

Airfoil Contour Control – Restoration using the Model 900A Edge Profile Comparator

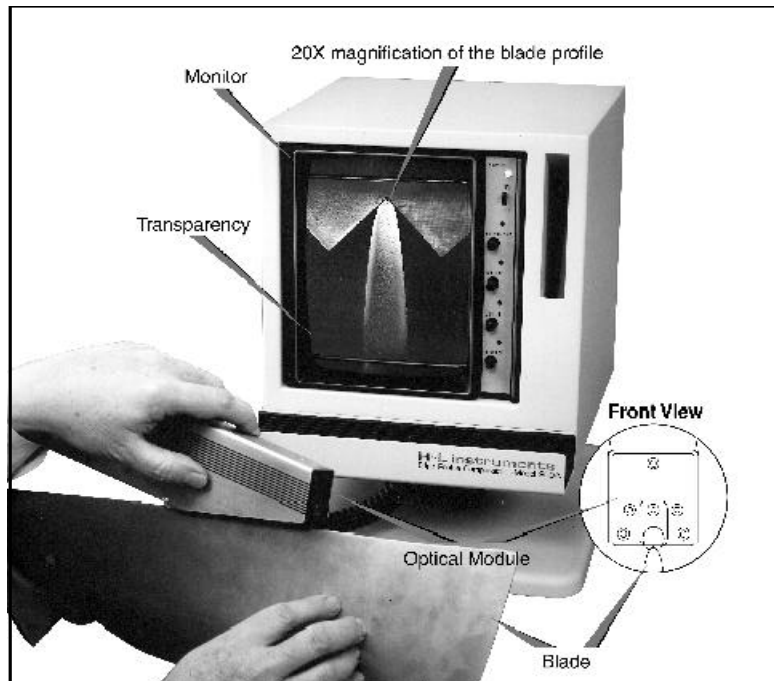


Figure 1: The Model 900A Edge Profile Comparator speeds up blade repair by up to 50% over conventional techniques.

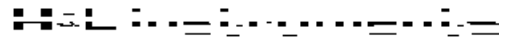
Escalating engine repair costs jeopardize engine performance

The airfoils on a gas turbine engine are subjected to harsh service, including rocks, sand, and ice. Even birds¹ may be sucked into the engine at high speeds. Studies show that regular restoration of airfoils enhances engine performance². In many cases, however, the time between airfoil preventive maintenance routines is increasing to compensate for escalating engine repair costs³. As a result, many aircraft are flying with engines at less than peak performance.

¹ “Sharing the Skies”, Donoghue, J.A., Air Transport World, November, 1996, p55 ff.

² “Gas Turbine Engine: Airfoil Shape – Performance Enhancement Through Airfoil Contour Control”, David S. Model, Gas Turbine Engine Overhaul & Repair Conference, October 30, 1996.

³ “Maintenance Operations and Programs”, Aerospace Engineering, October, 1996, p29 ff.



Portable imaging unit reduces preventive maintenance and repair costs.

Using the Model 900A Edge Profile Comparator to inspect the airfoils, before and during repair, minimizes costs. The 900A allows on-wing checks, ensuring repairs are only made when necessary. Airfoils can also be checked at the bench for accurate assessment and rapid repair. By using the 900A, airfoil rework time can be reduced by as much as 50% over conventional techniques. Rapid checking with the 900A encourages the finest quality workmanship.

Bench-top imaging for rapid repair

The Model 900A is an integral and flexible part of the blade and vane repair process. With the airfoil clamped in place, the operator can use the hand-held optical module to view profiles and determine where shaping must occur. By using the 900A to image the edge during the airfoil restoration process, the operator can see, first-hand, how reprofiling techniques enhance the airfoil contour. The industrial monitor is large enough for several people to view the blade at the same time, offering improved training and communication. This method provides a deeper understanding of how repair techniques affect the airfoil.

The 900A is faster than more costly, traditional methods of inspection. The reduced rework time results in shorter engine downtime and lower inventory costs. The ability to view the airfoil during the reprofiling process prevents excessive and unnecessary rework, minimizing scrappage. This offers significant savings to the engine operator and the airfoil repair shop.

On-wing checks for optimum engine performance

To check the airfoils on-wing, the lightweight, portable 900A can move from the bench to the flight line. The operator takes the hand-held, solid-state camera and passes it once along each airfoil, comparing the image with a transparency fixed to the monitor. The operator can compare the real-time magnified image of the airfoil edge with the desired profile on the transparency, and determine whether repairs are necessary.

Quality restoration ensures optimum engine performance, while minimizing engine repair time. Personnel experienced in visual checks find the 20X magnification improves their ability to characterize a blade.

An affordable solution to escalating repair costs

The Model 900A Edge Profile Comparator reduces repair costs by complementing the operator's skill. With three-point alignment, the camera tracks the edge of a wide range of blades and vanes. Profile overlays allow easy adaptation of the tool to various airfoil shapes, at minimal cost. This flexibility ensures a rapid return on investment, while robust components provide reliable, low cost operation.



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