
Portable Nano-Particle Emission Measurement System

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## Publishable Executive Summary

The focus of this project is on the measurement of particulate emissions from gasoline direct injection (GDI) engines. One of the main challenges faced in the measurement of these emissions is the losses of particles during the sampling of the exhaust gas. It is standard procedure to dilute the engine exhaust to meet the requirements of the measuring instrument, such as temperature, concentration, and humidity. Most of the measurement devices operate around room temperature, this means that the hot exhaust gas (around 1000 K) must be cooled before it is transferred to the device. During the sampling process, there are particle losses due to processes such as diffusion, thermophoresis and inertial forces. This report presents a methodology to calculate particle size distributions at the sample point for GDI engines assuming that the size dependent particle loss functions are known. The method uses two simultaneous measurements of particle number (PN) with different cut points to estimate the geometric mean diameter. With the geometric mean diameter, the particle size distributions can be reconstructed. This has been demonstrated in two cases: 1) Reconstruction of engine-out particle size distributions, and 2) evolution of particle geometric mean diameter in a drive cycle.

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**Project partners:**

| # | Type | Partner | Partner Full Name |
|---|---|---|---|
| 1 | IND | HORIBA | Horiba Europe GmbH |
| 2 | IND | Bosch | Robert Bosch GmbH |
| 3 | IND/SME | CMCL | Computational Modelling Cambridge Limited |
| 4 | IND | TSI | TSI GmbH |
| 5 | HE | UCAM | The Chancellor, Masters and scholars of the University of Cambridge |
| 6 | HE | ULL | Université des Sciences et Technologies De Lille – Lille I |
| 7 | IND | IDIADA | Idiada Automotive Technologie SA |
| 8 | IND | HORJY | Horiba Jobin Yvon S.A.S. |
| 9 | IND/SME | UNR | Uniresearch BV |

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