

Army Looks at Improving Vehicles' Performance With MR Fluid Technology From Lord Corporation

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California Vehicle Engineering Company Uses Lord MR Fluids in Hummer Tests

Lord Corporation, the world's leading supplier of commercially proven magnetorheological (MR) fluids, devices and systems, is supplying fluid in tests for the U.S. Army to develop unique, magnetically controllable suspension systems for heavy military vehicles.

Rod Millen Special Vehicles (www.rodmillen.com/), a California-based engineering company, has developed and tested a robust, MR fluid-based, computer controlled suspension upgrade for the Army's HMMWV Hummer. The new system, recently featured on the cable television network The Learning Channel, was developed to improve the performance and mobility of the Army's Hummer that uses a stock suspension system.

Rod Millen Special Vehicles calls its system MagnetoRheological fluid Optimized Active Damper Suspension, or MROADS.

Lord Corporation has provided the MR fluid for the Hummer tests. In addition to being the world's largest commercial supplier of MR fluids, Lord also designs and manufactures systems and devices for MR applications.

Developed for the Army's Tank and Armaments Command (TACOM), the MROADS system, designed for bolt-on retrofitting, consists of one MR fluid computer controlled damper at each of the vehicle's wheel positions. The active damper suspension modulates the forces in a damper as a function of sensed variables, such as the vehicle speed, body movements, and position of a particular wheel. The new active damper suspension system is lighter, smaller, less expensive, and uses much less power than a fully active system while providing similar levels of performance.

Tests showed significant (70 percent on certain terrain) reduction in driver absorbed power, excellent reliability and no failures. Other advantages of the MR fluid system include:

- Higher mobility speeds over a given terrain
- Improved tire traction
- Improved tire life
- Reduced fatigue loading of vehicle structure and payload
- Reduced driver, vehicle and payload damage from terrain impacts at speed
- Improved vehicle stability and handling
- Improved accuracy during surveillance, targeting, or weapons firing
- Suspension system prognostics / diagnostics.

Peter LeNoach, project manager for Rod Millen Special Vehicles, said that based on the excellent results of the HMMWV project, TACOM asked the company to develop a version of MROADS for the Army's new 20-ton, eight wheeled, Stryker infantry carrier vehicle. The system is scheduled to be completed and undergo testing through the second half of 2004.

In 2003 Delphi Corporation introduced a similar suspension system for passenger cars. The MagneRide shock absorber system using MR fluid

technology developed by Lord Corporation is available on a number of Cadillac and Corvette models.

MagneRide currently is the automotive industry's only real-time control system without electromechanical valves or small moving parts. The system consists of MR fluid-based monotube shock absorbers, a sensor set and onboard controller. The onboard controller continually adjusts the damping forces up to once every millisecond based on input from four suspension displacement sensors, two-position driver input switch on the Chevrolet Corvette, a lateral accelerometer and a steering wheel angle sensor.

By controlling the current to an electromagnetic coil inside the piston of the damper, the MR fluid's resistance to flow can be changed. This characteristic, and other features of the MagneRide system, provides smooth, continuously variable damping in a cost effective and reliable package that reduces body motion and increases tire road contact on all types of surfaces.

In addition to automotive shock absorbers, MR fluids and devices from Lord are in driver seat suspensions for truck and heavy equipment operators, and in industrial vehicle steering systems, as well as in factory machines to control motion. MR fluid devices have been used to develop seismic MR dampers to stabilize buildings during earthquakes and bridges susceptible to wind vibration. MR technology has been developed as a controllable artificial knee for amputees, to control vibration in spinning washing machines, and to manage satellite equipment in space orbit.

Lord Corporation, with headquarters in Cary, NC and sales in excess of \$440-MM, is a privately held company that formulates, produces and sells general purpose and specialty adhesives and coatings; designs, manufactures and markets devices and systems to manage mechanical

motion and control noise and vibration; and develops products and systems utilizing magnetically responsive technologies. With plants in nine states and facilities in 12 countries, Lord Corporation employs more than 2,200 worldwide. For additional information visit www.lord.com/ .

Source: [Lord Corporation](#)

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