Cambustion

DPG

Automated Particle Filter and Aftertreatment Test System

Accelerated aftertreatment aging (DAAAC and CFR1065) and durability testing

Filtration Efficiency (PN&PM) empty and during soot loading or regeneration

Repeatable, representative and controllable ash and soot loading

Measurement of Δp vs soot mass load

Regeneration simulation and soot mass limit determination

Catalytic activity testing

Testing at real-world conditions for light to heavy duty aftertreatment systems.

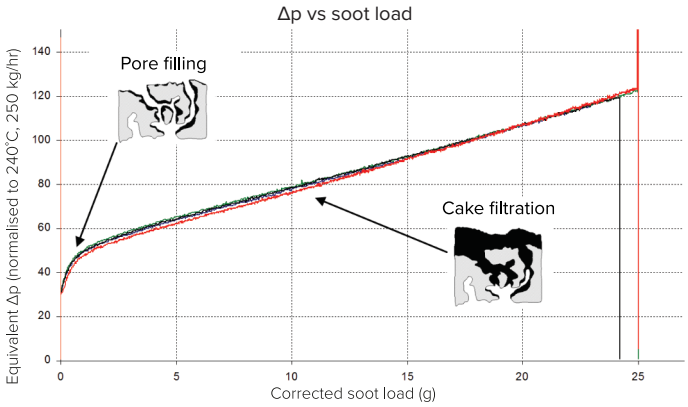
Gasoline and Diesel Particle Filter testing

Minimal infrastructure requirements

Automated testing & unattended operation

Soot generated from Diesel fuel: results correlated with engine test data

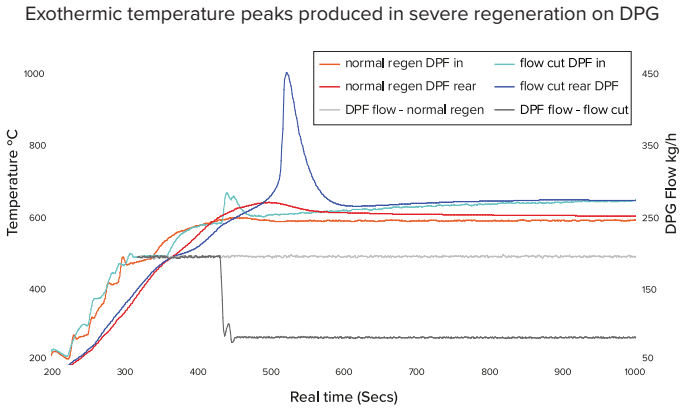
Soot Loading



The DPG loads filters with real Diesel soot faster and more repeatably than engines.

For production QA, the increase in backpressure with soot load is a critical specification monitored by the DPG.

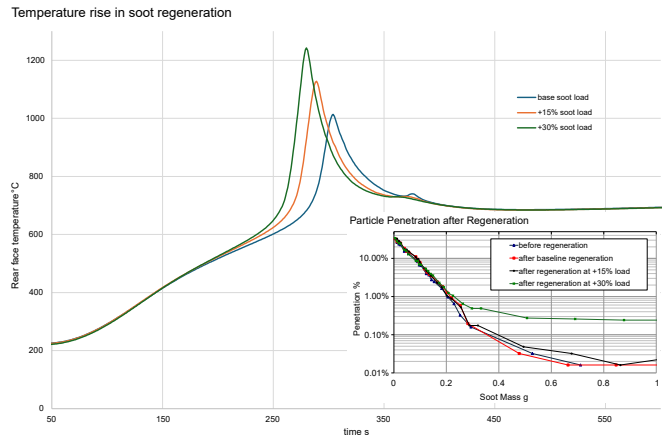
Regeneration Simulation



With realistic soot generation and full-scale flow and temperature capabilities, the DPG can reproduce transient soot regeneration events.

Multiple thermocouple inputs allow measurement of the temperature distribution.Optionally, O_2 concentration can also be controlled.

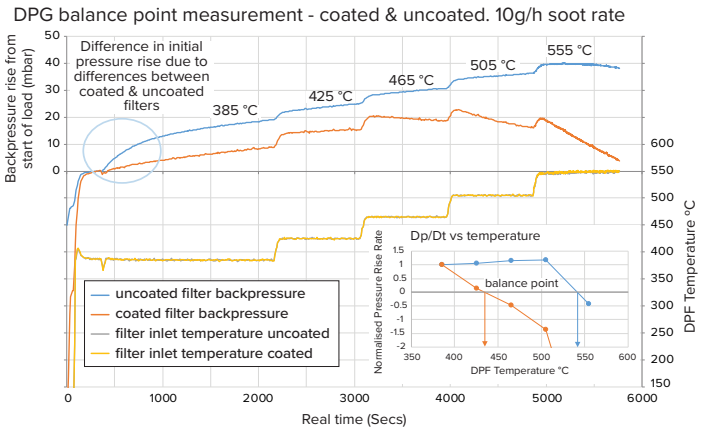
Soot Mass Limit Evaluation



The maximum allowable soot mass in a particle filter for safe regeneration is determined by repeated regeneration at incrementing soot levels.

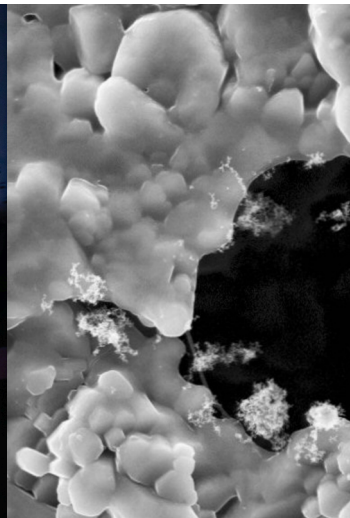
The DPG can automate this whole test cycle, automatically detecting filter failure by loaded filtration efficiency.

Filter Catalytic Activity Testing

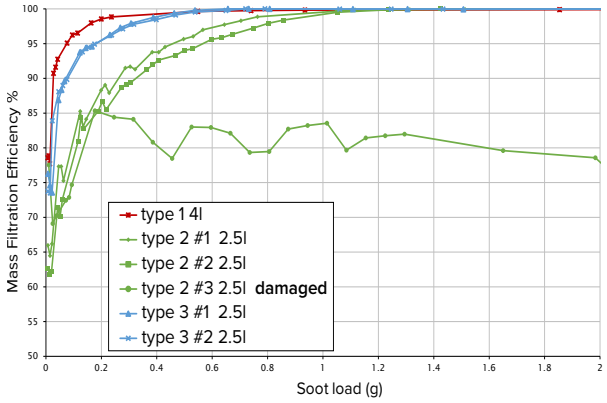


With accurate sample temperature control, the DPG can accurately determine the effectiveness of soot oxidation catalysts.

Optional NOx generation allows automated mapping of passive regeneration kinetics.

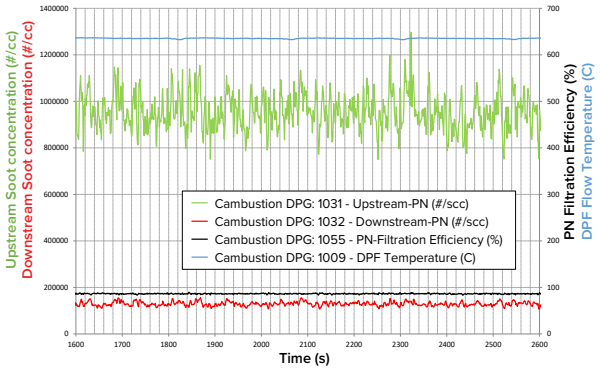


Filtration Efficiency Measurement



The DPG integrates with several sensor options to measure filtration efficiency. It can measure fresh/empty filtration efficiency critical for current EU emissions compliance, or loaded filtration efficiency best for detection of cracked parts. Measurements can be mass- or number-based.

Regeneration Particle Emissions

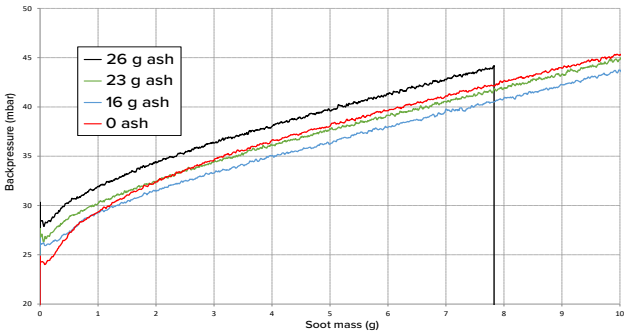


The DPG can simulate regeneration events any soot, ash and sulphur loading of the filter, determining the particle emissions.

Stable upstream particle generation through the regeneration event allows validation of the filtration efficiency in these transient conditions.

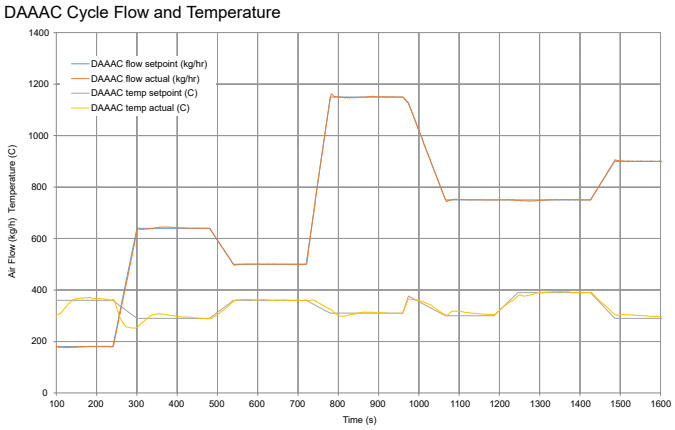
Ash Loading

Backpressure rise in load : regeneration cycles with ash



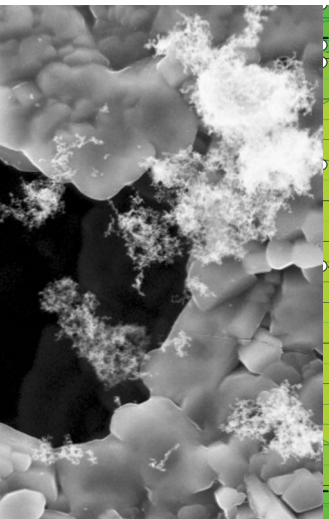
With the additive dosing option, the DPG can load filters with ash at controllable rates and in conditions representative of real-world use, including co-deposition with soot, ash redistribution in regeneration and volatile vs. bulk pathway.

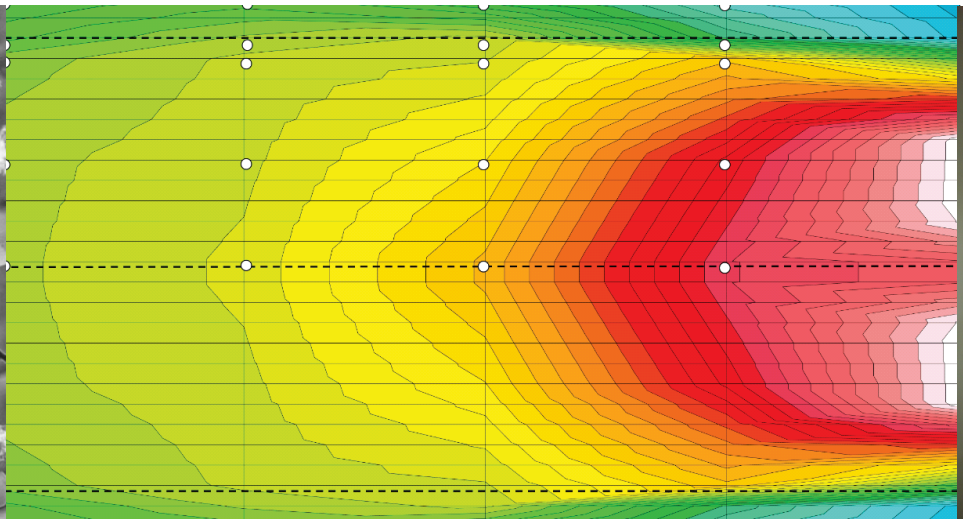
Aftertreatment Aging - DAAAC



The DPG ages parts with real-world simulation, standard DAAAC or CFR1065 protocols, or proprietary cycles. The system can reproduce real-world operating temperature and flows, add contaminants, and control NOx, H_2O and O_2 levels.

Automated long-term cycles can include periodic performance evaluation.



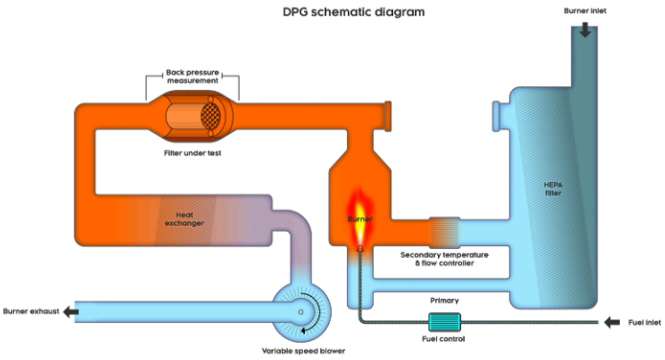


Cambustion

DPG System

The Cambustion DPG is a turn-key system used by OEM and Tier 1 customers around the world for R&D and Production QA testing of Diesel and gasoline particle filters and aftertreatment systems.

The DPG delivers improved repeatability, greater test automation, reduced infrastructure requirements, and shorter test durations than engine-based testing.



The DPG system incorporates

- Flow control systems to generate real-world exhaust system flows
- Diesel-fuelled burner to provide representative soot and exhaust temperature.
- Measurement of test sample temperatures and pressure drop.
- Optional systems for particle and gas concentration measurement, ash generation, H_2O, O_2 and NOx control.
- Control software automating test cycles and performance testing.
- Safety systems to ensure safe operation with minimal external monitoring.
- A range of options for rapidly mounting test samples ranging from individual aftertreatment substrates to full systems.

Minimal infrastructure requirements

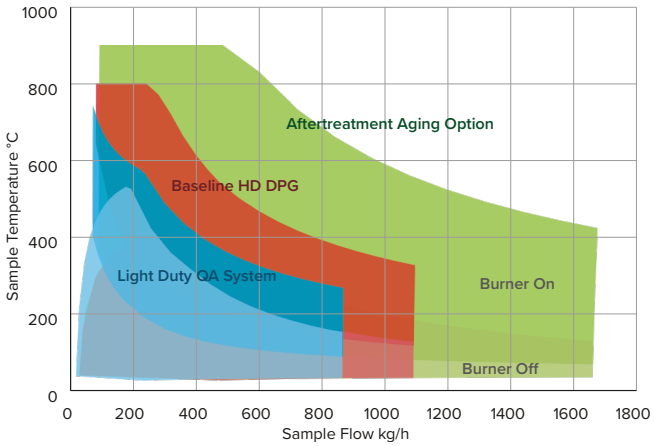
A DPG installation requires only minimal external services. The DPG system includes its own cooling air fan and controller, plus filtering and temperature control of all inlet flows. It will draw and filter fuel directly from a tank or barrel.

Ducts for cooling air inlet and exhaust, a stack for the burner exhaust, 3-phase electrical supply and a fuel tank are the only customer infrastructure requirements.

Specifications

The DPG is a flexible system which can be configured according to the intended application. Typical sample flow & temperature ranges for some applications are shown below.

DPG Example Flow - Temperature Capability Options



Soot generation rate	<0.001g/h (warm-up mode) Std. 2 – 20g/h (loading mode) $1x10^4$ — $2x10^7$ N/cc
Soot generation	Diesel burner
Fuel compatibility	Diesel fuel, up to 10% biodiesel (EN590 or ASTM D975 No.2-D
Soot rate repeatability	+/– 20%
Sample Temperature Channels	16, type K (32 optional)
Analogue data inputs	2 ch, 16 bit –10 — +10V
Data logging	User defined, max 10 S/s
Safety system interlocks	Fire, Ambient CO, Temperature, Fuel leak and System faults
Measurement acc. Flow Temperature Filter Backpressure	 ±5% of reading above 100kg/h ±1% reading (K) ±0.05 mbar ± 1% reading
System Dimensions	Base system: 2.8 m x 1.0 m x 1.6 m high. May vary according to spec.
All specifications subject to change without notice	

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