DPF fact and fiction

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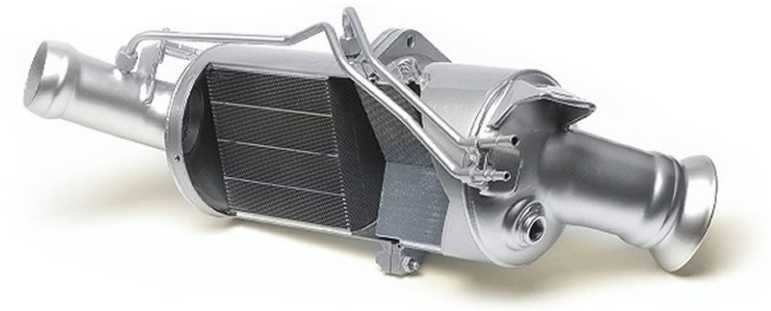
Diesel Particulate Filters (DPFs) have been around long enough now to have popped up in your garage. They have changed the knowlegde a mechanic needs, but they have also provided new opportunities to garages that adapt. JLM's Ian Humphreys explains some common DPF misconceptions.

All DPF systems are the pretty much the same. Fiction.

There are two general types of systems in use, plus another that is sometimes confused as a DPF system. The design used by Citroen/Peugeot, as well as some Fords, and Volvo use an active regeneration with an onboard additive dosing system. The additive assists the regeneration process by lowering the temperature that the particulates can be burned off. The disadvantage of this design is that the fluid needs to be replaced at regular intervals. The business opportunity to garages is another essential service that you can provide your customers.



Another type is known as passive regeneration, used by Jaguar, Land Rover, Audi, BMW Mercedes-Benz and others. It also uses a catalyst type filter system, but there is no additive. The disadvantage of this system is that it requires optimal operating temperatures to ensure regular, complete regenerations of the filter and can be prone to blocking.

AdBlue is designed to specifically reduce Oxides of Nitrogen (NOx) emissions, so therefore it is not the same as a diesel particulate filter system. AdBlue is a Urea based fluid that is injected into the exhaust to reduce harmful NOx emissions.

DPFs are not necessary. Fiction.

Diesel exhaust contain a wide array of soot particles that are harmful to human health. With more diesels on the road it has become more of a health concern. Some cities, London and Paris to name but two, wash down their streets to remove as much of the harmful soot particles as possible in order to improve public health.

A DPF stores the particulates and then attempts to burn them off, when conditions are right. Exhaust gases pass through the DPF, leaving larger particles behind in the pores of the filter. As the DPF fills with particulates, the ECU will detect that the DPF is filling, by measuring the pressure drop across the DPF, and carry out a regeneration. The greater the pressure drop, the more filled the DPF is.

Regeneration will happen on its own. Fiction.

When a DPF is working properly, passive regeneration will occur. Passive regeneration burns up the particles trapped in the DPF. However, this requires a fully operation temperature engine and vehicle speed of at least 40 mph for a long enough period of time. During passive regeneration, only a portion of particulates in the DPF may be burned up and cleared. This is because the temperature range of passive regeneration is between 250 to 550 C.

Active regeneration generally occurs about every 400 to 500 miles, depending upon the system & how the vehicle was driven. City and low speed driving will call for more frequent regenerations. High speed or motorway driving could cause regenerations to occur less frequently, due to lower engine revs.

Regeneration can occur in all types of driving. Fiction.

Passive regeneration requires temperature in the DPF to be high enough to burn off the particles trapped in the DPF. This will only occur while driving at higher speeds (and engine revs) for extended periods. The filter temperature increases even further during regeneration when (with some systems) excess fuel is injected into the engine during the exhaust stroke. This sends unburned fuel into the DPF where it combusts, increasing the DPF temperature, burning off the particulates trapped in the DPF. A regeneration usually takes around 15 or 20 minutes to complete and will cause the DPF temperature to rise to between 500° to 700° C. If at any time during a regeneration the vehicle speed drops sufficiently, regeneration will not be completed and will have to be attempted again, from the beginning. If an active regeneration has completed 90% of it's cycle and the car comes to a stop or slows significantly, the entire regeneration cycle must be repeated. After a series of failed attempts at regeneration, the ECU may go into Limp Home Mode until the DPF is cleared by a mechanic using the proper diagnostic tools..

Excessive regeneration attempts can cause problems. Fact.

If several regenerations are attempted but not completed, the excess diesel could accumulate in the sump and could result in a runaway engine. A diesel engine can run away if it can get enough fuel from the sump, even with the key switched off. A runaway engine poses a significant danger to all but a few quick-thinking drivers who would know what to do. Most drivers would not know what to do and a collision would most likely be the end result. The biggest indicator of this potential problem is rising oil levels in the sump, meaning that checking the oil level is even more important than ever. If you perform a manual regeneration in your workshop, you must change the engine oil after completing the regeneration for this reason.

Serious Problems can result from removing a DPF. Fact.

Many garages might be tempted to remove a DPF. This can lead to many different problems with the car. The most likely problem to happen on a turbocharged engine with the DPF removed is a turbocharger failure due to over-spooling. The DPF creates a back pressure in the exhaust that is accounted for in the ECU map. Removing the DPF changes the operating characteristics and creates the possibility that the turbocharger will attempt to provide too much boost, and catastrophically
fail. So a DPF removal can turn into a turbocharger replacement, that will also fail. The proper repair to the DPF may look cheap then.

It is also possible that a ECU remap will not be permanent. In a particular instance, a BMW 5 series had it's DPF removed and it was remapped. Later, the battery was so dead that a jump start was needed. After the jump start, the car had reset itself and the original map was back in use, indicating a fault with the DPF.