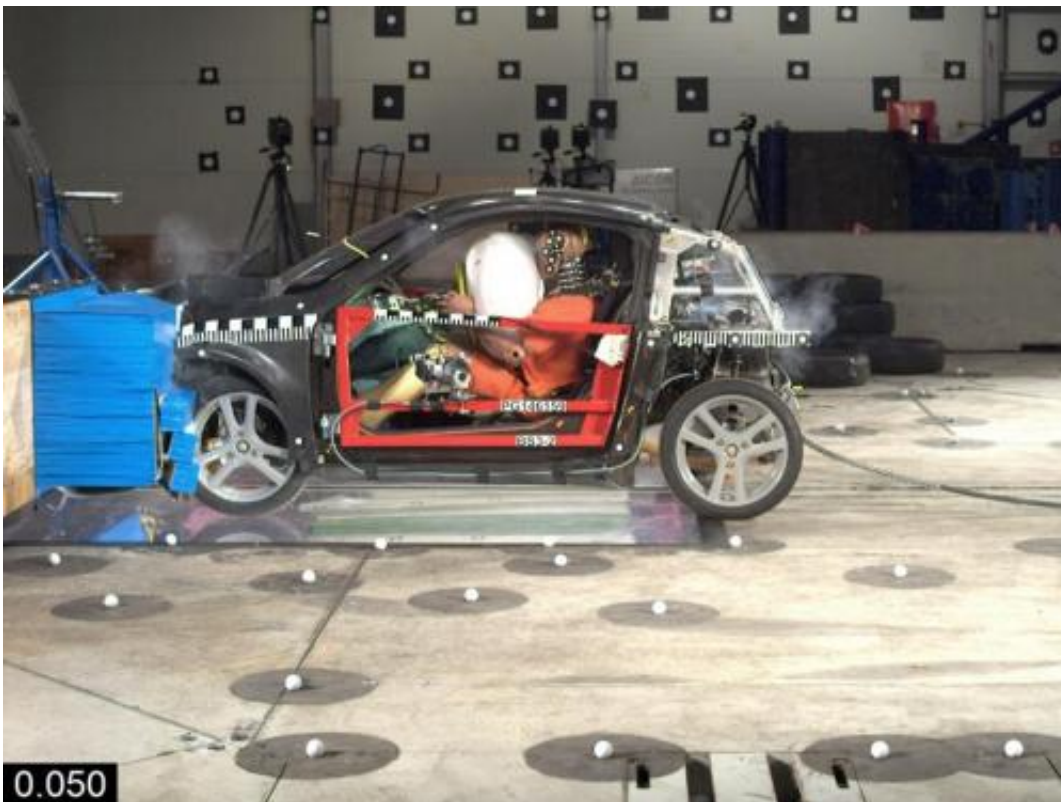


Visio.M consortium presents safety package for compact electric vehicles

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Visio.M's rigid passenger compartment made of carbon fiber reinforced plastic provides effective protection. A foresightful sensor system activates the integrated passenger protection systems even before the actual crash occurs.
Credit: IAV GmbH

Efficient, subcompact vehicles with electric drives provide an excellent opportunity to push forward electromobility. However, traffic experts

warn that the current safety standards of the L7E vehicle class are not sufficient for wide-scale deployment in traffic. Researchers of the Visio.M consortium's 'Safety' subproject have accepted this challenge and are now demonstrating how even light and efficient electric vehicles can achieve an acceptable level of safety.

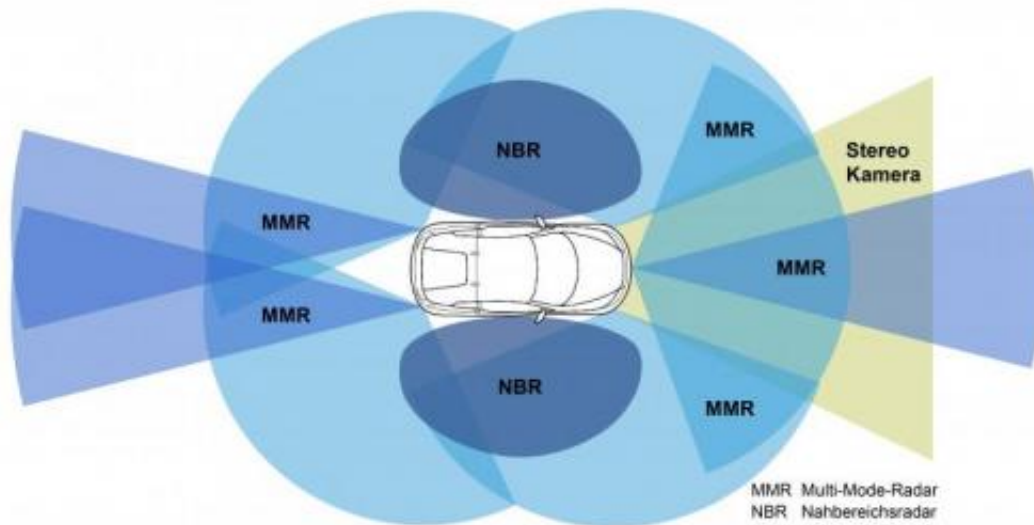
Systematic light-weight construction is a decisive component of efficient electric vehicles. Yet, during Euro NACP testing light-weight L7E class vehicles (max. empty weight of 400 kg) show substantial deficits in some areas. Because the requirements for the so-called quad class are low, [safety](#) experts are calling for more effective [passenger](#) protection in light [electric vehicles](#) should they populate roads in larger numbers.

Regardless of their reduced size, compact vehicles must provide passengers with a safe compartment, especially in collisions with heavier vehicles. The Visio.M achieves this through a rigid passenger compartment made of carbon fiber reinforced plastic. The deformation zones in the front and rear sections, as well as the roof structure, are made of high-strength aluminum profiles.

Foresightful Sensor System

The great rigidity of the passenger compartment and the unavoidably smaller chassis deformation length translate to high forces stressing passengers during an accident. Visio.M counteracts this with an integrated safety concept based on the sophisticated recognition of surrounding traffic via radar and camera sensors.

Thanks to its 360° detection of the immediate vehicle surroundings, Visio.M recognizes critical driving situations early on. This information is used not only for driver assistance and warnings. When it senses an imminent collision, it activates the integrated passenger protection system even before the actual crash occurs.



Visio.M's 360° detection system recognizes critical driving situations early on. This information is used not only for driver assistance and warnings. When it senses an imminent collision, it activates the integrated passenger protection system even before the actual crash occurs. Credit: IAV GmbH / Autoliv B. V. & Co. KG / Simon Rauchbart, TU Muenchen

A key component of this strategy is the integration of structural airbags: heavy duty pressure hoses mounted in the bumpers and side panels. Fractions of a second prior to impact a gas generator fills the pressure hoses. Thus the exterior panels are pressed outwards, placing themselves between the outer skin and chassis as an additional absorption layer.

Effective Passenger Protection



Visio.M's 3+2-point safety belt holds passengers firmly in their seats. If the vehicle detects an unavoidable side collision, the passenger on the impact side is pulled towards the middle of the car a split second before the crash. Credit: Autoliv B. V. & Co. KG

The forces stressing the passengers are controlled by adaptive seat-belt tensioners and force limiting systems. An additional two-point safety belt inside the vehicle holds passengers firmly in their seats. When the [vehicle](#) detects an unavoidable side collision, the seat on the impact side is pulled towards the middle of the car a split second before the crash. This moves the passenger out of the immediate danger zone. Furthermore the pre-acceleration also reduces the impact force on the passenger and increases the effectiveness of the side airbag. An airbag between the seats of driver and passenger alleviates any contact between

the passengers.

In countless computer simulations, the researchers of the Visio.M "Safety" sub-project, which includes the firms Autoliv, Daimler and IAV, as well as TU München, tested possible accident scenarios and verified their calculations in full-scale crash tests. "Our results show that the innovative solutions of the Visio.M realistically resolve the conflict between extreme light-weight construction and an acceptable level of safety," says Thomas Unselt (Daimler AG), spokesman of the "Safety" project group. "Our concept considers significant requirements of the NCAP Protocol for vehicles of the 3.5 ton M1 class and, thus, goes well beyond the legal requirements for L7e vehicles."

Provided by Technical University Munich

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