Mobile Mass Spectrometer Systems for Online Oil Emission and Oil Dilution Measurements in Combustion Engine Test Cells

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Adapting internal combustion engines to current and future emission standards requires an ever-rising effort in simulation and testing. While the combustion process itself is well known and measurable, specialized tools are necessary to minimize the effects of engine oil emission and fuel-oil-interaction. Due to dynamic test runs and the number of different runpoints and engine conditions, offline analysis or even slow sampling setups are not an option.

The combination of a compact TOF-MS with fast and robust direct inlet systems allows for a detailed quantification and analysis of engine oil HC emission in exhaust gas. The information obtained is then used to minimize the oil consumption via engine hardware and software changes, decreasing both HC and PM emission.

With the addition of a fast online GC and a multiport sampling and injector system, the measurement system can also be used for observation of dynamic fuel ingress into engine oil as well as fuel and oil aerosol emission from the crankcase.

Design, application and results of both setups in live engine test cells will be shown and discussed.