

Designing cars for expectant mothers

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UK researchers have developed a new computer model - Expecting - that can be used as a design tool for automotive designers to help ensure that vehicle designs can accommodate the safety needs of pregnant occupants. They report details in the latest issue of the International Journal of Vehicle Design.

Serpil Acar of the Department of Computer Science, at Loughborough University, Alix Weekes (now at Thatcham MIRRC), and David van Lopik (now at Atkins Aviation and Defence Systems), have worked within a comprehensive research program at Loughborough University to improve pregnant occupant safety. The overall aim is to produce a pregnant occupant model capable of simulating the dynamic response to impact and predict the risk of injury in automobile crashes.

There are almost three quarters of a million pregnancies in the UK each year and it is fairly certain that a large number of those expectant mothers will at some point during their pregnancy drive, or be a passenger in a vehicle. Thousands are involved in accidents each year and while a relatively small proportion will die, many more will suffer injuries.

The researchers explain that the safety of pregnant women is often compromised because of the changes in their body size and shape that occur during pregnancy. These changes are not limited to the abdominal region, but affect the chest and thigh areas, all of which can affect sitting and driving posture and seat belt use.

Inappropriate seat belt is a significant problem for pregnant women. It is often difficult and sometimes impossible for a pregnant user to get her seat belt into a comfortable position. As such many women take unsafe actions, either hold the belt away from their bodies while the vehicle is moving or do not use a seat belt at all.

Another problem is pressure on the abdomen from the steering wheel in the event of a crash. Researchers have found that more than one in ten pregnant women find the gap between their abdomen and the steering wheel is less than 2.5 cm and for some there is no gap at all. This proximity to the steering wheel may put the placenta at increased risk of abruption from direct impact with the [steering wheel](#).

Acar and Weekes have taken 48 different measurements from 100 pregnant women in different postures and at different terms in their pregnancy to help Acar and van Lopik to create their [computer model](#). The measurements show that even the designers that take into account the measurements of larger men, may still exclude majority of women at the late stages of pregnancy.

'Expecting', has been further developed to be the world's first computational model of a 38-week pregnant car occupant, complete with a detailed representation of a foetus within uterus and it is now used in further research, together with MADYMO, in the simulation of crash scenarios.

More information: "Expecting: occupant model incorporating anthropometric details of [pregnant women](#)" in *Int. J. Vehicle Design*, 2009, 51, 374-38

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