AEROSPACE

COMOTI Advances Aero-Engine Noise Research with GRAS Microphones

Customer

The Romanian Research & Development Institute for Gas Turbines (COMOTI) is one of Eastern Europe's leading aerospace research organizations. Based in Bucharest, COMOTI develops and tests advanced technologies for aircraft engines, propulsion systems, and aeroacoustic applications. The institute collaborates with international aerospace partners and research programs to improve engine efficiency, performance, and environmental sustainability.

As aviation faces increasing pressure to reduce community noise around airports, COMOTI is actively researching innovative technologies that can help lower noise emissions from future aircraft engines without compromising performance.

The Challenge

Fan noise is one of the dominant noise sources in modern aircraft engines, particularly during take-off and landing. Engineers are therefore investigating passive noise-reduction technologies that can be integrated into engine designs without adding weight, complexity, or maintenance requirements.

COMOTI's researchers set out to evaluate serrated fan blade technologies designed to reduce broadband noise generated by turbulent inflow conditions. To validate the effectiveness of these designs, the team needed highly accurate acoustic measurements capable of detecting relatively small differences in sound radiation between multiple fan configurations.

The challenge was not only to measure overall sound pressure levels but also to characterize the directivity of the noise field and understand how acoustic energy was distributed around the fan.



Microphone positioning along the circular arc.

INSTITUTE
The Romanian Research & Development Institute for Gas Turbines (COMOTI)

PRODUCT
GRAS 40AE
1/2" Prepolarized Free-Field Microphone

ARTIKEL
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GRAS
An Axiometrix Solutions Brand

Why GRAS?

To capture the detailed acoustic data required for the study, COMOTI relied on a 13-channel microphone array built around **GRAS 40AE measurement microphones.**

GRAS 40AE 1/2" Prepolarized Free-Field Microphone

The GRAS 40AE is a 1/2" Prepolarized free-field microphone for measuring medium sound pressure levels at medium frequencies. The equivalent externally polarized 200 V type is GRAS 40AF.

Freq range: 3.15 Hz to 20 kHz
Dyn range: 15 dB(A) to 148 dB
Sensitivity: 50 mV/Pa



The microphones were positioned in a semi-circular array covering 180 degrees around the test rig, enabling researchers to accurately map noise directivity and compare baseline and serrated fan designs under identical operating conditions.

GRAS microphones were selected because they provide:

- High measurement accuracy and repeatability
- Reliable performance in demanding aeroacoustic test environments
- Consistent response across multi-channel array measurements
- Confidence in detecting small acoustic differences between test configurations

These capabilities were essential for generating high-quality experimental data that could support the evaluation of advanced noise-reduction concepts for future aircraft engines.

The Outcome

Using the GRAS microphone array, COMOTI successfully characterized the acoustic performance of several serrated fan blade configurations.

The measurements demonstrated that passive serration technologies can deliver measurable reductions in fan noise under turbulent inflow conditions while maintaining aerodynamic functionality. The results provide valuable insight into how future aero-engine designs may achieve lower environmental noise footprints.

The study contributes to ongoing international efforts to develop quieter aircraft and supports the aviation industry's goal of reducing the impact of aircraft noise on surrounding communities.

GRAS Solution

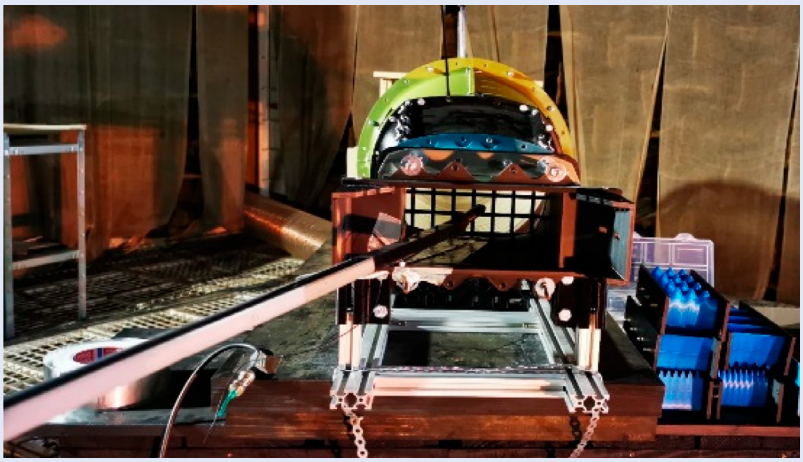
- 13 × GRAS 40AE Precision Microphones
- Semi-circular 180° microphone array
- Multi-channel aeroacoustic measurement setup integrated with data acquisition systems

Reference

Mihăilă-Andres, M. et al. Application of Passive Serration Technologies for Aero-Engine Fan Noise Reduction. Technologies, 2025.

Microphone placement for turbulence parameter identification

Aaerodynamically profiled microphoone



Surface microphone



For more information, please contact marketing@grasacoustics.com.

ABOUT GRAS ACOUSTICS

GRAS is a worldwide leader in the sound and vibration industry. We develop and manufacture state-of-the-art measurement microphones to industries where acoustic measuring accuracy and repeatability is of the utmost importance in R&D, QA and production. This includes applications and solutions for customers within the fields of aerospace, automotive, audiology, and consumer electronics. GRAS microphones are designed to live up to the high quality, durability and accuracy that our customers have come to expect and trust.
GRAS Acoustics is represented through subsidiaries and distributors in more than 40 countries and is part of Axiometrix Solutions, a leading test solutions provider comprised of globally recognized measurement brands.

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