A New VERT Occupational Health Project

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13th VERT Forum, EMPA, Dübendorf, Switzerland

EMISSIONS ANALYTICS

PIMS vehicle interior air quality testing

AGENDA

- Introduction
- Motivation
- New VERT International Occupational Health Project
- Potential Collaborations
- Next Steps

INTRODUCTION

- VERT is not only focusing on retrofitting activities **but on all possible best available technologies (BAT) for «non-tailpipe emission»** reductions such as emissions from tyres and in- cabin emissions
- **VERT is concerned about all sources of high nanoparticle emissions** causing dangerous effects on health and is starting a new collaboration **with Emissions Analytics**, already active in this field, by launching an **international occupational health project**
- **Testing campaign at international level**, will be carried out, monitoring in-cabin emissions and in cabin-filter performance **for passenger cars, taxi and trucks** were exposure to nanoparticle emissions is higher and with detrimental effects for the drivers

EMISSIONS ANALYTICS

PIMS vehicle interior air quality testing

MOTIVATION

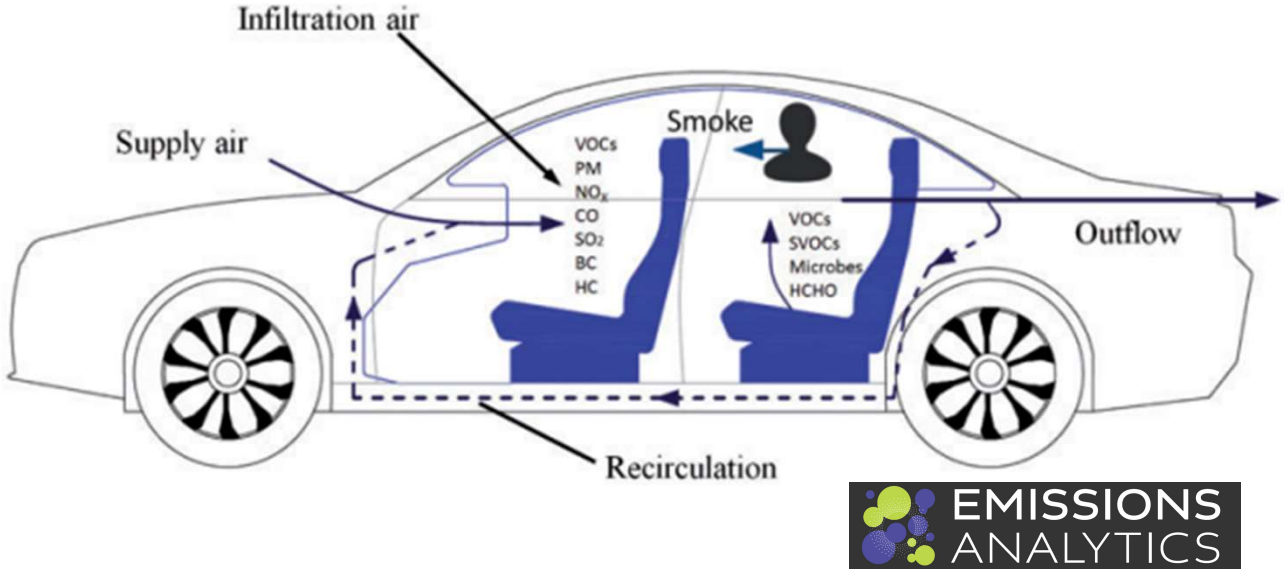
- **Most people are not aware that in-cabin air can be many times more polluted than outdoor** air; one of the most polluted venues in our daily lives is actually the cabin of our car
- Several studies have shown that PN emissions are much higher “in-cabin” than outside **due to pollutants quickly building up in the car** due to exhaust from the vehicles ahead as well as from fine particles from brake wear, tyre wear, road surface wear and more
- **In addition, a car’s interior is itself a source of volatile organic compounds** (VOCs) released by materials such as rubber, plastic, foam, and leather
- Modern passenger vehicles **are commonly equipped with cabin air filters but their FE for ultrafine particle (UFP) is rather low**. The practical deployment of the filters within an HVAC system does not guarantee good quality cabin air to compensate for the pressure drop caused by the filter in the HVAC system
- **Very high exposition of „Professional Drivers & Users of public transport!** We need a solution to protect Drivers!

Professional drivers and lung cancer: a systematic review and meta-analysis

Chi Tak Tsoi, Lap Ah Tse

IN-CABIN EMISSIONS

- Modern vehicles are usually equipped with **cabin air filters** but **their FE for ultrafine particle (UFP) is rather low**. Although setting the vehicle ventilation system to recirculation (RC) mode can reduce in-cabin UFPs by ~ 90%, passenger-exhaled carbon dioxide (CO2) can quickly accumulate inside the cabin – The primary route is typically the heating, ventilation, and air-conditioning (HVAC) system



EMISSIONS ANALYTICS

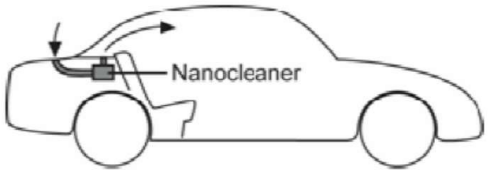
What can be done? - Possible Approaches

- Set ventilation to recirculation?
  no fresh air -CO2 may reach dangerous levels
- Nanofiltration material in existing AC system ?
  ventilators cannot cope with high backpressure
- Secondary filtration of recirculated cabin air
  large system and little improvement
- Additional clean air supply via NanoCleaner while existing AC is on recirculation
  development of a new product / Nanocleaners

*Source: Mayer e Al, 2022

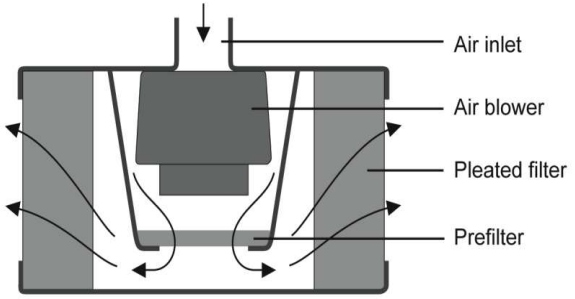
VERT Experience - Nanocleaners

Nanoclean Air to the Vehicle Cabin

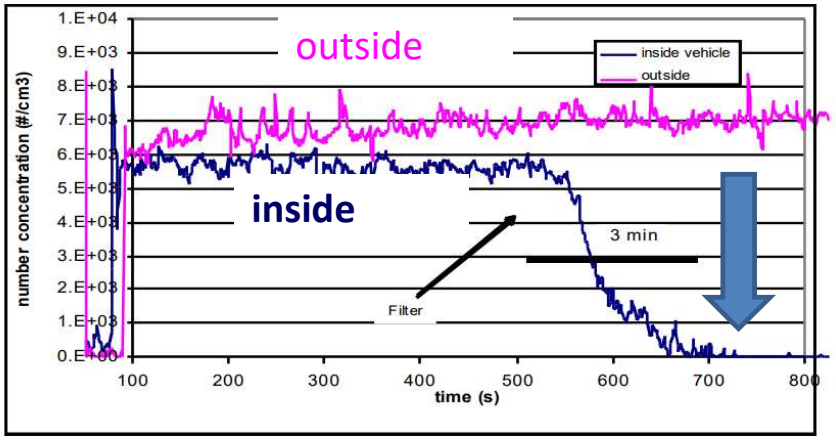


Cabin Filter: "NanoCleaner" Prototype 2012

Cabin Filter: Working Principle

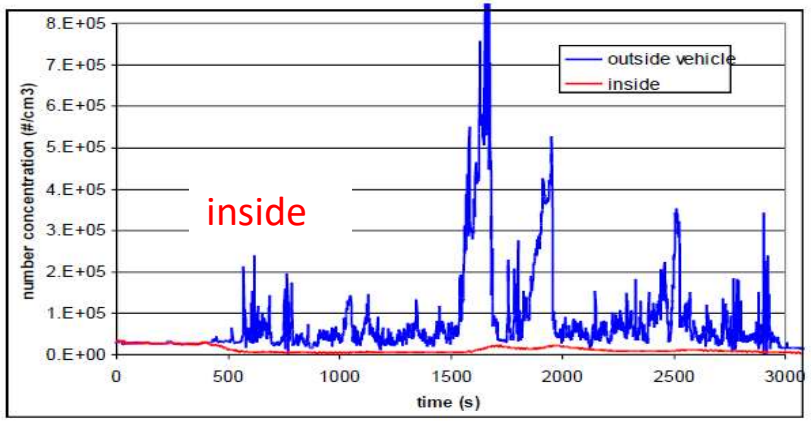


Doors shut, Filter ON...



... and On the Road

car switched to recirculation



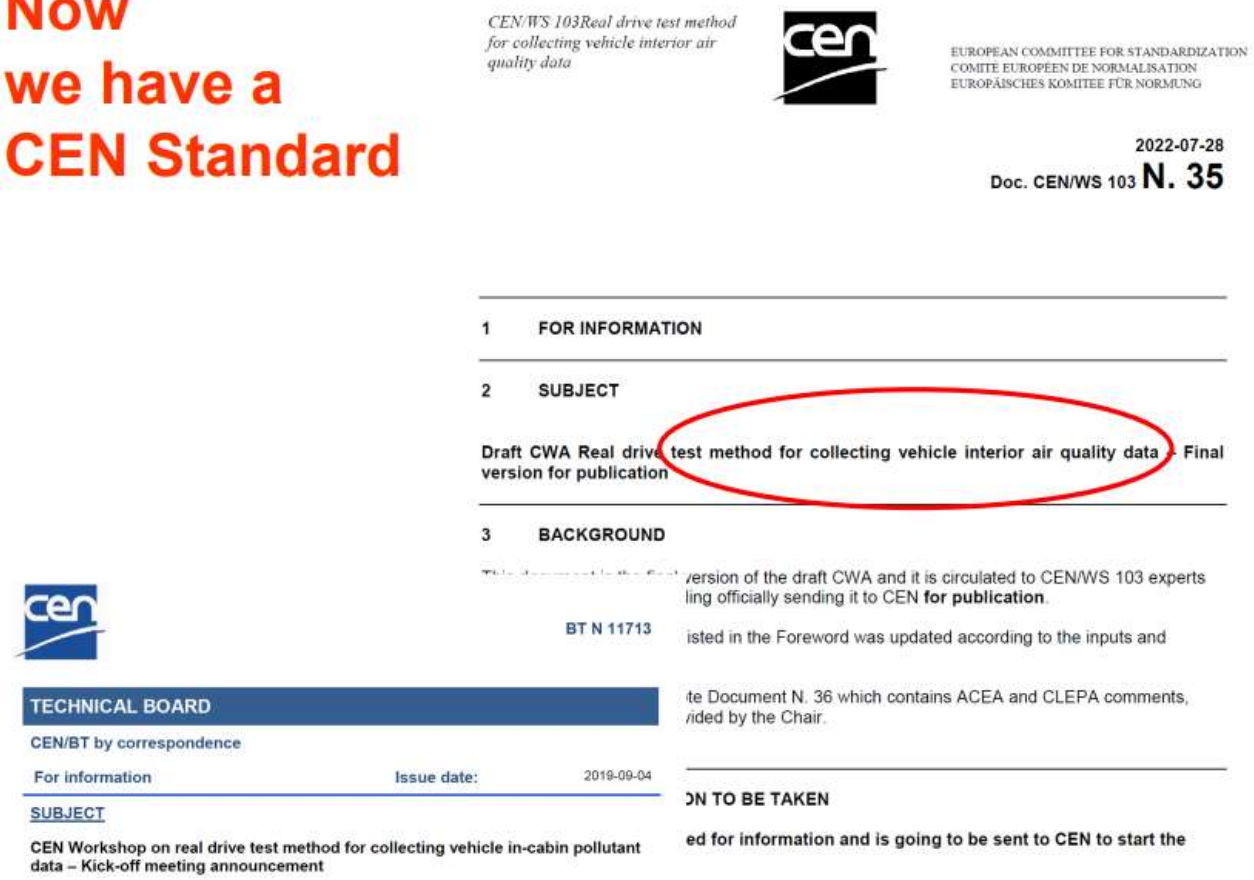
A New CEN Standard

- **CWA 17934 provides a test methodology** for collecting comparable interior air quality test data for different light duty vehicle makes and models
- It covers topics around the technical conducting of tests and reporting results, which **includes equipment, calibration, test boundaries and outputs**

*Source
Article ID: 02-12-02-0012

doi:10.4271/02-12-02-0012

Now we have a CEN Standard



CEN/WS 103Real drive test method for collecting vehicle interior air quality data

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

2022-07-28
Doc. CEN/WS 103 **N. 35**

1 FOR INFORMATION

2 SUBJECT

Draft CWA Real drive test method for collecting vehicle interior air quality data – Final version for publication

3 BACKGROUND

…version of the draft CWA and it is circulated to CEN/WS 103 experts …ling officially sending it to CEN **for publication**.

BT N 11713

…isted in the Foreword was updated according to the inputs and

…te Document N. 36 which contains ACEA and CLEPA comments, …ided by the Chair.

…ON TO BE TAKEN

…ed for information and is going to be sent to CEN to start the

TECHNICAL BOARD

CEN/BT by correspondence

For information Issue date: 2019-09-04

SUBJECT

CEN Workshop on real drive test method for collecting vehicle in-cabin pollutant data – Kick-off meeting announcement

Next Steps: Organizations & Working Groups

- SUVA - Swiss „Unfallversicherungsanstalt“ - Accident Insurance Institution
- BG „Verkehr“ –German Trade Association & TRGS – The Guideline for dangerous substances
- AUVA - Austrian organization for occupational health
- CRAMIF and INRS - French organizations for Safety and Health at work
- MSHA und OSHA - US Authority for occupational health
- DECOS - Dutch Organisation for Safety at Work
- EU Organisation – European Agency for Safety & Health
- Associations & Unions for „Profesional Drivers“ i.e. the Austrian AK („Arbeiterkammer“)
- **Working groups to be formed!**

SUMMARY

- Despite the use of filter, nanoparticles in car cabins remain a challenge
- Compact, retrofit solution i.e. NANOCLEANERS are now available to clean the breathing air in the cabin
- Nanoparticle number reduction typically 95-98%
- Maintenance free over > 100’000 km
- Ready for retrofit in every in-use car, truck, bus, construction machine and tractor
- **Need to Protect the Drivers by PN-limits**!

THANK YOU!

Questions / Comments?

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