SMS group

# MEERgauge®

## Superior profile measurement and surface quality inspection

# MEERgauge®

## State-of-the-art high precision true shape measurement and surface analysis


*MEERgauge® behind the PSM® at SDI Pittsboro / USA*

**Technology**
The cross-section sensors developed by SMS TBK measure up to 2,000 contours per second. For this special lasers project lines onto the surface of the product. The reflected laser light is captured by cameras and converted into distance values. Using the values recorded by all sensors arranged around the product, the SMS TBK systems determine the precise cross-section of the product. The high measurement density means that a high-resolution 3D model of the bar can be created.

**Measuring systems for wire rod and bar**
Contour measurements are particularly difficult to carry out in high-speed wire rod mills: Extreme production speeds of up to 120 m/s – that is over 430 km/h – and rapid lateral movements of the wire rod place high demands on the measuring technology dynamics. The contour measurement unit has to compensate for the effects of the movements, in order to attain effective measurements results. MEERgauge® meets these demands: Even with extreme production speeds, measurements in real time allow systems to react quickly and reliably by means of fully automatic production control and product optimization.

**Technical key features**

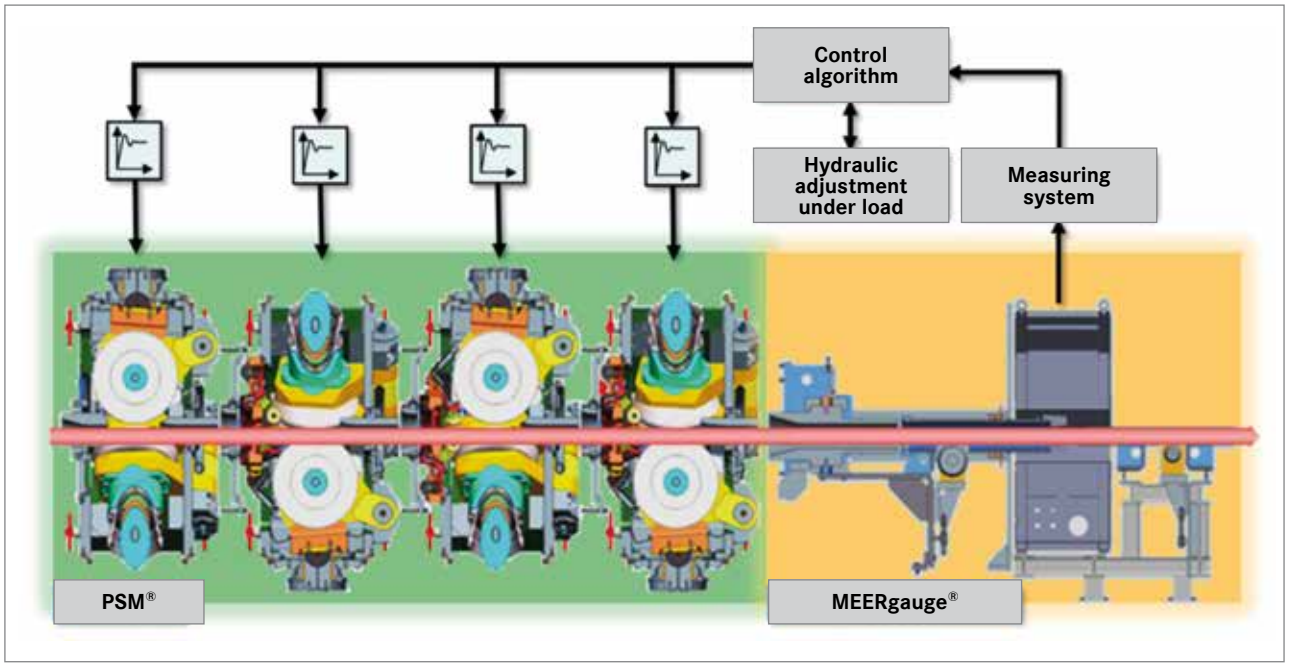
- Measuring system works completely contact-free
- Up to 2000 cross sections per second
- Synchronous measurement of the complete profile
- Sensors perform image preprocessing and contour extraction
- Accuracy: 0.05% of the size of the measuring field
- No moveable parts inside
- Life-time calibration
- Easy to maintain

**High Precision – fully automated**
SMS TBK measuring systems allow a Closed-Loop control between the contour measurement and rolling mill control systems. The computer-based interpretation on the measurement results allows roll adjustment corrections to be made while production is ongoing. The first application of such a system was performed in Třinecké Železárny, Trinec, Czech Republic in 2004.

The most important recent development however is a Closed-Loop control between a MEERgauge® and a SMS 3-roll Precision Sizing Mill (PSM®). The MEERgauge® system installed directly behind the PSM® enables fully automated operation and ensures maximum precision during production – independently of the operating personnel.

**Benefits**

- High measurement data density: up to 2 million measuring points per second
- Short exposure time and absolute synchronization of the measuring probes
- Measuring equipment in the immediate vicinity of the roll stands
- Direct transfer of measured values to the roll stand control system (closed loop control)
- Compatible with 2 and 3-roll systems
- Time and cost benefits from direct production control

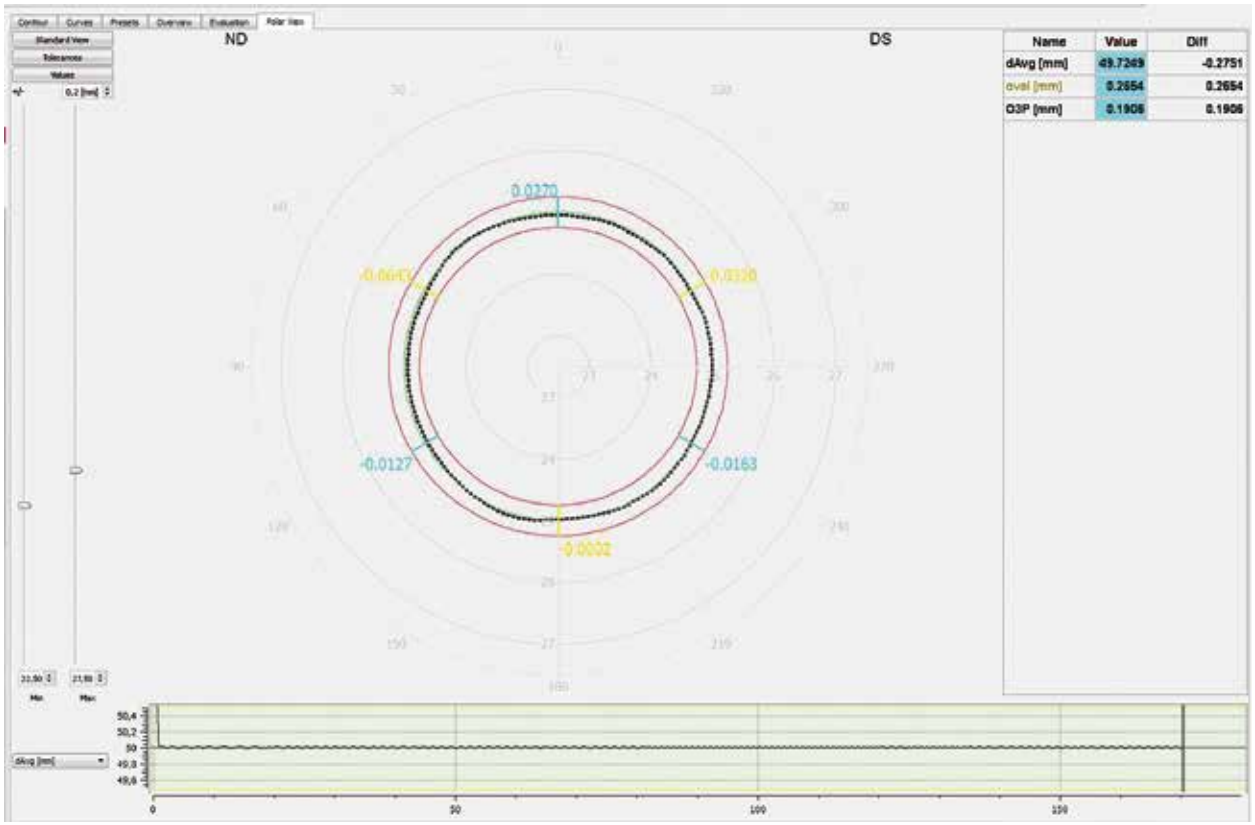

*Closed-loop / monitor control*

Best tolerances can be achieved by combining the MEERgauge® laser measuring system with the highly dynamic monitor control system. The rolls of the PSM® can be adjusted under rolling load in milli-seconds.

In the event of size or temperature fluctuations in the ingoing product, the system automatically reduces the tolerance deviation in the end product during rolling to a minimum.

## Available MEERgauge® types

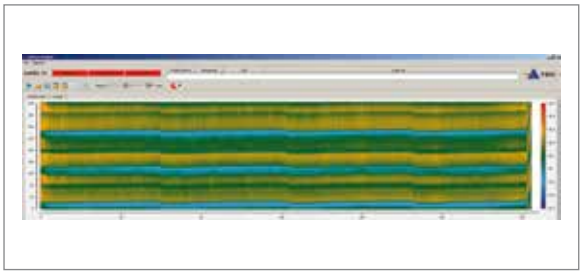
| Type | | PRG D50-4 | | PRG D100-4 | PRG D150-4 | PRG D275-4 |
|---|---|---|---|---|---|---|
| | | Wire | Bar | | | |
| Diameter Range | mm | 4.5 - 27 | 8 - 44 | 15 - 85 | 22 - 130 | 40 - 235 |
| No. of measurements | No./sec | 2000 | 1000 | 1000 | 1000 | 500 |
| Measurement Precision | ± mm | 0.015 | | 0.02 | 0.03 | 0.05 |



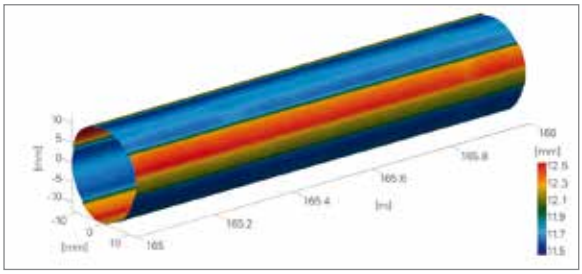

*Visualization of rolling results by a MEERgauge® behind the PSM®*

# SurfTec

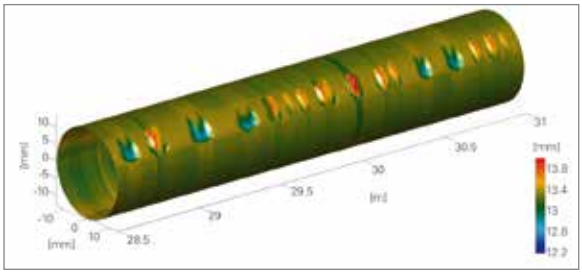
## Online surface defect detection



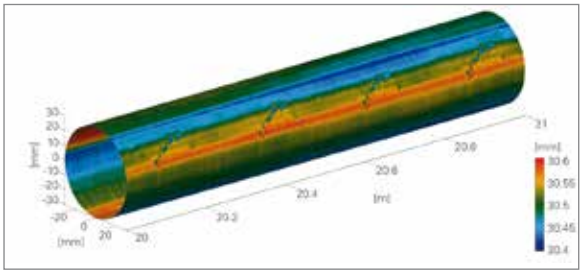
*Screenshot from the Surface Analysis Software*



*The seams and edges across longer areas of the bar are reduced by adjusting the roll positioning system*



*Deviations that occur frequently though irregularly indicate defective ingoing material.*



*Periodic deviations are caused by damaged rolls or guide rollers*

**Surface analysis technology**

In the case of quality steel for complex applications, such as the automotive or mechanical engineering sectors, for example, the tightest tolerances apply to the targeted dimensions. Nevertheless, every production line experiences minimal anomalies that are caused by the ingoing material or tiny damage to the rolls or guide rollers, among other things. Quality steel producers are therefore faced with two challenges: First, they need to detect and locate defects on the hot surface that are not visible to the naked eye in time; secondly, they need to identify and eliminate the cause.

**Surface defects detected**

- Underfill / Overfill due to errors in gap setting
- Periodic defects due to defective rolls or guides
- Error clusters due to defective material
- Single significant errors

**Troubleshooting with intelligent fault analysis**

The surface measurement system from SMS TBK helps rolling mill operators do both: It determines the precise position of the anomalies on the bar surface at the time of rolling, evaluates the data using special algorithms and provides the operators with information on the cause by classifying the defects. The basic principle is very simple: compare each measurement “slice” to the next one and look for deviations.

The system precision resolves tiny variations and creates a surface “map” where, for ease of understanding, areas of the surface that are slightly “above” the ideal shape are marked in red tone colors while areas “below” the ideal shape are marked in different tones. Areas close to exactly at the ideal shape are marked in green.

Automated defect detection routines monitor the surface map and alert the operator in case of anomalies.

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W2tw3 - 309E · Published on 04.04.2016 · Circulation 500 · Printed in Germany · KD