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FORMER FORD AND CHRYSLER CHIEF ENGINEER UNVEILS NEW WAY TO DESIGN VEHICLES AT SAE WORLD CONGRESS

Plug-in Hybrids and Electric Vehicles are Early Uni-Chassis™ Targets

April 12, 2011 Detroit, MI – The lead engineer behind the creation of the original Chrysler PT Cruiser, 2005 Ford GT, second generation Chrysler minivan and the DeLorean twin-turbo featured in the "Back to the Future" movies has introduced a new way of making cars that is particularly well suited to Plug-in Hybrid and Battery Electric Vehicles. Theodore and Associates President Chris P. Theodore today unveiled the Uni-Chassis, a frameless body-on-chassis design that is lighter in weight, lower investment and lower cost compared to traditional body-on-frame and unibody designs.

Uni-Chassis is a simple and efficient design made up of three basic elements: A front structure that utilizes a stressed engine to take suspension loads; a rear structure that utilizes the transaxle as a structural component; and, most importantly, the connection of front and rear structures by a structural tubular backbone that doubles as the torque tube.

Theodore sees three target markets that could benefit from the Uni-Chassis design – low volume speciality cars, coachbuilding, and plug-in hybrid and electric vehicles - with the latter having the largest commercial application.

"Why go to the complexity and expense of creating a battery box strong enough to support 400 to 800 pounds of batteries, then reinforce the body to support the battery box, when you can more efficiently use the battery box to double as the structural backbone of the Uni-Chassis?" said Theodore in a display at the 2011 Society of Automotive Engineers' World Congress in Detroit.

Adding to the Uni-Chassis' advantages of simplicity, efficiently and lower cost, are its flexibility and modularity. To increase wheelbase from one vehicle model to the next, the

tubular backbone can be lengthened by as much as 20 percent, covering two and perhaps three classes of vehicles. The design is modular since front and rear structures can easily be substituted, enabling a true mix-and-match architecture.

The Uni-Chassis design also is world-class in both torsional and bending stiffness.

“Using Finite Element Analysis, we optimized the backbone design to achieve more than 13,000 ft. lbs./degree torsional stiffness and 47,000 lb./inch bending stiffness,” said Theodore. “That’s better than most supercars.”

The Uni-Chassis is made up of four aluminum suspension corner castings and aluminum extrusions, helping keep the weight and manufacturing expenses low. The aluminum tubular backbone also can be made from carbon fiber to further increase stiffness and reduce weight.

“Of course, carbon fiber is expensive, but tubular carbon fiber products are the least costly to manufacture using filament winding techniques,” said Theodore. “Just think of golf clubs.”

Theodore expects to have a complete, running Uni-Chassis vehicle, built around Ford GT parts and housed in a modified Shelby Cobra 427 body, for evaluation this fall.

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