

Issue no. 03/2016: Decline in turbocharger performance—diesel particulate filter loading limit reached

If performance issues continue to arise after a new turbocharger is fitted, or if the new turbocharger fails immediately, the diesel particulate filter (DPF) may be the cause.



Figure 1: Disassembled diesel particulate filter

When combustion takes place in the engine, extremely fine soot particulates are created which continuously accumulate in the DPF as the exhaust gases are filtered. Unlike a catalytic converter, however, a particulate filter has a limited uptake capacity and must be regenerated or replaced at specific intervals.

If this is not done and the DPF has exceeded its loading limit, the differential pressure rises. This can result in performance losses and malfunctions during driving operation—even leading to a complete failure of the turbocharger.

The exhaust gases flow from the engine to the turbocharger and the particulate filter. Due to the excessive counter-pressure, the exhaust gases can no longer pass through the DPF unobstructed; in the worst case, they penetrate the bearing housing, where they strip the oil film from the radial bearings (see figure 2).



Figure 2: Exhaust gas path through the bearing housing—from the turbine wheel **1** into the bearing housing **2** then through the oil drain **3** into the return line **4**



Figure 3: Broken rotor shaft due to insufficient lubrication of the radial bearings

This results in increased wear and may even lead to calcination and subsequent breakage of the rotor shaft (see figure 3). Coked residue in the oil return line to the oil sump is a clear indication of this damage scenario (see figure 4).

IMPORTANT! When fitting a new turbocharger, be sure to always check the loading status of the diesel particulate filter.



Figure 4: Coked oil return line as a result of exhaust gas penetratio