

Design in theory · supported focus

Supported focus · HL

Supported scope

- Supported HL focus. First assessment 2027 target; current brief and public guide return 403; 2016 SL/HL briefs are historical. Remaining guide, assessment and practical requirements retain their recorded holds.
- State model conditions and distinguish fictional data from measurements.

Design Users · 1.1

Reasoning

A handle that feels comfortable to its designer may exclude another user. Design evidence starts with the people and context of use. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Design Users · 2.1

Reasoning

Anthropometric data describe body dimensions. Ergonomics concerns the relationship between people, tasks and products. A design specification turns a user need into a measurable requirement. ergonomics: Designing the fit between people, tasks and products; specification: Measurable requirements a proposed solution should meet.

Design Users · 3.1

Reasoning

Choose data for the target population and task. Clearance often needs a larger-user percentile; reach may need a smaller-user percentile. A single mean dimension cannot satisfy every design constraint. Observe an approved low-risk task with consent, interview users without leading questions, and record measurable success criteria. Test an early model before committing to expensive materials. Do not collect unnecessary personal measurements.

Design Users · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: a handle must withstand a 40 N use force with a design safety factor of 2.5. Target test load = use force $\times$ factor = $40 \times 2.5 = 100$ N. The factor is a design assumption to justify; it is not a substitute for a supervised safety review.

Design Users · 4.2

Reasoning

A use force is 30 N and selected safety factor 3. Find target load. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Design Users · 5.1

Reasoning

A specification is not a list of vague wishes such as nice or strong. User testing should evaluate measurable requirements and reveal conflicting needs. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Design Users · 5.2

Reasoning

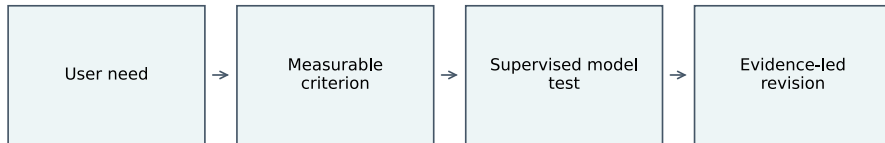
A population mean dimension always accommodates every user. This claim is false: A specification is not a list of vague wishes such as nice or strong. User testing should evaluate measurable requirements and reveal conflicting needs.

Design Users · 5.3

Reasoning

Designing for actual users: Choose data for the target population and task. Clearance often needs a larger-user percentile; reach may need a smaller-user percentile. A single mean dimension cannot satisfy every design constraint.

Design Users · diagram



- Original teaching diagram: Designing for actual users
- Use the labels and the stated model together.

Design Users · original transfer

Your turn

Fictional users require one-handed opening below 15 N; a prototype needs 18 ± 1 N. Evaluate this criterion and propose a measurable revision test.

Design Users · transfer reasoning

Method and interpretation

Even 17 N exceeds 15 N, so this evidence fails the criterion. Revise and repeat force measurements with representative users and conditions. Passing one criterion does not certify every need.

Design Ergonomics · 1.1

Reasoning

A handle sized for the average hand can exclude many intended users. Design decisions need a user range, task and context rather than one average. Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

Design Ergonomics · 2.1

Reasoning

Anthropometry measures body dimensions; ergonomics considers interactions between people, tasks and products. A percentile locates a value within a specified distribution. Choosing a lower or upper percentile depends on whether the dimension concerns reach, clearance or another function. Adjustable design may accommodate a broader range than a single fixed dimension.

anthropometry: Measurement of human body dimensions for a specified population and method;
ergonomics: Study of interactions between people, tasks and systems to inform design.

Design Ergonomics · 3.1

Reasoning

A clearance dimension often needs to consider larger relevant body dimensions, while reach can require smaller relevant dimensions. Neither principle automatically selects a universal percentile. The measured population, posture, clothing, capability and task determine relevance. Consider physical, perceptual and cognitive demands together rather than assuming body size explains every usability issue. Define a consenting user group and task. Use attributed data or anonymous teacher-approved measurements, record measurement posture and units, and test safe low-fidelity models before construction. Include users whose access needs differ. Set measurable acceptance criteria and retain qualitative feedback about grip, visibility and comprehension alongside dimensions.

Design Ergonomics · 4.1

Reasoning

State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution. Known: sorted fictional reach measurements are 40, 42, 43, 45, 46, 47, 49, 51, 53 and 56 cm. Under a stated nearest-rank classroom convention, the 10th percentile uses rank $\text{ceil}(0.10 \times 10) = 1$, giving 40 cm; the 90th uses rank 9, giving 53 cm. A 53 cm control distance is beyond the recorded reach of eight users. The small fictional sample does not define a product standard.

Design Ergonomics · 4.2

Reasoning

A stated nearest-rank method uses $\text{ceil}(p \times n)$. For $p=0.90$ and $n=20$, find the rank.

Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

Design Ergonomics · 5.1

Reasoning

Percentile methods differ, especially for small samples. A percentile is not a percentage of a body dimension. An average dimension and a successful test by one user do not establish accessible design. Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Design Ergonomics · 5.2

Reasoning

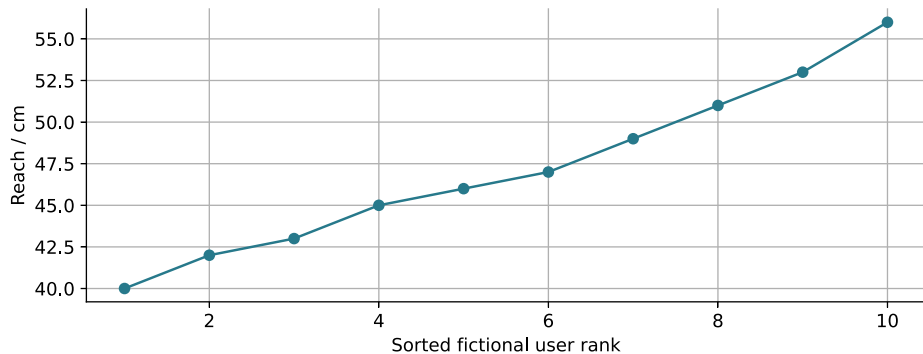
A product dimension based on the mean automatically accommodates every intended user. This claim is false: Percentile methods differ, especially for small samples. A percentile is not a percentage of a body dimension. An average dimension and a successful test by one user do not establish accessible design.

Design Ergonomics · 5.3

Reasoning

Ergonomics: fit a range of users: A clearance dimension often needs to consider larger relevant body dimensions, while reach can require smaller relevant dimensions. Neither principle automatically selects a universal percentile. The measured population, posture, clothing, capability and task determine relevance. Consider physical, perceptual and cognitive demands together rather than assuming body size explains every usability issue.

Design Ergonomics · diagram



- Original teaching diagram: Ergonomics: fit a range of users
- Use the labels and the stated model together.

Design Ergonomics · original transfer

Your turn

Sorted fictional reaches are 40,42,44,46,48 cm. Under nearest rank, find the 20th and 80th percentiles. Which end of the range matters for maximum control reach?

Design Ergonomics · transfer reasoning

Method and interpretation

Ranks 1 and 4 give 40 and 46 cm. A lower reach accommodates more short-reach users; a 46 cm control exceeds three of five observed reaches. This small fictional sample is not a product standard.

Check yourself

- Explain ergonomics using the stated model.
- Explain specification using the stated model.
- Change one value in the original transfer; explain which assumption still matters.