NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Thermal Analysis and Test Program to Evaluate Passenger Compartment Thermal Load Reduction and Improve

Cooperative Research and Development Final Report

CRADA Number: CRD-07-00231

NREL Technical Contact: John Rugh

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Cooperative Research and Development Final Report

In accordance with Requirements set forth in Article XI.A(3) of the CRADA document, this document is the final CRADA report, including a list of Subject Inventions, to be forwarded to the Office of Science and Technical Information as part of the commitment to the public to demonstrate results of federally funded research.

CRADA number: 07-00231

CRADA Title: Thermal Analysis and Test Program to Evaluate Passenger Compartment Thermal Load Reduction & Improve

Parties to the Agreement: General Motors

Joint Work Statement Funding Table showing DOE commitment:

Estimated Costs	**NREL** Shared Resources
Year 1	$ 00.00
Year 2	$ 00.00
Year 3	$ 00.00
TOTALS	$ 00.00

Abstract of CRADA work:

This activity supported a GM and NREL collaborative exploration of strategies to minimize and alleviate the temperature rise in the passenger compartment of an automobile during prolonged exposure to solar radiation in hot climates. It developed and exercised math-based models to simulate the air flow and thermal environment in the passenger compartment in order to compare the effectiveness of the strategies. This activity also assessed the strategies using vehicle tests.

Summary of Research Results:

Various strategies to reduce the thermal load in a parked vehicle were tested at NREL. The approach of this test was to thermal soak two identical vehicles (one control and one modified) oriented in the same direction on an outdoor test pad. Passenger compartment ventilation and window shades were effective strategies to reduce the interior temperatures during the solar soak.

NREL also developed a numerical soak and cool down model of the test vehicle. We used the RadTherm thermal comfort model to assess occupant comfort and assess impact of reduced thermal load technologies. Fluent/RadTherm modeling successfully predicted vehicle soak temperatures and the impact of thermal load reduction technologies on vehicle soak temperatures. RadTherm thermal

comfort results show that the time to comfort can be substantially reduced by employing thermal load reduction technologies.

Subject Inventions listing: None

Report Date: 1/26/11 Responsible Technical Contact at Alliance/NREL: John P. Rugh

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