

# CONTOUR CHECK SHAPE

LAP profile measurement system for long products



# CONTOUR CHECK SHAPE

Real-time laser profile measurement for rolled long products using laser light-section sensors

- 4-camera solution for convex and L-shaped profiles.
- Camera protection with heat-shield, airflow through frame, airflow around sensor baseplate and water cooling.
- Blue laser for optimal visibility on glowing surfaces.
- Detection of size, geometry and surface defects
- High accuracy and simple calibration
- Standardized gauge with no moving parts
- Virtually maintenance free

The rugged, robust design of CONTOUR CHECK SHAPE is based on more than 30 years of experience of supplying systems for rolling mills.



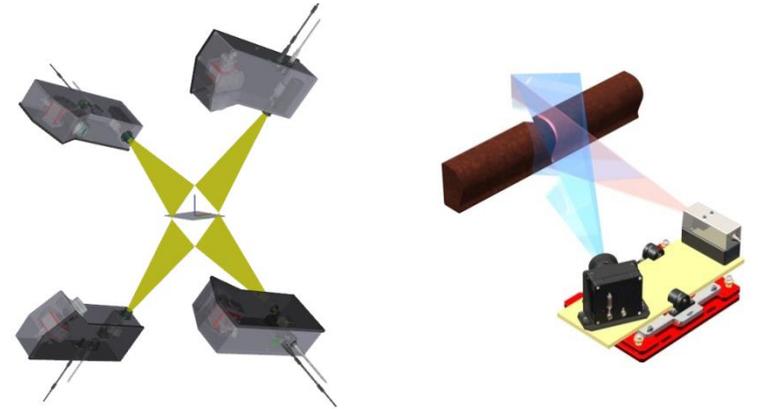
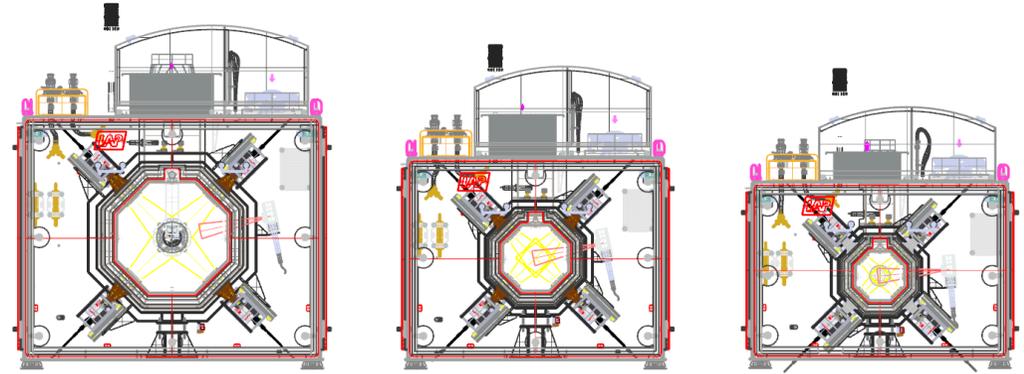
# CONTOUR CHECK SHAPE

Well designed system to secure long life time and easy maintenance



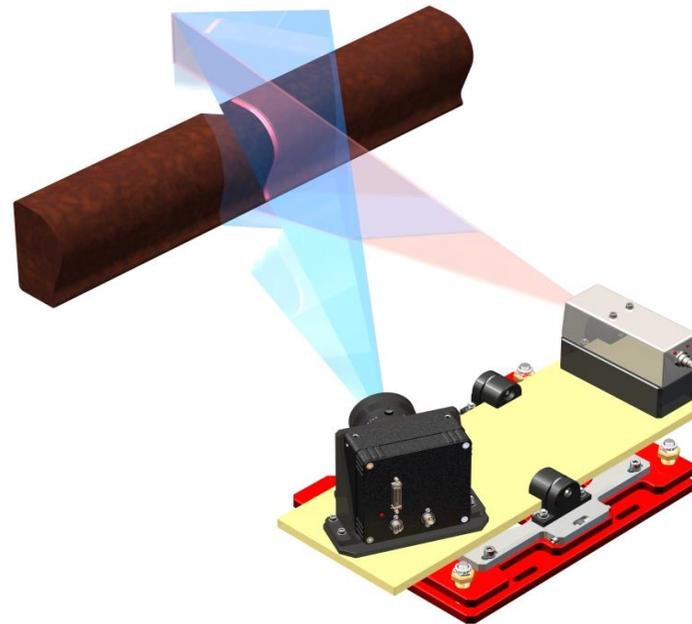
# FEATURES

- Blue laser diode for hot applications ensures adequate contrast ratio. Red laser diode for cold applications (tbd)
- Frontend concept with pre-arranged camera signals for real-time data processing
- High independence from material movements thanks to extremely short exposure time
- 4 Sensors, OPTARIS Sensor with 2 Wavelength, 405nm, 450nm
- Closed thermal design for extreme stabilized conditions
- Separated air flush for clean windows
- Round:  
diameter, ovality, roll shift, fill grade
- Square:  
height, width, diagonal length, corner radius
- Flat:  
heights, widths, diagonal length, corner radius
- Hexagonal:  
height, side relation, width across flats
- L-form angle:  
lengths, thickness, corner angle
- Weight per meter



# LASER MEASUREMENT PRINCIPLES

- **LASER LIGHT SECTION METHOD:** The sensor contains a line laser, a CCD camera and electronics for processing the camera signals. The laser projects a straight line perpendicular to the surface to be measured. The camera is fixed at a certain angle to the laser line. Any deformation of the surface causes a deformation of the laser line from the cameras angle of view. Using the basic calibration as reference, the sensor calculates the dimensional values.



# CONTOUR CHECK SHAPE

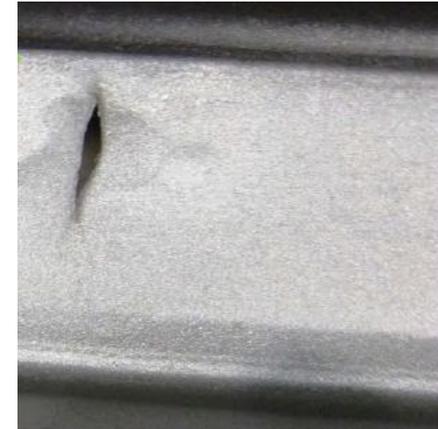
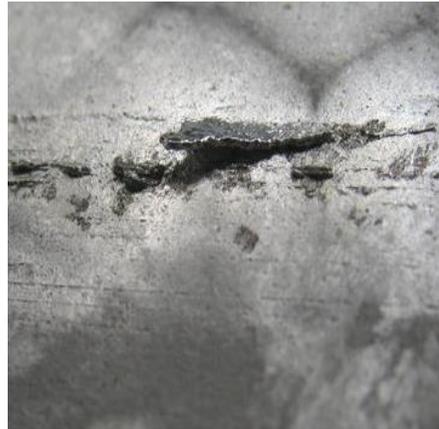
Real-time laser profile measurement for rolled long products using laser light-section sensors

Profiles	 ROUND: diameter, ovality	 SQUARE: height, width, diagonal length, corner radius	 FLAT: heights, widths, diagonal length, corner radius	 HEXAGONAL: height, side relation, width across flats
Detection and detailed display of rolling defects				
Detection and display of surface defects				

Rolling defects and singular defects are automatically detected

# SURFACE DEFECTS

- Detect surface defects over the complete shape
- More detailed quality control

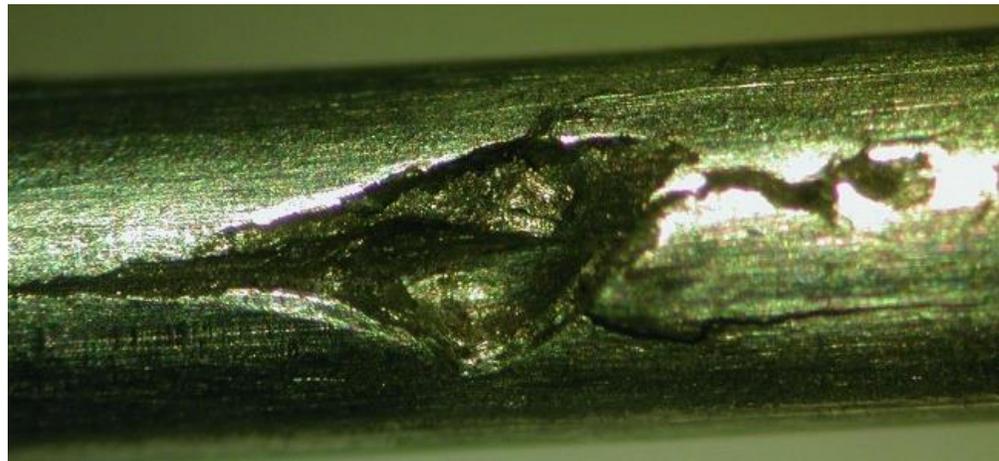


Minimum defect sizes:

Defectlength: 3 measurement values  
 $\text{speed} / \text{frequency} * 3$

Defectwidth: min. 12 Pixel  
 $\text{measurementrange} / 2000 * 12$

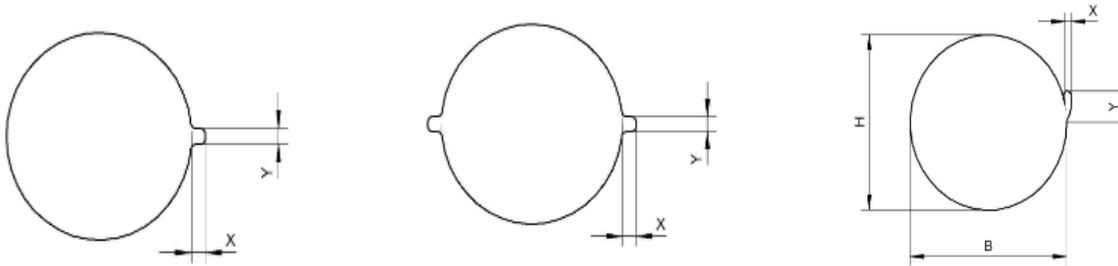
Defectdepth: min. 1 Pixel  
 $\text{measurementrange} / 1048$



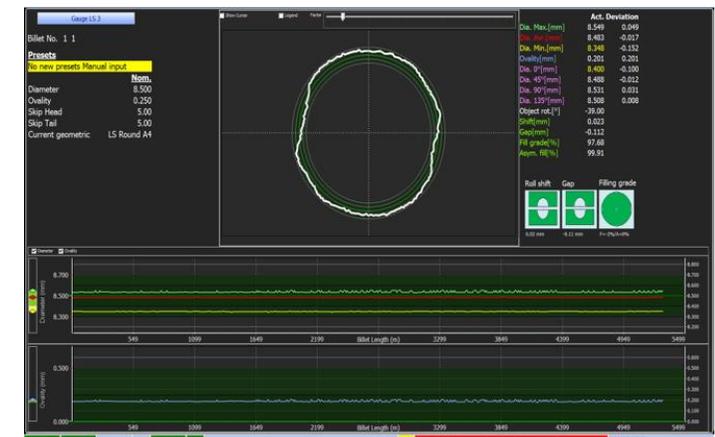
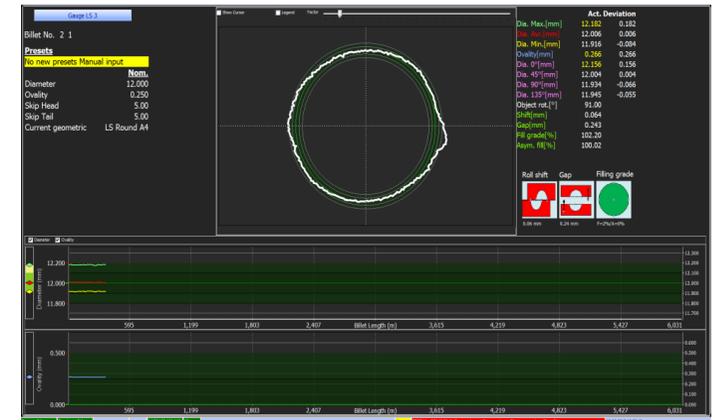
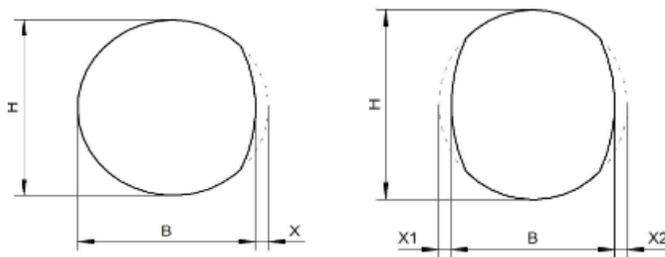
# CONTOUR CHECK SHAPE

## Rolling defects

- Overfill: Seam on both sides or on one side



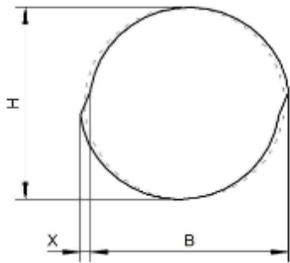
- Underfill on both sides or on one side



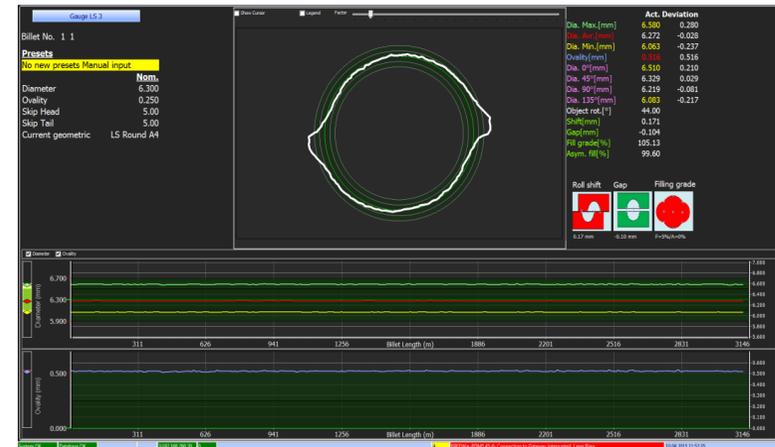
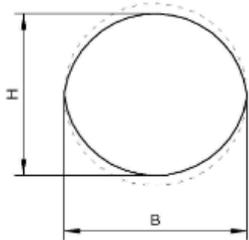
# CONTOUR CHECK SHAPE

## Rolling defects

- Roller Shift



- Rolling gap too small



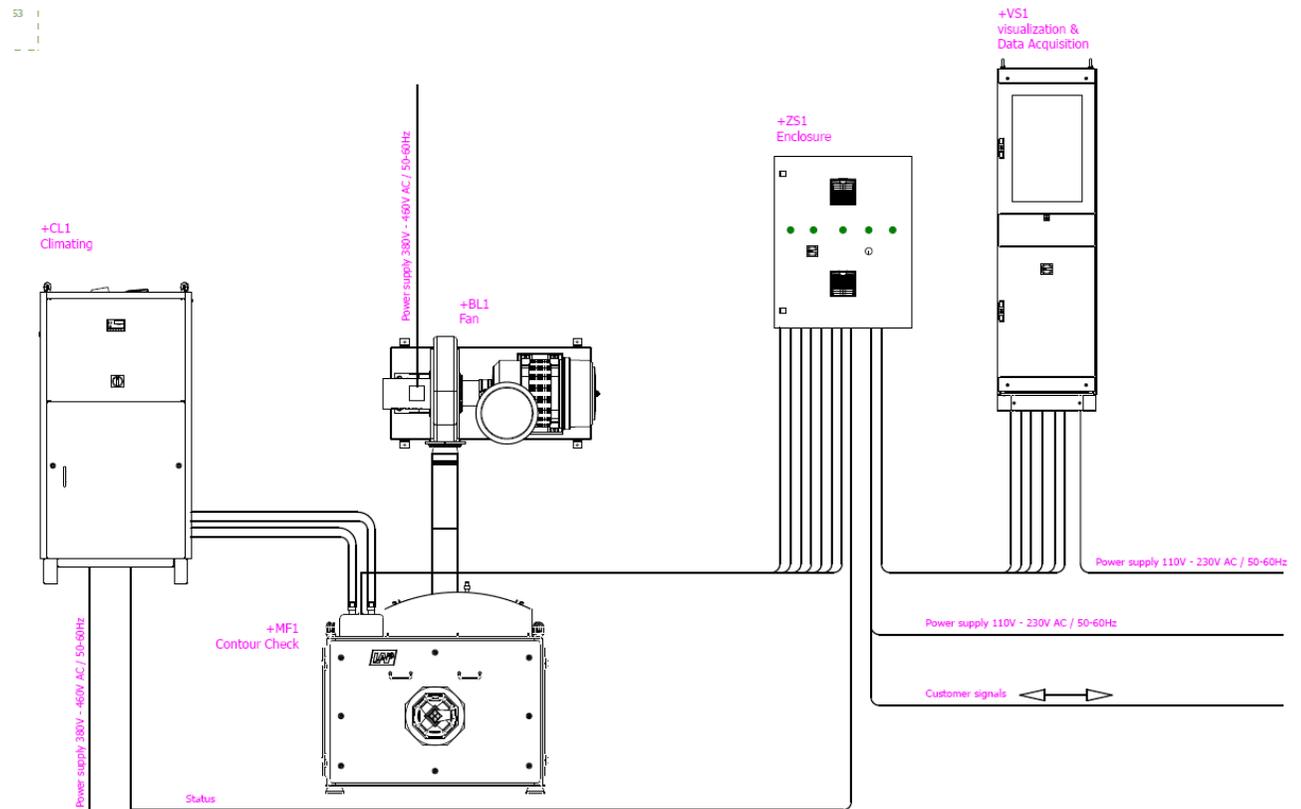
# CONTOUR CHECK SHAPE OVERVIEW

## ■ Standard

- Measurement Gauge
- PC cabinet/ monitor
- Local control box
- Software/HMI
- Blower
- Water-conditioning unit

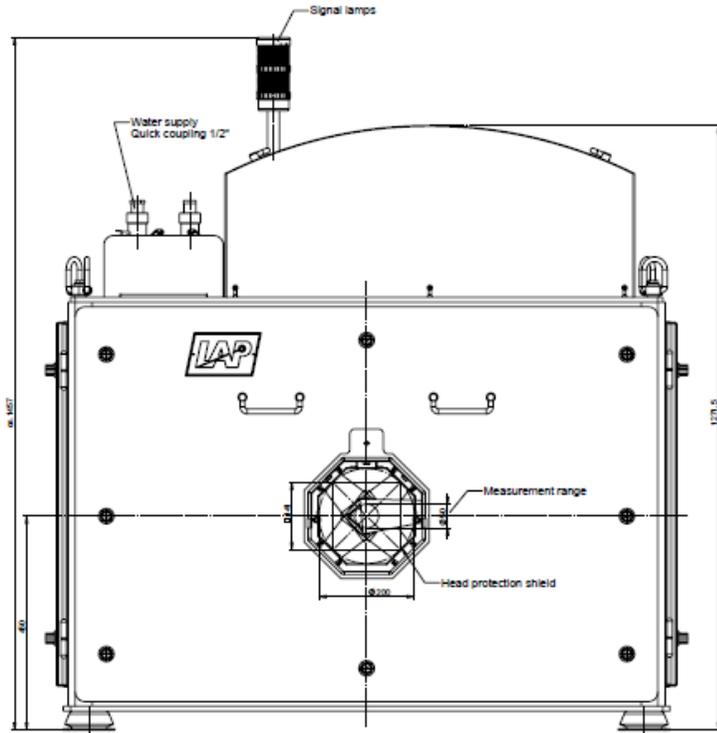
## ■ Optional

- Big display
- Multi-client/HMI
- Level-2 interfaces
- Pyrometer
- Speed measurement
- Slide unit/trolley (tbd)



# SHAPE 50

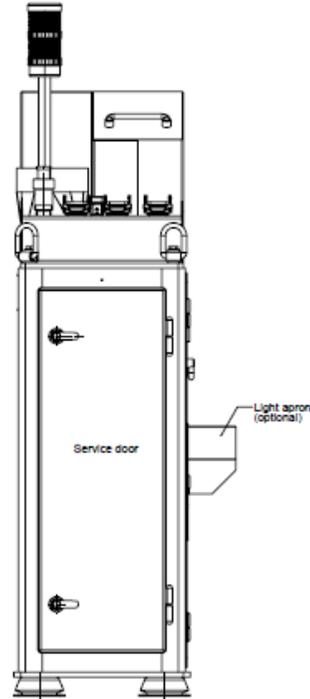
Max height over all 1460mm



Pass line 450mm

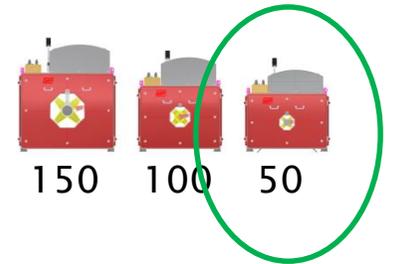
Width 1250mm

Rolling direction →



Depth 370mm

## Dimension

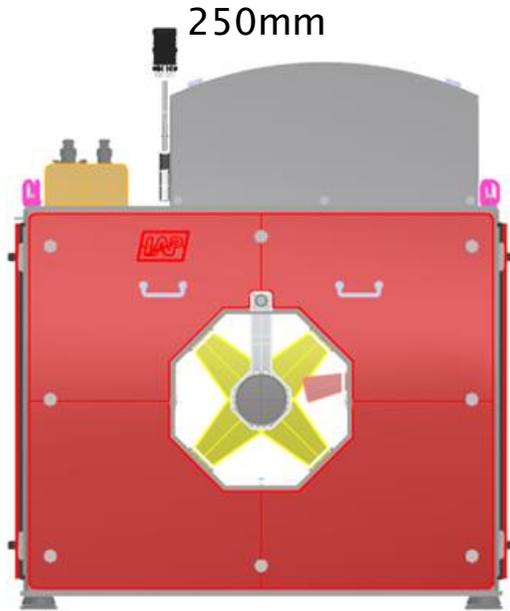


150

100

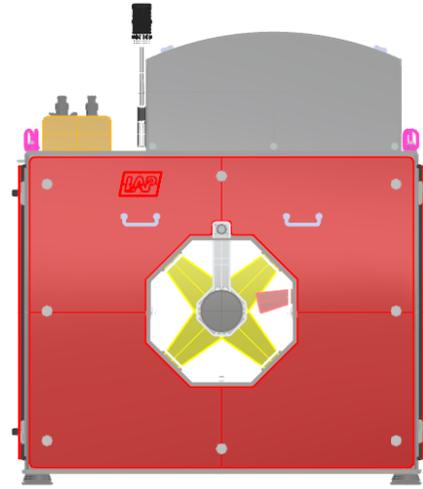
50

# GAUGE SIZES



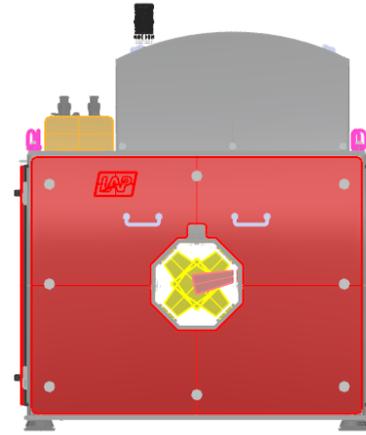
- Tube mills, block mills, roughing mills  
Accuracy up to +/- 0,08mm
- Material Speed  
typical:  $\leq 10\text{m/sec}$

150mm



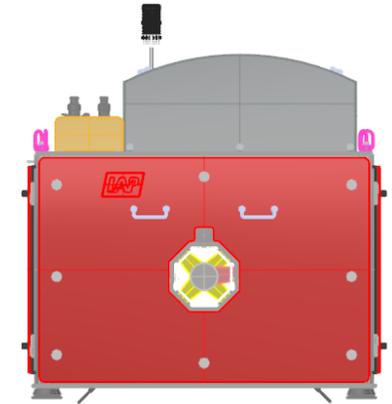
- Tube mills, block mills, roughing mills  
Accuracy up to +/- 0,04mm
- Material Speed  
typical:  $\leq 10\text{m/sec}$

100mm



- Bar mills  
Accuracy up to +/- 0,03mm
- Material Speed  
typical:  $\leq 25\text{m/sec}$

50mm



- Wire rod mill  
Accuracy up to +/- 0,02mm
- Material Speed  
typical:  $\leq 120\text{m/sec}$

# CONTOUR CHECK PROFILE

Real-time laser profile measurement for rolled long products using laser light-section sensors

- Customized set-up with 4 to 12 cameras supporting various profile types



- 4-level camera protection with heat-shield, airflow through frame, airflow around sensor baseplate and water cooling
- Virtually maintenance free

Concave profiles, rail profiles, profiles with flanges, profiles of varying type and size in production lines with centered or lateral guiding.



# CONTOUR CHECK PROFILE

Real-time laser profile measurement for rolled long products using laser light-section sensors

	4 CAMERAS	6 CAMERAS	8 CAMERAS
Application	e.g. billets & merchant bars with max. measuring range: appr. 160mm x 160mm	e.g. bar mills max. measuring range: appr. 400mm x 400mm	e.g. medium section mill max. measuring range: appr. 500mm x 500mm
Profiles	Round, square, hexagonal	Round, square, hexagon, U-Profile, T-Profile, L-Profile	Round, square, hexagonal, H-profile, I-profile, U-profile, L-profile, Rails
Achievable accuracy	± 0.07 mm	± 0.1 mm	± 0.15 mm
Sampling frequency	60 Hz	60 Hz	60 Hz
Setup	angles and distances depend on rolling stock variation		

**PROFILES**

-  **ROUND:**  
diameter, ovality
-  **SQUARE:**  
height, width, diagonal length, corner radius
-  **FLAT:**  
heights, widths, diagonal length, corner radius
-  **HEXAGONAL:**  
height, side relation, width across flats
- UTHL**  
U-, T-, H-, L-PROFILES, RAILS:  
lengths, thickness, corner angle
- IRREGULAR PROFILES**
- DETECTION AND DETAILED DISPLAY OF ROLLING DEFECTS**







# CONTOUR CHECK

## Global references

More than 400 systems of CONTOUR CHECK systems operational worldwide

### ▪ EUROPE

- Arcelor Mittal, Sandvik, Badische Stahlwerke, Swiss Steel, DEW, Georgsmarienhütte, Tata, Böhler, Vallourec Mannesmann, ...

### ▪ ASIA

- Hyundai, Posco, SeaH, BaoSteel, Binxin, Zhongtian, Dalian Steel, WISCO, Nangang, Huaigang, Nippon Steel, Kobe Steel, Hitachi, JFE, China Steel, Feng Hsin, Tata, ....

### ▪ AMERICAS

- US Steel, Gerdau, Charter, CSN, Ivaco, Latrobe, Nucor, Republic, Timken ...



# CUSTOMER BENEFITS

- Optimize the process control
- Independent quality assurance through 100% inline control of product dimensions
- Immediate response in the event of dimensional faults
- Sustainable documentation of quality results on the complete profile
- High availability and low maintenance due to heavy industry design
- Drastic reduction of run-in phases
- Typically payback within first to second year after installation



# LAP LÜNEBURG

Company headquarters and production



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Sales and Service Industry



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