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Poster-Abstract Form

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Title: VERT dePN – a Quality Verification Procedure for Combined Diesel Aftertreatment Systems DPF + SCR.

Abstract: (min. 300 - max 500 words)

VERT verification procedure of DPF-systems for retrofitting is an international recognized quality trade mark for:

filtration quality, durability, auxiliary systems and no secondary emissions.

The application of deNO_x-systems inline with DPF becomes very frequent by the OEMs and it penetrates to the retrofitting market. The Swiss VERT-Network consisting of AFHB, EMPA, Matter Eng. SUVA, TTM, UMTEC started the activities under leadership of BAFU, to develop the testing procedures and the quality criteria for SCR and for combined DPF + SCR.

In a close collaboration with the manufacturers several criteria are investigated: NO_x reduction, NO_2 / N_2O / NH_3 – slip, temperature window, dynamic operation, field application, durability and auxiliary systems.

On an international discussion stage a support of R&D will be connected with the development of standards.

Short CV:

BIOGRAPHICAL SKETCH Dr. J. Czerwinski:

- Study of Mechanical Engineering in Austria
- Assistant on the Technical University, Vienna Ph.D. about combustion in SI-engines
- R & D diesel injection systems, diesel combustion, Voest Alpine Friedmann, Austria
- R & D turbocharging systems, Asea Brown Boveri, Switzerland
- Since 1989, professor for thermodynamics and IC-engines, head of the Laboratory for Exhaust Gas Control, University of Applied Sciences, Biel-Bienne, Switzerland

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IC-Engines and Exhaust Gas Control

VERT *) dePN – a Quality Verification Procedure for Combined Diesel Aftertreatment Systems DPF + SCR

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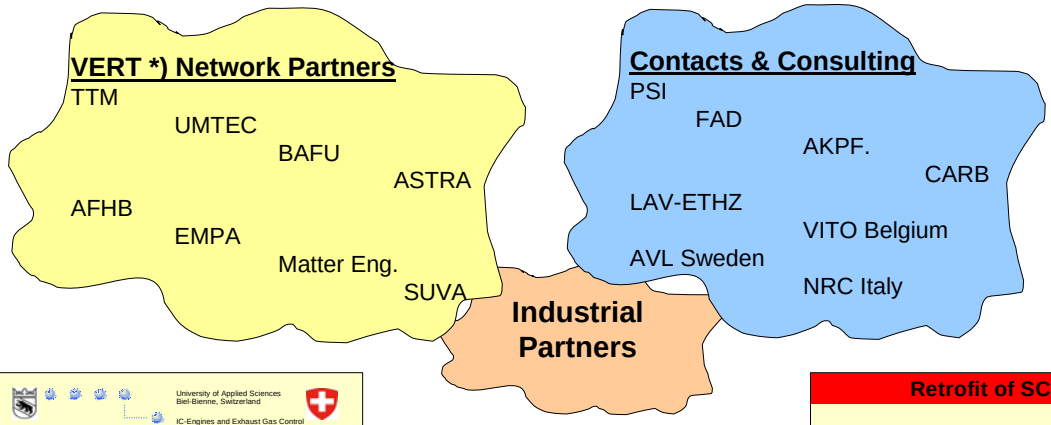


University of Applied Sciences Biel-Bienne, Switzerland
IC-Engines and Exhaust Gas Control

VERT Verification for HD-SCRT-Retrofitting
VERT ⇨ **VFT + VSET**

For DPF:

- filtration quality
- durability
- control - & auxilliary systems
- secondary emissions

For SCR:

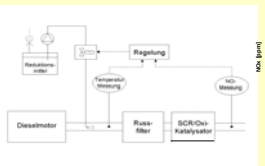
- NOx reduction
- NO2- and /or NH3- slip
- temperature window
- dynamic operation
- field application & durability
- auxilliary systems

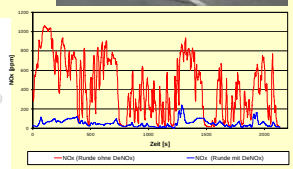
Research, Development, Standards

Retrofit of SCR+DPF-combinations

Umtec, HUG, Larag, CH

- Retrofit of SCR+DPF-combinations
- Control via NO downstream
- Fast NO-measurement
- Ammonia water solution
- NOx-conversion >70%





PAUL SCHERRER INSTITUT PSI

Reactions between NO, NO_2 and NH_3

Standard SCR reaction:

$4\,NH_3 + 4\,NO + O_2 \longrightarrow 4\,N_2 + 6\,H_2O$

Fast SCR reaction:

$4\,NH_3 + 2\,NO + 2\,NO_2 \longrightarrow 4\,N_2 + 6\,H_2O$

Slow NO_2 SCR reaction:

$4\,NH_3 + 3\,NO_2 \longrightarrow 3.5\,N_2 + 6\,H_2O$

Ammonium nitrate reaction:

$4\,NH_3 + 4\,NO_2 \longrightarrow 2\,NH_4NO_3 + 2\,N_2 + 6\,H_2O$

K053, 21.10.2004

Secondary Emissions

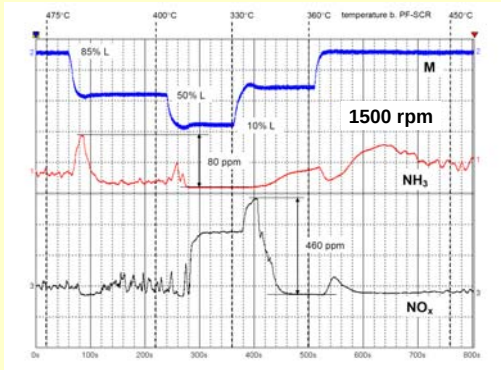
NO2, N2O, NH3

Secondary nanoparticles

Ammonium Nitrate

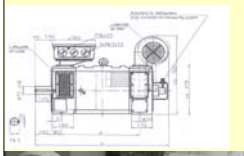
Influences of engine load on NO_x & NH_3 SP3

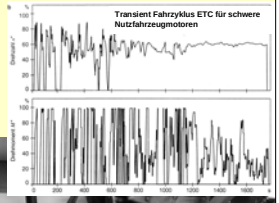
HUG DPF-SCR system, Liebherr 934L, ULSD



Dynamic Engine Dyno

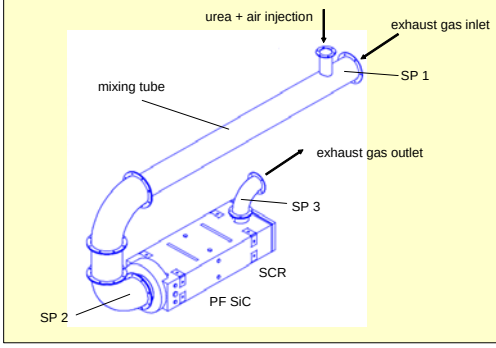
at Laboratory for IC-Engines (AFHB)





HUG DPF-SCR system

Test installation in Biel-Bienne (for cogeneration unit)



SP … sampling position

*) VERT … Verminderung der Emissionen von Realmaschinen im Tunnelbau

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