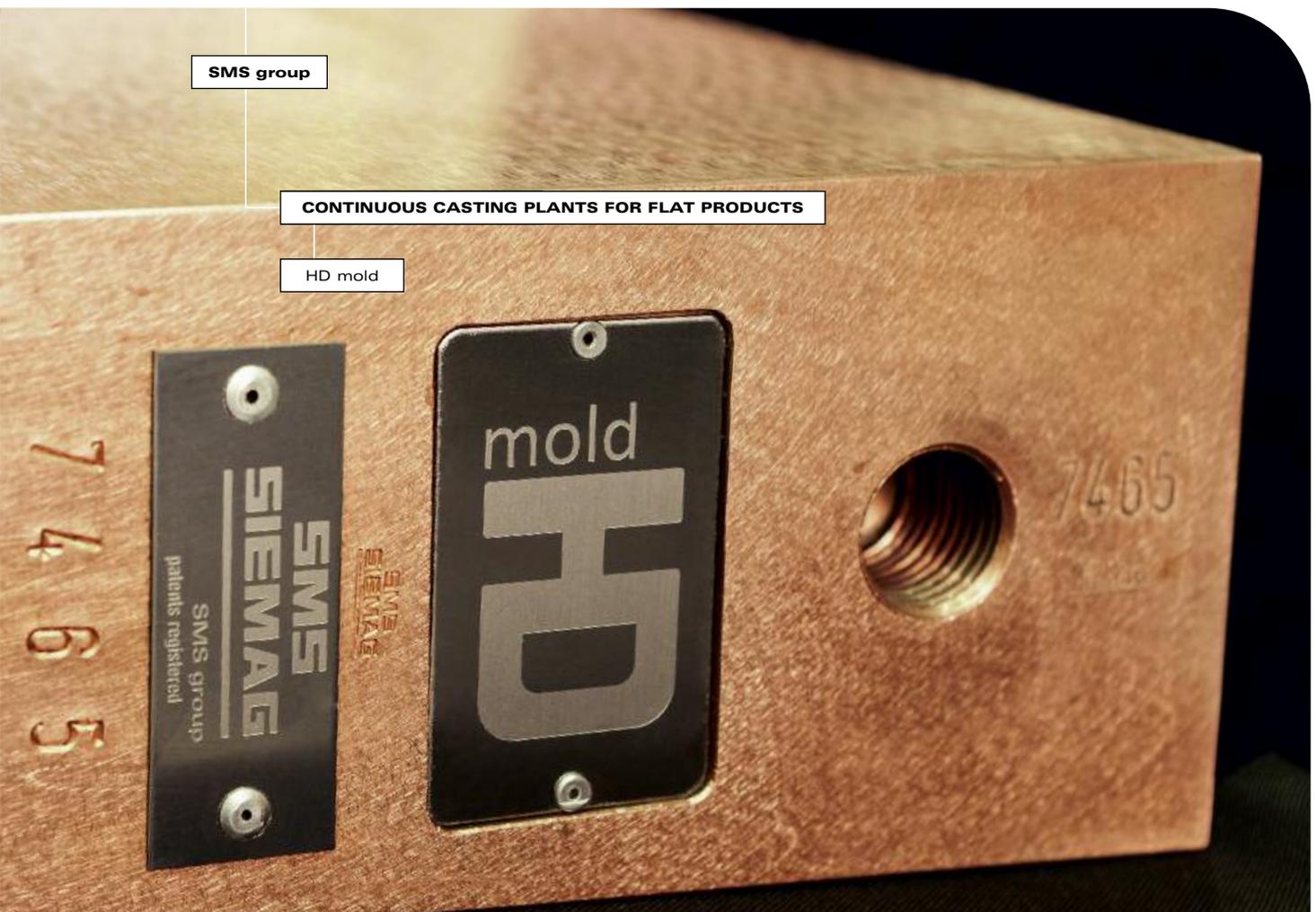


HD mold

High definition – high value



HD mold

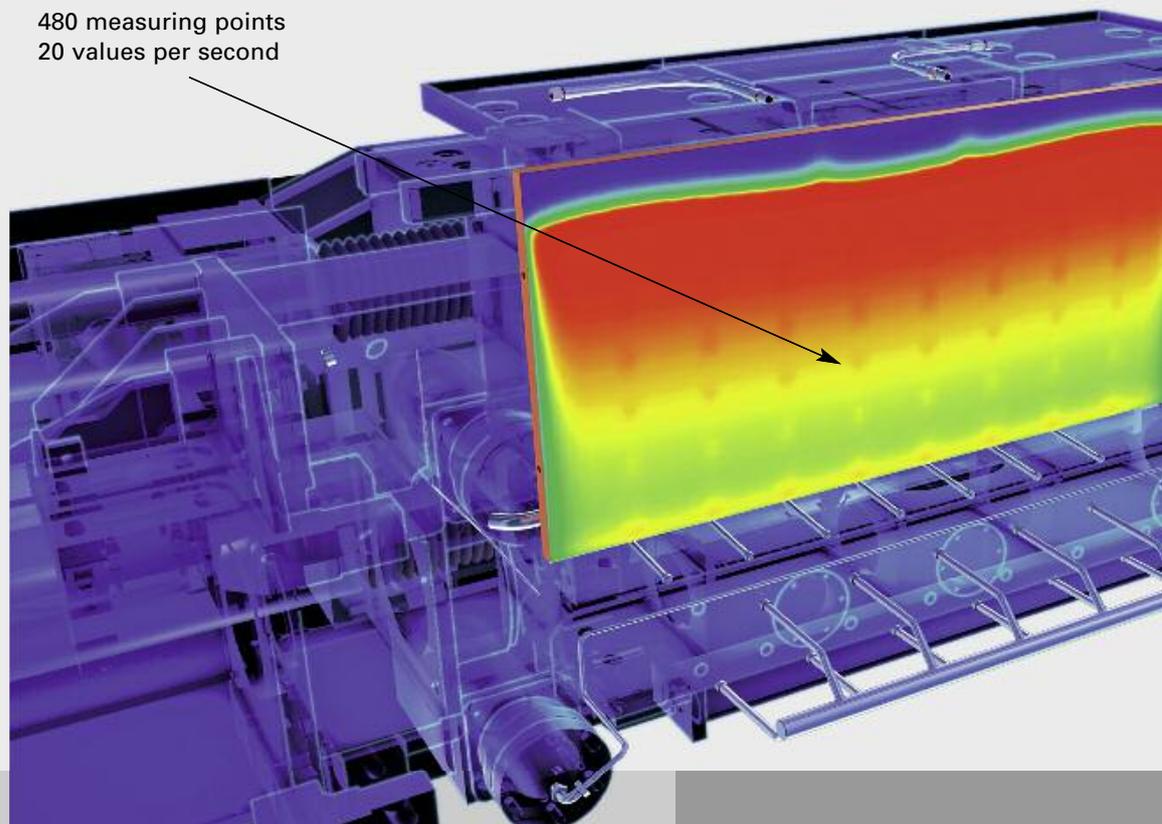
Process understanding is the key to improving quality

The core element of a continuous casting machine is the mold. It has the greatest influence on the quality of the slab and availability of the plant. Temperature data are essential for understanding and optimizing the casting process.

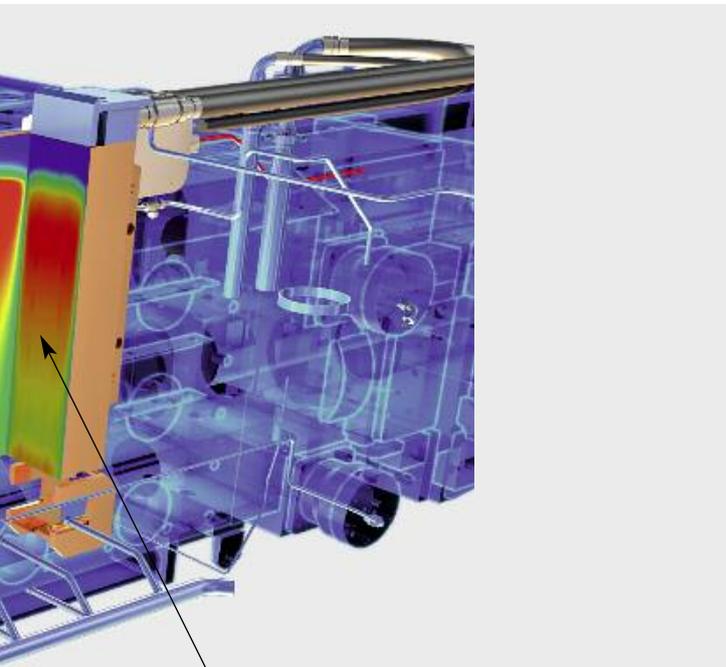
The HD mold, newly developed by SMS group, reproduces this data in high resolution and provides a new insight into the processes taking place inside the mold. For temperature measurement, SMS group offers an innovative solution using optical fibers.

SPECIAL FEATURES OF THE HD MOLD

- Copper plate with innovative optical fiber sensor technology
- Maintenance-free design
- Cabling with special connector (multi-coupling), suitable for steel mill operation
- Visualization and operating software including MMS HD package



mold HD



NEW:
Narrow face measurement
now possible

Increasing process understanding:
3D view of the HD mold.

BENEFITS

Perfect signal dynamics and quality, even in electro-magnetic fields

Extremely accurate, high-quality measurement data can be obtained through precise positioning of the optical fiber sensors integrated in the mold. The temperature is measured to the exact degree, 20 times per second. It is not influenced by electro-magnetic fields.

Extensive, detailed insight into the solidification process

With 480 measuring points, the density of measuring points in the HD mold is four times higher than with conventional systems, meaning large-surface measurements can be carried out along the full height of the mold. The position of the measuring points can also be freely chosen. Direct visualization of the local strand shell thickness and therefore a deeper understanding of the process is only possible with HD mold optical fiber technology.

Maintenance-free

Without any exposed measuring cables the sensor technology of the HD mold is maintenance-free. The overall supply line to the copper plate is the only cable present.

Increased slab quality and casting time

With the HD mold continuous caster owners have the opportunity to improve the casting process and increase the availability of the plant. The end result is higher quality of the slabs produced and reduced operating costs.

ENTIRELY NEW POSSIBILITIES

CLEAR DISPLAY

All previously known mold monitoring system (MMS) functions, such as thermal imaging, breakout and longitudinal facial crack detection are shown in greater detail. In addition, further diagnostic facilities are offered by the optical fiber technology. Alterations in the thermal conditions resulting from a change of casting flux are visualized as well as the contact behavior of strand and copper plate. What's more, the start of cast process is presented as detailed temperature gradient. This information can be viewed and used for optimization purposes.

DISMANTLING AND REWORKING OF MOLD WITH BUILT-IN SENSORS

All HD mold sensors are securely integrated in the copper plate. This prevents them being damaged during servicing or operation. Wear or contamination of the sensor technology is also prevented, thus

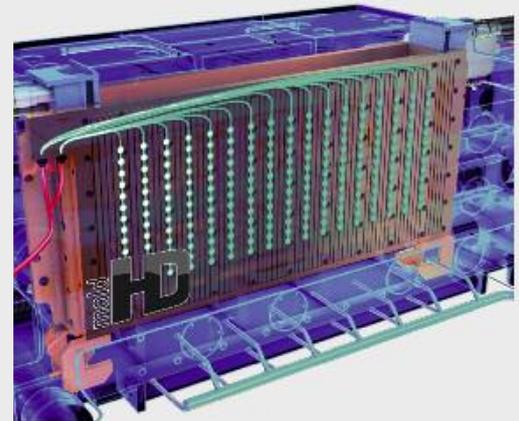
eliminating the risk of imprecise measuring signals. What's more, fixing the position of the sensor technology means it is no longer possible to confuse the cables when carrying out maintenance work. In the event of wear, the HD mold can be disconnected at the multi-coupling and removed as a unit. No sensors need to be dismantled for reworking purposes. Shut-downs for maintenance are reduced to a minimum.

MORE RELIABLE DETECTION OF 'STICKERS' - INCREASED CASTING TIME

Using the heat flux density values provided by the HD mold, it is possible to produce a real-time representation of the strand shell thickness in combination with the specific properties of the steel grades. The resolution is so high that stickers in the mold are clearly visible on the display.



HD mold with integrated sensors.



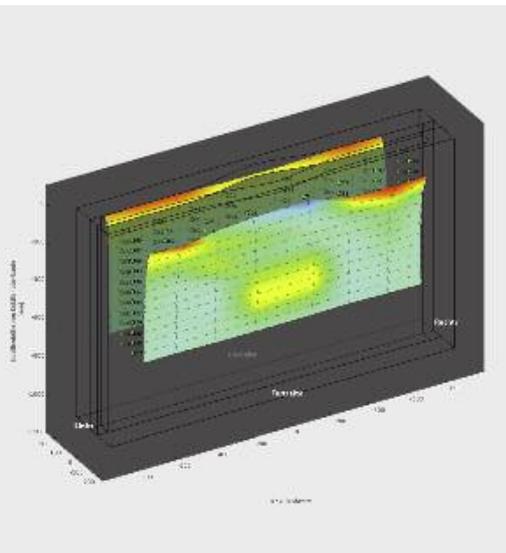
Perfect 'sticker' detection – thanks to fiber optics.



www.sms-group.com/qr/hd-mold



HD mold in a CSP[®] casting machine.



MEASURING TEMPERATURE WITH LIGHT

Different temperatures are present in the mold during casting and these influence the optical fibers integrated in the copper plate. These expand minimally as the temperature rises.

The optical fibers were previously marked with a so-called Fiber Bragg grating using a laser at precisely defined points. Each individual point reflects only the light of a specific color. The Fiber Bragg gratings also change the type of light reflection as a function of the temperature. By using light in various colors,

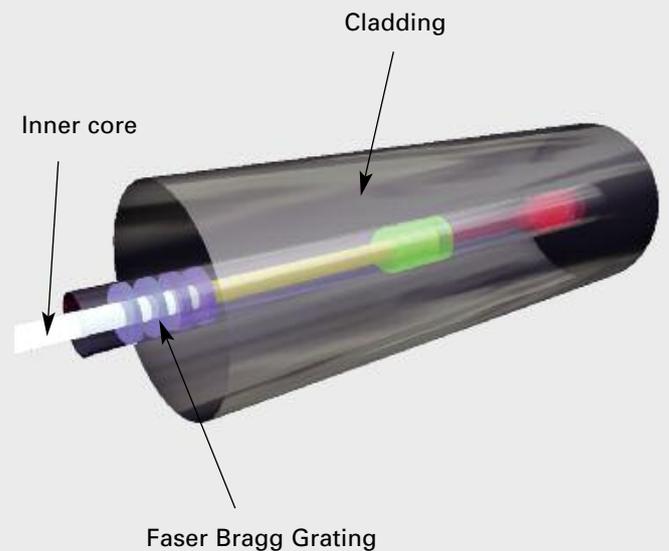
several differentiable signals are generated per optical fiber.

The software analyses these signals and can allocate the precise temperature to the known points. This results in a very precise graphic representation of the temperature distribution in the mold.

An optical fiber can be equipped with up to 15 temperature measuring points.



CSP® casting platform.





Together with the HD mold we now offer a completely new visualization module which gives the operator in the control room an HD-resolution image from the mold. The image can be rotated in 3D in real time, meaning no point is left unmonitored. This view into the mold is the key to a wider understanding of the process.

*Ronald Wilmes, Continuous Casters Division,
General Manager Sales Electrical and Automation, SMS group*



A high degree of innovation is needed for SMS group to make such delicate sensors fit for use in a steelworks. The deployment of optical fibers creates ground-breaking advantages that our engineers have put to successful use for continuous casting.

*Christian Geerkens, Executive Vice President,
Continuous Casters Division, SMS group*



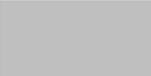
By investing in the HD mold steel producers are able to reduce production faults and control the quality of the slabs produced. The 'steel-in-mold-time' can also be increased. Both factors have an influence on costs and together produce a valuable competitive advantage.

Jochen Wans, Senior Specialist Continuous Casters Division, SMS group



In the past when changing the mold all temperature sensors had to be removed and re-fitted before the mold was removed and after it was re-installed. Since these stages are omitted with the HD mold, two hours of work are saved at least.

Oliver Wiens, Service Division, General Manager Copper Plates, SMS group



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