One of the major challenges of meeting tougher 2007 EPA emissions standards is to significantly reduce levels of the particulate matter diesel engines discharge into the air. Cat engineers responded by taking an innovative approach to solving the problem. Their safe, effective two-part solution once again differentiates Cat® on-highway engines with ACERT™ Technology from the rest of the industry—and ultimately provides more value to customers.

Part 1

Cat Diesel Particulate Filter

For 2007, Cat engines with ACERT Technology will be equipped with a Cat-manufactured Diesel Particulate Filter (DPF). It replaces the diesel oxidation catalyst and provides sound attenuation to eliminate the need for a conventional muffler. Made from a ceramic material, the DPF employs “wall flow” technology to collect particulate matter, or soot, from the exhaust gas that passes through it.

Under many operating conditions, the engine produces enough heat to oxidize, or “burn off” the collected soot from the DPF. However, extended idling periods, light load operation and/or low ambient temperatures can inhibit the process, requiring an alternative heat source for oxidation. That’s where a proprietary Cat system takes over.

Part 2

Cat Regeneration System (CRS)

On Cat engines with ACERT Technology, the electronic control module determines DPF soot buildup. At that point, the CRS activates to automatically regenerate itself under all conditions. The CRS uses only the precise amount of fuel necessary to oxidize soot, and occurs only when necessary, which optimizes fuel economy. No driver action is required.

The CRS is a safe, controlled system that utilizes a closed combustion chamber similar to gas-burning home furnaces. And because the system is self-contained, it offers the same reliability and durability as the Cat engine. The CRS is also covered by the standard Cat Engine Warranty. When regeneration is required, it will only take place while the vehicle is in motion at a speed in excess of that set by the vehicle manufacturer. Some vehicle manufacturers will offer a dash-mounted switch to control regeneration. Consult the vehicle manufacturer for more specific information.
Dosing: a Regeneration Alternative

Only Cat engines with ACERT Technology use the proprietary self-activating Cat Regeneration System. Other engine manufacturers are pursuing an alternative approach to DPF regeneration commonly called “dosing.”

Dosing injects a small amount of diesel fuel directly into the exhaust stream before the DOC. There, it reacts with the precious metals contained in the diesel oxidation catalyst to chemically increase temperatures to the levels needed to oxidize soot—up to 1200 degrees Fahrenheit. However, problems may occur:

- Under certain conditions “under-dosing” may occur, leading to incomplete soot removal and requiring the driver and a service technician to intervene to ensure complete regeneration.
- If higher sulfur diesel fuel is used, the fuel coats the precious metal and slows the oxidation process.
- The fuel may also pool inside of the DPF, creating the possibility of an “uncontrolled thermal event.”
- Fuel may pass through the DPF

Advantages of the DPF/CRS Over the Dosing Process

The Cat Diesel Particulate Filter and Cat Regeneration System provides multiple advantages over the dosing process, which raises operational and safety concerns.

<table>
<thead>
<tr>
<th>Cat DPF/CRS</th>
<th>Dosing Process</th>
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<tbody>
<tr>
<td>Controlled, self-regeneration under all operating conditions</td>
<td>May not regenerate DPF under all conditions</td>
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<tr>
<td>No driver involvement required</td>
<td>Possible reduced effectiveness with higher sulfur fuel</td>
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<tr>
<td>Self-contained on the engine for safety</td>
<td>DPF fuel pooling could result in an “uncontrolled thermal event”</td>
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<tr>
<td>Same reliability and durability as engine</td>
<td></td>
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<tr>
<td>Serviced by the Caterpillar Genuine Network of Cat Dealers and Authorized Truck Dealers</td>
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Another Cat Advantage: On-Vehicle Ash Removal

Eventually, the residual ash that remains after soot oxidation needs to be removed from the DPF. Although the minimum clean-out interval required by the EPA is 150,000 miles, Caterpillar projects an interval of at least two times that. At this point, an ash collection tool allows the Cat DPF to be serviced in about the same time as an oil change—without removal from the vehicle. That means less downtime, more productivity and lower maintenance cost.