

H2020 SOCIETAL CHALLENGES

Climate action, environment, resource
efficiency and raw materials

The Industrial Problem

To obtain of a new kind of mono and multilayer materials for the automotive industry, which will be used to improve the comfort conditions inside the vehicle cabins.

Research group



Instituto
Tecnológico
de Matemática
Industrial



UNIVERSIDADE DA CORUÑA

Center for technological research in the field on
Industrial Mathematics: Modelling, Simulation,
Optimization & Big Data (MSO & Big Data).

Company

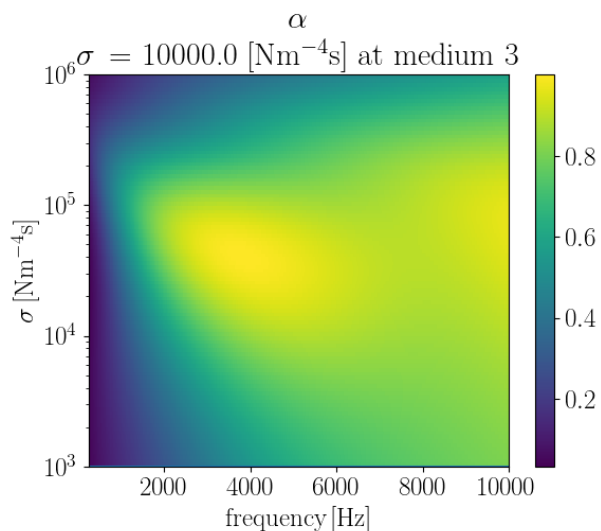


*The adhesive
technology company*

ADHEX is a company whose main activity is the
manufacture and commercialization of products
and assemblies in adhesive polymeric materials
for different components of motor vehicles.

Challenges & Goals

- Development and verification of different specific mathematical and numerical tools to analyze vibro-acoustic and thermal problems involving a new range of polymeric multilayer materials.
- Optimization of the physical characteristics of mono and multilayer materials for the thermal and acoustic protection at low frequency range.

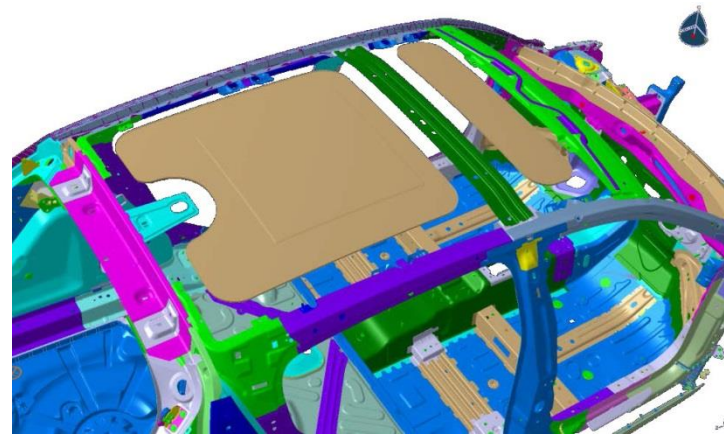


Absorption coefficient for a range of materials with different flow resistivity, where the frequency response is analyzed

This project was co-funded by CDTI in the framework of PDI call.

Mathematical and computational methods and techniques applied

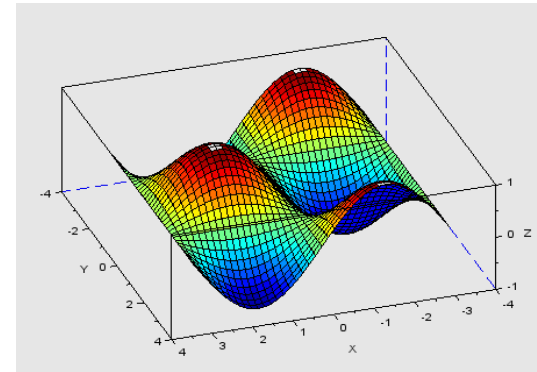
- **Acoustic problem:** vibro-acoustic coupled models in one-dimensional structures.
- **Thermal problem:** numerical simulation tool that allows, in a one-dimensional way, the thermal analysis of structures, and the post-processing of thermal variables of interest.
- **Finite element methods** to solve the coupled three-dimensional vibro-acoustic problems in 3D alpha cabins.



Parts with structural function: providing rigidity and damping to vehicle roofs

Results & Benefits to the Company

- The numerical simulation is used as an innovation tool in the design process of multilayer materials.
- Support to verify process parameters and to predict potential problems setting novel multilayer materials.
- Cost reduction by avoiding unexpected coupled phenomena, which could arise during the process of integrating layers of different materials.
- Optimization of use of materials, energy consumption, and costs related to manufacture novel multilayer materials.



Graph generated by the developed OPERPER thermal tool

The numerical simulation allows to have a specific and complete range of fully qualified and quantified materials: specific solutions in terms of thermal and acoustic protection adjusted to different technical requirements.

