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THERMAL BARRIER COATING LIFE MODELING IN AIRCRAFT
GAS TURBINE ENGINES

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Analytical models useful for predicting ceramic thermal barrier coating (TBC) spalling life in aircraft gas turbine engines are presented. Electron beam-physical vapor deposited (EB-PVD) and plasma sprayed TBC systems are discussed. TBC spalling was attributed to a combination of mechanisms such as metal oxidation at the ceramic-metal interface, ceramic-metal interface stress concentrations at free surfaces due to dissimilar materials, ceramic-metal interface stresses caused by local radius of curvature and interface roughness, material properties and mechanical behavior, transient temperature gradients across the ceramic layer and component design features. TBC spalling life analytical models were developed based on observations of TBC failure modes and plausible failure theories. TBC failure was assumed to occur when the imposed stresses exceeded the material strength (at or near the ceramic-metal interface). TBC failure knowledge gaps caused by lack of experimental evidence and analytical understanding are noted. The analytical models are considered initial engineering approaches that capture observed TBC failure trends.

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13. ABSTRACT (Maximum 200 words) This document contains the agenda and presentation abstracts for the Thermal Barrier Coating Workshop, sponsored by NASA, DOE, and NIST. The workshop was held in Westlake, Ohio, March 27-29, 1995. The workshop covered thermal barrier coating (TBC) issues related to applications, processing, properties, and modeling. The intent of the workshop was to highlight the state of knowledge on TBC's and to identify critical gaps in knowledge that may hinder TBC use in advanced applications. The workshop goals were achieved through presentations by 22 speakers representing industry, academia, and government as well as through extensive discussion periods.			
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