

IMPROVING COMPONENT LIFE AND PERFORMANCE

F402 BLADE EDGES



AV 8B Harrier Jet

LPB Mitigates FOD and Fatigue in F402 Blade Edges



F402 Engine

Low Plasticity Burnishing (LPB®) enhances foreign object damage (FOD) tolerance and improves fatigue performance of the leading and trailing edges of the LPC Stage 1 Blade in the F402-RR-408 engine used in the Harrier.

- Increases Damage Tolerance
- Reduces Inspection Time
- Lowers Ownership Costs
- Increases Safety for Pilots and Crew



F402 Blade

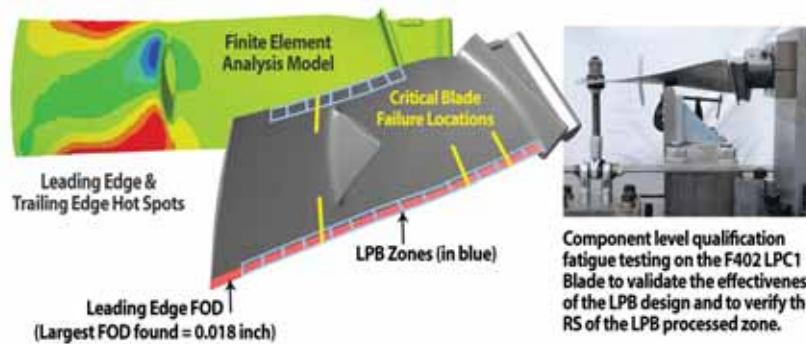
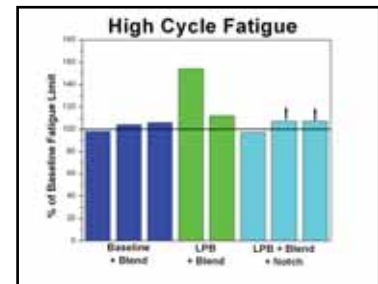
LPB improves service life by imparting through-thickness compression in the leading and trailing edges of the F402 LPC1 blade. This greatly increases damage tolerance and eliminates fatigue cracking. LPB provides a significant savings in downtime and inspection while improving fleet readiness and safety.



To ensure that the LPB solution would be viable for in-service as well as new parts, testing was performed on blades that had already been blended to repair FOD. Blades were tested as a baseline blended, blended with LPB treatment, and blended with LPB and a new unrepaired .020 FOD notch.

The application of LPB to produce 0.10 in. of through-thickness compression provides tolerance of 0.020 in. deep damage. Blending to depths of 0.040 in. or 0.080 in. to remove service FOD occurring either before or after LPB leaves sufficient compression to provide fatigue strength with damage exceeding that of an undamaged new blade. LPC1 blades with LPB compression applied to 0.10 inch of the LE and TE can be blended up to 0.080 inches deep while retaining a fatigue strength exceeding that of a new undamaged blade.

Considering that the LPC1 disk has 23 blades, at an estimated cost of \$3,000 per blade, the current inspection, replacement, and maintenance costs run into millions of dollars over the lifetime of an engine, significantly increasing the total cost of ownership and operation of the F402 engine, and adversely impacting fleet readiness. The LPB solution would alleviate these costs and provide increased safety for pilots and crew.



To learn how LPB can increase the life of your engines, please visit www.LambdaTechs.com or contact Kim Bellamy at (513) 561-0883.

References:

- R. Ravindranath, P. Prevey, T. Gabb, M. Shepard, "Case Studies of Fatigue Life Improvement Using Low Plasticity Burnishing in Gas Turbine Engine Applications." Turbo Expo 2003: Volume 3., Atlanta, GA. June 16-19, 2003. Pp 657-665.

<http://www.lambdatechs.com/publications/publications.html>

Accreditation:

- ISO/IEC 17025 Accredited Laboratory
- ISO 9001:2008 Certified
- FAA Accepted

For more information on Lambda, LPB® or to read complete papers, please visit www.LambdaTechs.com