Effects of high-speed driving on particle number emissions of gasoline cars

Beranek V[1], Sikorová J[2] and Vojtisek M[1]

1 Institute for Automobile, Combustion Engine and Railway Engineering, **Czech Technical University in Prague**
2 Institute of Experimental Medicine, **Academy of Sciences of the Czech Republic**
Contacts -> email: vit.beranek@fs.cvut.cz, jitka.stolcpartova@biomed.cas.cz, michal.vojtisek@fs.cvut.cz

Conclusions

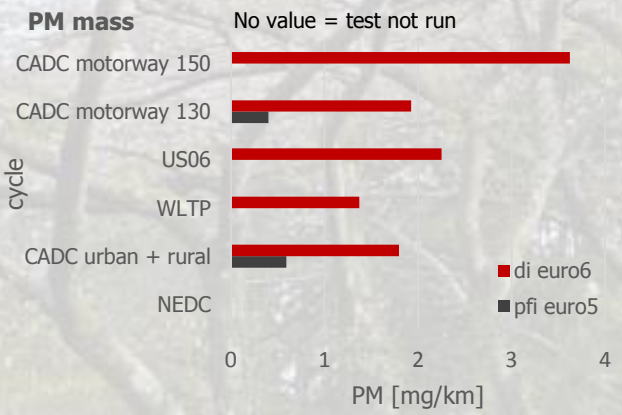
Both particle number and particle mass emissions were higher during the Artemis motorway (150 km/h) cycle than during the Artemis motorway (130 km/h) cycle, and much higher than during the NEDC.

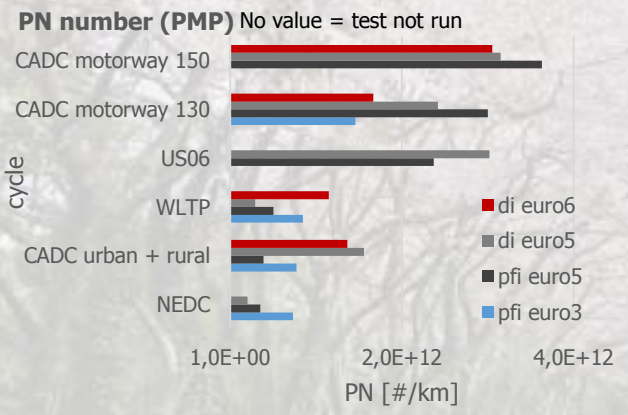
The relatively high PFI engines particle emissions during high speed operation, mostly due to enrichment, suggest that spark ignition engine particle emission problem is not limited to DISI engines but also extends to engines that due to cost saving measures do not use state of the art technical solutions and rely on enrichment.

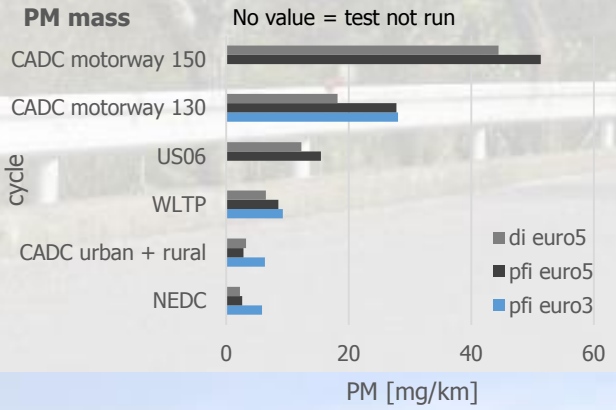
The DISI engine used in a hybrid featured, among other, advanced variable valve timing, did not use enrichment, and exhibited very low particle emissions during all cycles, suggesting that maintaining low emissions is well within the capability of current gasoline engines.

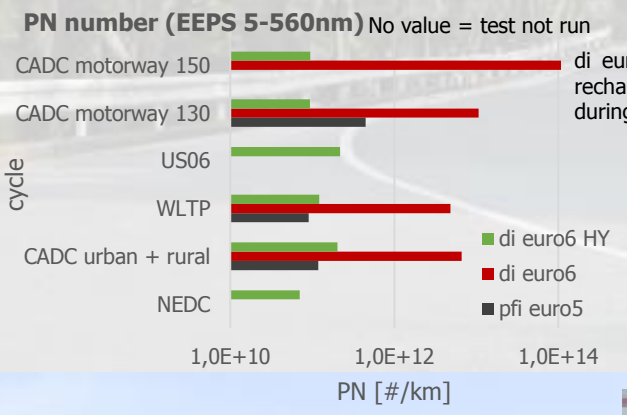
What influence does high speed driving have on Particle Mass (PM) and Particle Number (PN) emissions from spark ignition engines?

Six production gasoline cars have been subjected to multiple driving cycles on chassis dynamometer including 150 km/h version of Artemis driving cycle.





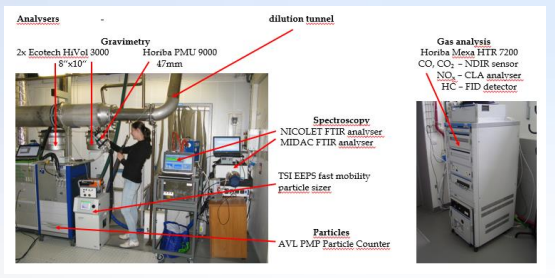




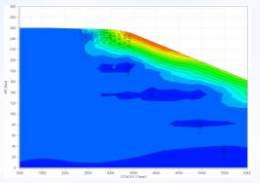
di euro6 hybrid was recharging batteries during CADC 150

rush hour, time pressure, unexperienced drivers or wanabe racers

Analyzers on chassis dynamometer test cell

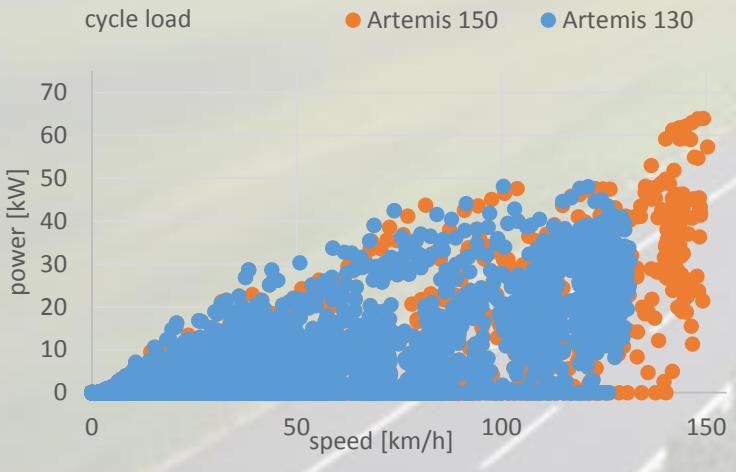


Due to the poor engine design some vendors are using enrichment during high engine loads



di euro6 HY - 81 kW, odo 1 kkm
di euro6 - 92 kW, odo 2 kkm
di euro5 - 103 kW, odo 20 kkm
pfi euro5 - 63 kW, odo 2 kkm
pfi euro5 - 63 kW, odo 30 kkm
pfi euro3 - 55 kW, odo 208 kkm

speed above traditional convention or limit



high speed driving demands additional engine power