Overview

LaserGauge® Automation is a robotic system for measuring vehicle gap/flush on a moving assembly line. It is cost-effective, fast, flexible, and delivers LaserGauge® accurate measurements.

Utilizing the Cross-Vector scanning technology, the LaserGauge® Automation System provides more surface information around the edges of assembled panels than any other robotic laser profiler. This is particularly important for accurate gap and flush measurements.

The system is flexible. Measurement routines are developed using the LGWorks software. Measurement locations for each vehicle are taught to the robot. Implementation is completed in a matter of hours, not weeks.

The Automation software can be used with any brand of robot, and can support 2, 4, or more robots at the same time. It can be installed by an outside integrator or the plant's personnel.
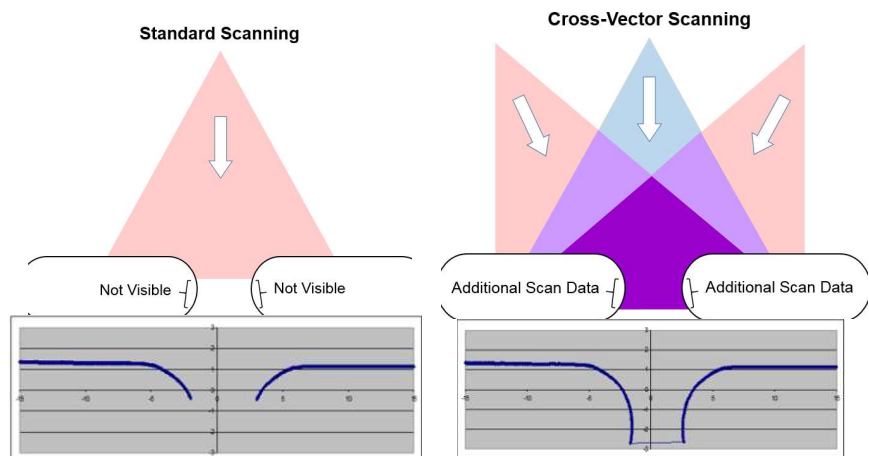
Operating Features

Advanced Cross-Vector Measurement Sensor

The most innovative feature of the Automation system is the advanced Cross-Vector scanning sensor. Traditional laser profilers utilize a single laser stripe coupled with a single imager to capture surface scans. But a single view does not reveal surface points around the radius on the edge of the gap.

The Cross-Vector sensor utilizes multiple lasers and multiple views at crossing angles. This allows the sensor to see around edges of the radius to the vertical tangent and beyond. The result is a complete surface profile and the most accurate gap measurements. This provides a higher density of points around the edges for increased accuracy and repeatability. No sensor movement or rolling of the sensor is required. The sensor is automatically positioned into non-contact alignment for each scanning location based on real-time feedback from the vehicle position and orientation detection systems.

Standard Scanning

Cross-Vector Scanning

Not Visible

Not Visible

Additional Scan Data

Additional Scan Data
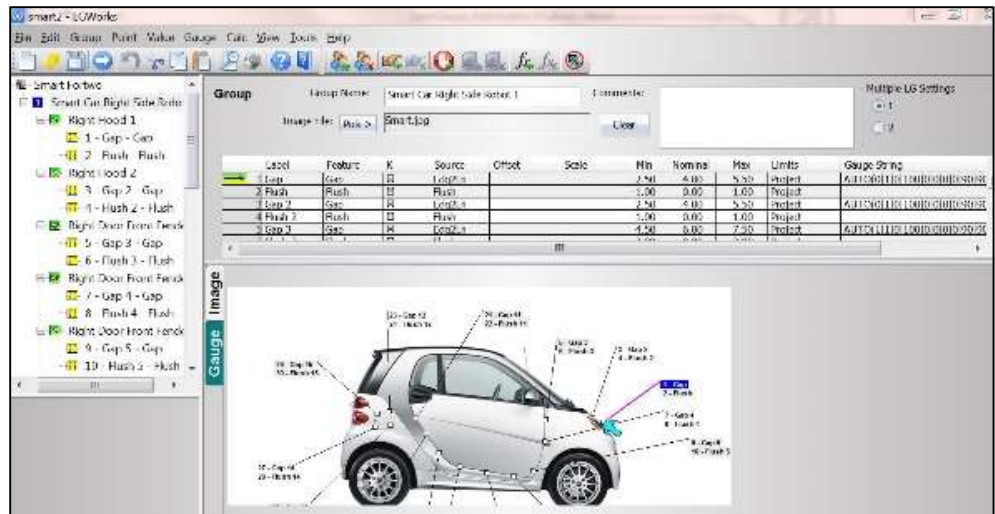
[Blue Laser](#) Technology

A problem that has always existed is that the scan cannot be acquired if the laser cannot trace the surface feature. A red laser penetrates transparent or translucent surfaces - windshields, headlights, tail lights, etc., so features around these types of surfaces are difficult to measure. We have resolved this challenge by utilizing a blue laser coupled with the traditional red lasers. The LaserGauge® Automation solution with HS763 sensor incorporates both blue lasers for the translucent surfaces and red lasers for the features on solid body panels.

Proven LaserGauge Capabilities

The LaserGauge® line of handheld inspection sensors has been serving automobile manufacturers for 15 years. The LaserGauge® Automation continues that functionality with an automated gap/flush inspection system that is 100% compatible with the measurement methodologies (Virtual Gauges) of other LaserGauge® products.

Inspection routines are created and edited using the LGWorks software. Virtual Gauges are configured specifically for each measurement point and specification limits are defined for each returned value. Detailed graphics and on-screen messages indicate the location and progress of the robotic sensor from one measurement to the next. Complex calculations referencing


measurement data can be processed in real-time and included in the data file. All scans and numerical data can also be saved and output to various formats, pushed directly into the plant's data handling system, and/or passed to a Fitter's Station for manual refit and follow-up inspection of panels.

Flexible Robot Interface

Flexibility and ease of setup has been designed into the system. Using a standard Ethernet connection, the RS763 sensor can communicate to a PC, robot controller or PLC using the AnyBus X-Gateway, which allows the LaserGauge to communicate using any number of industrial networks such as Profibus, DeviceNet, Modbus DP, etc. The Automation software and the robot controller use two-way communications to control sequencing and operation. Development tools are available from LMI Corporation for third-party integrators or for the plant's robot programmers to implement and support the system internally. Virtualization tools allow for the testing of the system before installation is complete. A special Teach application provides sensor position and orientation feedback during robot path teach for optimum positioning of the sensor.
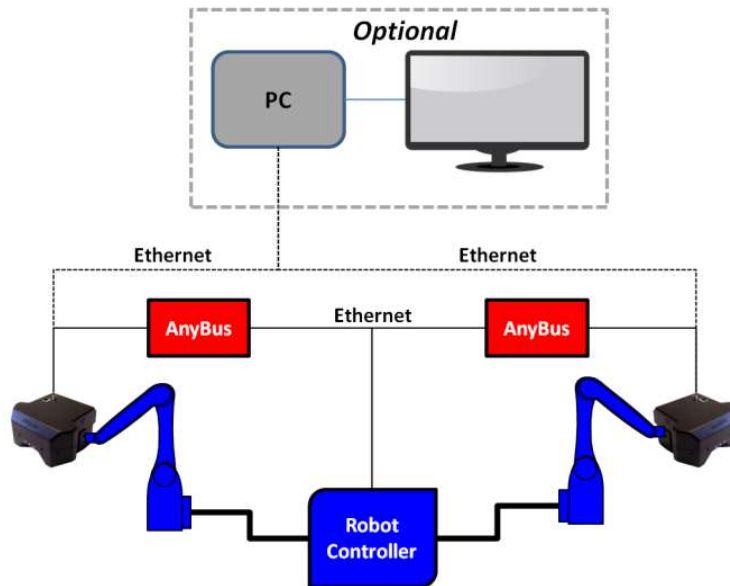
Collision Avoidance and Detection

Multiple safeguards are embedded into the system to prevent the robot from colliding with the vehicle:
- Robot limits – configured by the integrator to limit the robot to a specified operating envelope
- Software limits – can verify that the car moving into the inspection station correlates with the VIN received.
- Physical collision detection/prevention – the LaserGauge® measurement sensor is surrounded by a rubber-coated protective cage that will detect when the robot positions the sensor too close to the vehicle. If a collision is detected, the robot will immediately E-Stop and halt the conveyor to prevent any damage to the vehicle.

Fitter's Module

The Fitter's Module accumulates and filters the measurement results from a LaserGauge® Automation station and then displays the results on a separate monitor for the manual refitting of out-of-spec parts. The fitter can use a handheld LaserGauge® inspection system for a secondary inspection or for confirmation. Rescanned data can be logged and passed to the factory's data handling system or it can be archived. The Fitter's module software runs on a separate PC from the LaserGauge® Automation station.
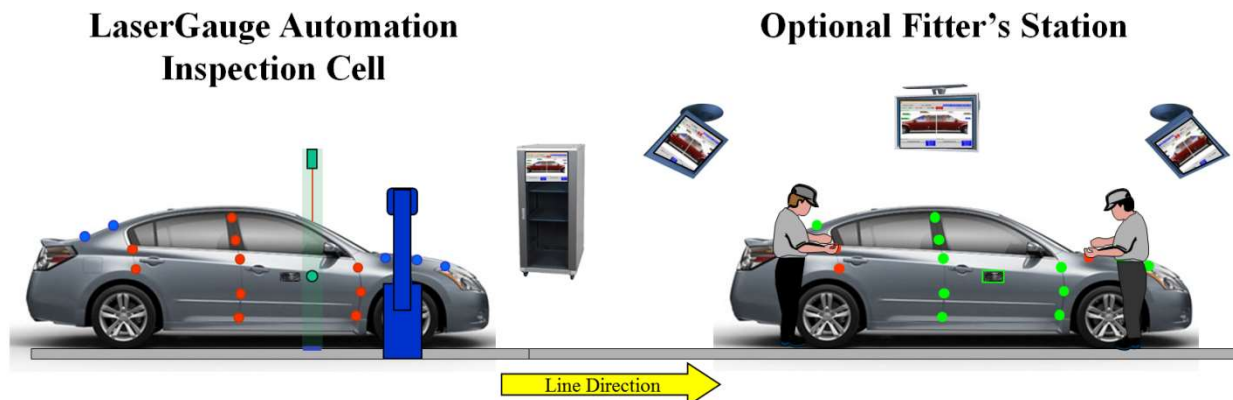
Advantages

Complete Surface Profile – The Cross-Vector approach captures surface profiles around edges and down into the gap. This results in the most complete surface profile and most accurate measurements from a single scan. No need for multiple measurement sensors or rotational scanning motion to acquire a complete scan.

Speed – The scanning process is completed, measurements calculated, results displayed in the data table, and the scan plotted on the graph, all in less than one second. The non-contact sensor is able to move from point to point while the assembly line is in motion.
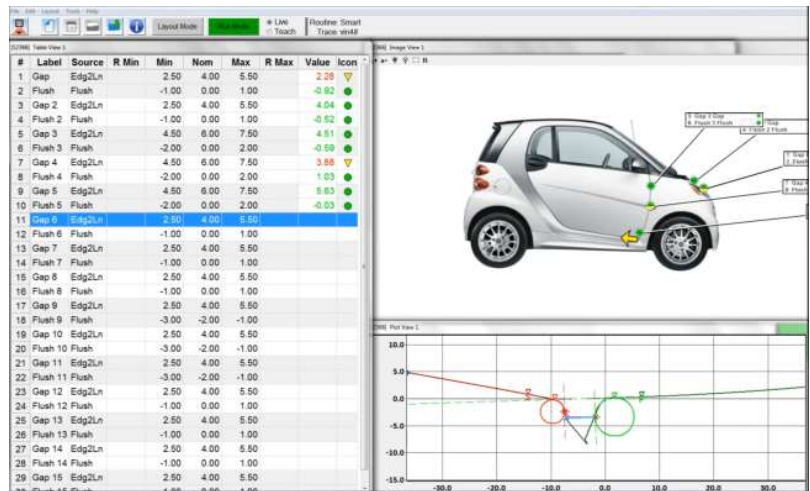
Cost – The LaserGauge® Automation system is more cost effective than other robotic systems. Use of plant preferred integrators or internal resources to install the system, the flexibility of the Automation software, and the ease of setup/implementation all help to reduce the overall cost of the system.

Flexibility – Points can be added and deleted from existing routines, and new routines can be added using the Teach Mode, without having to involve the robot programmers. The LaserGauge® Automation system supports 1, 2, 4, or more robots.

Compatibility – All routines, virtual gauge definitions and, data output capability are 100% compatible with all other LaserGauge® products.

Specifications

System Specifications	
Measurement Speed	<1 second
Robot Interface	Anybus X-Gateway Communicator module
Sensor Specifications	
Accuracy	± 0.001″ (±25μm)
Communication Interface	Ethernet
Size/Weight	6.2lbs; 5.5″ (w) x 6.75″ (h) x 9.5″ (l)
Power	24V @ 1 amp
Shock Protection	Cast urethane housing
Environment	0° – 70° C

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Distributor of LaserGauge ® Commitment to quality may mean a change in specifications without notice.