

Airfoil Contour Control – Inspection using the Model 900B Edge Profile Comparator

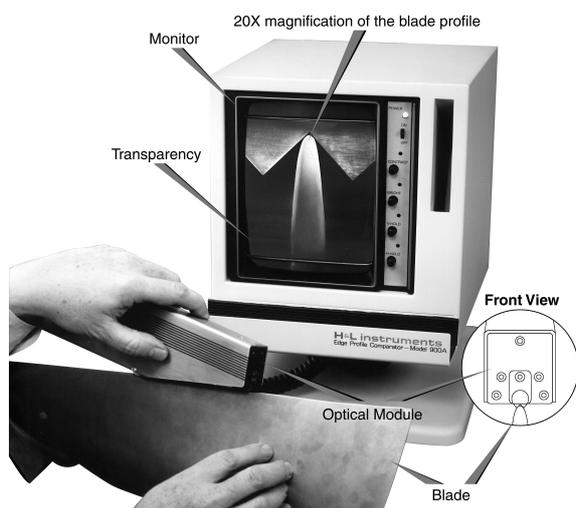


Figure 1: The Model 900B Edge Profile Comparator speeds up blade repair by up to 50% over conventional techniques.

Escalating engine repair costs jeopardize engine performance

The airfoils on a gas turbine engine are submitted to many abuses, including dust and debris, and even birds¹, which are sucked into the engine at high speeds. Studies show that regular inspection and repair of these airfoils enhance the performance of the engine². 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.

Portable inspection unit reduces preventive maintenance and repair costs.

By using the Model 900B Edge Profile Comparator to inspect the airfoils, before, during and after repair, costs are minimized. The 900B allows on-wing inspection, ensuring repairs are only made when necessary. Once off the wing, the airfoils can be inspected at the test bench for accurate assessment and rapid repair. By using the 900B, airfoil rework time can be reduced by as much as 50% over conventional techniques. A final QC inspection using the 900B encourages the finest quality workmanship.

Bench-top Inspection for Rapid Repair

The Model 900B is an integral, but flexible part of the blade and vane repair bench. With the airfoil clamped in place, the repair technician can use the hand-held camera to view the blade profile and determine where shaping must occur. By using the 900B to inspect the blade at various points during the process, the user can see, first-hand, how reprofiling techniques affect the blade contour. The industrial style monitor is large enough for two people to view the blade

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.

at the same time, offering training and consultation opportunities. This method provides a deeper understanding of how repair techniques affect the airfoil.

Once rework is complete, the user can re-inspect the blade, becoming an active participant in the QC process.

By using the 900B in place of slower, more costly methods of inspection, blade rework time can be reduced by as much as 50%. This reduced rework time results in shorter engine downtime and lower labor costs. By nearly eliminating blade scrap associated with overworking the blade, the 900B offers significant savings to the aircraft owner and the airfoil repair shop.

On-Wing Inspection for Optimum Engine Performance

To inspect the airfoils on-wing, the lightweight, portable 900B is moved from the bench to the flight line. The inspector 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 inspector can compare the real-time magnified image of the blade edge with the desired profile on the transparency, and determine whether repairs are warranted.

This type of inspection ensures optimum performance of the engine, while minimizing engine repair time. Personnel experienced in visual inspections find the 20X (40X optional) magnification improves their ability to more accurately characterize a blade.

An off-the shelf solution to escalating repair costs

The Model 900B Edge Profile Comparator reduces repair costs by complementing the skill of a maintenance technician. With two-point alignment, the camera tracks the edge of a wide range of blades and vanes. Profile overlays allow specialization or generalization of the tool at minimal cost. This flexibility ensures a rapid return on investment, while robust components maintain a low cost of ownership.

H&L Instruments

PO Box 580, 34 Post Road, North Hampton, NH 03862,
USA tel 603-964-1818