

NOx Adsorbers for Heavy Duty Truck Engines – Testing and Simulation

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This feasibility study of NOx adsorbers in heavy-duty diesel engines examined three configurations (dual-leg, single-leg and single-leg-bypass) in an integrated experimental setup, composed of a Detroit Diesel Class-8 truck engine, a catalyzed diesel particulate filter and the NOx absorber system. The setup also employed a reductant injection concept, sensors and advanced control strategies.

The study included the development of thermal and empirical NOx absorber characteristic models. These models were further applied to the development of regeneration strategies and were used for a comparative performance analysis of the three NOx adsorber configurations.

The reported steady-state experimental and simulation results show relatively high NOx conversion efficiencies, with various levels of fuel economy deterioration. Further, the findings confirm that the development of acceptable regeneration and desulfation control logics are a major technical challenge for practical NOx absorber system applications. These logics are further complicated by factors such as engine transient operation, drivability and durability.