Measurement Experts for
Sensors and Systems
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- LOKE Engineering GmbH & Co. KG
- LOKE Products and Services Overview
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  - LOKE Measurement Systems LMC
  - LOKE Crane Guidance System LCG
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  - Spare Part Service
- Reference List (extract)
- Open discussion
Milestones

- **1988**  
  Company established in Walldorf/ Germany

- **1991**  
  LOKE Office Shanghai.

- **1993**  
  Move to new place in Walldorf.  
  LOKE Office Peking.

- **1994**  
  First Engineering Projects for chinese steel plants

- **1999**  
  New Head Office Building  
  First Crane Guidance System sold in China

- **2000**  
  New developed LCG- LOKE Crane Guidance and Storage Yard Management Systems with usage of newest laser and data transmission technologies sold in Turkey and Taiwan
LOKE Engineering GmbH & Co. KG

- 01/2005  Joint Venture Hykol established in Yantai for development and production of Laser Sensors and Hot Metal Detectors (OEM for MODULOC).

- 05/2005  First WLAN and Bluetooth Laser distance Sensor of world developed by Hykol.

- 01/2006  LOKE Office Jena

- 03/2006  Developing of extra fast Laser gage for Lift application

- 07/2006  New Ethernet Interfaces for LOKE Sensors

- 01/2007  100% take over of Hykol Joint Venture

  New Developments:
  - extreme water cooling
  - ProfiBus-Interface
  - New own HMD’s

- 01/2008  Start marketing HMD-Sensors LMC-H-0100

  Development HMD-Scanner

- 10/2008  Start marketing HMD-Scanner at german Steel day 2008

- 11/2008  Developing Fibre HMD

- 01/2009  New ProfilIST Length Measurement System
LOKE Product Range

- Laser Distance Sensors
- Laser Doppler Sensors
- Hot Metal Detectors
- Measurement Systems
- Crane Guidance Systems
- More System by LOKE
- Spare Part Service
Contactless Measuring Technology

Laser distance Sensors based on TOF, Phase-Shift- and Triangulation measuring
Contactless Measuring Technology

Speed gages based on the doppler principle

Hot Metal Detectors / Hot Metal Scanner
Sensors

- **LMC-J-0030** (Distance Detector, Collision Protection)
- **LMC-J-0050** (Distance Sensor, Phase Shift)
- **LMC-J-0200** (Distance Sensor, TOF, Short Range)
- **LMC-J-0310** (Distance Sensor, TOF, Long Range)
- **EEx Sensor LMC-X-0040-x** (Distance Sensor, Phase Shift)
- **Laser Doppler Sensor LMC-L-0xxx-xxx** (Speed and Length)
- **Hot Metal Detectors** (Normal, Fibre and Scanning)
LMC-J-0030-x Series, Collision Protection

- Visible Laser with 650nm, easy adjustment
- Detect nearly all natural Surfaces up to 30m and on Reflector up to 100m
- Detect positions in millimeter accuracy
- Three, via “teach-in” buttons programmable, switching outputs
- Relays with 250 VAC / 3A, usable as normally open or normally close
- Additional error relay for indication of system and measuring errors
- Detection up to 1000°C surface temperature
Options:
- Digitale Out
- NPN/PNP Out
- Rain Protection Cover
- Plug Version
- Standard Bracket
- Connection Box
LMC-J-0050-x Series, the most flexible sensor available

- Measuring Range: 0,2 - 150m
  (up to 40m on near all surfaces)
- Accuracy: +/- 2 mm (without averaging)
- Repeatability: +/- 0,5 mm
- Scaling: Free adjustable scaling factor
- Resolution: 1mm if Scaling Factor SF=1
  0,001mm if SF=1000

- Interfaces:
  - Analog
  - Serial RS232/RS422
  - 1 or 3 Alarm Out
  - EtherNet, WLAN
  - ProfiBus / SSI

- Connection:
  - Terminal
  - Plug

- Filters:
  - Hot object filter
  - Shiny object filter
  - Exchange windows

- Cooling:
  - High efficient water / air cooling

- Cleaning:
  - Dust protection inside front tube
  - Double long front tube
  - Air purge

- Bracket:
  - Horizontal or vertical
  - Flange (DN80, DN100, ANSI 4“, etc.)
Annealing Colours for hot steel

Annealing Colours

- Dunkelbraun 550 °C
- Braunrot 630 °C
- Dunkelrot 680 °C
- Dunkelkirschrot 740 °C
- Kirschrot 780 °C
- Hellkirschrot 810 °C
- Hellrot 850 °C
gut Hellrot 900 °C
- Gelbrot 950 °C
- Hellgelbrot 1000 °C
- Gelb 1100 °C
- Hellgelb 1200 °C
- Gelbweiß 1300 °C und darüber

POSSIBLE

IMPOSSIBLE
Length-, width-, thickness-, position measurement

Prototype installation in 2002 for cut to length system at Rod Mill HES (still working)
Different Coil Measurement Applications

**Coil Width and Diameter Measurement**
with LMC-J-0050-x, sensor 1 +3 +4

**Determining Remaining Roll Length**
with LMC-J-0050-1 sensor 1 + 2

By using the measurements taken by S1 and S2, the remaining length of the material on the roll can be calculated using the following formula:

\[
L_{\text{remaining}} = 2\pi (S2 - S1 + r_{\text{pin}} - D_{\text{material}})
\]

**Coil position control**
With LMC-J-0050-1 sensor 3

Positioning of the coils in the axial direction. The coil is centered on the pin. A scheme of the mid-band is now possible
Straightness Measurement
System application examples

- Ladle
- Flame Cutting
- Thickness
- Width
- Length
- Light barrier for length measuring
System application examples
Cutting of slabs, gears- length measure with laser
Further more applikations LMC-J-0050-x

Loop control (Thyssen Krupp, Germany)

Width measurement, parallel alignment

Lengths measurement

Deviation from the straight line

$D = L \times \cos \alpha$
Positioning ladle truck

Accuracy positioning of ladle truck

Fast distance measurement of the positioning
Accuracy: < ± 5mm
Measurement range: >20 m*; bis 150 m auf Reflektor

Sensor with long pitot tube, dust fall and exchangeable filter
- IP 66
- Optional water cooling, air purchase
- RS 232/422, Analog 4-20 mA, W-LAN, Profibus

* dependent on target reflectivity, stray light influences and atmospheric conditions

HES Henigsdorfer Stahlwerke, Germany
The LMC-J-0050-2 detected the slabs and start via trigger the camera, which recorded the material code.
Time of Flight Sensor LMC-J-0200 (Short Range)

The laser distance-meter LMC-J-0200 is robustly engineered especially for industrial applications.

It works at distances up to 630 m. Up to 150m depending on type (-1: 35m; -2: 150m) and target reflectivity, no special reflector is needed.

Measuring values are provided continuously via the integrated RS422/RS485. In this way the device is providing position information during the production process.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wavelength (nm)</td>
<td>905</td>
</tr>
<tr>
<td>Beam Divergence (mRad)</td>
<td>2.5 x 0.2</td>
</tr>
<tr>
<td>Reflectorless Range (m)</td>
<td>0.5 – 35 (-1 type)</td>
</tr>
<tr>
<td></td>
<td>0.5 – 150 (-2 type)</td>
</tr>
<tr>
<td>Max range (m)</td>
<td>630</td>
</tr>
<tr>
<td>Accuracy (cm)</td>
<td>5</td>
</tr>
<tr>
<td>Resolution (cm)</td>
<td>1</td>
</tr>
<tr>
<td>Rep rate (Hz)</td>
<td>up to 100 Hz</td>
</tr>
<tr>
<td>Eye safety</td>
<td>Class 1</td>
</tr>
<tr>
<td>Data I/O</td>
<td>2m cable with 9-pin D-type</td>
</tr>
<tr>
<td>Power (VDC)</td>
<td>9 to 24</td>
</tr>
<tr>
<td>Protocol</td>
<td>RS422/485</td>
</tr>
<tr>
<td>Environmental Temperature</td>
<td>-10 to +60 °C</td>
</tr>
<tr>
<td>Dimensions</td>
<td>103 x 54 x 38</td>
</tr>
<tr>
<td>Weight</td>
<td>260g</td>
</tr>
<tr>
<td>Protection Class</td>
<td>IP67</td>
</tr>
<tr>
<td>Housing</td>
<td>Anodised Aluminium</td>
</tr>
<tr>
<td>Options</td>
<td>1000Hz, Pilot Laser</td>
</tr>
</tbody>
</table>
**TOF Time of Flight Sensor LMC-J-0310 - Long Range**

**Distance Range:**
- approx 350m on natural surfaces
- 0,5 ...3000 m on foil

**Speed Range:**
- up to 100m/s (0,5m to 700m)

**Accuracies (without averaging):**
- ± 2cm (-10°C to + 50°C)
- ± 5cm (-20°C to +60°C)

**Resolution:**
- 1 mm

**Measuring Frequency:**
- 0,5 ms ...1s (Standard)
- 0,1 ms ...1s (Option)

**Laser:**
- 905 nm, Laser class 1 (EN 60825-1:2003-10)

**Divergence:**
- 2 mrd

**Supply:**
- 10V ... 30V DC

**Interface:**
- RS 232/422

**Bus Interface:**
- SSI, 50 kHz ...1 MHz
- Profibus ≤ 12Mbit/s

**Switch Output:**
- 2x High-Side Switch with adjustable window
- $I_{\text{out max.}} = 0,2$ A

**External Trigger:**
- 1 Trigger IN/Out
Optional Bracket and Protection Housing LMC-J-0310
Application Examples LMC-J-0310

- Position control for big distances
- Level Control
- Speed Control of Car, Trucks, Train or other vehicles
- Ship Positioning
- Positionioning of Cranes, etc.
Installation SubWay Seoul

Measuring on the front of the train

Moving Direction

Platform Screen Door

Display

1234

SUBWAY

Platform

Moving Direction

Laser class have to be eye-safe for drivers and environment

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Level Control System at Gas Tanks

With the EEx Sensor LMC-X-0040-x

PTB03 ATEX 1051
II 2G EEx d IIC T6
II 2D IP66 T80°C
**EEx Sensor LMC-X-0040-x**

**Made for Gas Level Measurement**

**PTB03 ATEX 1051**
II 2G EEx d IIC T6
II 2D IP66 T80°C

<table>
<thead>
<tr>
<th>Repeatability</th>
<th>in whole measuring range ≤ ± 0,5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range:</td>
<td>0.2 to 35 m on most natural surfaces. Up to 150 m possible</td>
</tr>
<tr>
<td>Measuring accuracy:</td>
<td>± 2 mm</td>
</tr>
<tr>
<td>Measuring resolution:</td>
<td>Depends on scale factor</td>
</tr>
<tr>
<td></td>
<td>1 mm with SF = 1 (standard)</td>
</tr>
<tr>
<td></td>
<td>0,001 mm with SF = 1000</td>
</tr>
<tr>
<td>Interface:</td>
<td>RS232/RS422, Analogue 4-20mA</td>
</tr>
<tr>
<td></td>
<td>Optional: EtherNet, ProfiBus, W Lan</td>
</tr>
</tbody>
</table>

**Newest installations at Gas Holders:**
- 01/2008 Anyang Steel 1 Sensor
- 04/2008 Anyang Steel 4 Sensors on 1 Gas Holder
- 08/2008 Jinan Steel 3 Sensors on 3 Gas Holders
- 03/2009 Jinan Steel 1 System with 4 Sensors RS422 on 1 Gas Holder
- 06/2009 Anyang Steel 4 Sensors
The LMC-L Series directly replaces traditional, high-maintenance, problematic contact wheel and rollers type devices, with accurate “state-of-the-art” laser Doppler technology.

Extremely easy to install, integrate and use. Production processes, such as wire, cable, web products, wovens, non-wovens, paper, plastic film, tapes, building material, floorings and labelling are all measured using the laser Doppler method.

Accurate speed and length measurement reduces scrap, increases uptime and improves material yield, through elimination of product “Give Away” or “Short Length” claims.
Benefits:
- Accurate: Better than 0.05%
- Repeatability: Better than 0.02%
- Non-Contact: No Slippage, No Marking, Any Colour
- No Moving Parts: No Wear
- Industrial Design: Harsh Factory Environment
- Easy Integration: Modern Communications.
- Easy to Use: Bright Clear Displays
- Reduce Downtime: Permanently Calibrated
- Reliable: SL Technology 24/7
- Excellent Value: Low Cost of Ownership

Connect:
Integration has never been easier. Select from Standard Communications or choose from a wide range of factory fitted Optional Communications to meet your needs. Connect to your existing indicator / display devices, PLC or PC.
# Laser Doppler LMC-L-0xxx-xxx

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accuracy</strong></td>
<td>Better than 0.05%</td>
</tr>
<tr>
<td><strong>Repeatability</strong></td>
<td>Better than 0.02%</td>
</tr>
<tr>
<td><strong>Acceleration Rate</strong></td>
<td>&gt; 500 ms²</td>
</tr>
<tr>
<td><strong>Measurement Rate</strong></td>
<td>25000/sec</td>
</tr>
<tr>
<td><strong>Update Rate</strong></td>
<td>0.04 ms</td>
</tr>
<tr>
<td><strong>Spot Size</strong></td>
<td>4 mm</td>
</tr>
<tr>
<td><strong>Speed Units</strong></td>
<td>0/min, ft/min</td>
</tr>
<tr>
<td><strong>Length Units</strong></td>
<td>m, ft, yd</td>
</tr>
<tr>
<td><strong>Serial I/O</strong></td>
<td>Selectable RS232, RS485, RS422: Speed, Length, GR, (Status Indicators)</td>
</tr>
<tr>
<td><strong>4 x Digital Inputs</strong></td>
<td>1 Fixed: Laser Enable; 3 Programmable: Length Reset, Display Hold, Length Hold, Speed Hold, Direction, Pause. Max Input 24Vdc</td>
</tr>
<tr>
<td><strong>3 x Relay Outputs</strong></td>
<td>Volt-Free Contact; Select to be NC or NO; Max. Voltage 50Vdc 0.5%Gauge OK, Gauge Measuring, Laser On, Laser at Temp, Shutter Open,(Status Indicators) Preset Length 1, Preset Length 2</td>
</tr>
<tr>
<td><strong>CANBUS</strong></td>
<td>Connects to SL Series Products range of SIDI AiG2 &amp; AiG3 Indicators. Can be used to supply power to gauge head.</td>
</tr>
<tr>
<td><strong>Analogue Output</strong></td>
<td>0 - 10Vdc Scaleable output. Output based on Speed or on Good Readings</td>
</tr>
<tr>
<td><strong>3 x Pulse Outputs</strong></td>
<td>Opto-Isolated differential outputs. Configurable as Quadrature or Index. Default output 5V or user input to 24Vdc max. Max. Pulse Output up to 1Mhz</td>
</tr>
<tr>
<td><strong>Additional Protocols</strong></td>
<td>Profibus, Ethernet IP, DeviceNet, Modbus, and SSI available</td>
</tr>
<tr>
<td><strong>Gauge Power</strong></td>
<td>15 - 25Vdc; 20W</td>
</tr>
<tr>
<td><strong>Gauge Size (L x W x H)</strong></td>
<td>230 x 130 x 75 mm</td>
</tr>
<tr>
<td><strong>Gauge Weight</strong></td>
<td>3 kg</td>
</tr>
<tr>
<td><strong>Temperature Range</strong></td>
<td>0 – 45 °C</td>
</tr>
<tr>
<td><strong>Protection Rating</strong></td>
<td>IP67</td>
</tr>
</tbody>
</table>
# Laser Doppler LMC-L-0xxx-xxx

<table>
<thead>
<tr>
<th></th>
<th>LMC-L-0550-025</th>
<th>LMC-L-0300-060</th>
<th>LMC-L-0600-060</th>
<th>LMC-L-1200-120</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Min. Speed</strong></td>
<td>0,1 m/min</td>
<td>0,2 m/min</td>
<td>0,2 m/min</td>
<td>0,4 m/min</td>
</tr>
<tr>
<td><strong>Max. Speed</strong></td>
<td>2500 m/min</td>
<td>5000 m/min</td>
<td>5000 m/min</td>
<td>10000 m/min</td>
</tr>
<tr>
<td><strong>Depth of Field</strong></td>
<td>25 mm</td>
<td>60 mm</td>
<td>60 mm</td>
<td>120 mm</td>
</tr>
<tr>
<td><strong>Stand off Distance</strong></td>
<td>150 mm</td>
<td>300 mm</td>
<td>600 mm</td>
<td>1200 mm</td>
</tr>
</tbody>
</table>

**Options:**
- Protection Housing
- Water Cooled Housing for extreme hot areas
- Exchange Window
- Custom made Systems incl. Software
LOKE HMD Series LMC-H-01xx

LMC-H-0100: The standard HMD with InGAs diode
LMC-H-0110: Line scanning HMD with improved background radiation attenuation
LMC-H-0150: Fibre HMD for extreme environments
Beam of InGaAs Diode
IR - Field of view in 1 m distance a x b (10 x 50) mm

Hot environment 340°C

Hot material 700°C

3 m

4 m

Controller
LMC-H-0100 threshold adjustment 270°C to 1100°C,
Detection of hot material after the water box
- Monitoring of hot slab-wire material
- Horizontal and vertical loop control,
Pipe production

Monitoring of tubes with HMD
Speed control with LMC-L250-100
Rolling mill (hot strip)

- Monitoring of hot strip with HMD- detectors
- Coil- monitoring with laser LMC-J-0050-X
Rolling mill (profile)

Monitoring of profile with HMD- detectors / LMC-J-0050-1
Detection of profile after the cooling table with laser LMC-J-0050
LOKE Measuring Systems

- **LoWIDTH - Width measurement system**
  - **LoCAM – Camber Measurement ad-on**
  - **LoPROF – Side Profile Measurement ad-on**
- **ProfilIST - Tube, Rod, Bar and Profile Length Measurement System**
- **ProfilIST2 - Length Measurement System**
- **LoGAS Gas Tank Level Control System**
- **LCG LOKE Crane Guidance System**
- **More Systems from LOKE, Overview**
The two width measurement sensors are mounted on each side of the slab. The sensors are synchronised, to allow the slab to move sidewise without affecting the width measure.
LoWIDTH- Width Measurement System – Angle Correction

To optimize the accuracy, which is necessary due to the slab is most time not parallel to product line, the system have a width error compensation. Width is defined as averaged, max and min. The values can be Temperature compensated.
LoWIDTH - LoCAM Ad-On – Camber Measurement

The camber is calculated after the slab is completely measured, with the data from the 2 width sensors and the speed input.
LoWIDTH - LoCAM Ad-On – Width and Camber Measurement

- Cooling System
- Speed 4-20mA
- 3x Digital Inputs
- EtherNet
- Power Analogue/Power
- Connection & Converter Box
- Server PC and power supply in industrial cabinet
- TCP/IP connection to factory network and level 2 systems

Operator Station 1
Operator Station n

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LoWIDTH - LoCAM Ad-On – Width and Camber Measurement

BaoSteel – Shanghai No.1, China
With the LOKEscan 2D triangulation sensor the laser beam is diverted via an integrated system of mirrors, and the received diffused light is projected, also by a mirror, on the same rotation axis onto the receptor. In this way, two analogue output signals are created for the distance and for the angle position, respectively. On the basis of the angle information an edge detection is also possible.
LoPROF – Side Profile Measurement Ad–On

Why Measuring at Slab Caster
Feedback from Users:

- Improved Random Adjust Mold control due to profile measurement of the slab edges provides important information on process parameters such as casting speed, cooling and mould performance.
- Increased productivity and process knowledge.
- Allows for quick recognition and response to out-of-tolerance features.
- Improved Hot Rolling productivity. Number of coils where targeted width is missed have been reduced.
- Control slabs that are processed from other locations, due to the reported width from the works seldom match the manual tape measured width (top or bottom surface).
- Thicknesses may not be correct due to grinding operations to eliminate surface defects.
- If profile data where to be delivered together with the slab it would be easier to schedule different slabs for different coils.
LoPROF – Side Profile Measurement Ad–On

The following diagram shows the arrangement of sensors:
Application Ilsenburg, Slab temp. max. 600°C
LoPROF – Side Profile Measurement Ad–On
The ProfilIST System is used for high accurate length measurement of Tube, Rod, Bar and Profiles with wall thickness of bigger than 5mm in mm accuracy. The max. Measurement Range can be bigger than 40m. The System tolerance is same for the whole measuring range. As standard, the value output goes via large display and TCP/IP. It can be also adjusted due to customers request.
ProfilIST - Tube Length Measurement System

At Vallourec – Mannesmann Tubes
ProfiLIST - Systemlayout

- Power supply
- EtherNet (only system)
- Factory EtherNet (separate card)
ProfilIST - Working Principle
Start of the Measurement with Light barrier/Laser Distance Sensor on on front face

Stop on the end of the front face, last measurement value = effective length of the material.

Note: It is the possibility to save all of the individual values and to calculate the total length of the material.
ProfilIST 2 – Length Measurement System - Layout

- Power supply
- EtherNet (only system)
- Factory EtherNet (separate card)
LoGAS Level Measurement System for Gas Holder

For the parallel movement control in mm accuracy of Gas Tanks, LOKE developed the complete turn key System LoGas

The LoGas System existing of:

- 4 pcs. LMC-x-0040-1 Sensors
- 4 pcs. Reflector boards
  (needed for long range measurement with same frequency)
- 1 pc. PC with interfaces for Sensors (RS422 or EtherNet)
- System Software

- Optional:
  - PLC or level 2 communication
  - Wirless Sensor communication
  - Software customization
LoGAS Level Control System Principle

System Output of Value A and B to PLC for Motor Control:
- A = a1 - a2
- B = b1 - b2

A = 006 mm
B = 060 mm

Alarm Set to +/- 100mm

Calibration

SETUP
LoGAS Level Control System Layout RS422

System Output of Value A and B to PLC for Motor Control:

- A = a₁ - a₂
- B = b₁ – b₂

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System Output of Value A and B to PLC for Motor Control:

• \( A = a_1 - a_2 \)
• \( B = b_1 - b_2 \)
LoGAS Level Control System for Gas Tanks - Software

Multiple Language Software
LCG – LOKE Crane Positioning and Data Transmission Systems

Crane Positioning, Data Transmission and Yard Management

Eregli Steel Turkey, China Steel Corp. Kaoshiung, Taiwan

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LCG-P-0xxx Series X and Y – Axis Positioning
LCG-P-0xxx CSC Kaoshiung
LCG - Layout

Ground Installation

- Terminal 1
- Terminal 2
- Server
- Terminal 3

Crane Installation

- Connection Box
  - Power Supply + USV
  - Interface Converter
- Industrial PC with Wireless LAN
- X-Axis
- Y-Axis
- Z-Axis
- Laser Distance Measurement

Ethernet
TCP/IP

Wireless LAN Access Point
RS422

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LOKE Crane Guidance System - LCG

- Saves Costs and Time
- Reducing of Storage Mistakes up to 100 %
- Less Staff necessary

- Latest and most safe Radio- and Laser-Technology
- Online-Information from the Host-Computer to the Crane and back
- Low effort at the Installation

- Easy Handling
- Avoiding of time spending Crane movements
- Working Procedure are shown transparently
LoCAM - Stereoscopic Width Gauge

System layout

Ethernet
Crop Optimization Systems

Width Measurement and Crop Shears Optimization System LOCROP

CAPSHAPE
Crop shear measurement for hot strip mill and plate mill by using Matrix Camera

Matrix Camera
Laser Photo Cell Rear End Trigger
Laser Photo Cell Head End Trigger

Ethernet, Puls, ProfiBus or etc.
Coil Detection

Distance Range: 0.5 ... 3 m
Angle Range ± 8°, f.e. ± 250 mm at a distance of 1600 mm
Resolution 1-D 0.15°
Measuring rate 25 Hz
Interface RS 422
Max Bump: 25 g at 10 ms
Vibration: 10 ..50 Hz, 5G in 3 directions
IP67
Environmental Temp: -20°C....+60°C
Pinhole Detection

Material Thickness ≤ 3 mm
10µm up to 700m / min
15µm up to 1000m /min
Crack & Hole Detection

SYSTEM CONFIGURATION

SENSOR
Crack and hole
detection

CRATER
detector

SENSOR
Crack and hole
detection

IR LEDs

Sheet

4 Sensors
TRC/PL or RS422
to PLC or to Mainframe

4 relays

ARCK
computer

InfraRed beacon

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Band- Position Control

1-D Detector transmit in an angle of ± 8°

Max. 6 Detectors can be connected to the control unit via RS422
Special Made Systems
Reference List (extract)

- POSCO
- Baosteel
- SMS
- Danielli
- Baotou Steel
- Erdemir
- CSC
- WISCO
- Arcelor
- Thyssen Krupp Stahl AG
- Pangang Group
- Angang
- Jigang
- Shanghai Volkswagen
- Benxi Iron and Steel Group
- V&M Röhrenwerke
- VVT
- FAW-Volkswagen Automotive, Changchun
Thank You !!!

LOKE Engineering GmbH & Co. KG