Temposonics®

Magnetostrictive, Absolute, Non-contact
Linear-Position Sensors

MTS SENSORS

Butech Bliss uses MTS Sensors to Ensure Minute Precision in World's Largest Stretch Leveler

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Case Study

Model RP Profile-style position sensor

Model RH Rod-style position sensor

By Matt Hankinson, Ph.D, Technical Marketing Manager of MTS Sensors

UNIQUE CHALLENGES FOR METAL SHAPING AND PROCESSING

Precision measurement is important in any industry. In metal shaping and processing, where material defects are difficult to remedy, it is absolutely vital. When a coil of metal leaves the truck, before it can be cut or shaped, it must first be flattened into workable sheets. This goal is typically achieved using one of several different leveler technologies. Options include roller levelers, tension levelers, temper mills, precision levelers and stretch levelers.

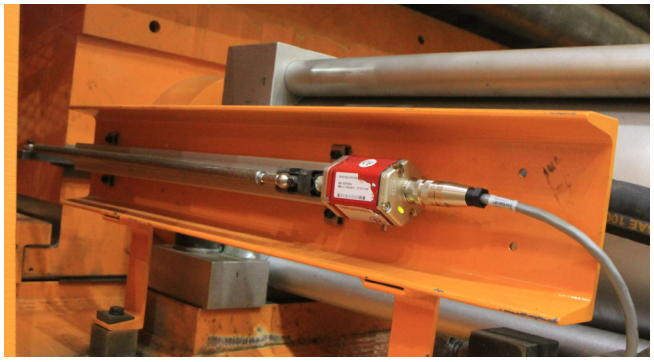
Of these, stretch leveling, which involves stretching the metal beyond the elastic yield point, offers the lowest possible level of defects, such as wavy edges and buckling. The elastic yield point is the point at which the shape of a material is permanently altered. Accomplishing this task requires extreme force and precision control. Ideally, a stretch leveler will pull to just beyond the yield point and stop.

THE LARGEST STEEL STRETCH LEVELER IN THE WORLD

The larger the stretch leveler, the more important this precision becomes. When Butech Bliss was commissioned by Ferragon Corporation to design and manufacture the world's largest stretch leveler, company engineers understood how large a difference the smallest measurements could make.

"The goal was to design a stretch leveler that would stretch the steel up to 2 percent of its original length," Haishi Zhao, a mechanical engineer on the project at Butech Bliss, explained. "Achieving that small a margin in a machine this size was a definite engineering challenge."

The finished machine, which was delivered to Ferragon's Ferrosouth facility in Iuka, Mississippi earlier this year, utilizes 4.44 million pounds of stretching force to flatten hot rolled steel as well as pickled and oiled rolled steel. Its nominal operating capacity can stretch steel half an inch thick, 96 inches wide with a 92,500 psi yield strength.



A STRONG NEED FOR ACCURACY

"When a strip leaves the stretch leveler, it is cut to a specific length," Zhao said. "There is no room for deviation or error."

To accomplish the precision and reliability required in this process, Butech Bliss utilized multiple Temposonics® magnetostrictive linear position sensors throughout the machine. These sensors register deviations and vibrations in increments as small as 20 microns and are designed to operate with minimal to no maintenance in demanding applications.

"Unlike most other sensor technologies, magnetostrictive sensors use 'absolute' measurement and do not require calibration," Matt Hankinson, technical marketing manager with MTS Sensors, said. "For that reason, machine operators can reliably track the distance the sensing unit moves at all times."

That mixture of precision and reliability made magnetostrictive sensors ideal for this application.

"This machine will be running continually," Zhao said. "The operator has to be able to trust the data he is receiving from the sensors. We've been utilizing Temposonics sensors in our machines for years. They are the best solution for this application."

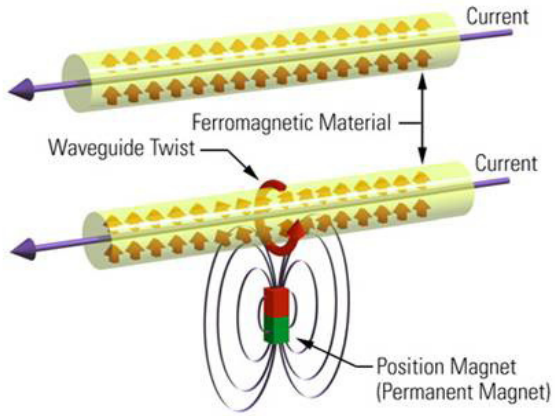
The stretch leveler shipped from Butech Bliss to the Ferrosouth facility in the first quarter of 2012.

For more information, visit www.butechbliss.com.

HOW MAGNETOSTRICTION WORKS

Magnetostrictive-based sensors work by inducing a sonic strain pulse in a specially designed magnetostrictive waveguide by the momentary interaction of two magnetic fields. One field comes from a movable permanent magnet which passes along the outside of the sensor tube, the other field comes from a current pulse or interrogation pulse applied along the waveguide. This interaction produces a strain pulse, which travels at sonic speed along the waveguide until the pulse is detected at the head of the sensor.

The magnet's position is determined with high precision by measuring the elapsed time between the application of the interrogation pulse and the arrival of the resulting strain pulse. Consequently, accurate non-contact position is achieved with absolutely no wear to the sensing components.



ABOUT MTS SENSORS:

MTS Sensors, a division of MTS Systems Corp., is the global leader in the development and production of magnetostrictive linear-position and liquid-level sensors.

MTS Sensors Division is continually developing new ways to apply Temposonics® magnetostrictive sensing technology to solve critical applications in a variety of markets worldwide. With facilities in the U.S., Germany, Japan, and China, MTS Sensors Division is an ISO 9001 certified supplier committed to providing customers with innovative sensing products that deliver reliable position sensing solutions.

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MTS® SENSORS

MTS Systems Corporation
Sensors Division

3001 Sheldon Drive
Cary, North Carolina
27513, USA
Tel.: +1-800-633-7609
Fax: +1-919-677-2343
+1-800-498-4442
e-mail: sensorsinfo@mts.com
http://www.mtssensors.com

MTS Sensor Technologie
GmbH & Co. KG

Auf dem Schüffel 9
D - 58513 Lüdenscheid, Germany
Tel.: +49-2351-9587-0
Fax: +49-2351-56491
e-mail: info@mtssensor.de
http://www.mtssensor.de

MTS Sensors Technology
Corporation

737 Aihara-cho, Machida-shi
Tokyo 194-0211, Japan
Tel.: +81-42-775-3838
Fax: +81-42-775-5516
e-mail: info@mtssensor.co.jp
http://www.mtssensor.co.jp