Students design suspension for ultra-fast DiMora Motorcar sport sedan

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Automotive-engineering graduate students at the Clemson University International Center for Automotive Research (CU-ICAR) collaborated with a unique vehicle development company to design an automotive suspension system that can handle speeds in excess of 240 mph.

Because CU-ICAR fills the gap between basic research and commercial application of automotive technologies, DiMora Motorcar challenged it to assess suspension-technology options for the Natalia SLS 2 sport luxury sedan. A team of students, under faculty supervision, accepted that challenge last semester.

"This kind of project provides our students invaluable real-world experience, and the quick turnaround time and results show they were up to the challenge," said Steve Hung, associate professor of mechanical engineering and team faculty leader.

Natalia SLS 2Based in Palm Springs, Calif., DiMora Motorcar crafts automobiles designed to exceed expectations for safety, performance, technology, ecology, beauty, comfort and luxury. It reveals the design, production and testing of its automobiles via the Internet so that people around the world can learn from and participate in the process.

"DiMora Motorcar is about showcasing new technologies," said Carl Flesher, CU-ICAR director of Global Business Development. "CU-ICAR is about developing the methods and people to make showcase technologies ready for the automotive original-equipment manufacturer

market."

Road conditions vary greatly, so experts agree an automobile's suspension is crucial to a safe and smooth ride. An effective suspension system will maximize the mechanical grip between the tires and the road's surface, enhance steering stability and provide a comfortable ride for the occupants. The Natalia sedan has to thrive in all road environments, including bad weather, so the suspension must be compatible with all-wheel drive and have the ability to clear common road obstacles. On the other hand, the vehicle also must be controllable at speeds above 240 mph, so body response to driver input and road excitations must be well controlled across a broad speed range. A unique design-driven requirement is the use of 275/40R24 tires.

Using numerous advanced digital design and verification processes, preliminary DiMora Motorcar vehicle parameters and computer-aided-design for the Natalia, the CU-ICAR graduate team generated a solution that includes short-long arm architectures for both front and rear suspensions, titanium control arms and wheel carriers, and combination air spring and damper units.

The concept design services the requirement for all-wheel drive, minimizes suspension weight and allows for rear-wheel steering to enhance directional stability at high speeds as well as maneuverability at low speeds. The concept design also will help DiMora Motorcar package other vehicle systems that yield the right levels of performance without significant changes to the suspension system.

"This was our first opportunity to test the ability of the Clemson University International Center for Automotive Research to tackle a difficult engineering problem that is critical to meeting the performance parameters we have set for the Natalia," noted DiMora Motorcar Founder Alfred DiMora. "The designs they produced are excellent. We

were already impressed by CU-ICAR's facilities, equipment and staff. Now we know that the graduate students working here are outstanding as well. We look forward to a long and productive association with Clemson University."

Source: Clemson University