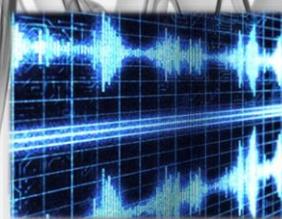
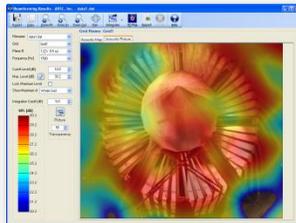


AVEC, INC. CONSULTING SERVICES



AVEC, Inc. provides a variety of services in acoustics and vibrations. These services range from relatively simple sound level measurements to wind tunnel testing with multiple microphone phased arrays using AVEC-developed hardware and software systems.

Our areas of expertise include the following topics:

- › Noise Measurements (including phased arrays),
- › Aeroacoustic Measurements,
- › Wind Tunnel Testing,
- › Vibration Measurements,
- › Noise and Vibration Control,
- › Noise Predictions,
- › Theoretical Modeling,
- › Structural Analysis (FEM and BEM),
- › Machinery Fault Diagnostics,
- › Technical Software Development (with a focus on acoustics, vibrations and digital signal processing),
- › Graphic User Interface (GUI) Development for Engineering,
- › Unsteady Aerodynamics (Vortex Lattice Methods), and
- › Aeroelasticity.

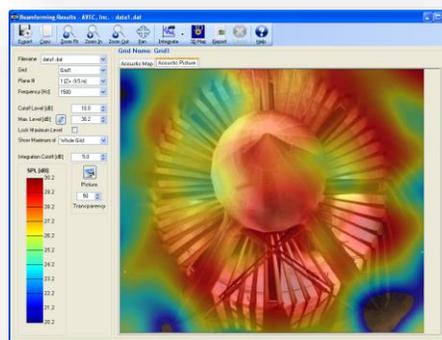
Phased Array Measurements

AVEC provides phased array measurements and analysis at a fraction of the cost usually associated with purchasing or developing the hardware and software. These services include testing, data processing, analysis and reporting of the results.

The tests can be performed using different phased arrays that AVEC has built to target different applications. This allows to fit the customer needs in terms of frequency range, desired resolution, measurement environment (wind tunnels, anechoic chamber, outdoors or indoors) and background noise levels.

AVEC can also work with phased array data from other systems in order to provide assistance in analysis and interpretation of phased array data.

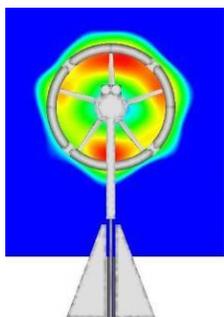
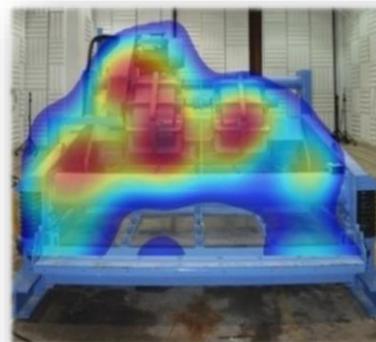
Our phased array systems and analysis software are also available for purchase or lease. Custom arrays can also be designed to meet customer's requirements. The terms and pricing vary based on the specific application, so please contact us if you require more information.



Sample Applications of Phased Array Technologies

For applications where the position of the noise sources is unknown, phased array measurements are especially useful. This localization technique can be used to find the most dominant noise sources over a wide frequency range and quantify their contribution to the overall noise levels. This technique is also very useful when comparing the noise from different configurations being tested.

Vibration measurements can also provide very useful results when conducted in conjunction with phased array measurements. AVEC also offers this type of service.



AVEC, INC. CONSULTING SERVICES

Noise Measurements

Besides testing using phased arrays, one of our most common consulting projects involve measurements made with a number of microphones. AVEC provides single and multiple microphone measurements (e.g. using circular, linear or rectangular arrays) to determine metrics such as radiation directivity and sound power.

Our expertise includes noise studies involving weighted levels, propagation of noise over distance, atmospheric attenuation and detectability distance.



Aeroacoustic Measurements

This service includes multiple-microphones and phased array measurements. Aerodynamic measurements can also be performed. Recent AVEC tests were conducted at the Virginia Tech Semi-Anechoic Stability Wind Tunnel. Tests can also be performed at a different facility selected by the customer.

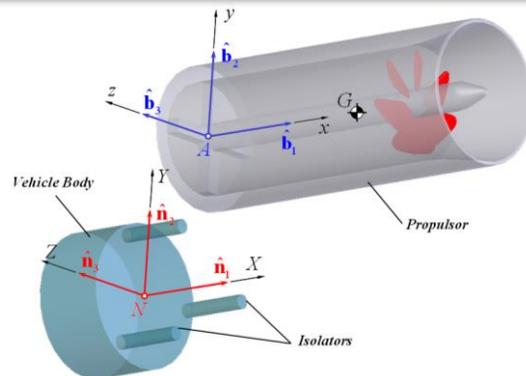
Please contact us for more details or to discuss a potential project involving wind tunnel testing.



Theoretical Modelling

AVEC's experience in research and development allows us to provide consulting services involving theoretical modelling of:

- Noise sources,
- Vibration of systems,
- Aerodynamic noise,
- Fluid-structure interaction, and
- Systems dynamics and control.



Other Services

Other services provided by AVEC include:

- Noise predictions (e.g. fans, airfoils, etc.),
- Muffler design and material selection,
- System re-design based on acoustics/vibration measurements

AVEC, INC. CONSULTING SERVICES

Clients

Since its establishment in 2002, AVEC has provided R&D, consulting services, and products to governmental agencies and companies such as:

- AAI Corporation (MD)
- Ford Company (OH)
- GE Energy and GE Global Research
- Goodrich Corporation
- Honeywell (AR)
- Ingersoll Rand
- Japan Aerospace Exploration Agency (JAXA, Japan)
- LM Windpower (Denmark)
- Michelin (SC)
- NASA Langley Research Center (VA)
- National Institute for Occupational Safety and Health (Mining Branch, PA)
- National Renewable Energy Centre (CENER, Spain)
- Naval Surface Warfare Center (Carderock Division)
- Northrop Grumman Corporation
- Office of Naval Research (ONR)
- Risø DTU (Denmark)
- Techsburg Inc. (VA)
- US Air Force (AEDC, TN)
- US Air Force (AFRL, OH)
- Vestas Technology R&D (TX)
- Virginia Tech Aerospace and Ocean Engineering Department(VA)
- Virginia Tech Transportation Institute (VA)

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