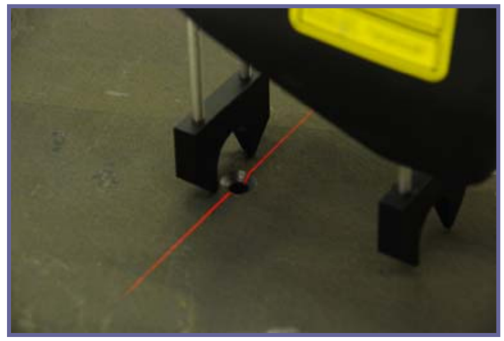
LASER GAUGE® APPLICATION

Countersinks

Inspection Problem



Countersink holes must be drilled with precision to the exact depth required, and the walls to the exact angle. The dimensions are especially critical for countersinks on the exterior panels of aircraft because they determine how well the fastener will fit and if the fastener head will be positioned exactly fair or flush to the adjacent surfaces. A fastener that protrudes above or below the surface beyond certain tolerances may adversely affect performance of the aircraft.

There are mechanical tools that can measure the depth of a countersink, but the measurements are not very repeatable between different operators. The angle of the countersink is even more difficult to measure with existing tools and more subject to operator bias. Manually inspecting countersinks with mechanical gauges consumes valuable human resources.

Requirements

Measurements - The diameter and depth of the countersink and the angle of the countersink relative to the surface are critical measurements. Angles of the countersink relative to the adjacent surface can be measured in two places, which will indicate the relative normality of the hole. The diameter of the countersink at a predetermined offset distance from the surface also reveals how accurately the hole has been drilled.

Tool – The outer skin of an aircraft contains literally thousands of countersink holes. Each must be inspected, so the measurements must be very fast and very accurate. Inspections are made by hand, so the tool must be lightweight and easy to use. Out-of-spec conditions must be readily identified and documented for repair or remanufacture.

LaserGauge® Solution

LaserGauge System - Depending on the diameter of the countersink, the HS701 DSP sensor with either a 1.2" or a 1.9” field-of-view is the best system for this inspection problem. A newly developed countersink standoff is used to minimize the problem of laser reflections.

Measurements - Measurements are automatic. The operator pulls the trigger, centers the laser stripe over the countersink and a green LED indicates that the measurement is complete. Measurement values are displayed immediately on the sensor LCD and out-of-spec conditions are noted in red. The entire data set can be saved to memory.

Advantages

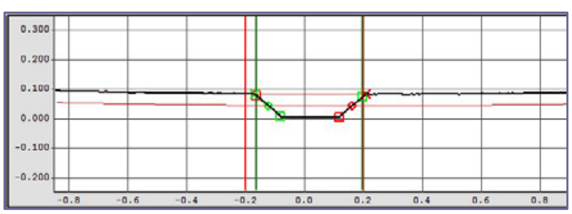
Time Savings - Each measurement takes less two seconds to complete. A single operator can inspect and document thousands of countersinks in a single day.
Accuracy – The HS701 sensor scans with a resolution of 0.001”. With sub pixel averaging, the measurement algorithm returns values with an accuracy of +/- 0.0005”.
Documentation – The operator is alerted to out-of-spec conditions by color-coded values displayed on the sensor LCD and by audible alert tones. All data values can be automatically saved.
Easy to Use – The sensor can be set-up so that the operator only has to be trained to turn the sensor on, position the sensor for a valid measurement and change and charge the batteries.
Ergonomics – The sensor weighs 20 ounces including the battery. The rechargeable lithium-ion battery will power the sensor for over four hours of continuous use. A power-save mode will extend the run-time of the battery even longer.

Application Notes

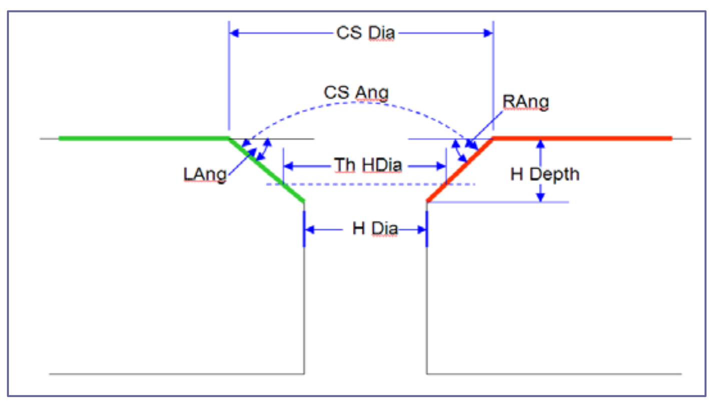
The countersink program for a single-laser sensor (as opposed to the dual-laser of the cross-hair sensor) measures nine parameters on a typical countersink hole. Those parameters are:

1. Hole diameter on surface
2. Diameter of countersink at predefined distance from surface
3. Hole diameter at the bottom of the countersink hole as viewed by the sensor
4. Hole depth
5. Countersink angle
6. Left countersink angle relative to surface
7. Right countersink angle relative to surface
8. Normality
9. Surface angle

Scan from Sensor



Measurements Extracted



Origin Technologies Corporation

9238 Madison Boulevard, Building 1, Suite 845 • Madison, Alabama 35758 USA
Phone 256.461.1313 • Fax 256.461.1390
Our continuing commitment to quality products may mean a change in specifications without notice.

www.origintech.com