

## Evaluation of Thermal Barrier Coating Applied to the Gas Turbine Blade According to the Thermal Gradient

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**Abstract :** The Thermal Barrier Coating (TBC) prevents heat directly transferring from the high-temperature flame to the substrate. Top coat and bond coat compose the TBC and top coat consists of a ceramic and bond coat increases adhesion between the top coat and the substrate. The TBC technology drops the substrate surface temperature by about 150~200°C. In addition, the TBC system has a cooling system to lower the blade temperature by the air flow inside the blade. Then, as a result, the thermal gradient occurs inside the blade by cooling. Also, the internal stress occurs due to the difference in thermal expansion. In this paper, the finite element analyses (FEA) were performed and stress changes were derived according to the thermal gradient of the TBC system. The stress was increased due to the cooling, but difference of the stress between the top coat and bond coat was decreased. So, delamination in the interface between top coat and bond coat.

**Keywords :** gas turbine blade, Thermal Barrier Coating (TBC), thermal gradient, Finite Element Analysis (FEA)