ANSYS, Stanford And Honeywell Collaborate To Create More Fuel-Efficient Aircraft Engines

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PITTSBURGH, Sept. 30, 2014 /PRNewswire/ -- Engineers from Stanford University, Honeywell International and ANSYS (NASDAQ: ANSS) are working together with simulation software to create more energy-efficient aircraft engines at lower costs.

As demand grows for increased gas turbine efficiency, engine manufacturers are challenged with creating designs that operate at higher temperatures. But that becomes a significant challenge as temperatures approach the melting point of some engine component material. A well-established method for maintaining turbine blade temperatures at acceptable levels is to employ "film-cooling," a technique in which cooler, compressor-discharge air is detoured around the combustor then ejected from precisely-machined holes placed over the surface of the turbine airfoil. Excessive use of compressor air for turbine film cooling can, however, reduce engine efficiency.

Historically, film-cooling-hole-placement on turbine airfoils has been optimized by elaborate experiments, sometimes necessitating engine testing. For decades, research engineers have been developing computer simulations of film cooling geometries with the ambition of reducing – if not eliminating – the need for expensive, time-consuming rig testing.

Stanford, with support from Honeywell and ANSYS®, is performing a new type of testing with 3-D magnetic resonance velocimetry to measure the velocity and concentration field in a test section. These methods measure the turbulent interaction of crossflow jets with the main flow, for a variety of jet configurations and orientations. These data sets provide an important benchmark against which the large available range of ANSYS turbulence models and computational methods can be compared. The objective is to develop validated models, methods and best practices for prediction of film cooling.

"This is the first time that an engineering software company has supported an extensive test series like this, and it illustrates the commitment of ANSYS to the continued upgrade of the turbulence models in ANSYS computational fluid dynamics solutions," said John K. Eaton, the Charles Lee Powell Foundation professor in Stanford's School of Engineering. "Our combined efforts are aimed at validating the turbulent mixing models in these tools over entire complex flow fields, something that has never been done before. Conducting this testing over a wide range of film cooling conditions provides a comprehensive test of the predictive capability."

"At 30,000 feet in the air, there's little margin for error," said Brad Hutchinson, global industry director for industrial equipment and rotating machinery at ANSYS. "By always focusing on solving the most complex problems – like the thin film cooling challenge Honeywell and Stanford are addressing – ANSYS ensures that our customers are armed with the tools that will help them to create the most innovative products on the market."

About ANSYS, Inc.

ANSYS brings clarity and insight to customers' most complex design challenges through fast, accurate and reliable engineering simulation. Our technology enables organizations -- no matter their industry -- to predict with confidence that their products will thrive in the real world. Customers trust our software to help ensure product integrity and drive business success through innovation. Founded in 1970, ANSYS employs nearly 2,700 professionals, many of them expert in engineering fields such as finite element analysis, computational fluid dynamics, electronics and electromagnetics, and design optimization. Headquartered south of Pittsburgh, U.S.A., ANSYS has more than 75 strategic sales locations throughout the world with a network of channel partners in 40+ countries. Visit www.ansys.com for more information.

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