

Improved Performance and Durability in Gas Turbines Through Airfoil Clocking and Hot Streak Management

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Experimental and computational studies have shown that two factors affecting the performance and durability of gas turbine engines are unsteadiness and thermal gradients. Many studies have been performed to examine the unsteady interaction between adjacent blade rows, but the interaction between adjacent stages is less well understood. The major source of thermal gradients is the large circumferential and radial temperature non-uniformities (or hot streaks/cooling wakes) in the flow exiting the combustor. It has been shown recently that controlling the relative circumferential positions of gas turbine components, known as clocking or indexing, can be used to increase the efficiency of turbine stages and mitigate the effects of combustor hot streaks. An important advantage of clocking is that it can be applied to existing gas turbine designs.

The research described by this poster applies airfoil and hot streak clocking to turbine geometries (using representative airfoil counts) to increase performance and durability.