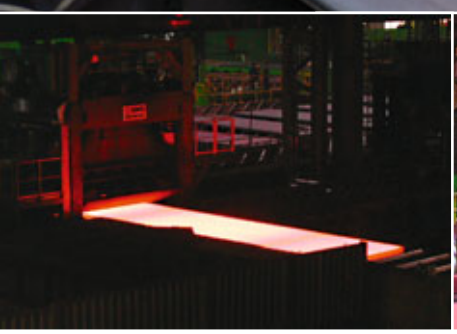
MEASURING SYSTEMS FOR PLATES

CROPTIMIZER® – PLATE PROFILE MEASUREMENT AND CUT OPTIMIZATION

APPLICATION REPORT



LAP LASER

ILSENBURGER GROBBLECH GMBH.

THE CUSTOMER.

The Salzgitter group operates a 3.7 m heavy plate rolling line at their Ilsenburg works. The annual output amounts to 800,000 t of heavy plate, making them one of the leading suppliers of heavy plate in Europe. The product range of the Ilsenburger Grobblech GmbH comprises construction steel, pipe steel, off-shore steel, pressure vessel steel, ship building steel, special toughness steel, case-hardening and heat-treated steel, stainless and acid-proof steel, and high-strength and wear-resistant steel. Depending on the steel grade, Ilsenburg works can supply heavy plates with thicknesses from 5 mm to 120 mm (from 2010 - 175 mm), widths up to 3.5 m, and lengths of up to 24 m.

THE JOB PROFILE.

The Ilsenburger Grobblech GmbH specializes in the rolling of small batches. The primary goal of the measurement system was to determine the optimum cut size of each raw plate, based on production requirements, so that the final product sizes could be cut from the raw plates with minimal amounts of scrap. These important measurements and calculations were required in order to optimize the production process. Flatness, in addition to the plate geometry, is a critical quality parameter. However, flatness was not currently being measured, other than a visual flatness check from the control pulpit. For these reasons the plant management decided to purchase a measurement system for plate profile, length and flatness. The proposed gauge location was immediately after the 9-roll hot leveler, but only very limited space was available. The maximum roller table speed at this location is 1 m/s (200 fpm) and the temperature of the plates ranges from 20 to 1,050 °C (70 - 1,922 °F).

THE SOLUTION.

The solution was to install an LAP laser gauge behind the exit of the hot leveler, which would measure the width, length and flatness of the plates. These values constitute the complete profile of the plates, including the shapes of the head and tail crop. Other shape anomalies like saber, necking and wedges would be captured as well.

THE MEASURING PRINCIPLES.

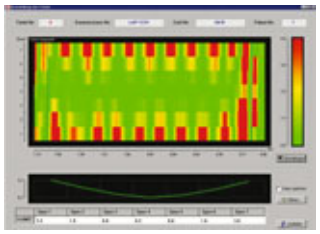
Laser Triangulation and Laser Doppler.

Width: Two laser triangulation sensors mounted on each side of the roller table are used for measuring the width. To guarantee reliable measurements, especially for thin plates, these sensors are equipped with light band optics.

Flatness: The flatness gauge consists of 11 laser triangulation sensors mounted above the roller table in a straight line across the width of the plate. The sensors measure the precise distance to the plate surface and, when combined with the results of the length measurement, provide a complete flatness profile.

Length: A Laser Doppler gauge is mounted above the roller table in the center of the table to measure the length of the plate as it is passes. Laser photocells with light band optics measure across the table to precisely detect the leading and trailing edges of the plates. A second, identical Laser Doppler gauge replaced the measuring wheel in front of the hot shears to assist with positioning during sectioning of the hot plates.

EXCELLENT BENEFITS FOR PRODUCTION.



OPTIMAL FLATNESS.

The results of the flatness measurement determine whether a plate takes the normal production process or needs to be re-leveled. Further more, the flatness measurement results are used to optimize the adjustment of the hot leveler.

YIELD CONTROL.

The plate geometry measurements determine whether the desired finished plates can actually be obtained from the raw plates. The location of a subdivision cut, the length and position of a material sample, the crop shape, and the lengths of head and tail crops are computed and displayed for the operator. All results are used for further optimization of the slab size calculation.

IMPROVED PRODUCTION CONTROL.

The measurement system is integrated in the material tracking system, providing immediate access to all plate geometry data and allowing inspection of production sequences to quickly diagnose and correct possible bottlenecks.

PRECISE SHEARING.

The plate geometry and the location of the computed shearing lines are displayed for the operator of the hot leveler and the hot shears, allowing him to precisely position the plates under the hot shears in manual operation.
In automatic mode, the measurement system provides control signals for the roller table to position the plates automatically under the hot shears.

COMPLETE DOCUMENTATION.

The measurement system continuously archives the measurement data of all plates in a database, providing traceability of all sequences in the process chain.

"The LAP gauge assists in achieving the optimal yield by optimization of the slab weights. The detected geometry of the mother plate by the LAP system is a basic condition."

Dipl.-Ing. Gerd Grastorf

Production
Manager Rolling Dep.
Ilsenburger Grobblech GmbH

CAN

LAP LASER

Sensors, Line Lasers, Projectors
Systems & Solutions

TECHNICAL DETAILS.

Measuring System
- Width: 2 Laser Triangulation sensors, model ANTARIS L with special light strip optics
  Accuracy: +/- 3 mm
- Flatness: 11 Laser Triangulation sensors, model ANTARIS L
  Accuracy: +/- 1 mm
- Length: 2 Laser Doppler velocimeters with 2 Laser photocells with special light strip optics
  Accuracy: +/- 0.1 % of actual length

Mechanical Structure
- All sensors are mounted in insulated protective housings directly behind the hot leveler at the sides and above the roller table. Considering the conditions of plate rolling, the system has been designed very compact to integrate into the existing rolling line without modification.

Mill-duty Design
- Large measuring stand-off
- Temperature monitoring inside the protective housing with integrated automatic over-temperature protection
- Independent air supply for purging and cooling of the measuring frame, using filtered ambient air. No mill utilities are required.
- PCs and electronics in cabinets in the control pulpit

Measuring Sequence
- Fully automatic measurement controlled by and synchronized to the plate transport
- Online display of cold dimensions, computed according to rolling temperature and material shrinkage coefficient

Integration
- Display and archiving of all measured data through a networked multi-PC system
- Local database for archiving of all measured data
- Ethernet link of the measurement system to the material tracking system

Calibration and Maintenance
- Quick and easy on-site calibration through certified master pieces
- Replacement of filter cartridges in the air supply unit approximately every 3 – 6 months, routine cleaning of Laser windows

10/2009

LAP Laser LLC.

Sales, Service

7669 Wooster Pike
Cincinnati, OH 45227
USA

Phone +1 (513) 271-4529
Fax +1 (513) 271-3821
Email info-us@lap-laser.com

**LAP GmbH
Laser Applikationen**

Headquarter: Production, Sales, Service

Zeppelinstr. 23
21337 Lueneburg
Germany

Phone +49 (0)4131 9511-95
Fax +49 (0)4131 9511-96
Email info@lap-laser.com

**LAP Laser Applications
Asia Pacific Pte Ltd**

Sales, Service

Block 750A, #07-02 Suite 8
Technopark at Chai Chee
Singapore 469001
Singapore

Phone +65 6536 9990
Fax +65 6533 6697
Email info-asia@lap-laser.com

WWW.LAP-LASER.COM

LAP LASER

Sensors, Line Lasers, Projectors
Systems & Solutions