UPDATE ON DIESEL ENGINE WASTE HEAT RECOVERY UTILIZING ELECTRIC TURBOCOMPOUND TECHNOLOGY

Ulrich Hopmann
Caterpillar, Inc.

A cooperative program between the U.S. Department of Energy Office of Heavy Vehicle Technologies and Caterpillar is aimed at demonstrating electric turbocompound technology on a Class 8 truck engine. The goal is to demonstrate the level of fuel-efficiency improvement attainable with the electric turbocompound system. The system consists of a turbocharger with an incorporated electric motor/generator on the turbo shaft. The generator extracts the surplus power at the turbine and feeds it back to a crankshaft-mounted electrical motor. The electric turbocompound system also provides more control flexibility in that the amount of power extracted can be varied. This allows for control of engine boost and thus air/fuel ratio.

The paper presents the status of development of an electric turbocompound system for a Caterpillar heavy-duty, on-highway truck engine. Layout of the system architecture, the turbocharger design features, and the development of a system control strategy is shown. Furthermore, engine simulation results are presented, and development of electrical machinery is described.