European Metrology Research Programme

Delivering Impact

Supporting reduced exhaust emissions

Air pollution continues to be responsible for more than 430,000 premature deaths each year in Europe. Automotive vehicles are a major source of air pollution, particularly fine and ultrafine particles emitted by diesel engine exhausts. To improve public health and environmental quality the EU regulates pollution from road vehicles.All new passenger cars must meet European emission standards for particle number (defined in the *Euro 5b and Euro 6b* regulations) before they can be type approved for sale in the EU.

Europe's National Measurement Institutes working together

The European Metrology Research Programme (EMRP) brings together National Measurement Institutes in 23 countries to address key measurement challenges at a European level. It supports collaborative research to ensure that measurement science meets the future needs of industry and wider society.

Challenge

Euro 5b and *6b* and its predecessors involve both the initial type testing of new automotive engines and, as emissions change over time, the periodic testing of engines throughout their lifetimes. *Since their introduction, the Euro regulations have significantly reduced exhaust pollution by progressively decreasing the permitted emissions*. As a consequence, the low levels of particulate permitted by the regulation are now beyond the sensitivity of opacity-based technology currently used for periodic emission testing. With the introduction of *Euro 6c* in September 2017 for the first time engine emission testing under real driving conditions, a concern of regulators, is covered. To comply with these new regulations for particle number concentration, new capabilities are urgently required to enable robust and practical exhaust emissions measurements at these low levels with traceability to national standards to ensure consistency across Europe.

Solution

The EMRP project *Emerging requirements for measuring pollutants from automotive exhaust emissions* developed a facility at PTB, the German national measurement institute, to calibrate and validate automotive particle emission instruments which measure particle number concentration to the low levels required by the regulation. Within the project, the facility was used to compare the performance of existing opacity-based tests against innovative commercial instruments for particle number measurements, to identify candidate technologies for the proposed testing requirements of the *Euro 6c* standard.

Impact

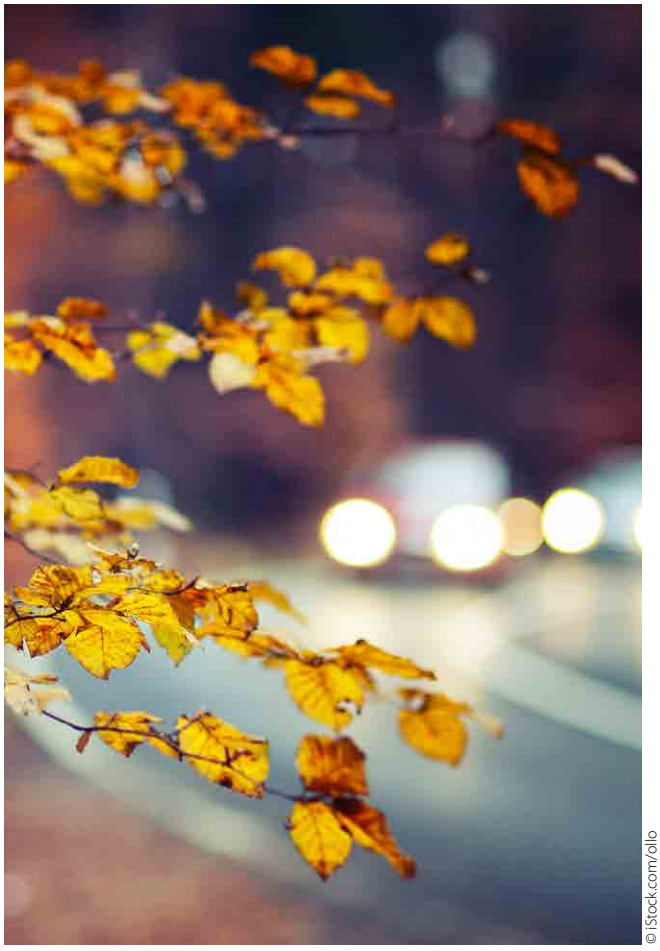
Testo AG, a world leader in the field of portable measurement technology, took part in the comparison exercise with an innovative exhaust monitoring instrument for particle number concentration. Using the results and expertise gained, Testo was confident that, after further modifications, the new technology would be suitable for launch in both the new engine type test market and the mandatory periodic vehicle test market.

Testo's instrument for engine type testing, used to approve new vehicles for sale, has since been launched and is enabling its customers to demonstrate that new engines comply with the upcoming *Euro 6c* emissions standard. The company has also developed a new portable version, suitable for periodic vehicle testing, including under normal driving conditions, which will be available in the near future. The market for this instrument is expected to be significantly larger than the market for the engine type approval test instrument, as test centres across the EU will be required to include particle emission measurements in a wider range of test conditions as part of periodic vehicle testing.

The introduction of the updated regulations will ensure that vehicles deliver reduced engine exhaust emissions over their entire life span. This is a key piece of the EU's air quality policy framework and an important step towards realising Europe's goal of improving health and environmental quality through cleaner air.

Tackling exhaust emissions

EMRP project *Emerging requirements for measuring pollutants from automotive exhaust emissions* provided the underpinning metrology infrastructure to better understand, measure and consequently control automotive exhaust emissions. The research focussed on particulate air pollutants in exhaust emissions for which measurement infrastructure were lacking: soot particles, platinum group elements and mercury. The capabilities developed will simplify, and increase the comparability and accuracy of, vehicle particle emission measurements, leading to the more effective implementation of legislation designed to protect human health.



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