

Solutions Portfolio

Digital Sensing Technology for Process Optimization

Core Commitment: Turning data into optimized performance. Reduce waste, boost quality, and deploy scalable solutions to fit any budget.

Key Credentials:

30+ Years of Experience

150+ Industrial Solutions

90% Customer Retention Rate

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Note: Specifications subject to change without notice. Contact LGE for custom requirements and application-specific configurations.

Section 1: Thickness Measurement Systems

Core Function: Non-contact, micron-level thickness measurement for metals, plastics, rubber, and composite materials. Real-time monitoring with seamless integration into Automatic Gauge Control (AGC) systems.

1.1 LGauge Series

Positioning: Balanced performance for moderate-duty applications. Designed for finishing lines, slitting lines, and Cut-to-Length (CTL) operations where practical precision meets operational simplicity.

Technical Specifications:

Parameter	Specification
Technology	Laser Triangulation / Confocal Chromatic
Measuring Range	0.1 mm – 500 mm (custom up to 200 mm)
Resolution	10 micron
Repeatability	±0.5 microns
Linearity	±0.05% of Full Scale
Sampling Rate	Up to 2000 Hz
Interfaces	Ethernet/IP, PROFINET, Modbus TCP,

Parameter	Specification
	EtherCAT
Analog Output	4-20 mA / 0-10 V
Protection Class	IP67 (sensor head)
Operating Temperature	-10°C to +50°C
Power Supply	24 VDC $\pm$ 10%

Core Features:

- **Effective Speed:** Up to 2000 measurements per second for dynamic processes
- **Temperature Compensated:** Built-in thermal stability for consistent accuracy
- **Data Logging:** Historical trend analysis and reporting capabilities

1.2 nGauge Series

Positioning: The standard of excellence for critical environments. Engineered to withstand extreme temperatures, high vibration, dust, moisture, and corrosive atmospheres common in heavy industries.

Technical Specifications:

Parameter	Specification
Technology	X-Ray (mass absorption principle)
Accuracy	$\pm 0.1\%$ across full thickness range (not better than 1 micron)
Response Time	3 ms (ideal for closed-loop AGC)
Measuring Range	7 μm (foil) to 50+ mm (hot steel)
Surface Independence	Unaffected by surface color, texture, or steam
Calibration	Digital calibration standards
Reliability	Mill-duty 24/7 operation

Core Features:

- **Ultimate Accuracy for AGC:** $\pm 0.1\%$ accuracy with millisecond-level response for automatic gauge control
- **Extraordinary Range:** Measures from ultra-thin foil at 7 microns to hot steel exceeding 50 mm

- **Digital Architecture:** Unified software platform manages data from multiple sensors and technologies
- **Rapid Calibration:** Digital calibration standards allow fast, automated setup and standardization

Section 2: Width & Shape Measurement Systems

Product Series: WGauge

Core Function: Non-contact laser width gauges for metals, plastics, rubber, and composites. Real-time edge detection, width monitoring, and cut optimization with sub-millimeter accuracy.

Technical Specifications:

Parameter	Specification
Measuring Width Range	50 mm – 3000 mm (custom up to 5000 mm)
Resolution	0.1 mm (0.05 mm optional)
Accuracy	±0.2 mm up to 2000 mm / ±0.5 mm up to 3000 mm
Repeatability	±0.1 mm
Sampling Rate	Up to 1000 Hz
Technology	Dual-edge laser (2 or 6 sensors)
Working Distance	Up to 1000 mm from material

Parameter	Specification
Material Temperature	Up to 1200°C (with cooling)
Interfaces	Ethernet/IP, PROFINET, Modbus TCP, EtherCAT
Analog Output	4-20 mA (width deviation)
Protection Class	IP65 (sensor heads with cooling)
Operating Temperature	-10°C to +60°C (with cooling up to 120°C)
Power Supply	24 VDC $\pm 10\%$ / 110-230 VAC for controller

Core Features:

- **Dynamic Edge Tracking:** Real-time edge detection for strips with lateral movement up to ± 200 mm
- **Cut Optimization:** Direct integration with shear controls for precise length cutting
- **Profile Mapping:** Full width profile measurement with multiple sensor arrays
- **High Speed Lines:** Operates at line speeds up to 30 m/s (6000 ft/min)

Section 3: Shape & Dimensions Measurement Systems

Product Series: 3DShaper

Core Function: Advanced 2D/3D laser scanners for shape and dimension analysis. High-speed profile sensors for non-contact measurement of complex shapes, contours, and dimensions. Ideal for quality control, reverse engineering, and inline inspection.

Technical Specifications:

Parameter	Specification
Points per Profile	3200 points
Z-Axis Resolution	0.5 μm – 50 μm (depending on model)
X-Axis Resolution	20 μm – 100 μm
Linearity	$\pm 0.05\%$ of Full Scale
Sampling Rate	Up to 4000 profiles/second
Interface	GigE Vision / Ethernet/IP / PROFINET
Output	2D Profile / 3D Point Cloud / Dimensions
Protection Class	IP67 (sensor head)
Operating Temperature	0°C to +45°C (with cooling options)
Power Supply	24 VDC $\pm 10\%$

Core Features:

- **High-Speed Profiling:** Up to 4000 profiles/sec for dynamic inline inspection
- **3D Point Cloud:** Generate dense 3D models for dimensional analysis
- **On-Board Processing:** Built-in measurement tools for gap, step, angle, and radius
- **AI Integration:** Machine learning ready for defect classification

Key Applications:

- **Welding Inspection:** Weld seam profile, undercut, reinforcement measurement, porosity detection
- **Robot Guidance:** Real-time part positioning and robotic bin picking with 3D vision
- **Automotive Parts:** Gap and flush measurement, sealant inspection, assembly verification
- **Extruded Profiles:** Cross-section measurement of rubber, plastic, and aluminum profiles

Section 4: Flatness & Roughness Control

Product Series: Misplana

Core Function: Real-time flatness and planarity control for steel and aluminum strip. The system uses an array of up to 64 independent laser sensors to reconstruct the full 3D shape profile of moving strip across its entire width.

Technical Specifications:

Parameter	Specification
Number of Zones	16 to 120 across strip
Strip Width Range	400 mm – 2,200 mm (custom up to 2,800 mm)
Accuracy	±1 I-unit or ±2% of reading
Resolution	0.1 I-unit
Line Speed	Up to 30 m/s
Material Temperature	Up to 400°C (with active cooling)
Scan Rate	Up to 200 Hz full-width
Defect Types	Center wave, edge wave, quarter buckle
AFC Integration	Bending, shifting, cooling zones

Core Features:

- **Closed-Loop AFC:** Flatness data converted into correction signals for mill actuators including work roll bending, roll shifting, and zoned cooling
- **Real-Time Defect Classification:** Automatic identification of quarter buckle, center wave, and edge wave
- **Fiber Optic Transmission:** Immunity to electromagnetic interference from variable frequency drives
- **Mill-Hardened Housing:** IP65/IP66 enclosures with air purge and cooling

Roughness Measurement

Core Function: AI-powered surface inspection combining vision and laser technologies for inline roughness measurement and defect detection.

Technical Specifications:

Parameter	Specification
Roughness Parameters	Ra, Rz, Rq, Rt, Rsk, Rku
Measurement Range	0.01 µm – 200 µm Ra
Resolution	0.001 µm
Defect Detection Size	Down to 0.1 mm
Line Speed	Up to 30 m/s
Detection Accuracy	99.5% with <1% false alarm rate
Standards	ISO 4287, ISO 25178 compliant

Core Features:

- **Dual-Technology Approach:** 2D laser triangulation (up to 8 kHz) combined with confocal microscopy for sub-micron axial resolution
- **Deep Learning Classification:** 20+ defect categories including scratches, pits, roll marks, edge cracks, chatter marks
- **Continuous Learning:** AI model supports new defect types without stopping production
- **Real-Time SPC Reporting:** Full traceability with position tracking

Section 5: Pipe & Profile Dimensional Control

Product Series: 3D Shaper

Core Function: Complete 3D dimensional control for pipe manufacturing. Inline measurement for diameter, ovality, straightness, length, and external defect detection in seamless and welded pipe production.

Technical Specifications:

Parameter	Specification
Diameter Range	10 mm – 2500 mm (custom larger)
Accuracy (OD)	±0.05 mm / ±0.1% of reading
Ovality Detection	±0.01% of diameter
Measurement Points	Up to 360 points per cross-section
Scan Rate	100 profiles/second
Length Range	0.5 m – 18 m (custom longer)
Length Accuracy	±1 mm or ±0.01% of length
Straightness	±0.1 mm per meter
End Squareness	±0.5 mm
Bevel Angle	±0.5°

Core Features:

- **360° Full Coverage:** Multiple laser profilers capture complete pipe circumference in real-time
- **Real-Time Shape Reconstruction:** 3D point cloud generation and analysis at line speed
- **Defect Classification:** AI-powered classification of dents, scratches, weld defects
- **Traceability:** Full pipe history with heat number and serial tracking
- **Standards Compliance:** API 5L, ISO 10893-3, DNV-OS-F101

Key Applications:

- Seamless Pipe Mills: Rotary piercing, mandrel mill, sizing stand, stretch reducing line control
- ERW / HFI Welded Lines: Pre-weld strip alignment, weld seam monitoring, post-weld sizing
- LSAW / SSAW Lines: Plate edge preparation, forming station, finishing line inspection
- Pipe Finishing Lines: Cut-to-length, end facing, beveling, hydrostatic test stations

Section 6: Complete Steel Production Solutions

LGE provides end-to-end measurement and control solutions for steel mills from hot rolling to finishing lines.

6.1 Automatic Gauge Control (AGC)

Parameter	Specification
Technology	X-ray / Laser thickness gauges
Response Time	<5 ms
Tolerance	±0.01% of nominal
Actuators	Roll gap, bending, speed, tension

6.2 Thickness Measurement (QC)

Parameter	Specification
Range	0.1 mm – 200 mm
Accuracy	From ±50 to ±0.5 microns
Technologies	Laser, X-ray
Application	Hot/Cold rolling, Casting, Slitting, Finishing, QC lab

6.3 Width Measurement

Parameter	Specification
Range	200 mm – 3000 mm
Accuracy	±0.2 mm
Technology	Dual-edge laser triangulation
Edge Tracking	±200 mm lateral movement

6.4 Weld Detection & Inspection

Parameter	Specification
Defects	Lack of fusion, porosity, undercut
Technology	Eddy current / Laser shearography
Application	ERW, SAW, laser welded pipes
Reporting	Real-time defect mapping

6.5 Emulsion & Fluids Control

Parameter	Specification
Parameters	Concentration, temperature, pH, conductivity
Technology	Inline refractometers / sensors
Benefits	Optimized lubrication, reduced consumption
Integration	PLC / DCS for automatic dosing

Section 7: Measurement Technologies

LGE's portfolio is built on three complementary measurement principles:

7.1 Vision-Based Systems

Best For:

- Wide-field surface inspection
- Color and contrast detection
- Pattern recognition and OCR
- Multi-width band measurement

Applications: Width, Multi-width (slitted bands), Presence and Position, Visible Defects, Thermal Distribution

7.2 Laser-Based Systems

Best For:

- High-precision thickness (micron accuracy)
- 2D/3D profile measurement
- Distance and positioning
- Speed and vibration measurement

Applications: Dimensions, Thickness, Speed, Position, Shape Reconstruction

7.3 X-Ray-Based Systems

Best For:

- Internal defect detection
- Density measurement
- Wall thickness of pipes/containers
- Multi-layer material analysis

Applications: Profile, Density, Continuity, Internal Defects

Section 8: Aluminum Processing Solutions

Optimized non-contact measurement for cold rolling mills, casting lines, and finishing lines. Specialized sensors for reflective aluminum surfaces from foil to plate.

Performance Metrics

Parameter	Specification
Thickness Range	0.006 mm (foil) – 150 mm (plate)
Accuracy (foil/sheet)	$\pm 1 \mu\text{m}$ or $\pm 0.2\%$ of reading
Accuracy (plate)	$\pm 0.05 \text{ mm}$ or $\pm 0.5\%$ of reading
Width Range	100 mm – 2500 mm
Width Accuracy	$\pm 0.1 \text{ mm}$ (cold) / $\pm 0.5 \text{ mm}$ (hot/cast)
Sampling Rate	Up to 3000 Hz

Core Technologies

- **Blue Laser Technology:** Optimized for reflective aluminum surfaces — eliminates specular reflections
- **High-Speed Foil:** Measures aluminum foil down to 6 microns at 2000 m/min line speed

- **Thermal Compensation:** Real-time temperature compensation during cooling
- **Edge Drop Control:** Specialized algorithms for aluminum's characteristic edge thinning

Section 9: Retrofit & Upgrade Solutions

Ready-to-Use Retrofit Kits for Legacy Measurement Systems

LGE's upgrade kits breathe new life into existing mechanical frames without removing heavy civil works.

Key Features:

- **Non-Contact Measurement & 3D Shape Reconstruction:** Digitizes measurement for long products including pipes, hollow profiles, and H, U, C, L beams
- **Seamless Automation Integration:** Converts legacy frames into smart sensors providing robot input coordinates
- **4G/IoT-NB Router:** Enables remote monitoring and diagnostics by LGE technicians
- **nGauge Software:** Modern Windows-based HMI replacing DOS-based or proprietary systems

Benefits:

- Significantly lower capital expenditure vs. full replacement
- Downtime measured in shifts rather than weeks
- Preservation of existing mounting and power infrastructure
- Faster operator training with modern HMI

Section 10: Software & Integration

LGE Profiler Software Suite

- Real-time profile visualization
- Measurement tool configuration
- Data logging and trend analysis
- Compatible with C++, Python, .NET, and ROS
- Includes SDK documentation and code examples

Communication Protocols

All LGE systems support standard industrial communication interfaces:

- **Ethernet/IP**
- **PROFINET**
- **Modbus TCP**
- **EtherCAT**
- **GigE Vision** (3DShaper)
- **MQTT** (surface inspection systems)
- **Analog Output:** 4-20 mA / 0-10 V

Remote Maintenance & Diagnostics

Built-in remote diagnostic and support capabilities allow issues to be solved without waiting for a service visit.

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