



Pitting and Corrosion



Inspection Problem

Pitting on a jet engine turbine blade requires repair once it exceeds a depth threshold. If the pitting is too severe, the blade cannot be repaired and has to be scrapped. Identifying blades that are eligible for repair saves significant costs for the airlines.

Attempts have been made to visually inspect the blades and determine the depth by comparing the pitting coloration to examples or templates. Visual measurements are not always repeatable because of the different individual capabilities of the inspectors. Optical comparators have also been used, but these machines lack the portability desired.

Jet Engine Turbine Blade

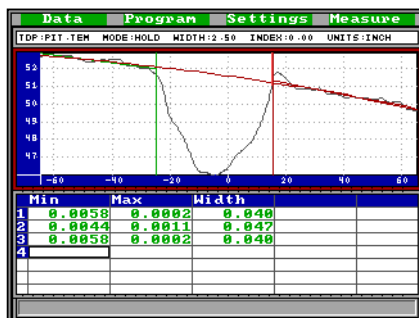


Requirements

Measurements - The depth of pitting must be measured and documented to qualify a blade for repair. Thresholds for repair and scrap are in the thousandths of an inch, so the measurement instrument must achieve this resolution.

Instrument - Inspection of several engines can be in process at the same time over a wide area of the repair facility. If the instrument used to measure the pitting is not portable, the blades from every engine will have to be transported to a single inspection location.

LaserGauge® Solution



LaserGauge System - An HS400 sensor with a 0.150" field-of-view is used with a portable LG1102 controller to make the measurements. The sensor has a depth resolution of ± 0.0005 -inches enabling it measure the pitting with the accuracy required.

Measurements - Measurements are automatic. The operator positions the laser stripe over the pit and releases the trigger. The edges of the pit are found based on a selected tolerance and the greatest depth of the pit (Min), any material that has been pushed up above the parent surface (Max) and the width (Width) of the pit is calculated and displayed in the data table.

Advantages Realized

Saves Costs - Thousands of blades have been salvaged for repair rather than scrapped and hundreds of thousands of dollars have been saved.

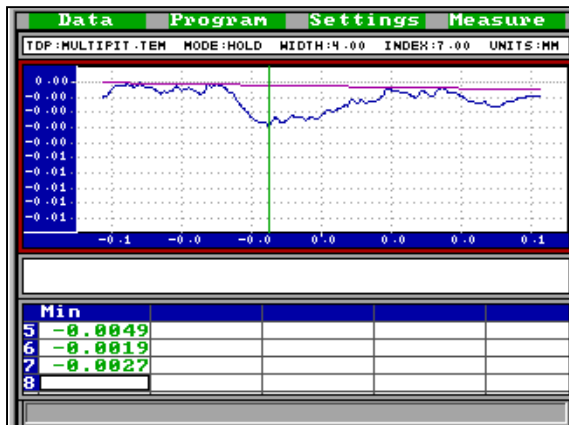
Saves Time - Inspections can be performed at the repair site; blades do not have to be transported to a laboratory.

Documented Results - Measurements are repeatable and the results are traceable.

Related Applications

CORROSION - The measurement of corrosion presents a similar problem to pitting. The severity or depth of corrosion on critical parts such as gears must be measured to determine if repair or replacement is warranted.

LaserGauge System - Depending on the size of the corrosion and the resolution required, a 0.150" or a 0.5" field-of-view sensor will be used to take the scan. Real-time plots of the corrosion are displayed on the LG1102 controller as the operator takes the scan. This allows the operator to view the surface as the laser stripe is being moved over the region of interest.



Measurements - The operator identifies the corrosion to measure, pulls the trigger, positions the laser stripe and releases the trigger. An automatic calculation is made of the greatest depth (Min) relative to a calculated surface.

Features - The surface profile as seen on the LaserGauge display can be captured and saved. This ASCII type file can be retrieved to a PC and plotted using any common spreadsheet application. Data files are of similar type and can be opened with any number of common application programs.

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