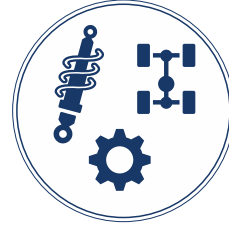




MATERIAL TESTING



COMPONENT
& ASSEMBLY TESTING



ROAD TESTING, EMISSION TESTING &
ENGINE/POWERTRAIN TESTING

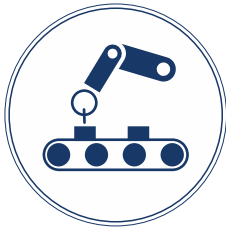
Solution for Vehicle Cabins

BOSMAL

VERT Forum and VERT Focus Day

March 19th – 20th 2026

Rafał Sala, Piotr Bielaczyc



PROTOTYPING, MANUFACTURING,
ENGINEERING
& PRODUCTION AUTOMATION



ENGINEERING
SERVICES



HOMOLOGATION
TYPE APPROVAL

BOSMAL Automotive Research and Development Institute Ltd
Bielsko-Biala, Poland

Research & development tests of: All type of powertrains: LD/HD, NRMM, marine, e-motor, e-axle, battery modules/packs and components

Type approval and COP tests

Contact details:

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BOSMAL

TESTING



Vehicle testing



Road tests



Engine and exhaust aftertreatment system tests



Exhaust emission and fuel consumption tests



Tests of automotive parts and assemblies



Heat exchangers testing



Transmission/gearbox testing



Braking systems testing



Mechanical tests of parts and assemblies



Pressure tests



Vibration, vibroacoustic (NVH) and tensometric testing



Electrotechnical and electronic testing



Testing resistance to environmental conditions



Photometry



Materials testing



Material Emissions/ VIAQ (Vehicle Interior Air Quality)



Technical cleanliness inspection



Metrological testing



Ultrafine particles cabin air filter solutions for automotive applications

Problem definition - long-term exposure of the professional drivers and passengers to the harmful ultrafine particles (UFPs) pollution present inside the vehicle cabin.

UFPs (< 500 nm) are toxic substance that can enter cardiovascular system creating heart attacks, strokes or cancer.

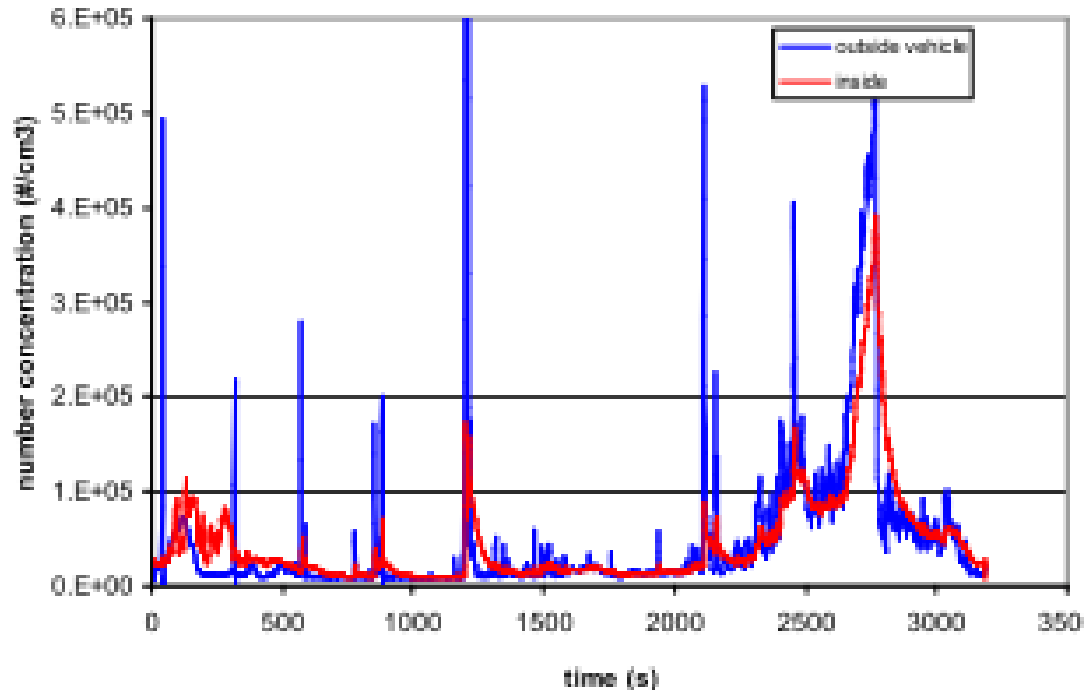
Solutions and objectives - to design, prototype and test in real life operation innovative air filter solutions for the UFPs removal.

Example of application fields





Analysis based on the NanoCleanAir and VERT cabin filter project 2006-2012



Number concentration of particles inside and outside a car measured in Zürich area.

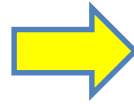
Main sources of UFPs in the ambient air:

- Exhaust gases
- Tyres wear
- Brakes wear
- Road dust and pollen

Regular automotive cabin air filters remove coarse particles only with 50% separation efficiency at 1 μm for dust and pollen.



NANOPARTICLE FILTRATION SYSTEM SOLUTION



Operation Principle:

- Clean air taken from the back of the car fills and slightly pressurizes the cabin
- The vehicle's preset ventilation system is switched to recirculated
- Windows remain closed

Challenges:

- High filter back-pressure
- Increased power of air blower is required
- Integration into vehicles
- CO2 concentration monitoring in the vehicle cabin
- Noise emission



NANOPARTICLE FILTRATION SYSTEM SOLUTION

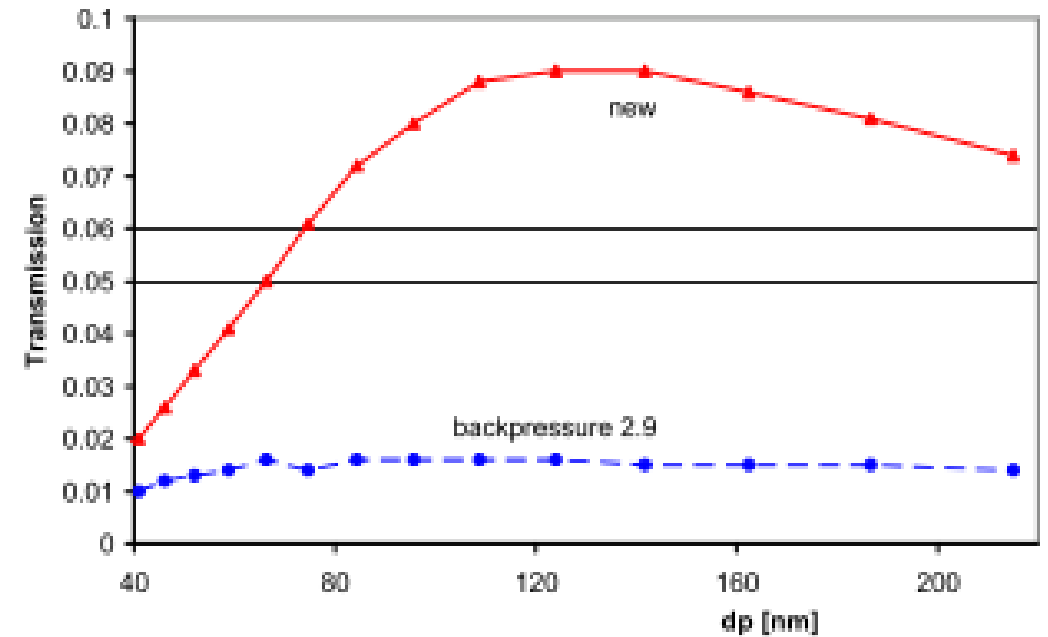


Prototype quartz fiber filter system:

- Main filter, prefilter and blower are integrated
- Operated by an external control box
- Backpressure monitoring

Filtration efficiency - transmission vs. dp:

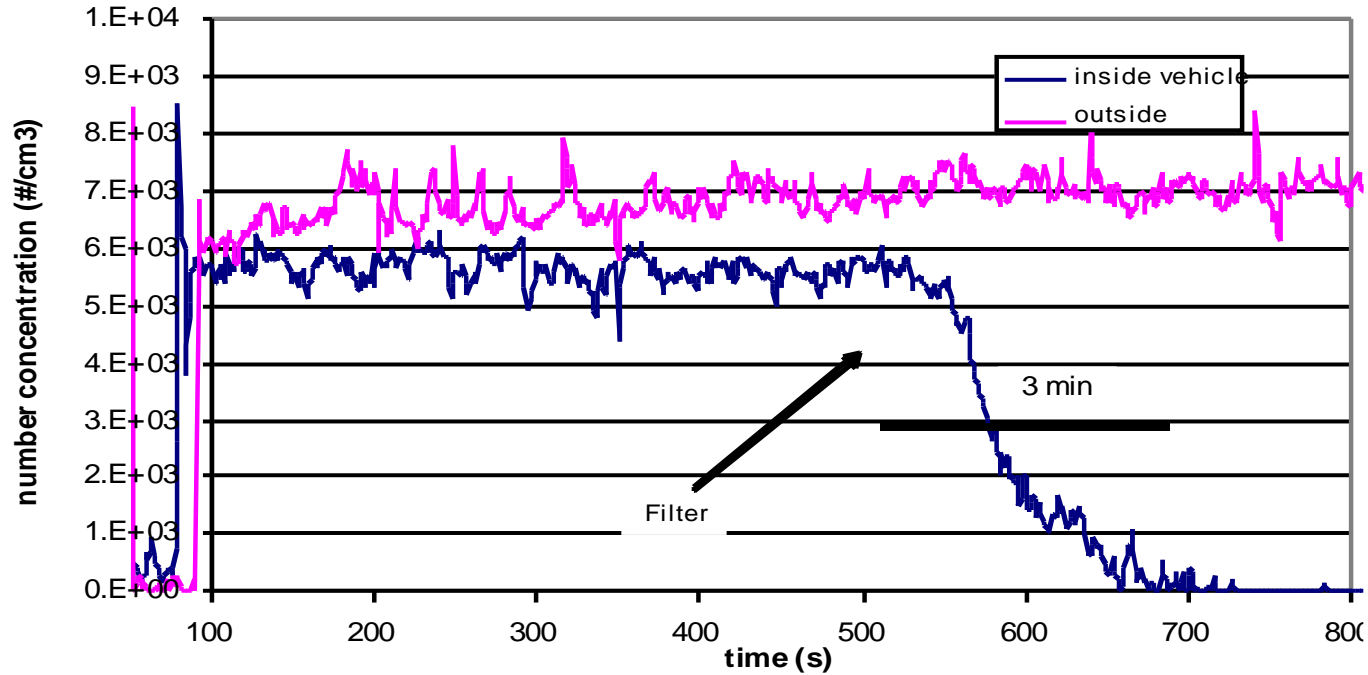
- New filter
- Filter pre-loaded to backpressure of 2.9 mbar reaches levels $< 2\%$, filtration $> 98\%$



Expected filtration of UFPs $> 95\%$



TEST RESULTS AND ANALYSIS



Switching on the filter system while driving.

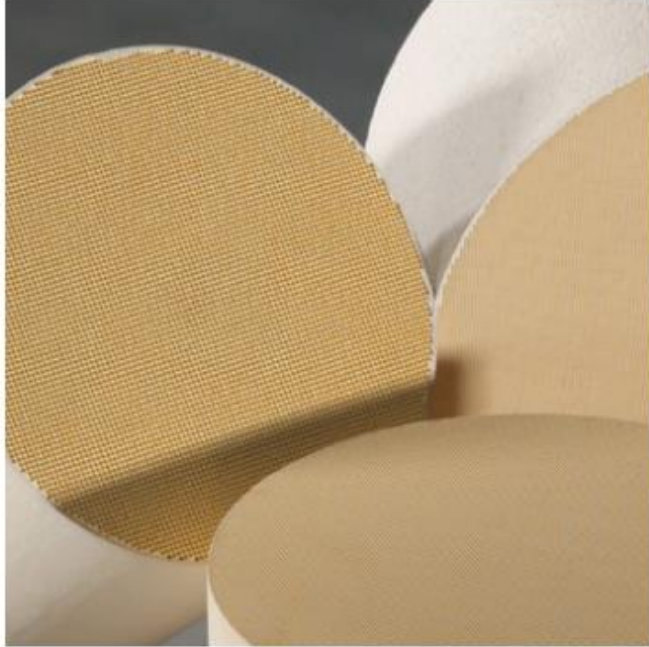
Only 3 minutes needed to clean the interior air to very low levels.



RDE test equipment with PN10 analyser



Ready for Euro 7



Prototype ceramic substrate system to be introduced and tested as a second UFPs filter solution.

ULTRAPURE project supported by:

- SUVA - National Health Authority of Switzerland
- CIOP - Central Institute for Labour Protection, Poland
- National Institute of Oncology, Gliwice, Poland



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