

# Designing Vehicles for Older Users

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# Designing Vehicles for Older Users

## Introduction

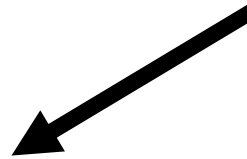
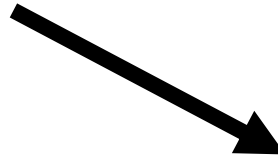
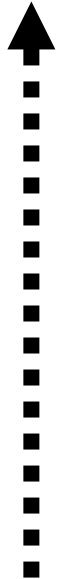
- Discuss what is important when considering the needs of the older person and when designing vehicles
- Talk about what methods are already used in industry to consider the needs of older users
- Discuss how well this is currently working and how we can improve on the current situation
- Talk about what methods we use to teach our design students to understand older users here at Coventry University



**Understanding the needs of older users**

**Applying the knowledge of those user needs within the design process**

**Evaluating the designs from the point of view of older users**



Decreased joint ranges

Loss of stature/sitting height

Reduced muscle strength

Loss of physical & mental stress capacity

**Some of the changes of getting older that impact on our use of vehicles**

Less efficiency in visual search tasks

Macular degeneration

Slower reaction times

Reduced tactile sensitivity

**Understanding the needs of older users**



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As designers and design ergonomists we are in the business of empathising with others...



...but how can we **really** know what it feels like to get older?

**Understanding the needs of older users**



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# Simulation tools to help the designer understand the needs of older people

- Experiencing the effects of aging can be a powerful tool in understanding how to design for users
- At Ford the 'Third Age Suit' it was produced to enable younger people, designers and management to experience some of the functional limitations associated with ageing.
- Simulation tools like this can also be very useful when comparing between vehicles
- The Ford Focus was one of the first products to benefit from its use.



**Understanding the needs of older users**



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## Observing the needs of older people



Although role play and simulation can help us as designers to understand the need of older people it isn't until you actually observe the strategies older people use to perform a task that you really start to understand their behaviours and needs

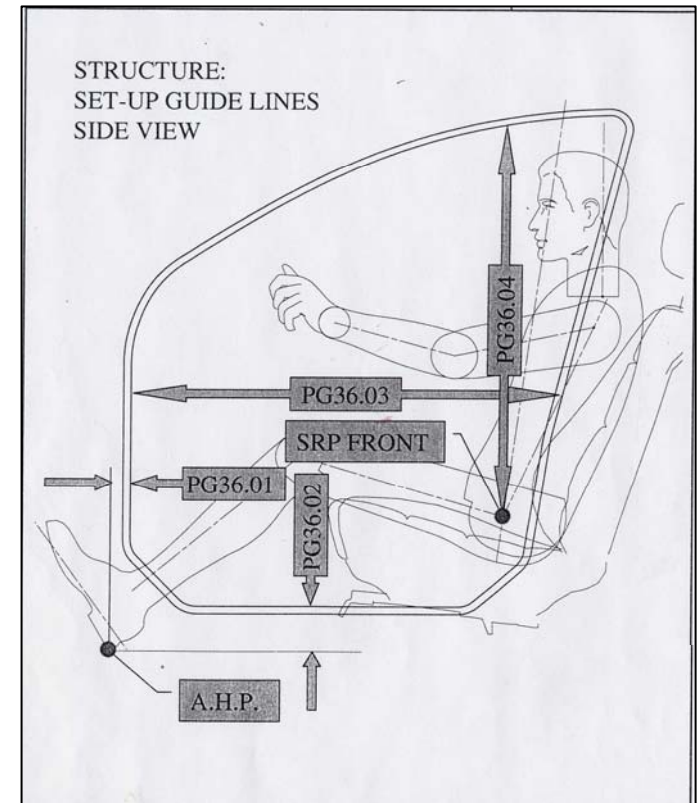
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# Designing the “Package” of the Vehicle

- The vehicle “package” describes the vehicle space including all the components and the occupant space
- As ergonomists we need to understand the critical tasks for our users will have to perform with the vehicle
- Understand the variation in the human needs and scenarios surrounding those tasks, including the effects of age
- Identify what are the key design dimensions and their relationship with other factors to ensure that the design meets the needs of the users
- We have to learn to translate the needs of older users into the language of engineering



Applying knowledge about Older Users



# Designing the Interior Detail of the Vehicle

- Highly accurate models of the interior of the vehicle are produced to show all the surfaces with which people will interact
- Technology is bought in to provide the functions that people will interact with
- At each stage of the design process need to consider “what do these design decisions mean for the older user?”
- Considering e.g. Contrast ratio of instruments, tactile differentiation of controls, forces required to operate controls



**Applying knowledge about Older Users**



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## Involving older people in the design process



User trials are used to gain an appreciation of how people interact with full size models of whole vehicle interiors and models of aspects of vehicles

Due to the “sensitivity” of new model development it can be difficult to get test subjects from outside the company

Have used retirees in the past to overcome this

**Evaluating Designs with Older people**



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# 3D CAD man-models that represent the needs of the older user

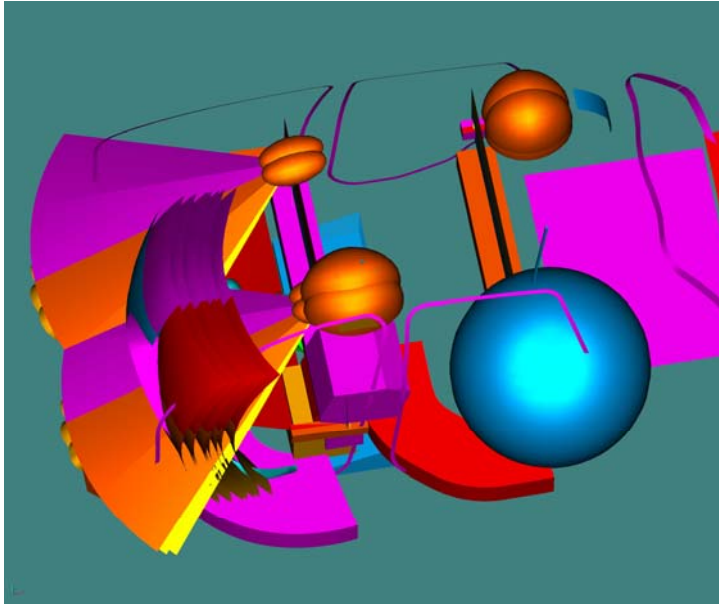


RAMSIS

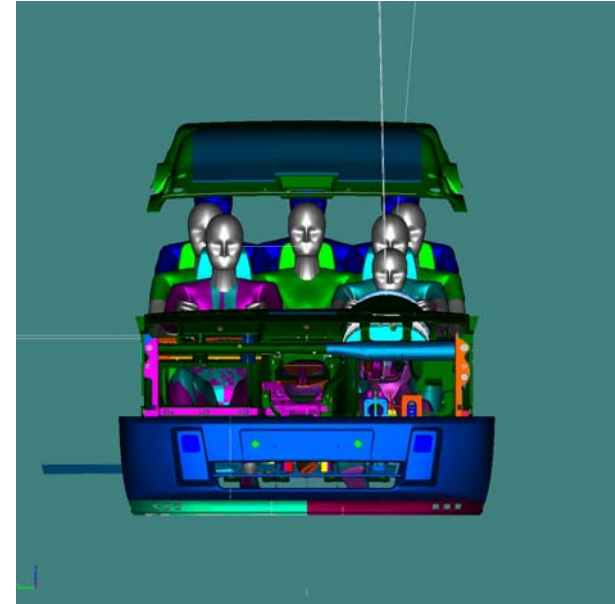
- Automotive design industry is moving away from producing hard models of vehicles during the design process
- The package design work is carried out in CAD, the detailed design of the interfaces carried out in Alias
- Without hard models it becomes difficult to observe actual human interactions with the proposed vehicle
- Man models such as RAMSIS and JACK have been developed to overcome this but there are real limitations to their use in predicting older user comfort and interaction



## 3D CAD man-models must represent the needs of the older user



Zones of user interaction as carried out using Jack



Manikins sat within the vehicle as carried out using Jack



# Biggest hurdles to Inclusive Design in the Automotive environment:

- Older people are just not represented on vehicle projects teams - rarely anyone over 60 years of age
- Designing vehicles for people over 60 years of age is still not “sexy”. Many product briefs just don’t include people from this age bracket
- Need to have processes in place that ensure designs are created that are inclusive
- Designers and management often still only assess other vehicles on the basis of their own experiences, psychological and physical characteristics
- Older people need to make the most of any input opportunities they are afforded

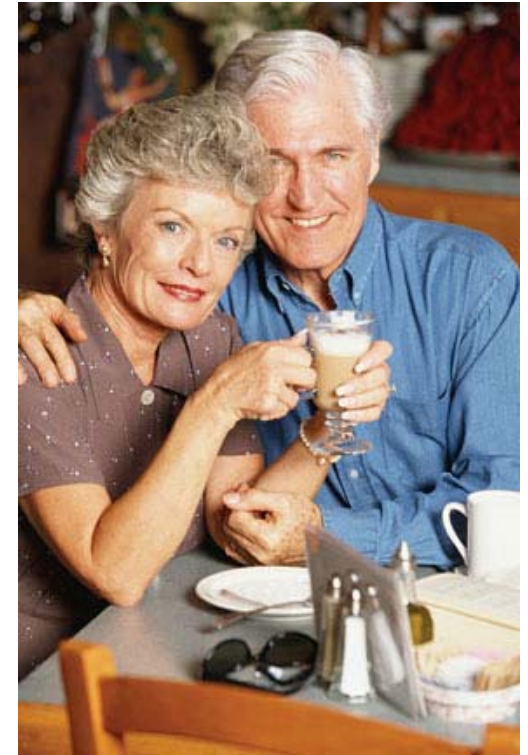


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# How do we get the students at Coventry University to develop empathy with their older selves?



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# Setting of project briefs

- Students are given certain user types to design for within their briefs
- Older people included in briefs that range from pill dispensers through to backpacks and sports cars
- As part of this process they have to investigate their users and discover their requirements by a variety of research methods
- Students are encouraged to speak to older users and observe them carrying out critical tasks



# Role play and simulation



# Role play and simulation

**Stiffness in the lower back**  User D Family

To simulate lower back pain and stiffness, I taped up the skin on my lower back in the standing position. This tightens, giving a feeling of stiffness and slight discomfort in the area. For experimental purposes, I assumed that once I felt the skin pulling on my lower back, this is when a person with back pain would be experiencing serious discomfort.

**Simulating back pain**



**Results**  
A stretching feeling occurs in the lower back, even at very slight degrees of bending. Somebody experiencing this pain in real life would find it extremely uncomfortable to bend down to pick items off the floor, additionally, if they were to be sitting at a computer leaning forward, pain would also be experienced.

In conclusion, home tasks which involve bending and twisting, such as organising paper work, carrying heavy files or sitting at the computer on a chair that does not support the back will all result in a back pain sufferer experiencing severe discomfort and reduced manoeuvrability.

**.....Difficulty in performing simple tasks, severe discomfort, reduced manoeuvrability**

Andrew Rainsford



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