



Behaviour of an electrically regenerated particulate filter system on a wheel loader

The *Institute for Applied Environmental Technology (umtec)* carries out research and consulting in the field of diesel particulate filter technology. One recently finished project involved regeneration problems of an electrically regenerating particle filter system on a front wheel loader operating in a gravel pit.

PROBLEM

Although the filter system was selected according to the conventional dimensioning guidelines for this type of machine, after only 5 - 6 hours of operation the exhaust gas back pressure exceeded the critical value of 200 mbar. While the wheel loader didn't produce excessive amounts of soot, the filter clogged and didn't regenerate properly.

Even after multiple attempts of electrically regenerating the filter, the soot remained in the form of coked bars and tubes within the filter (fig. 1).

Our findings indicate that the soot, produced by this particular engine, is of a composition that is unusually difficult to ignite and hence causes problems with the regeneration. Obviously this filter system was not appropriate for this particular engine under those particular operating conditions. The problem was eventually solved after a careful analysis of the filter regeneration behaviour and the soot composition.



Fig. 1: soot-bars after regeneration ("French fries")

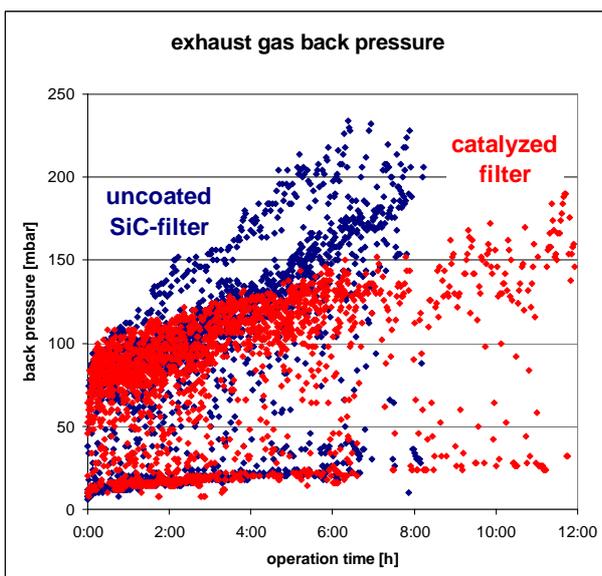


Fig. 2: back pressure maxima values of the two filter systems

SOLUTION

A high powered quick regeneration heating unit was able to provide a temperature sufficient for proper regeneration.

Despite a much improved regeneration, the maximum operating time of the wheel loader was still too short for an uninterrupted operation cycle. It was observed, that maximum back pressure was reached before the filter was completely loaded with soot. Apparently the composition of this particular soot forms an unusually dense layer on the surface of the filter. This causes a premature increase in back pressure.

The application of a catalyzed filter instead of an uncoated SiC-Filter, in addition to a thermal insulation of the exhaust pipe, provided sufficient regeneration during operation. As a result, the operation time could be extended to 11 hours (fig. 2).

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