

## Gap and Flush Automotive Exterior



### Inspection Problem

As vehicles are assembled, the fit-up of various parts is inspected by measuring the width of the gap between two adjacent panels and the alignment of the two surfaces, also called flushness. If the panels on either side of a gap are flat and if the edges have square corners or small radii, traditional gap/flush tools, such as feeler gages, calipers, or transducers, can be used.

However, today's vehicles are designed with flowing contours, angled panels, edges with large radii and closure seals in the gaps. Mechanical devices struggle to measure gap and flush features on such complex surfaces.

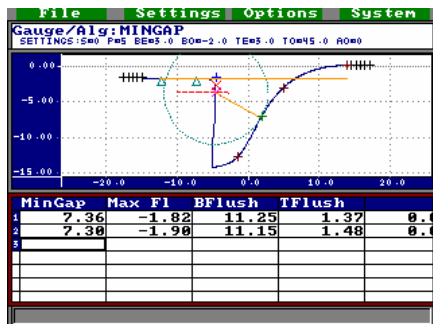


### Requirements

**Measurements** - Measurement methodology must be consistent with design criteria. That means that one instrument must have the flexibility to make many different types of measurements or an operator must learn to use many different instruments. The repeatability of measurements must be in the 0.20mm range and operators must be able to use the instrument competently after a day or two of training.

**Instrument** - Hundreds of points are inspected for gap and flush on newly launched models. The instrument must be able to guide the operator to the correct location for each measurement so the inspection is made in a predetermined order. Each measurement needs to be associated with a unique label or identifier and saved to a data file according to a specified format.

### LaserGauge® Solution



**Measurements** - Measurement methodology is defined in software, not hardware, and flexible Virtual Gauges can be used with different settings to simulate almost any measurement method imaginable. Once selected, Virtual Gauges run automatically on the LaserGauge and can return measurements using caliper, minimum gap, nearest point and other virtual methodologies.

**LaserGauge Sensors** - Typical exterior gaps range from 3mm all the way up to 12mm. A sensor with a 1.2" field-of-view (~30mm) is capable of capturing enough surface on either

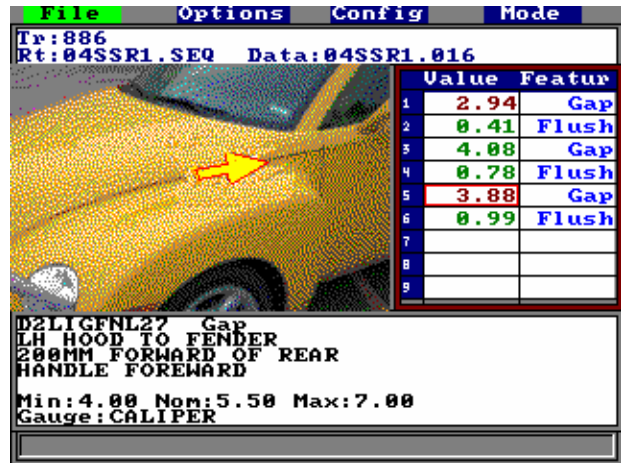
## LG1102 Controller & HS330 Sensor

side of the larger gaps to return a repeatable flush measurement. The multipurpose HS300 sensor is the most widely used for exterior applications; however, HS600 and HS610 sensors can also be used if the contours around the gaps are not extreme. The new HS330, cross-vector, sensor provides the most surface information around the edges and down vertical walls of a gap.



**LaserGauge Controllers** - Any of the three portable controllers can be used with these sensors. The LG1102 controller provides a wealth of graphical and textual feedback to the operator while running a routine. An image of the vehicle being inspected is shown with an arrow pointing to the location for the next measurement. Additional text instructions are provided in message windows and out-of-spec measurements are displayed in red in the data table. As the measurements are made, the profile momentarily replaces the image of the vehicle.

The LG4003 controller is smaller and lighter than the LG1102, and provides only textual instructions and feedback. It is ideal for the shorter routines or where the operator does not need to rely on the graphical directions. If measurements are taken at one location, for example at a quality station, the LG4101, wireless controller offers maneuverability for the operator but also instantaneous data reporting into the plant's process management systems.



## Advantages Realized

**Time Savings** - No matter which model sensor or portable controller is used, measurements can be taken quickly, accurately and repeatably. Gap and flush can be measured with one pull of the trigger; the values displayed in a data table and saved to a file; all in less than three seconds. Inspection routines consisting of hundreds of points can be completed in minutes instead of hours.

**Flexibility** - Complex features can be measured according to design criteria, making the data much more meaningful than that generated by mechanical or manual methods. Operators are alerted to out-of-spec conditions and can be required to verify the condition before continuing. All data files are saved automatically and available for retrieval to a PC for documentation or subsequent analysis.

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