# Mecanum

We build silence
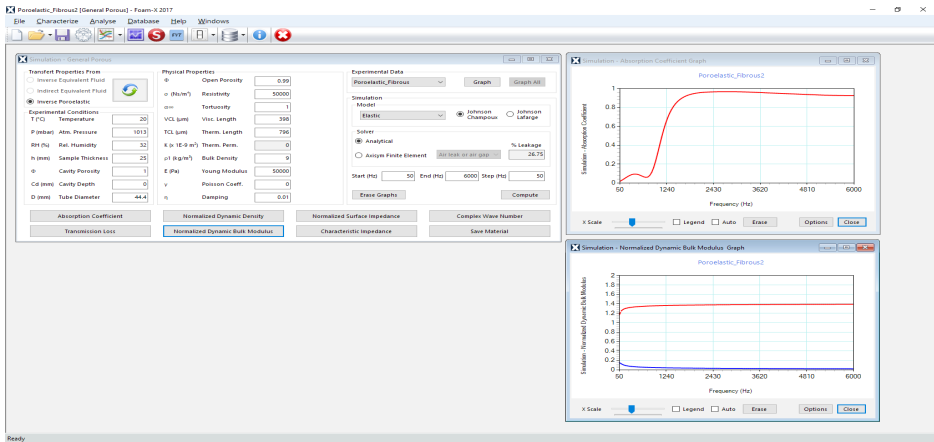
## FOAM-X

Identication of Non-acoustic Parameters of
Open-cell Porous Mterials





Different types of open-cell porous materials

From sound absorption coefficient or dynamic bulk density and bulk modulus, it calculates the main non-acoustic properties of open-cell porous materials: open porosity, static airflow resistivity, tortuosity, viscous and thermal characteristic lengths, thermal static permeability, Young's modulus, Poisson's ratio and damping loss factor.

FOAM-X uses identification algorithms that work with acoustic data output from ASTM E1050 and ISO 10534-2 impedance tube tests or ASTM E2611 transmission tube tests to identify porous material properties.

FOAM-X calculates the acoustic material properties from identification process.

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## Benefits and Advantages

• Works with all standard ASTM E1050, ISO 10534-2 and ASTM 2611 impedance and transmission tube equipments;
• Supplements standard test equipments (resistivity meter, porosity meter and quasi-static mechanical analyser).

## Software - FOAM-X

• Interface: Characterization results in a compatible XML format with ESI/VA One and its extension modules;
• Available methods:
  - Inverse and indirect (equivalent fluid parameters)
  - Poro-elastic (Biot's theory parameters)
• Reads text file from most ASTM E1050 and ISO 10534-2 impedance tube test systems containing absorption coefficient, equivalent/effective density and dynamic compressibility modulus;
• Mean and standard deviation of datasets;
• Corrects room and tube conditions;
• User-defined auxiliary parameter:
  - Bulk density
• Computed properties (set one or more):
  - Static airflow resistivity
  - Open porosity
  - Viscous and thermal characteristic lengths
  - Tortuosity
  - Thermal static permeability
  - Young's modulus
  - Poisson's ratio
  - Damping loss factor

## Support and Software Disclaimer

The software includes 1-year technical support.

Ask Mecanum for software disclaimer policy.

## Material Models

### Types of open-cell porous materials
• Foam (metallic, polymeric, chipped foam, etc.)
• Fiber (glass wool, glass fiber, felt, resinated cotton, fabrics, etc.)
• Perforated plates and resistive membranes
• Woven and non woven fabrics

### Frame types
• Rigid frame (reinforced glass fiber, metallic foam, foam board, etc.)
• Limp frame (glass wool, felt, etc.)
• Elastic frame (polymeric foam, some fibers, etc.)

## Technical Data

• Data export formats:
  - VA One Neutral File (fiber material and foam material properties)
  - NOVA ASCII text datafile

## Display, Verification, Simulation and Archiving

• Validates parameters gathered by comparison with impedance tube measurements;
• Predicts all acoustic properties under normal incidence plane wave: absorption coefficient, transmission loss, surface and characteristic impedances, complex wave number, dynamic effective density and bulk modulus;
• Embedded simulation module to verify effect of:
  - Cavity, rigid, or anechoic terminations
  - Boundary conditions and leaks
  - Rigid, limp and elastic frames
  - Thickness and diameter
  - Room conditions
  - Sensitivity to uncertainties
• Database module to store, retrieve and compare tested materials;
• Exports simulations and database.