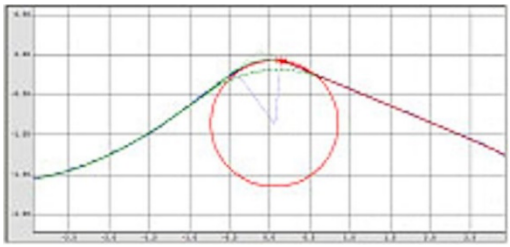
APPLICATION DATASHEET

Break Edge / Radius / Chamfers

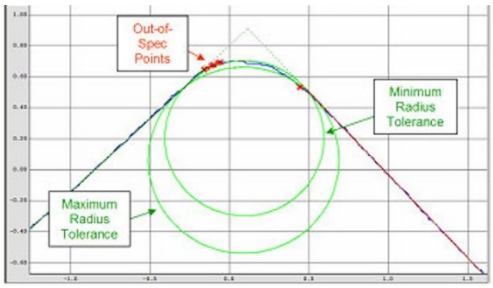
INSPECTION PROBLEM

The break edge on corners of critical jet engine parts must be within established maximum and minimum tolerances for the parts to be flight worthy. An algorithm is available to inspect edge breaks on corners, such as required for these parts. The algorithm will work on parts with curved as well as flat surfaces.



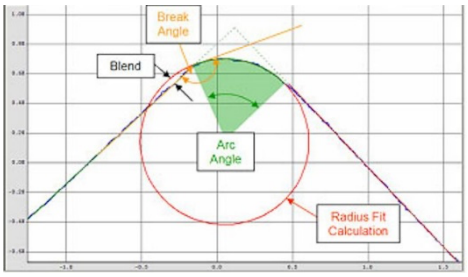
REQUIREMENTS

Two categories of measurements are calculated on a radius edge: comparison to a tolerance band and quantitative indicators of radius quality. All the measurements are extracted from a single scan and archived to a data file.



TOLERANCE BANDS

For comparison to tolerance bands, a minimum and maximum allowed tolerance band is entered according to the specification. These bands define minimum and maximum circles of a given radius that lie tangent to the surface lines on each side of the radius. The scan points are then checked to verify that the scan lies within the tolerance bands. Any points outside of the tolerance band are highlighted in red and the maximum and minimum errors are saved to the table. In the accompanying graph, the green circles indicate the minimum and maximum allowable radius specifications. The red plus symbols indicate the out-of-spec points in the scan. The dotted lines above the circles are the projected surface lines and show where the original corner was before the radius was applied.



QUANTITATIVE CALCULATIONS

The quantitative measurements are direct calculations on the features of the radius edge and detect things such as edge breaks, edge break angle, actual edge radius and a “blending” parameter that indicates how well the radius transitions into the surface. The measurements are:

- Edge Radius Calculation – the least-squares circle fit of the points between the tangents to the surface (or the edge break if a tangent does not exist.)
- Break Angle – in the case where the radius does not transition to the surface as a tangent, this parameter is the angle between surface and the tangent point of the radius fit. Ideally, this should be 180 degrees. Anything less than 180 degrees indicates an edge break. This is calculated for both the left and right sides.

- Blend – another parameter that indicates an edge break. This is the distance that the radius fit "protrudes" past the surface level. Ideally, this should be 0.0. Anything above that indicates and edge break.

- Arc Angle – the angle of the circle fit arc between the tangent points and/or the edge break points. Ideally, the Arc Angle should be equal to the Corner Angle. If Arc Angle is less than Corner Angle, then an edge break exists.

- Surface Angle – the angle between the two surface lines. This should be equal to the Arc Angle if no edge break exists.

LASERGAUGE® SOLUTION

LASERGAUGE® SYSTEM

The recommended system for this application is the TS800 USB sensor. The TS800 USB sensor runs from a computer using the LGCommander software or LG5000 Controller or a larger screen LG7000 Controller. The TS800 sensor provides feedback to the operator for positioning the sensor. The sensor uses a high-resolution imager and is available in a 0.5", 1.0" and 2.0" field-of-view.

MEASUREMENTS

Measurements are automatic. The operator positions the laser stripe over the radius, moves the sensor based on feedback and then releases the trigger. The profile of the radius is shown in real time on the computer monitor or controller screen. All measurement values are automatically saved to a data file and the profiles for each measurement can also be saved automatically.

(256) 461-1313 | sales@origintech.com