

ENHANCEMENT OF SEAT PERFORMANCE IN LOW-SPEED REAR IMPACT

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Abstract: Benchmark testing of existing seat designs reveals poor performance in low-speed rear impacts. In tests according to the test procedure proposed by GdV, ETH and Autoliv, the neck injury criterion NIC exceeds the limiting value of 15 for almost all seats without a CSD protection system. As only few new car models offer this, a system was developed and tested for aftermarket fitting. The Aftermarket Anti Whiplash System, AWS, consists of a yielding device which is fitted to the seat rails and allows the whole seat to rotate and move backwards. This reduces thorax acceleration and thus the NIC value. As the force required to actuate the device depends on the position of the seat, the system offers optimum protection for large and small occupants. Tests with rear impact dummies (BioRID and HIII(TRID)) show a noticeable reduction in NIC and head rebound speed compared to the standard seat. Loadings to the neck at Δv 15 km/h with AWS are in the same magnitude as at 9 km/h without AWS. MADYMO simulations with real crash pulses have been performed, and the potential benefit of AWS is estimated on the basis of those results.

Key words: Benchmark testing, impact, protection system.