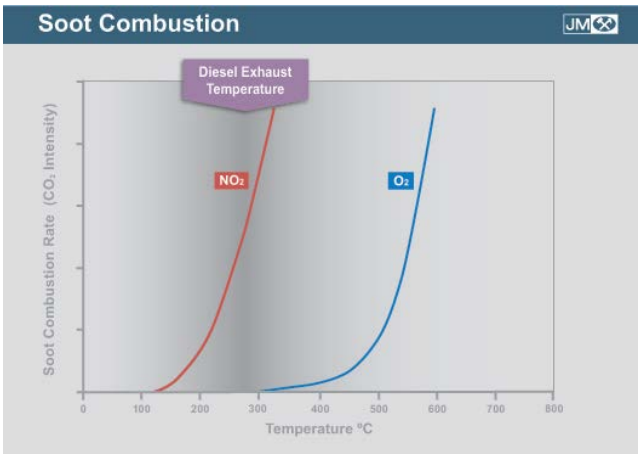
Otto-Volger-Str. 9B, 65843 Sulzbach/Ts. GERMANY
T +49(0) 6196 703813 **F** +49(0) 6196 72450 www.jmdpf.com

Johnson Matthey
Catalysts

Filter Regeneration

Any filter has a finite capacity. Diesel particulate filters must be cleaned out, intermittently or continuously, if they are not to block. This is most important, since an overfilled filter can damage the engine through excessive exhaust back pressure and can be damaged or destroyed.

The material trapped in the filter is in most part carbon particles (C) with some absorbed hydrocarbons. There are two principle techniques for removing the particles:



1. combustion with oxygen (O_2)

[C] + $O_2 \rightarrow CO_2$

2. combustion with nitrogen dioxide (NO_2)

[C] + $NO_2 \rightarrow CO_2$ + NO

The merits of the two different techniques can be summarised as follows:

	O_2-based regeneration	**NO_2-based regeneration**
Temperature required for regeneration	Requires temperatures of around 600°C (or 400°C with a fuel-borne catalyst).	Reaction occurs from 250°C.
Gas used in regeneration reaction	O_2 abundant in exhaust gas stream	NO_2 needs to be made from NO in exhaust stream.

NO_2-based systems are greatly favoured because the reaction takes place at temperatures seen in most diesel exhausts. The leading DPF system around the world is the CRT® (Continuously Regenerating Trap®) technology from Johnson Matthey, which uses an oxidation catalyst in front of the filter to generate the NO_2 required to keep it clean.

Passive and active regeneration

DPF systems that are able to regenerate themselves using only the exhaust gas stream, without additional energy inputs, are known as passive systems. The CRT® system is able to function in a wider range of conditions than any other passive system and this is the basis of its success. Its advantage is most clearly seen in applications with low exhaust temperatures, an advantage further enhanced in the CCRT® system.

Passive systems (link) are favoured, particularly for retrofit applications, because they require no integration with the engine, no source of energy other than the exhaust gases themselves, and no complicated control systems.

Applications with variable or unreliable duty cycles, or with exhaust conditions not suitable for passive systems, require active systems.