

Monitoring air improvement measures in Shenzhen with the **portable nanoparticle measurement system testo NanoMet3**



Measurably improving air quality.

Situated in the Pearl River delta, Shenzhen's air quality is the envy of other Chinese metropolitan cities such as Peking or Shanghai. In addition to extensive wooded areas and companies producing only low levels of pollution, the geographical location on the coast also has a positive effect on the air quality. In spite of this, the city launched the "Shenzhen Atmospheric Environmental Quality Improvement

Plan (2017–2020)" which intends to reduce the fine particle concentration by $2 \mu\text{g}/\text{m}^3$ by the year 2020. This is intended to lead to a percentage of 98 % of the number of days with good air quality, to a limitation to $25 \mu\text{g}/\text{m}^3$ of the fine particle concentration and to achieving the target value of the second level of the WHO Air Quality Guidelines.



The challenge.

Thanks to its port, Shenzhen is a logistics hub with a high proportion of diesel vehicles operating in supply and freight traffic. Together with the frequently obsolete diesel engines on construction sites, these are the main sources of air pollution. For this reason, the city of Shenzhen has launched a model project for the installation of diesel particle filters (DPF). Prototype DPFs designed to remove a minimum of 95 % of the particulate matter were installed in 200 diesel vehicles from various commercial sectors such as the earth-moving, postal, environmental hygiene and freight-forwarding fields, and in 40 mobile construction site engines. In order to monitor the conformity of the DPFs, the vehicles and engines were subjected to a fine particle test immediately after installation, in the course of the project and after 3 months or 5,000 km in operation. Since the fine particle removal rate was to be determined on the test bench as well as under driving conditions (RDE – Real Driving Emissions), the demands placed on the measuring instruments were especially high – bearing in mind that the values recorded form the basis for subsequent retrofitting of all diesel vehicles and mobile engines in Shenzhen.

The solution.

In order to determine the concentration of fine particle emissions after installing the DPF, and to test the function of the DPF, the project team chose the nanoparticle measurement system testo NanoMet3. The testo NanoMet3 is able to measure the concentration of emission particles in vehicle exhaust gases (1,000–300,000,000 /cm³) and the diameter of nanoparticles in the size range 10 to 700 nm.

Thanks to its compact and robust design and 12-V battery operation, the instrument is also suitable for on-board use. In addition to this, the testo NanoMet3 was honoured as the Golden Instrument for PEMS-PN (Portable Emissions Measurement System – Particle Number) two years running by the Joint Research Centre of the EU (JRC).

The advantages.

The project team used the portable nanoparticle measuring system testo NanoMet3 to measure the fine particle removal rate on 211 diesel vehicles and 51 non-traffic engines after installation of the DPF. The experts benefited from the unique possibilities provided by the testo NanoMet3:

- Practical, one-button operation in RDE measurement
- Fast system response time which allows even transition conditions to be recorded perfectly
- Better data recording than with other particle measuring equipment

The project was presented by the city of Shenzhen in July 2017 when the “10th International Conference on Advanced Diesel Engine Emissions Control and Test Evaluation Technology” took place in Kaili in Guizhou Province. The Vehicle Emission Control Centre of the national Environment Ministry positively emphasized the portable emission measuring system testo NanoMet3.

More information.

Do you have questions on nanoparticle measurement, or would you like individual support?

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