

## **SMART ENGINES – CONVENTION VS. ADVANCED CONTROLS FOR OPTIMIZED EFFICIENCY AND EMISSION**

**M. Allain, P. Ge, M. Sun, Y. Kalish, C. Savonen, N. Hakim**  
Detroit Diesel Corporation

The recently announced future truck exhaust emissions regulations escalate the aggressiveness and focus required to successfully complete a competitive product technology development. There are enormous technological complexities in seeking a feasible solution to meet highly stringent emissions reduction without increasing fuel consumption or compromising the powertrain life-cycle cost. There is great opportunity for controls technology to play an increasingly key role in future diesel engine advancements. Furthermore, smart controls development cycles can moderate product development cost and time, while increasing first-pass yield of a reliable controls package.

This presentation will contrast model-based controls (MBC) with today's popular table-based approach. Detroit Diesel Corporation (DDC) has introduced the concept of "An Engine that Thinks" at a DEER workshop in the late 1990s. The intent of this presentation is to provide an update to previously presented DDC MBC technology developments, reflecting progress towards this ultimate goal.

The "Wired" experimental plus virtual lab combined tool set will be revisited. Efforts to develop control packages for advanced technology developments will be highlighted. Application examples will be provided reflecting the potential of MBC.