Evaluation of fuel quality impact on a new coating technology for advanced exhaust gas after treatment systems

Introduction
For emission regulation 97/68 EC stage IV, Liebherr developed a SCR-only solution with a SCR catalyst as the only necessary exhaust gas after treatment system. The particulate matter (PM) limit (0.02 g/kWh) for stage IV is entirely met with internal engine measures.

In Switzerland, a different legislation is in place that only allows for particle numbers (PN) lower than 1E12 #/kWh. In order to also cover that market, Liebherr had to come up with another solution in addition to SCR-only.

The following options were considered:
- Installation of a DPF retrofit solution after the SCR-only system
- Development of a new system solution consisting of DOC + DPF + SCR
- Development of a SCR on Filter system

Liebherr decided to develop the SCR on Filter system, mainly for packaging reasons and also because of the involved system costs.

As the SCR on Filter technology has not been used in off-road applications before and might also be a possible solution for an upcoming stage V in the European Community, various validation processes are required.

Opti-SCRF™ project
One important question that needs to be answered in the validation process is the impact of biofuel on the functionality of the SCR on Filter system. In order to investigate this effect, an INTERREG France-Suisse funded project (so called Opti-SCRF™ project) was started, together with universities and industrial partners in France and Switzerland.

A biofuel was selected and the engine with the SCRF™ system will run for several hours. During this endurance test, measurement checks will be carried out in regular intervals in order to evaluate the performance of the SCR on Filter system.

Coating poisoning
It is well known, as shown in the graph below, that biofuel has an impact on the engine out emissions and on the NOx conversion efficiency of the SCR system.

This new system design should give the opportunity to keep the full functionality of the system even if a biofuel like B10 is used. The study included in the Opti-SCRF™ project will confirm or disprove of this hypothesis.

Expected outcome of the Opti-SCRF™ project
The project started in November 2013. All necessary tests will be performed at the engine test bench from R&D Motoru. Some specific measurements and analysis will be done by project partners.

All measurements will be done with a selected biofuel - EU: EN590 and US: ASTM-2D.

The endurance tests will be run only with the biofuel.

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