

Collaborative Engineering


Product Usability (Ergonomics)




- Ease of Use (Ergonomics)
- Design for Usability
- Design Guidelines

OrthoCAD Lab, I.I.T. Bombay


Innovation versus Usability



Clock
[Eileen Conway]



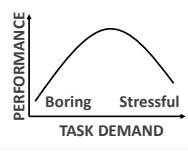

Coffee pot
[Jacques Carelman]



Convergent bicycle
[Jacques Carelman]


Product Design for Usability

- Commonly referred to as ergonomics or human engineering
- Involves: comfort, efficiency, safety and reliability
- Ensure operation is suited to the intended end-user: personality, intelligence and skill level.

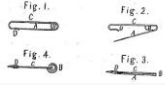



Design for Usability – General Guidelines

- **General guidelines:**
 - ✓ Keep it simple and intuitive (no need for bulky manuals)
 - ✓ Design and test for the target physiology of users
 - ✓ Understand and design for natural human behaviour
 - ✓ Use materials considering operating conditions



*M. Hunt
Pin.
Nos. 1, 2, 3, 4
Patented 7/11/1849*



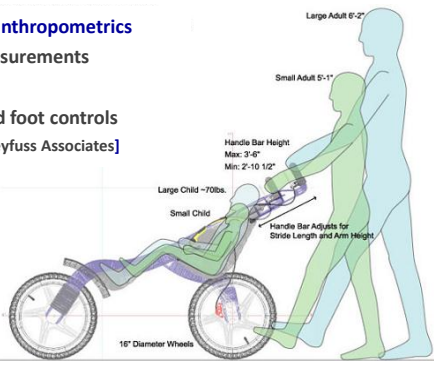
Design for Simplicity – Phone for Senior Citizens




Design for Physiology – Baby Stroller

- **Stroller anthropometrics**
 - Link measurements
 - Seating
 - Hand and foot controls

[Henry Dreyfuss Associates]



Design for Natural Behaviour – Gas Stove

Compact Design

Natural Design

Four-burner gas stove controls

Design for Natural Behaviour – Keyboard

The qwerty Keyboard

An Alphabetical Keyboard

The Dvorak Keyboard

A Random Keyboard

Different layouts of keyboards

Design using Appropriate Materials – Bench

Outdoor bench - steel

Outdoor bench - wood

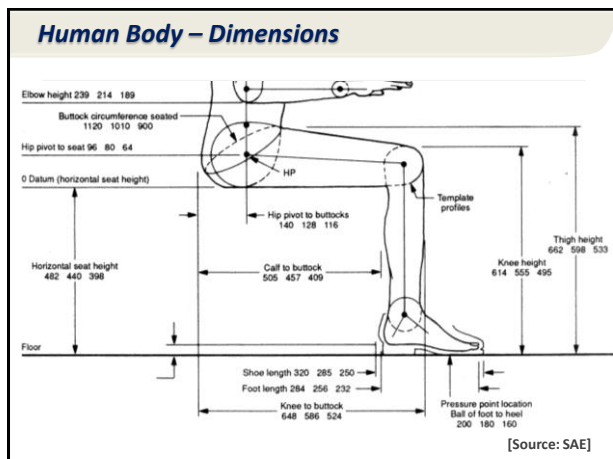
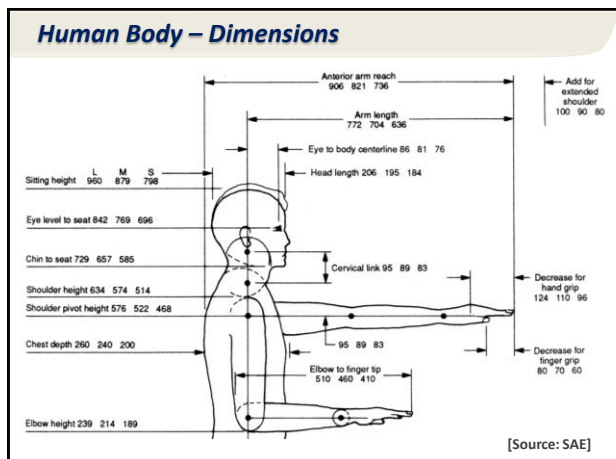
Human Body – Dimensions

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[Source: SAE]

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Human Body – Capabilities

- Visual (eyes)
- Auditory (ears)
- Proprioceptive (orientation)
- Kinaesthetic (muscles)
- Whole body (bones & joints)

Vary with:

- Age
- Gender
- Culture
- Training
- Occupation

Human Body – Capabilities

- Visual (eyes)
 - Recognizing:
 - words
 - symbols
 - Focusing
 - Perception:
 - Spatial (3D)
 - motion
 - colour
 - Adaptation:
 - light-dark
 - near-far
 - flicker

Human Body – Capabilities

- Kinaesthetic
 - Control precision
 - Multi-limb coordination
 - Reaction time
 - Speed
 - Rate control
 - Dexterity:
 - hand
 - wrist
 - fingers
 - Steadiness
 - Aiming

SUMMARY

- Design products for ease of use (human engineering)
- Simplicity, natural behaviour, appropriate materials
- Consider human body dimensions and capabilities