

Blade Vibration Measurement System for Unducted Fans

Provides noncontacting measurements to characterize unducted fan blade dynamics

With propulsion research programs focused on new levels of efficiency and noise reduction, two avenues for advanced gas turbine technology are emerging: the geared turbofan and ultrahigh bypass ratio fan engines. Both of these candidates are being pursued as collaborative research projects between NASA and the engine manufacturers. The high bypass concept from GE Aviation is an unducted fan that features a bypass ratio of over 30 along with the accompanying benefits in fuel efficiency. This project improved the test and measurement capabilities of the unducted fan blade dynamic response. In the course of this project, Mechanical Solutions, Inc. (MSI) collaborated with GE Aviation to (1) define the requirements for fan blade measurements; (2) leverage MSI's radar-based system for compressor and turbine blade monitoring; and (3) develop, validate, and deliver a noncontacting blade vibration measurement system for unducted fans.

Applications

NASA

- ▶ Innovative, nonintrusive unducted fan blade dynamics measurement system
- ▶ Wind tunnel facilities

Commercial/Military

- ▶ Turbofan and turboprop engines
- ▶ Blade health management for wind turbines and rotorcraft



Phase II Objectives

- ▶ Develop and validate a noncontacting measurement system for unducted fans
- ▶ Integrate system with existing technology at GE Aviation
- ▶ Deliver a working system to NASA

Benefits

- ▶ Offers resolution capable of characterizing fan blade dynamic modes
- ▶ Improves test and measurement technology
- ▶ Improves measurement capability

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