



TRANSFORMATION MONITOR

REALTIME, ON-LINE MEASUREMENT OF AUSTENITE-FERRITE TRANSFORMATION USING EMSPEC[®] TECHNOLOGY UNDER LICENCE FROM THE UNIVERSITY OF MANCHESTER

Many steel mills use modelling to determine the microstructure of the final product by controlling rolling and cooling. However, the model often relies on parameters that are not exclusively related to microstructure. The Transformation Monitor measures directly the transformation of iron from austenite to ferrite as the steel cools.

YOUR CHALLENGE

Steel producers are under increasing pressure from their users to supply ever more sophisticated steel grades to even higher specifications with improved process control and increased yields. This is especially true in the automobile sector where increased strength and reduced weight are the goals.

With pipeline steels, the goals are superior metallurgical and mechanical properties (strength, toughness and ductility) in order to allow exploration and exploitation in hostile environments.

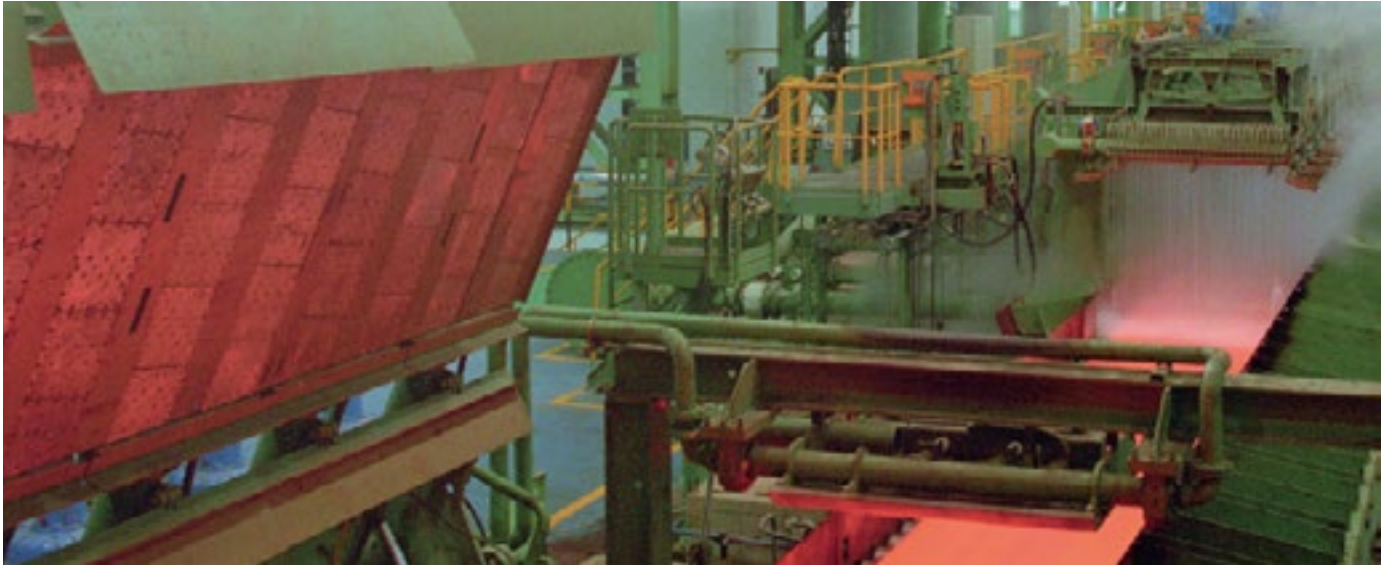
OUR SOLUTION

One or more sensor heads are located under the passline on the runout table. Each water-cooled head is in close proximity to the hot steel.

Each sensor head generates a primary magnetic field which interacts with the hot steel, producing a secondary magnetic field which is detected by the sensor head. Austenite has a low magnetic permeability, whilst ferrite has a high magnetic permeability.

The Transformation Monitor exploits this difference to measure the percentage of transformation that has occurred. This online measurement can be used for process control and monitoring or as a feedback signal into your cooling model.

The accuracy in monitoring can deliver improved product quality control and can significantly reduce the time to market of new steel grade developments.



Currently, the most common way to monitor the transformation of iron from austenite to ferrite is by measuring the surface temperature of the steel on the run out table.

This method is open to error as the temperature reading can be affected by other conditions. For example, scale or water on the steel surface will produce a lower reading.

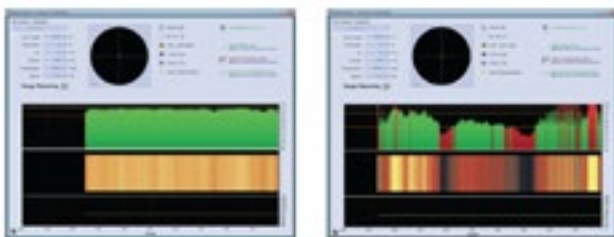
Another consideration is that the transformation process itself generates heat and raises the temperature of the steel. A given temperature could be one of two positions on the transformation-temperature curve

KEY FEATURES INCLUDE

- The Transformation Monitor makes a direct, dynamic measurement of the ferrite concentration within the steel as it cools (using EMspec® technology under licence from The University of Manchester).
- Transformation along the coil is displayed as a colourcoded coil map
- The sensor head is constantly washed with water to prevent false signals caused by material residing on the surface
- Sensor response is independent of stand-off distance

ADVANTAGES OF TRANSFORMATION MONITOR

- Direct measurement of transformation
- Real time, online measurement
- Avoidance of damage to strip surface as steel does not have to be constrained in order to make a measurement
- Simple Installation into new and existing mills



As certain steel grades do not fully transform to ferrite, a more useful measurement against the model is Transformation Index. This is a material dependent measure of the ratio of austenite to ferrite in the final product.

Pirmetals Technologies Limited
A joint venture of Mitsubishi Heavy Industries and partners

9 Enterprise Way | Christchurch
Dorset | BH23 6EW
pirmetals.com

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