

Weave Design Enhances Heat Transfer and Reduces Thermal Stresses in Gas Turbines

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Categories:

- Mechanical Engineering

Keywords:

- Clean Energy
- Green Technology
- Mechanical Engineering
- Turbine Engines
- Wind Energy

In order to improve their efficiency and reduce fuel costs, advanced gas turbines typically operate at temperatures exceeding the allowable temperature of the component materials. To maintain structural integrity it is necessary to efficiently and uniformly cool the components that come in contact with the hot gases. The most difficult areas to cool are the trailing edges of the turbine blades and vanes, which are very thin and must maintain the aerodynamics of the airfoil. Cooling strategies for this region must fit the limited space and provide effective and uniform cooling while minimizing the amount of flow that exits the trailing edge.

A Purdue University graduate student has developed an improved cooling paradigm for the trailing edge of turbine airfoils. This weave design combines several geometrical concepts to efficiently utilize the internal flow to cool the trailing edge material effectively and uniformly. When compared to three advanced cooling strategies, the weave design provided more efficient and uniform cooling and caused less unnecessary pressure loss.

Advantages:

- More efficient cooling
- More uniform, solid temperature
- Requires less coolant mass flow

Potential Applications:

- Gas turbine industry

People:

- Weaver, Adam (Project leader)

Intellectual Property:

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