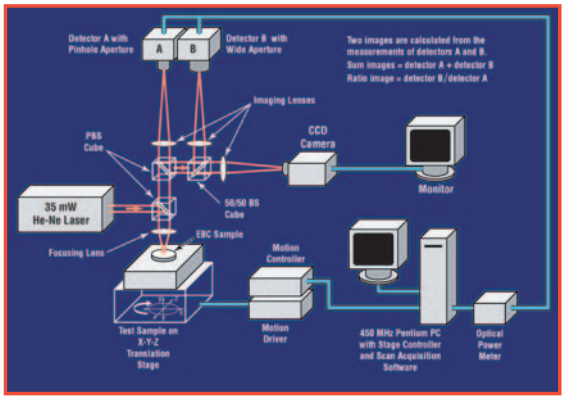
Nondestructive Evaluation for Advanced Ceramics

Environmental Barrier Coatings (EBCs) on Si_3N_4 substrates must remain adherent and erosion resistant to protect ceramic materials in the hot gas path.

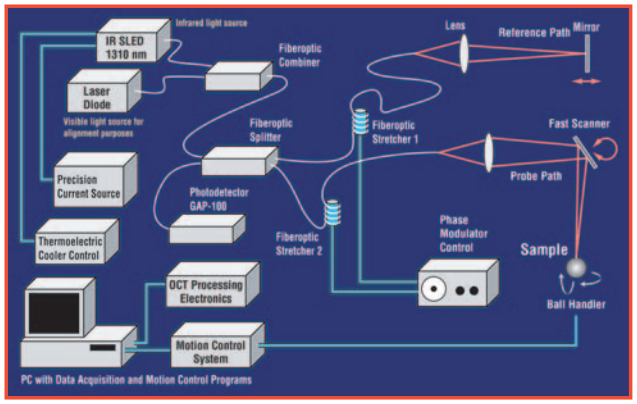
The object of this task is to develop noncontact, nondestructive methods that can assess the "health" or condition of ceramic materials used in the hot gas path section of advanced, high-efficiency microturbines and industrial gas turbines.

Noncontact Nondestructive Methods Under Development

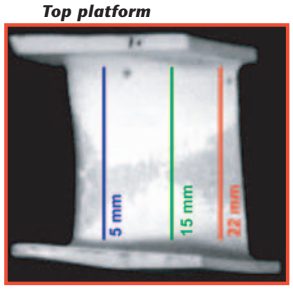
Laser-Based Elastic Optical Scattering (EOS)



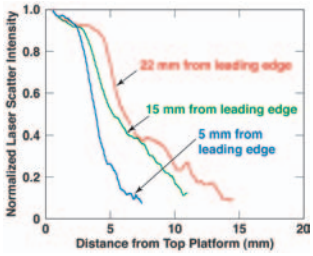
Optical Coherence Tomography (OCT)



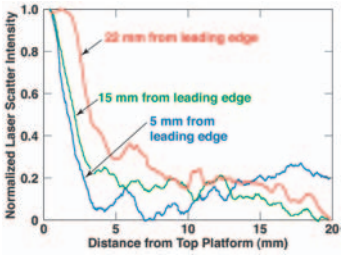
EOS Investigation of EBCs on Monolithics — Detection of EBC Erosion



Turbine Blade



As received



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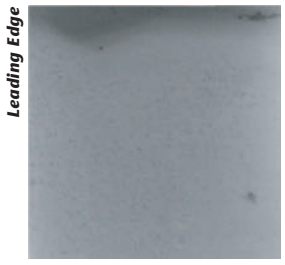

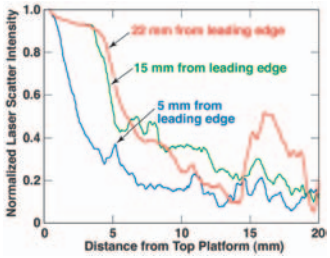

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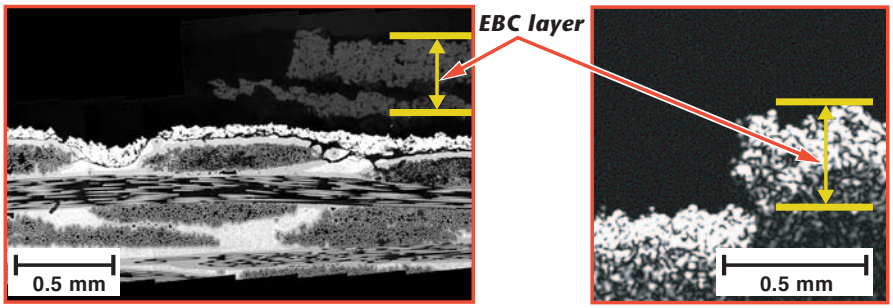
OCT Measurement of EBC Coating Thickness on Ceramic Matrix Composites

5x Cross-Sectional Optical Micrograph ***OCT Cross-Sectional Image***



EBC Thickness Measurements	
Micrograph	0.29 mm
OCT	0.30 mm
All measurements +/–10 μm	

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