MSRC
Materials & Structures Research Center

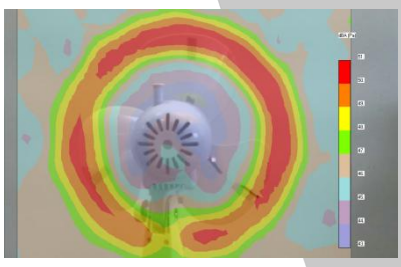
instituteofaviation
warsaw, since 1926

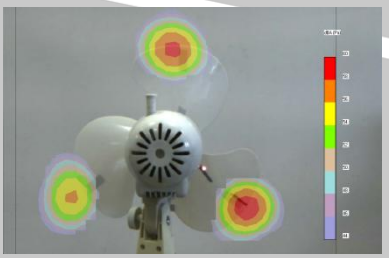
# ACOUSTIC TESTS

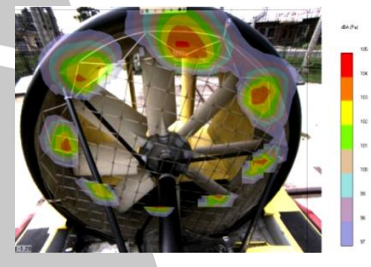
**Acoustic measurements**

- Sound Source Localization,
- Sound Power Level and Sound Energy Level determination,
- Sound Intensity measurements,
- Sound Pressure Level Measurements.

**We are ready to do measurements at client's site (within EU).**








**Institute of Aviation**
**Materials & Structures**
**Research Centre**
al. Krakowska 110/114, 02-256 Warsaw, Poland
Phone: +48 22 868 51 06, + 48 22 846 00 11 ext. 246
Fax: +48 22 868 56 80
e-mail: msrc@ilot.edu.pl
www.msrc.pl, www.cbmk.pl

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# ACOUSTIC TESTS

| Test type | Object | Specification | Test conditions | Equipment |
|---|---|---|---|---|
| Sound Source **Localization** (not standardized) | Every dynamic object which is visible and emits acoustic waves. The object can rotate or move. | Freq. range: 20Hz to 20kHz (+/-5dB), Effective localization from 1kHz to 8Khz | Temp. -10˚C up to 50˚C Wind less than 5m/s | MicrodB HDCamV2 with 36 ICP PCB 130E22 microphones |
| Determination of Sound **Power** Levels and Sound **Energy** Levels of noise sources according to ISO3744, ISO3744, ISO1996-1 standards | Every dynamic object which emits acoustic waves and is in one place for at least 10s. | Freq. range: 3.15Hz to 20kHz(+/-2dB) Sensivity: 50mV/Pa (+/-1.5dB) | Temp. -40˚C up to 80˚C Wind less than 5m/s | 4 Free Field ½" PCB 377B02 microphones |
| Sound **Intensity** measurements according to IEC 61043, ISO 9614-1, ISO 9614-2 standards | Every dynamic object which emits acoustic waves and is in one place for at least 2min. | Freq. range: 50Hz to 6.3kHz Dyn. range: 25dB(A) to 152dB Sensitivity: 25mV/Pa | Temp. 5˚C up to 40˚C Wind less than 5m/s | G.R.A.S. 50AI-L CCP Sound Intensity Probe |
| Acoustic **Pressure** Level measurements in flow (not standardized) | Dedicated for measurements in airflow (on the surface of moving object or in the wind tunnel) | Freq. range: 5Hz to 70kHz Dyn. range: 46dB(A) to 167dB Sensitivity: 1.8 mV/Pa | Temp. -55˚C up to 100˚C Wind less than 5m/s | G.R.A.S. 40LS ¼" Surface Microphone (2.5mm thickness) |

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# VIBRATION TESTS

**Measurements and analysis of structural dynamics:**

- Vibration measurements and analysis.
- Resonant tests – measurement of modal parameters of structures – frequency, modal mass and damping, and modes shapes.
- Calculations and verification of vibration properties of structures.
- Investigation into the aeroelastic characteristics of aircraft (verte).

**Measurement range:**

- frequency: 0.1 Hz - 50 kHz,
- amplitude: 0.01g – 50g.

**Equipment:**

- 256 channel system LMS.
- 300 light accelerometers (from 2g).
- Contactless vibration measurements using laser unit 3D with software PSV-500 Polytec.
- 8 shakers Fmax = 1600 N.
- LMS software for measurements analysis.



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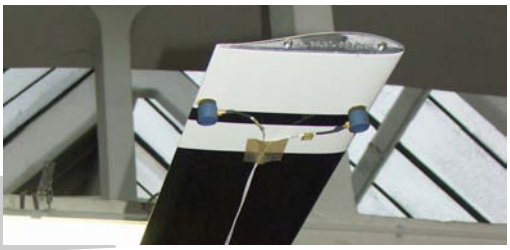
# INVESTIGATIONS INTO THE AEROELASTIC CHARACTERISTICS OF AIRCRAFT

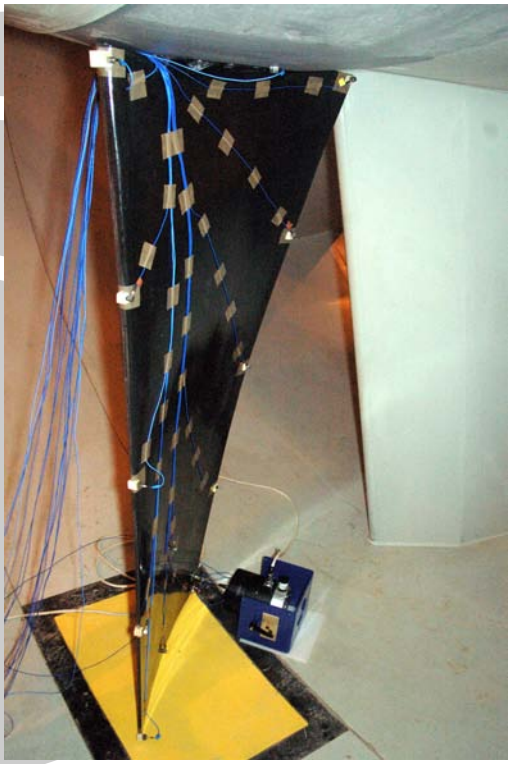
**Scope of research:**

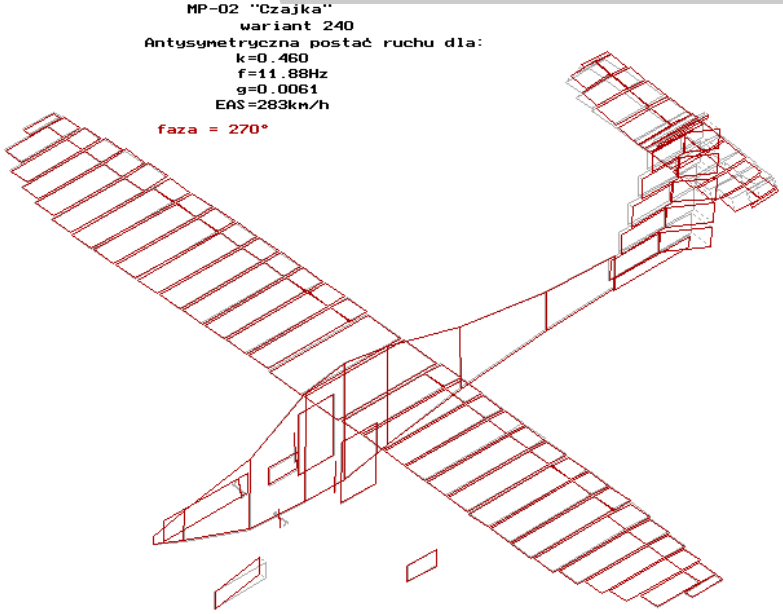
- Ground vibration tests (GVT).
- Determination of flutter speed and shape based on the results of GVT.
- Calculation of free vibrations and flutter using the FE methods.
- Preparation of flutter flight tests programs.
- Execution of flutter flight tests.
- Support towards the certification of new or modified aircraft.



**Software:**

- MSC.Patran.
- MSC.Nastran.
- Siemens FEMAP.
- JG2 (IPPT PAN).
- ZAERO (ZONA Technologies Inc.).
- SAF (Subsonic Aerodynamic Flutter).



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