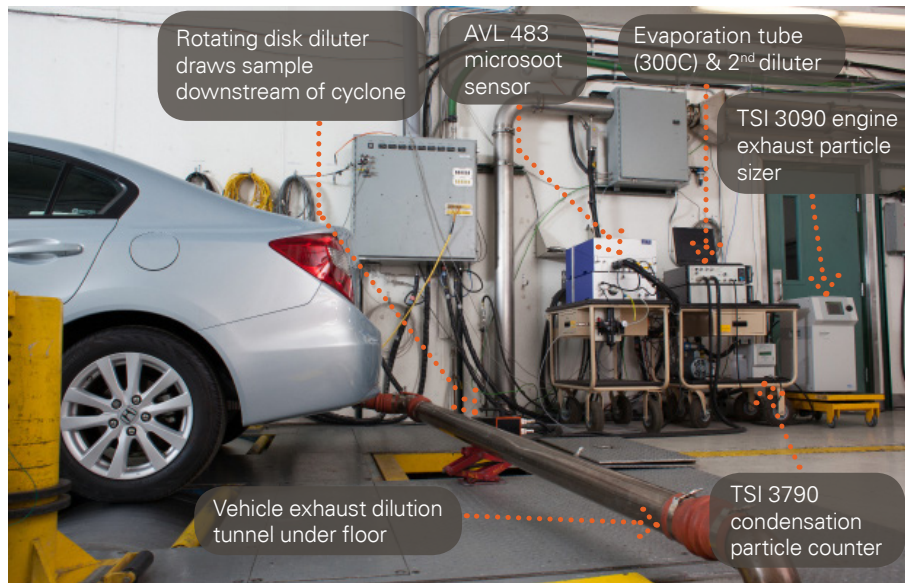


# SGS PARTICULATE MATTER CHARACTERIZATION

## SGS IS EQUIPPED TO HELP YOU UNDERSTAND PARTICULATE MATTER EMISSIONS

SGS has made a significant investment in particulate matter (PM) instruments and measurement techniques for the development of next-generation engines. Offering an array of instruments to characterize particulate emissions, the instruments are used in SGS engine and vehicle chassis dyno emissions labs to develop new products and to perform certification tests. SGS engine and vehicle labs, located in Aurora, CO, are compliant with US and European emissions certification testing standards.



### AVAILABLE INSTRUMENTS

- Particle counters
- Particle size spectrometer
- Research grade diluters
- Thermodenuders
- Microsoot sensors
- Part 1065/1066 PM samplers
- EC/OC/sulfate fractionation
- Available in SGS engine & vehicle emissions labs

### UNDERSTANDING PM

Our engineers can use instruments to understand the make-up and variability of PM emissions, the source of the emissions, and pathways to emissions reduction.

- Diesel Particulate Filter (DPF) filtration efficiency
- Soot slip past particulate filters on cold start & during active DPF regenerations
- DPF materials/porosity evaluation
- Filter damage assessment on filtration efficiency (missing plugs, cracks, segmentation, & matting defects)
- Contribution of unburned fuel & oil to PM
- Catalyst sulfate-make & sulfur purge effects
- Strategies to meet PM regulations without a particulate filter

### MEETING GOVERNMENT STANDARDS

Further evolution of powertrain technology will be required to meet stringent government standards for PM emissions.

- EPA Tier 3 has reduced light-duty PM emissions limits by 70% to 3 mg/mile
- CARB LEVIII has reduced light duty vehicle PM emissions to 3 mg/mile starting in 2017, & to 1 mg/mile starting in 2025
- Stage V for non-road engine applications will force DPFs & require particle number certification starting in 2019
- European light-duty vehicles & on road heavy-duty engines must be certified within a Euro 6 particle number limit

### CONTACT US

To request a quote or discuss your testing needs in detail, please call +01 844 730 4175 or email [us.transportation@sgs.com](mailto:us.transportation@sgs.com).

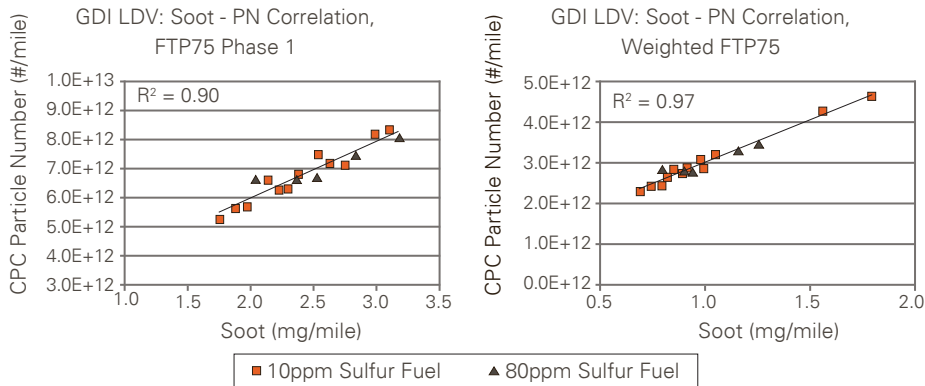


# SGS

# SGS PM CASE STUDY

## PARTICULATE CHARACTERIZATION FOR GDI ENGINES

SGS has tested a range of passenger cars equipped with different gasoline direct injection (GDI) engine technologies to characterize particulate matter emissions. Results for a GDI vehicle are shown below. SGS used a TSI condensation particle counter (CPC) and AVL microsoot sensor for the tests, both independently measuring the elemental carbon portion of the PM.

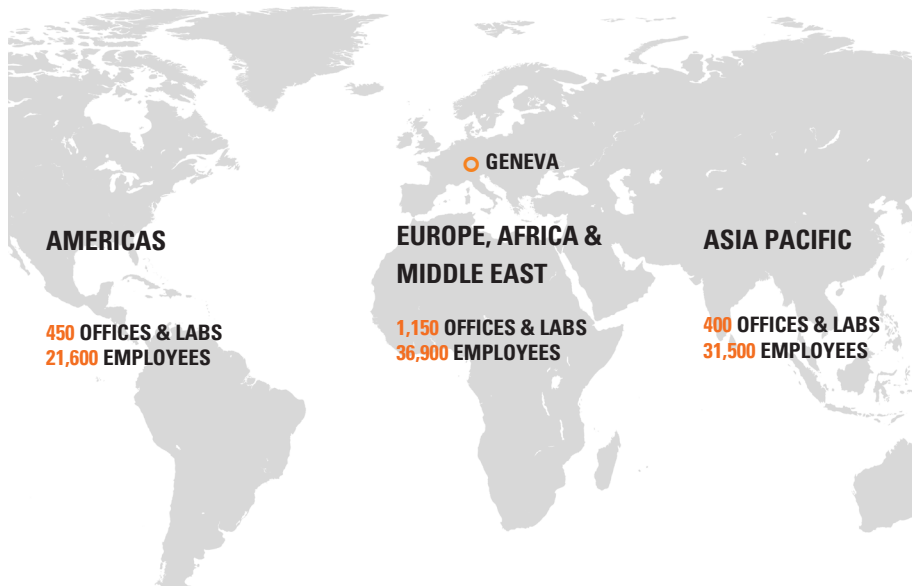


### OUR FINDINGS

- The particle number emissions were highly variable for repeated FTP75 test sequences
- This foreshadows the difficulty of certifying a GDI equipped vehicle to an EPA Tier 3/California LEVIII standard of 1 to 3 mg/mile
- The strong correlation between the independent CPC and soot measurements confirms that the emissions variability is indeed produced by the vehicle and not measurement artifact

## SGS GLOBAL & LOCAL

90,000 EMPLOYEES | 2,000 OFFICES & LABS AROUND THE WORLD



**FUEL & COMPONENT SYSTEMS TESTING**  
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**VARIABLE ALTITUDE ENGINE & VEHICLE TESTING**  
 Aurora, CO

**COMMERCIAL VEHICLE | POWER GENERATION ENGINE & COMPONENT SERVICES**  
 Columbus, IN

**ROCKY MOUNTAIN HIGH ALTITUDE TEST CENTER**  
 Empire, CO

**MILEAGE ACCUMULATION CENTER**  
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WHEN YOU NEED TO BE SURE