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PROPERTIES OF PLASMA SPRAYED BOND COATS

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Increasing bond coat oxidation resistance has been clearly linked to increasing durability of the ceramic layer of TBCs. However, recent studies have shown that significant differences in TBC life can be achieved for different bond coats that have little or no difference in oxidation behavior. These results suggest bond coat properties other than oxidation resistance can also influence TBC life. A determination of which properties affect TBC life and an understanding of how these properties affect TBC life could be valuable in designing new, more durable TBCs. Unfortunately, there is little existing information on the physical and mechanical properties of bond coat materials and there are fewer comparative studies that can be used to determine which properties are important to TBC life. This paper compares the properties of three bond coat compositions that have similar oxidation behavior but different TBC lives. Analysis of the properties indicates that the coefficient of thermal expansion and stress relaxation (creep) behavior of the three alloys are strongly correlated to the observed differences in TBC life.