

Results of ADSEAT

The ADSEAT project was active between October 2009 and March 2013 and has resulted in a variety of outcomes:

- We developed EvaRID (Eva female, RID – Rear Impact Dummy), the world's first virtual crash test dummy of an average female Specified anthropometric data of an average female crash test dummy model
- Performed dynamic volunteer sled tests comprising females and males
- Constructed a prototype dummy model, called BioRID 50F, with the weight and size of an average female. Sled testing with BioRID 50F allowed direct comparison to the dynamic performance of vehicle seats with the existing BioRID II dummy, based on a male.
- Suggested new whiplash injury criteria limits for female occupants in rear impact testing.
- Showed differences in car seat protection performance when using male and female occupant models
- Distributed newsletters, describing the most recent results of ADSEAT to more than 600 e-mail recipients.
- Presented the results of the project in 27 publications and presentations at conferences and scientific journals during the project.
- Further results will be presented at the conferences RS4C 2013 and IRCOB2013.

ADSEAT Develops Important New Occupant Model for Car Safety

The EU-funded ADSEAT project has developed the world's first virtual crash test dummy of an average female. The computational model is to be used in virtual testing of vehicle seat safety performance.

Crash statistics have long shown that females are at higher risk of sustaining whiplash injuries, by a ratio of 1.2 to 3.1 times when compared to males. One of the reasons is that, until now, the only available model for assessing seat designs aimed at protecting against whiplash has been that of an average male. In the area of crash testing, no model of the average female has ever been available. There is a need to develop such a model in order to have the tool necessary to improve safety for females as well as males.

The EU Project ADSEAT has developed EvaRID (Eva female, RID – Rear Impact Dummy), a computer based model of a 50th percentile female. EvaRID incorporates information on the anthropometry of the average female, based on data found in the scientific published literature. In addition, new data from tests using male and female volunteers in identical conditions were also collected and analysed. Read on to find more about the results in ADSEAT.

ADSEAT Final Workshop Held in Brussels

A group of ADSEAT researchers and external stakeholders gathered at the European Commission's DG Research facilities on February 14, 2013. There were 25 participants representing the society, industry and research organisations.

The project coordinator, Astrid Linder opened the workshop and gave an overview of the ADSEAT project. She was able to demonstrate the media attention gained in the project by showing a short video from a Norwegian science program. Even North American television reporters are requesting time to interview and film ADSEAT researchers and their results.

Sylvia Schick provided the risks for injuries and the disparity between males and females. The current test device, BioRID II has provided a 60% improvement in injury protection but only 45% for females. A tool like EvaRID should reduce the difference and allow for equal protection opportunities for both sexes. Astrid Linder provided information on the general anthropometry for males and females and the baseline information for EvaRID. She also provided an overview of the volunteer test used to validate the models and provide more basic data for female impact response to supplement the current database which is biased towards male volunteers.

Paul Lemmen gave an overview of the design and validation of the EvaRID Finite Element (FE) model. The model has gone through some revisions as ADSEAT delivered more reference data. There is a good correspondence between the FE dummy model and volunteer response but future refinements are envisaged to address issues with the seatback and occupant contacts. The female torso contours and the spine response can be improved to achieve an even better biofidelity.

Kai-Uwe Schmitt presented the activities to find injury criteria as well as test experience with a mechanical loading device called BioRID50F. In terms of injury criteria, the ADSEAT testing and simulations suggest that the threshold for the Neck Injury Criteria (NIC) proposed at 15 should be reduced to 12 for females. Kai-Uwe also presented the mechanical surrogate for the EvaRID dummy. The model was used to gain practical



experience with the EvaRID dimensions and was used to test different automotive seats. The mechanical testing was able to demonstrate that many seats are biased towards the male dimensions and criteria to the detriment of female occupants. The information was also reported in the simulation activities by Ines Levallois. There are differences in geometry and mass distribution for males and females that influence occupant interactions with the seatback. Without an appropriate tool,

these issues cannot be addressed in future seat designs.

Ernst Tomasch was the last ADSEAT presenter. He showed the *Illustrator*, a web based tool that allows any user to investigate the differences in occupant sizes, seatback positions, and other parameters. A document describing seat design guidelines is also available, describing the knowledge gathered in ADSEAT and how it can be applied to protect car occupants.

The Role of Virtual Testing in Vehicle Safety

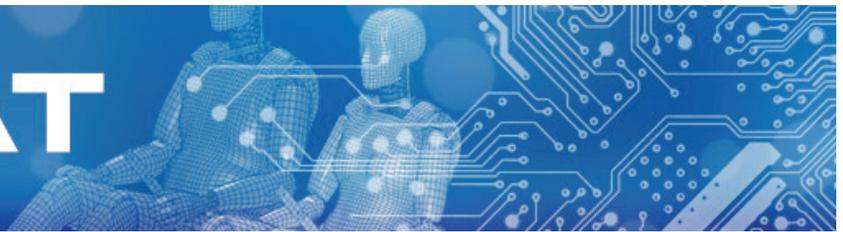
The ADSEAT final workshop provided a forum to discuss the application of computer simulation as a “virtual testing“ of vehicle safety systems. ADSEAT was probably the first project to design an anthropometric test device as a computer model first without starting from a physical prototype. A panel with Michiel van Ratingen (EuroNCAP), Bernie Frost (UK DfT), Tjark Kreuzinger (Toyota), Astrid Linder (VTI-ADSEAT), and Peter Broertjes (DG-Enterprise) started the session with a brief discussion of their interests, experiences, and expectations with virtual testing. All expressed an interest in applying computational resources to the homologation of vehicles but there were reservations about the maturity and verification of the tool. In particular, Peter

Broertjes identified the evidence that needs to be submitted with a type approval certificate. There is physical evidence and specimens in the conventional, physical testing, approach and complementary documentation ability must be established for simulation results. Michiel van Ratingen commented that he has seen notable improvements in vehicle safety with the wider spread application of virtual testing in the development process.

The panel and workshop participants had a fruitful exchange discussing both practical and theoretical issues regarding virtual testing. Proposals were introduced to somehow combine or share information between regulation activities and consumer testing like EuroNCAP. Another proposal was to require manufacturers

to comply with several different test scenarios but only supply test data for some scenarios and rely on virtual testing for the remaining cases. Randomly choosing which scenarios are to be tested could ensure good quality control on the simulations. The submitted test reports could be compared to their corresponding virtual testing results for validation purposes.

All were in agreement that virtual testing provides an opportunity for a broader scope of safety evaluation in vehicle regulations without excessive requirements on manufacturers. The issues of occupant diversity, such as the gender issues investigated in ADSEAT, are one of the priority areas for government agencies.



PROJECT CO-ORDINATOR

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ADSEAT PARTNERS

- AGU – Stiftung Arbeitsgruppe für Unfallmechanik, Switzerland
- Chalmers University of Technology, Sweden
- CIDAUT, Spain
- Faurecia Sièges d'Automobile, France
- Folksam Ömsesidig Sakförsäkring, Sweden
- Graz University of Technology, Austria
- LMU – Ludwig-Maximilians-University, Munich, Germany
- LU – Loughborough University, Great Britain
- Humanetics Europe GmbH, Germany
- UdS – University of Strasbourg, France
- Volvo Cars, Sweden
- VTI – Swedish National Road and Transport Research Institute, Sweden

ADSEAT

ADSEAT, short for Adaptive Seat to Reduce Neck Injuries for Female and Male Occupants, is an EU Commission funded project within the 7th Framework Programme, has predominantly focused on whiplash injuries. The aim of the project has been to improve safety for vehicle occupants by making recommendations for future evaluation of the effectiveness of anti-whiplash systems.

WWW.ADSEAT.EU

More news on ADSEAT can be found on our website www.ADSEAT.eu. It features information on the project and links to project partners. You can also find abstracts and publications for downloading.

ADSEAT Recommendations Could Save €2bn Annually

An analysis of the impact ADSEAT's recommendations was undertaken at the end of the project. The objective was to identify costs and benefits to stakeholders and environment, particularly WAD costs for the health insurers/motor liability insurers and national economics.

Based on the literature and data within ADSEAT, an estimate of the potential population that could benefit from ADSEAT was undertaken. This was assessed with the literature identifying the actual benefit that could be expected based on previous studies of safety improvements.

Two hypothetical scenarios were compared for the benefit analysis: Scenario 1 describes the situation

of a vehicle fleet with 100% seat improvement according to the best current abilities. Scenario 2 describes the situation of a vehicle fleet with 100% seat improvement according to the suggestion by ADSEAT to use both male and female dummies, apply injury criteria accordingly and improve seats in a way that gender equality is achieved and protection for both genders is given.

It was shown that the additional benefit of ADSEAT depends mainly on the share of females and males in all current WAD cases. However, by choosing a conservative approach one can be confident that the additional benefit by implementing the ADSEAT suggestions will help the EU27 to save around €2bn per year.

From the ADSEAT Project Coordinator

On 31 March 2013, the ADSEAT project came to an end. In the preceding 42 months we did a lot of research in the area of whiplash injuries, virtual and physical model of average females. It has highlighted the needs for addressing occupant diversity and positioning in crash testing. Our work was also able to identify the potential savings for the society when fewer persons are injured in the transport system. The next challenge is to incorporate the topic of injury prevention in the new Horizon 2020 program with a focus of promoting traffic safety countermeasures.



ADSEAT Illustrator

Use the ADSEAT Illustrator to know more about how your seat adjustment affects your injury risk. The interactive web based tool allows you to see how men and women interact with different seatback and head restraint positions. Simulations of each case are provided with a short description of implications to the occupant.

Available at: www.adseat.eu

SEAT CONFIGURATOR

SELECT YOUR CONFIGURATION:		
Gender	Backrest	Head Restraint
		
Select your configuration:		
	Forward <input type="radio"/>	High <input type="radio"/>
Male <input checked="" type="radio"/>	Euro NCAP testing position <input checked="" type="radio"/>	Middle <input type="radio"/>
Female <input type="radio"/>	Backward <input type="radio"/>	Low <input type="radio"/>