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Success
Stories

Honeywell Incorporates the TURBO-AE Code into its Engine Design System

TECHNOLOGY

The propulsion aeroelastic analysis code TURBO-AE enables detailed high-fidelity modeling of aeroelastic and unsteady aerodynamic characteristics of turbomachinery blade rows for the prediction of flutter and forced response vibrations, performance, and blade row interaction effects.

COMMERCIAL APPLICATION

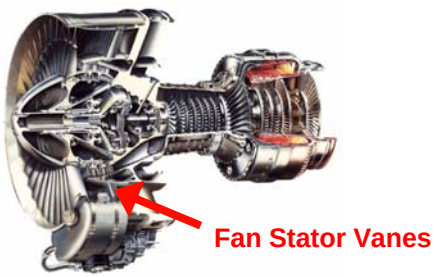
TURBO-AE has been released and distributed to US aircraft engine manufacturers, government agencies and academia. Significant savings in cost and time are being realized by using the TURBO-AE code in the design cycle of new turbomachinery components. As an example, Honeywell successfully used TURBO-AE to isolate, understand and eliminate the cause of a vibration issue in Fan Stator Vanes during the early development phase of a new engine. Honeywell expects significant cost savings by using an advanced aeroelastic design system, with TURBO-AE as a key component, to predict and avoid aeroelastic problems in their engines.

SOCIAL / ECONOMIC BENEFIT

◆ The TURBO-AE code assists designers in developing safer, quieter and lighter turbomachinery.

◆ The unique analysis code is essential in the design of fuel-efficient engines with decreased CO_2 emissions.

◆ The TURBO-AE code provides a better understanding of rotor-stator interaction, which allows designers to pursue designs that reduce blade vibrations, thereby developing durable engines.



Use of TURBO-AE Helps to Avoid Vibration Concerns in Components such as Fan Stator Vanes

NASA APPLICATIONS

The TURBO-AE code is an enabling technology that is used in the following NASA programs:

◆ *Quiet Aircraft Technology* – successfully calculated flutter of the Quiet High Speed Fan (QHSF), showed the underlying cause of flutter, and enabled the redesign of a flutter-free fan.

◆ *Ultra Efficient Engine Technology* – used to verify the aeroelastic stability of the advanced two stage proof-of-concept compressor design.

◆ *Low Emission Alternative Power* – being used to verify the aeroelastic vibration characteristics of turbine blades subjected to unsteady pressure loads from a constant-volume combustion system.

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