DIESEL PARTICULATE FILTERS HELPING SITES BRING DOWN DIESEL PARTICULATE EMISSIONS AS LOW AS REASONABLY PRACTICABLE
Not all mine site vehicles or their diesel particulate filters are made equally.

The largest underground mining vehicles typically with heavy duty cycles are in a class of their own for their power, performance and potential emissions (depending on engine type). Our Diesel Particulate Filters are purpose built to suit OEM specifications of these vehicles.

The mid-range support vehicles are often too compact to fit a standard Diesel Particulate Filter, add to that unpredictable duty cycles and most suppliers would be waving the white flag. However our catalysed substrate DPF has proven to be a key component in managing Diesel Particulate Emissions on these vehicles; purpose built to suit OEM specifications.

Finally the light duty vehicles, people movers, land cruisers, fuel and liquid trucks, shotcreters, etc are often the weak-link in the chain of holistic and thorough Diesel Particulate Management. The Mammoth Sintered Metal Filters are purpose built to suit OEM specifications.

Key Mammoth Advantages;

Guaranteed to Fit, Built to Last
We are committed to ensuring our products fit first time as a retrofit solution.

Any Machine, Anywhere
40 years of continuous improvement working with heavy diesel machinery developing standard and customised solutions across diverse mining fleets, operating in diverse environments spanning 12 countries across 6 continents. Our front-line approach to Research and Development keeps us working ahead of our competitors and alongside our Mining Partners.

Peace of Mind - 3D CAD Drawings;
Improve accuracy - save time and money when ordering parts with our comprehensive 3D parts catalogues complete with OEM cross reference and descriptions.

MAMMOTH FACT:
Mammoth Equipment’s original home base is often referred to as ‘the mining state’ in a holistic case study spanning 4 years Mammoth Diesel Particulate Filters played an integral role improving the air quality underground.

Before: Areas on site in excess of 250%
After: Areas on site ‘Below Detectable Limits’
This material is an overview focused on our range of Diesel Particulate Filters.

We design filters to suit individual make, model and serial variations, this considers a range of relevant factors such as; Original Equipment muffler brackets and space, engine size, power and original equipment specifications (as a function for allowable back pressure), proximity to heat sensitive components and exhaust gas flow direction.

For the purposes of this overview we have simplified and segmented our DPFs in terms of three key factors;
- Application
- Design
- Function

**Mammoth Catalysed Substrate DPF:**
- **Application:** Medium Duty Cycles
- **Design:** Catalysed Coating on DPF
- **Function:** Passive Regenerating
- **Examples:** Normet 1610B, Jetcrete, Jacon Transmixer
- **Typical Results:**
  - DPM: >98%
  - CO: 90%
  - HC: 90%

**Mammoth Sintered Metal Filter SMF:**
- **Application:** Light Duty Cycles
- **Design:** DOC -> SMF
- **Function:** Passive Regenerating
- **Examples:** Land Cruiser, Forklift
- **Typical Results:**
  - DPM: 60-91%
  - CO: 90%
  - HC: 90%
Mammoth’s enduring commitment to improve the operational conditions of mining professionals over the last 40 years led to our development of a Diesel Particulate Solution for your heavy duty fleet.

All of Mammoth’s Diesel Particulate Filters are purpose built for application, engine type, back pressure specifications and deliver >98% reductions in Diesel Particulate Matter consistently.

Using robust and durable recrystallised silicone carbide (SIC), known for its Mohs hardness rating close to diamond (9) and a very low thermal expansion coefficient (4.0 × 10−6/K) the Mammoth Diesel Particulate Filter is built stronger, enabling high soot loading and thermal capacity.

This passive regenerating monolith is further enabled by the Diesel Oxidation Catalyst module before the substrate ensuring the atmosphere within the filter is optimised for passive regeneration, high performance and reliability.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIC Substrate High</td>
<td>The atmosphere contained within the substrate is optimised for soot oxidation</td>
<td>Low running costs due to reliable passive regeneration, no aids or fuel additives required (heavy drive cycle vehicles).</td>
</tr>
<tr>
<td>Thermal Conductivity</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| SIC Substrate High       | Does not expand or warp, even at high temperatures       | Lasts considerably longer than ceramic filters under the same conditions | Thermal Expansion Coefficient
|                          |                                                          |                                                                         |
| Robust Design (80-150    | High soot load capabilities against other filters        | Lower service costs able to compensate for temporarily light drive      | CPSI) maximised volume
|                          |                                                          | cycles                                                                  |
| High efficiency          | Able to effectively capture and oxidise                  | Help you meet emissions regulations and site requirements               | particulate trap
| particulate trap         | >98% of diesel particulates in 10μm and above range     |                                                                         | (microfines) |
|                          | (microfines)                                             |                                                                         |

MAMMOTH TIP:
When it comes to Diesel Particulate Filters on your fleet do away with the guess-work of sizing charts and universal filters. There are a number of factors which have implications on DPF performance and suitability (Size is only one aspect). All of our DPFs have been developed specifically for application we now have a portfolio of DPFs, off-the-shelf-ready, to bolt and replace to meet your fleet requirements.
Mammoth's enduring commitment to Guaranteed to Fit, Built to Last meant the development of a new type of Diesel Particulate Filter that included catalytic coating on the substrate face.

The same great results, improved regenerative conditions in a more compact design. Making them the ideal choice for managing diesel particulate emissions on mid-range mining fleet such as Normets, Jetcretes and Jacons.

Compact Catalysed Diesel Particulate Filters provide highly efficient removal of diesel particulate matter. The key difference is the Diesel Oxidation Catalyst or Precious Metal catalytic coating being integrated onto the substrate face (as opposed to being a separate module upstream from the substrate (saving up to 30% of space) without any sacrifice of results.

The catalytic coating oxides harmful exhaust gas such as Carbon Monoxide (CO) and Nitrous Oxides (NOx) as well as Hydrocarbons.

The porous channels within the silicone carbide substrate trap soot particles as low as 10μm and regenerates in the presence of NOx at an improved ratio due to the compact design.

Key Benefits of the Sintered Metal Filters (SMF);

- Proven to reduce DPM emissions 60-91%
- Remove & replace - equipment specific retrofit solution
- Enhanced durability due to the metallic substrate
- No regeneration aids or fuel additives required
- Maintenance Free - Fit and Forget
- Suitable for light duty cycle equipment
- Cost effective solution for DPM emissions

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIC Substrate High Thermal Conductivity</td>
<td>The atmosphere contained within the substrate is optimised for soot oxidation</td>
<td>Low running costs due to reliable passive regeneration, no aids or fuel additives required (heavy drive cycle vehicles).</td>
</tr>
<tr>
<td>SIC Substrate High Thermal Expansion Coefficient</td>
<td>Does not expand or warp, even at high temperatures</td>
<td>Lasts considerably longer than ceramic filters under the same conditions.</td>
</tr>
<tr>
<td>Robust Design (80-150 CPSI) maximised volume</td>
<td>High soot load capabilities against other filters</td>
<td>Lower service costs able to compensate for temporarily light drive cycles.</td>
</tr>
<tr>
<td>High efficiency particulate trap</td>
<td>Able to effectively capture and oxidise &gt;98% of diesel particulates in 10μm and above range (microfines)</td>
<td>Help you meet emissions regulations and site requirements.</td>
</tr>
<tr>
<td>Coated Substrate</td>
<td>Save Space without the DOC module, improved regeneration efficiency</td>
<td>Minimum space maximum results, able to uphold our commitment to bolt-on exchange solutions</td>
</tr>
</tbody>
</table>
Mammoth’s enduring commitment to **Aim For Zero**, does not stop at Heavy Duty haul-trucks and loaders.

As a key partner in your holistic approach to diesel particulate management our product range caters for light duty vehicles which would otherwise not be suitable for a standard wall-flow DPF.

**SMF Partial flow Diesel Particulate Filter** provides effective removal of diesel particulate matter with lower maintenance requirements than wall-flow particulate filters.

Making them the ideal choice for managing diesel particulate emissions on light duty cycle vehicles.

SMFs are functionally similar to the standard Diesel Particulate Filter; hot gas (including DPM flows into the filter structure, where the microscopic metallic pores trap and oxidise DPM.

The **key difference** is the sintered metal substrate, which when coupled with the Diesel Oxidation Catalyst enables soot oxidation at lower temperatures and partial flow, virtually eliminating the risk of over-sooting; maintenance and manual regeneration not required.

**Key Benefits of the Sintered Metal Filters (SMF);**
- Proven to reduce DPM emissions 60-91%
- Remove & replace - equipment specific retrofit solution
- Easy integration into exhaust system
- No regeneration aids or fuel additives required
- Built as a ‘fit and forget’ solution
- Suitable for light duty cycle equipment

<table>
<thead>
<tr>
<th>Feature</th>
<th>Advantage</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sintered Metal Structure</td>
<td>Enhanced durability due to the metallic substrate</td>
<td>In most cases the filter will out-last the vehicle.</td>
</tr>
<tr>
<td>Compact Design</td>
<td>Enables bolt on exchange with OEM muffler / filter</td>
<td>Quick and easy fitting for site personnel</td>
</tr>
<tr>
<td>Flow Through Design</td>
<td>Does not clog or accumulate soot particles</td>
<td>Will consistently remain well within OEM back pressure specifications</td>
</tr>
<tr>
<td>Resilient steel construction</td>
<td>Resistant to even the harshest mining environments</td>
<td>Very reliable, lower running costs</td>
</tr>
</tbody>
</table>

**MAMMOTH TIP**
Our range of filters are built rugged and ready for the harsh mining environments in which they have operated for as long as 18,000 hours. However eventually the oxidation process of soot to ash will require a thorough cleaning service (more info on our related services on the next page)
**DPF Options and Related Services**

The Largest DPF Cleaner in the world (FSX).

Thorough Thermal Pneumatic Clean and Refurb of DPFs.

Endorsed by major OEM engine manufacturers.

Reporting and review services.

**Back Pressure Monitoring and Data Loggers.**

Real time feedback that checks the operation and condition of your DPF.

Historical data recording

Reporting and review services.

**Emissions Testing and Reporting.**

Before and After emissions testing including:

- DPM, CO, NOx, NO2, CO2

Reporting and review services.

---

**DPF Best Practices and Recommendations**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact</td>
<td>Hitting the wall, falling rocks</td>
<td>Protective housing, hazard and risk assessment, caution and use of proximity sensors</td>
</tr>
<tr>
<td>Soot overloading</td>
<td>Caused by duty cycle with high idle times, dirty engines</td>
<td>Reduce engine idle times, adjust operating procedures</td>
</tr>
<tr>
<td>Ash overloading</td>
<td>High ash oil</td>
<td>Use low ash oil (CJ-4 Spec)</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>Incorrect filter for duty cycle, high idle times</td>
<td>Correct filter, reduce idle times</td>
</tr>
<tr>
<td>Soot Characteristics</td>
<td>Oil quality, fuel quality</td>
<td>Use low ash oil (CJ-4 specifications) and Low Sulphur Fuel (ULSD - 10-15 ppm)</td>
</tr>
<tr>
<td>Engine Condition</td>
<td>Wear out, oil consumption, air filter conditions and turbo issues</td>
<td>Maintenance and servicing, monitor oil slip</td>
</tr>
</tbody>
</table>
Mammoth Equipment & Exhausts is known

• Replacement Exhaust Products
• Air Intake Components
• Diesel Purifiers
• Custom Built Silencers
• SCR Silencers
• Universal Exhaust Products

• Diesel Particulate Filters
• Thermal Products & Accessories
• Air Quality Testing Machines
• Emissions Testing Analysis
• EcoBlue Storage & Dispensing Equipment
• EcoBlue Diesel Exhaust Fluid