

## 60 percent higher ride quality through electromagnetic car suspension

April 7 2011

---



The electromagnetic suspension prototype developed by Eindhoven University for SKF

Researchers at Eindhoven University of Technology (TU/e, Netherlands) have developed an active electromagnetic suspension system that can increase the ride quality of cars by 60 percent. Cars fitted with this suspension system are also safer because they no longer roll (sway) in corners. The system was developed at TU/e in partnership with the Swedish company SKF, and was recently installed in a BMW test car to be shown at the AutoRAI exhibition, Amsterdam, from 13-23 April 2011.

A demonstration of the new suspension system starts with a striking scene: a standard-looking, dark blue BMW 530i that hops up and down like a ‘lowrider’ in hip-hop video clips. “Of course that isn’t the intention”, explains ir. Bart Gysen, who is working for his PhD on the development of the system. “But it certainly shows what the system can

do.” The car’s wheels can be raised and lowered independently in a fraction of a second. And this high speed is one of the most special features of the system. There are already active suspension systems, but these are hydraulic, which means their response is not fast enough to cancel out the rapid vibrations caused by irregularities in the road surface. The new system can do this effectively, which explains the better ride quality.

The system developed by Gysen was tested last year on a testbed that simulates road-surface vibrations on just one wheel. That resulted in an increase of 60 percent in ride quality. “We expect that this increased comfort can also be achieved with a real car”, Gysen explains. “And possibly even more, when all four wheels are fitted with the system.” The aim is ultimately to develop more comfortable cars that also have higher safety. This is because the roadholding is improved and the car no longer rolls in bends. For example a car fitted with this suspension system will be much less likely to overturn as a result of abrupt steering maneuvers, such as the slaloming involved in the notorious ‘elk test’. Gysen also believes the system will be attractive for use in ambulances. “An ambulance fitted with this system will be able to transport patients quickly and free of disturbing road-surface vibrations.”

The system replaces the normal shock absorber in a car, and itself has approximately the same size as a shock absorber. It consists of a passive spring, a powerful electromagnetic actuator, a control unit and batteries. The system is designed to be inherently safe. Even if the electrical power fails, the springing and shock absorbers will continue to work. The passive spring in the system provides springing, and the magnets provide passive, magnetic shock absorption.

According to Gysen the system’s energy consumption is modest. “If you install this suspension system on all four wheels, the peak consumption is 500 watt – half of what an air-conditioning system uses. Hydraulic

suspension systems use four times as much power. And the consumption of our system can probably be reduced still further by optimization. This is only the first version.” As well as that the system can even use the vibrations from the road surface to generate electricity, which is fed back into the battery.

Last month the suspension system was installed on two wheels of a test [car](#) for practical tests and further development. One of the tasks is to coordinate the behavior of the active suspension on the individual wheels. At present the separate wheel systems still work independently. SKF, which has financed Gysen’s doctoral research and has also patented the technology, is currently considering whether to market the new suspension system.

**More information:** The test car fitted with the new suspension system will be on show at the AutoRAI auto show, to be held from 13 to 23 April in Amsterdam, on the HTAS Automotive Innovation stand number E.01 (Elicium, Auto 2.0).

Provided by Eindhoven University of Technology

Citation: 60 percent higher ride quality through electromagnetic car suspension (2011, April 7) retrieved 19 April 2024 from <https://phys.org/news/2011-04-percent-higher-quality-electromagnetic-car.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.