Challenges and Potentials for Automotive Ergonomics

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Challenges and Potentials for Automotive Ergonomics

Content

• Automotive Ergonomics at a glance
• Ergonomics challenges in current vehicles
• Ergonomics potentials in future vehicles
• UniSA Mawson Institute Ergonomics Lab
• Case Study: Ingress-Egress Simulation
What Automotive Ergonomics is all about...

- **Fit** the vehicle to the driver (Package)
- Avoid driver stress and **fatigue**
- Provide a **comfortable** environment to the driver
- Design man-machine interface for **ease of use** and **safety**
- Allow for **access** and **usage** of vehicle features
- **Extend** the user population – e.g. for **aged and disabled** persons

Some examples:

- Pedals, steering wheel, gear-shifter placement
- H-Point window definition and seat design
- Design for visibility – beltline, A-pillar, C/D-pillar
- Placement of controls and navigation system
- Ingress/egress and trunk design
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Ergonomics challenges in current vehicles
Current challenges

• Variety of vehicle styles on common platforms
• Design is driving Package
  • windshield angle, beltline height, C/D-pillar width
  • rocker width, tumblehome
  • thin seats
• Reduced people package due to energy efficiency and safety
• Overloaded entertainment and navigation systems
• Large stamping parts
• Shortened development cycle with reduced number of physical bucks
• New driver populations
Future Vehicle Market Prognosis 2020

- Electric/Battery: 10%
- Hybrid: 20%
- Fuel Cell/Oxygen: 20%
- Gasoline: 30%
- Diesel: 30%
Changes in vehicle design we are facing ...

- Electric vehicles
- Flat floor without tunnel
- No gearbox
- Direct-Drive wheels, no engine package
- Potentially steer-by-wire: no pedals, no steering wheel – no “package dilemma”
- Free seat motion, swivelling seat
- Active joystick attached to seat
- Head-Up displays
- Speech control
- Ultra High Strength Steel and Composite structures
The Mawson Institute Ergonomics Lab...

- **Motion Analysis** studies
  - Ingress/Egress
  - Boot accessibility

- **Cockpit and Package Design and Evaluation**
  - Automotive
  - Aeronautic

- **Human** *Motion Assessment*

- **Human** *Motion Simulation*

- **Anthropometric Databases**

- **Biomechanic Modelling**

- **Comfort** assessment and simulation

- **Production Ergonomics**
  - **Hybrid Human – Robot Worksystems**
From Measurement to Simulation

The RAMSIS family

- define a percentiled standard population
- measure exemplary real test persons’ motion
- simulate motion for whole population using RAMSIS family
- understand and assess motion
- establish ergonomic **hardpoints** for design
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Case study: Ingress-Egress Simulation
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Case study: Ingress-Egress Simulation
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Thank you!

Q & A

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