

Proximion AB, Product news

Next Generation Steel Mold Temperature Monitoring Using Fiber Bragg Gratings

Apr 30, 2026



The conditions in the mold during continuous casting are critical for steel quality, yield, and process stability. Many surface defects originate close to the meniscus, caused by phenomena such as mold level fluctuations, stickers, uneven shell growth, or local heat transfer disturbances. Conventional thermocouple-based mold monitoring systems provide limited spatial resolution and can miss early indications of such events.

Innovators at Swedish company **Proximion AB** have developed an advanced **fiber-optic mold temperature monitoring system based on Fiber Bragg Gratings (FBG)**. The system delivers **unprecedented spatial and temporal resolution**, enabling steel producers to detect, understand, and act on critical process events in real time.

By embedding optical fibers with densely spaced FBG sensors directly into the copper mold plates, thousands of temperature measurement points can be obtained. A single mold plate can be equipped with **over 2,600 independent temperature sensors**, measuring temperatures at millimeter-scale resolution across the full mold width and height in the near-meniscus region.

This ultra-dense temperature mapping provides detailed live heat maps as well as vertical and horizontal temperature profiles, enabling operators and process engineers to:

- Detect early signs of stickers and breakout risks
- Identify local heat transfer anomalies linked to surface defects
- Monitor mold level and meniscus shape across the full mold width
- Analyze transient and dynamic events lasting only seconds
- Improve understanding of mold powder behavior and shell formation

Compared to conventional thermocouples, the FBG sensors have **minimal thermal mass, sub-second response time**, and are **immune to electromagnetic interference and vibration**. The system has been proven in long-term industrial operation, monitoring **thousands of heats and hundreds of thousands of tons of cast steel** in active continuous casting environments. Its robustness allows installation, removal, and even mid-life mold refurbishment without damage to sensors or cabling.

The high-resolution data generated by the system also enables **advanced analytics and machine-learning applications**. By combining mold temperatures with caster process data, predictive models can be created to estimate the real-time risk of surface defects, providing early warnings and operator decision support directly in the control room interface.

The FBG-based mold monitoring solution can be customized for:

- Slab, bloom, or billet casters
- Selected mold zones or full mold coverage
- Fiber layouts optimized for critical regions
- Integration with existing breakout protection, mold level control, and process automation systems

Proximion technology experts will be available at our Sensor+Test booth to discuss applications, system design, and live monitoring capabilities, and to demonstrate how high-resolution fiber-optic mold monitoring can significantly improve casting stability, quality, and resource efficiency.