

Application Note

Accurate, Stable Measurements of Continuous Casters and Billet Casters



Benefits

- Accurate measurements even at very slow speeds or zero speed
- Non-contact measurement eliminates measurement errors associated with contact measurement techniques
- Integrated system saves time and money previously spent on tweaking the mill control system to keep the product within specs

Meeting the Challenge

Measuring elapsed speed and length on Continuous Slab Casters and Billet and Bloom Casters isn't easy. One reason for the difficulty is the very slow speeds common during operation. Slab casters, for example, typically run at speeds between 30 and 80 inches/min and billet and bloom casters typically run at speeds between 50 to 150 in/min. Additionally, harsh environmental conditions and slag or scale on the surface of the product make accurate measurements difficult to obtain.

Typically, length and speed measurement for continuous casters are made using a tachometer connected to a roller or wheel that's in contact with the slab or billet. These mechanical systems are subject to slippage and calibration changes caused by changes in the diameter of the roll or wheel due to dirt build-up or wear. The measurement error of mechanical systems will change with mill conditions, requiring the mill operator to continuously check the cut length accuracy through hand measurements or weight measurements and then tweak the mill control system to keep cut lengths within specification.

The LaserSpeed Solution

The new Beta LaserMike LaserSpeed 9000 Gauge can help you avoid these measurement pitfalls. The LaserSpeed 9000 uses an acousto-optical modulator, allowing it to shift frequencies, as well as a unique down-mixing technique to ensure accuracy and resolution at zero speed and very slow speeds. The LaserSpeed 9000 Gauge is the only gauge that can make speed measurements continuously from zero speed up to its maximum speed specification, without any dead zones close to zero speed.

The non-contact LaserSpeed 9000 Gauge also helps you to eliminate the errors caused by roll or wheel slippage and errors caused by roll or wheel diameter changes. Maintenance costs are also reduced since the gauge can be mounted up to 2.5 meters for the slab or billet, reducing the cooling requirements and premature failure risk due to excessive heat.

The LaserSpeed Gauge shown on this page is inside a stainless steel housing, installed on the side of a slab caster. The gauge is mounted on

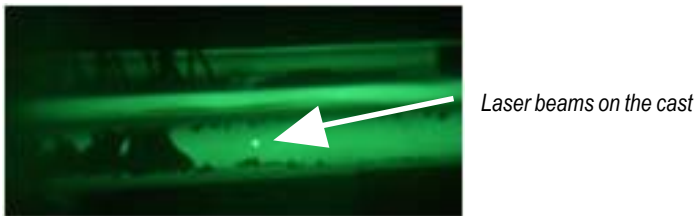
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a linear rail that allows the gauge to be automatically positioned the correct distance from the side of the slab during width changes. Installing on the side of the slab has several advantages compared to mounting the gauge above the slab.

- It reduces cooling requirements.
- It doesn't interfere with the overhead crane when mill maintenance is needed.
- It eliminates the heat shimmer effect on laser measurements.
- It allows the gauge to be pulled back for easy maintenance as required.

The use of a LaserSpeed Gauge eliminates the need for continual checks of cut length accuracy and constant tweaking of the control system. This results in a money savings by producing the correct slab length required with minimal waste. The accuracy of the LaserSpeed system is 0.05% of length, thereby producing more accurate and consistent slab lengths. Laser beams on the cast and the scale are shown in the photos below. The LaserSpeed Gauge is able to obtain accurate measurements on both the cast and the scale.

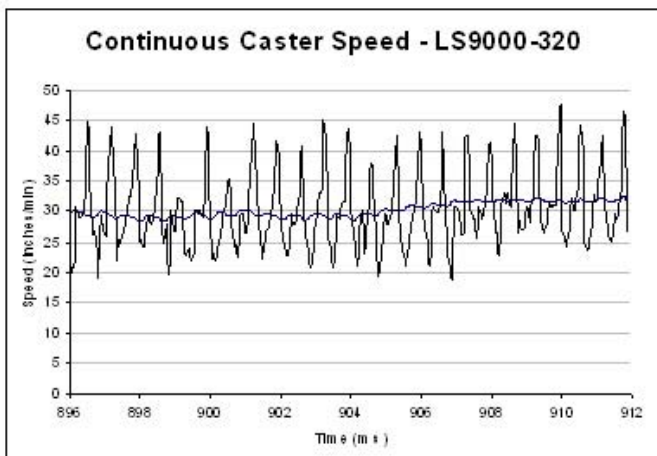


Laser beams on the cast



Laser beams on the scale

Speed measurements made by this system (see graph below) clearly show mould oscillation effects on the caster speed down by the torch cutter. Previous measurements presented on slab casters only showed a scattering of measurements throughout the speed range, and were unable to follow the actual speed of the caster. Also shown is the average caster speed. The speed is also integrated to obtain length. The length can be used to control the torch cutter to obtain accurate slab lengths.



This photo shows the gauge measuring the speed and length of a billet caster. The gauge can be mounted from the top or the side for billet and bloom casters because the heat shimmer is much less to the lower mass of the billet and bloom.



The graph below shows speed measurements made on a billet caster. Due to the gauge's technological design, the gauge can follow the mould oscillation effect on the cast down by the torch cutter. When the cast sticks in the mould, the mould oscillation has more influence on the cast speed. As shown, the mould oscillation effect can vary quite dramatically.



Summary

The LaserSpeed 9000 Gauge offers zero speed and slow speed operation, ideally suited to continuous caster and billet caster operation. Its ability to measure speeds continuously from zero speed up to its maximum speed—without any dead zones—provides excellent speed and length measurements for continuous caster application. The use of a LaserSpeed non-contact gauge eliminates slippage and calibration errors that commonly occur with tachometers and contact wheels or rollers.

Contact Beta LaserMike today to find out more about how the LaserSpeed 9000 Gauge can meet your needs for a highly-accurate, non-contact measurement solution that can reduce your costs and eliminates mechanical wear and slippage during production.

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