PERFORMANCE AND DURABILITY OF PSA PEUGEOT CITROËN'S DIESEL PARTICULATE FILTER SYSTEM ON TAXIS FLEET IN PARIS AREA

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ABSTRACT

The use of diesel engines has strongly increased during the last years and now represents 40 percent of the sales in Europe and up to 50 percent of the number of cars in circulation fro some countries. This success is linked not only to the economical aspect of the use of such vehicles, but also to the recent technological improvements of these engines. The new technical solutions (high-pressure direct injection, turbocharger, etc.) have indeed allowed the increase of these engine performances while decreasing their fuel consumption, pollutant emissions, and noise level.

From an environment point of view, diesel engines are nevertheless penalized by their particulates and NO_x emissions. The study and the treatment of the particulates, highly criticized for their potential impact on health, are the subject of numerous works of characterizations and developments.

PSA Peugeot Citroën has recently (2000) launched its diesel particulate filter (DPF) technology in several types of vehicles (500,000 vehicles with DFP have been sold today). In order to evaluate the durability of this technology over a long period of time, a study program has been set up by ADEME (French Environmental Agency), IFP Powertrain, PSA Peugeot Citroën, and Taxis G7 (a Parisian taxi company).

The objective is to study the evolution of five taxis and their aftertreatment-system performance over 80,000 km in hard urban-driving conditions, which correspond to the recommended mileage before the first DPF maintenance, as well over 120,000 km, after the DPF maintenance and re-manufacturing. More specifically, the following evaluations are being performed at regular intervals (around 20,000 km): regulated gaseous pollutant emissions on NEDC cycle, particulate emissions, and unregulated pollutant emissions. The results obtained until now have not shown any degradation of the DPF efficiency (more than 90 percent).

This paper presents the methodology set up, and the explanation of the first results obtained. Indeed, a more specific study has shown that most of the aerosols, measured with a scanning mobility particle sizer are composed of liquid fractions, mainly sulfates due to the sulfur coming from the fuel but also from the lubricant. The impact of sulfates stored on the catalyst surface during low-temperature running phases and removed during high-temperature running phases has been also outlined.