Regeneration of diesel particulate filters (DPF) is necessary to avoid engine damages. Inorganic thermocouples of engine integration (DPF) start funded Regeneration process of filters with certain ash loads takes longer. Delphi engine of increasing ash load leads to a start of the regeneration process at higher temperatures but of size at Silicon carbide (DFG) drop project. Huge differences in loading duration for comparison of smaller and inorganic with 2143 cm³, 4 of Daimler, OM 651 of Increasing ash load leads to a start of the regeneration process at higher temperatures but engine characteristics of 16 mode 112 of platinum 5 g/l ash of Degreening distribution behavior of uncoated, coated and aged Diesel particulate filters of behavior of uncoated, coated and aged diesel particulate filters. Comparison of loading and regeneration behavior of uncoated, coated and aged diesel particulate filters is necessary to avoid engine damages. PM oxidation should lead to a regeneration process that minimizes fuel penalty, avoid high temperature peaks and gradients inside DPF by maintaining a high regeneration efficiency. Lack of knowledge about thermal control of DPF regenerations and the variety of influencing factors. How do different engine operating conditions and different filter types influence DPF loading and regeneration behavior? Experimental approach:

**Experimental setup**

- *Engine characteristics:*
  - Manufacturer, Type: Daimler, OM 651
  - Capacity: 2143 cm³, 4 cyl.
  - Rated RPM: 4200 min⁻¹
  - Rated power: 150 kW
  - Injection pump: Delphi Piazza
  - Emission standard: Euro 5

- *DPF characteristics:*
  - Material: Silicon carbide
  - Dimension: 5.66'' x 6''
  - Cell density: 1200 cpsi
  - Porosity: 58 %
  - Pure size: 16 µm
  - Coating: 20 g/dm² platinum

- *Arrangement of thermocouples inside the diesel particulate filter:*

- *DPF aging system:*
  - Oil burner system
  - Mass flow controller for air and fuel
  - Loading of DPF with unburnt inorganic components of SAE 5W-30

Results:

**Particle size distribution**

<table>
<thead>
<tr>
<th>Engine mode</th>
<th>Median particle diameter (µm)</th>
<th>Exhaust mass flow [kg/h]</th>
<th>Exhaust temperature [°C]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode 1</td>
<td>112</td>
<td>115</td>
<td>203</td>
</tr>
<tr>
<td>Mode 2</td>
<td>218</td>
<td>61</td>
<td>245</td>
</tr>
</tbody>
</table>

**DPF loading behavior**

- **Engine mode 1**
- **Engine mode 2**

- Pressure drop behavior:

- Hourly pressure drop increase:

**Temperature at maximum pressure drop for quantification of the start of regeneration:**

**DPF regeneration behavior**

- **Engine mode 1**
- **Engine mode 2**

- Pressure drop behavior:

**DISCUSSION**

- **DPF loading behavior**
  - Huge differences in loading duration for comparison of smaller and larger particles.
  - Loading with smaller particles shows a linear rise of pressure drop whereas loading with larger particles has a rise in pressure drop gradient as a consequence.
  - Reduced durations of loading process are only visible at higher ash loads.

- **DPF regeneration behavior**
  - DPF loading with smaller particles (engine mode 1) has a faster regeneration process and higher temperature gradients inside the DPF as a consequence than loading with larger particles (engine mode 2) → effect of specific surface area.
  - Oxidation of smaller particles starts at lower temperatures → less energy input is necessary.
  - Oxidation process of filters with certain ash loads takes longer → impact of inorganic components and/or changed local soot concentrations.
  - Increasing ash load leads to a start of the regeneration process at higher temperatures but also to smaller temperature gradients in case of loading with smaller particles.