umtec
institut für angewandte umwelttechnik

HSR
HOCHSCHULE FÜR TECHNIK
RAPPERSWIL

Project 1: Long term monitoring of CRT equipped busses

Objective
The project started in 1999. The objective was to study the regeneration behaviour of the CRT-System under "real life"-conditions over a period of 18 months. Furthermore, secondary emission measurements were carried out on a chassis dynamometer. Special attention was given to the known problem of increasing NO_2-emission caused by the CRT.

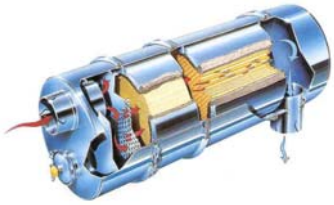

Figure 1: the CRT-system

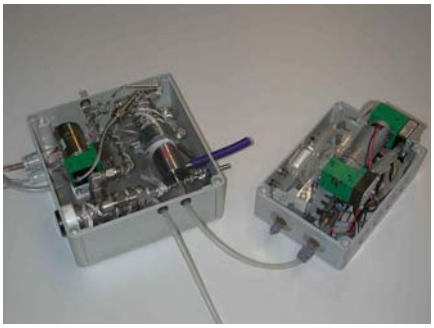

Figure 2: mobile NO_2-sampler

Results
The measurements on the dynamometer showed excellent recovery of the ultra fine particles (over 99%). For regeneration, the CRT requires an increased level of NO_2. This is provided by an upstream positioned catalyst which converts NO to NO_2. In certain operating conditions an oversupply of NO_2 leads to increased NO_2 emissions. This may be disadvantageous in areas with poor ventilation. To investigate, whether the NO_2 data from the chassis dynamometer are comparable with real life operation umtec developed a mobile NO_2- sampler system (picture 2). The sampler is able to measure the NO/NO_2- conversion across the oxicat and the NO_2- emission in the tailpipe.

Project 2: Operational experiences with DPF on construction machinery

Background
A new regulation in Switzerland stipulates that from September 2003 on, construction machinery on construction sites of a certain size and length of time, which are located in densely populated areas, must be equipped with DPF-Systems.

Our survey showed that DPF retrofitting requires a thorough system evaluation. As this is not always thoroughly carried out, in some cases, filter regeneration problems occur during operation. The acceptance of DPF-Systems in the construction industry is correspondingly low.

Figure 3: DPF on excavator

Objective
On behalf of the canton St. Gallen, umtec is carrying out a survey of the DPF- retrofitting situation and the difficulties incurred by the operators. One case of severe regeneration problems was examined in depth and eventually a solution developed.

Results
There is no single DPF available on the market that covers all possible applications for every construction machine in the field. The DPF-evaluation is machine- and application specific. For DPF- retrofitting, the machine supplier should be asked about already existing experiences. In case of the purchase of a new machine, it should be ordered inclusive a DPF.

The correct evaluation of a DPF includes an appropriate adjustment of the engine parameters and its designated application This leads to an estimate of resultant exhaust gas temperature during operation, which in turn, is crucial for the selection of an appropriate DPF system. If there are no experiences with machines of identical type and operational condition, the temperature data need to be logged under every possible working situation. If the results show insufficient exhaust gas temperature, catalytic regenerating trap systems are unsuitable and active regenerating systems (diesel burner or electric regeneration) must be applied.

Most of the encountered problems with DPF systems on construction machinery were caused by insufficient evaluation. Machine and DPF manufacturers must work closely together and use their specific knowledge to provide best possible solutions. For the future, the construction machinery manufacturers will be required to provide integrated solutions, which means to feature machines including a DPF.