# Course notes

International Baccalaureate · IB Diploma · Design Technology · HL

## IB IB Diploma · Design Technology · HL: teaching notes

Version: First assessment 2027 target

These notes cover selected topics of the course; they are not the whole specification.

## Assessment and course boundaries

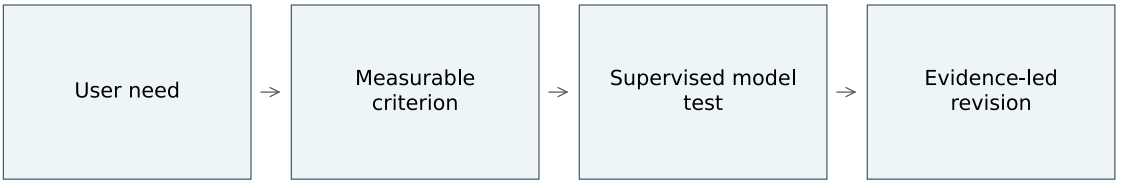
- The official 2027 update confirms design in theory, design in practice and design in context.
- Do not display old 2016 Topics 1–10 or its 40% design-project model as the current 2027 assessment.
- The school project needs user evidence, measurable specification, concepts, supervised prototype/testing and evaluation; written diagnostics cannot replace it.
- SL/HL objective and assessment differences remain unverified until current guide retrieval succeeds.

## Designing for actual users

Official-unit focus: A Design in theory; Project Design project

A handle that feels comfortable to its designer may exclude another user. Design evidence starts with the people and context of use.

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.




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



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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.

### ■ Checked worked case

Known: a handle must withstand a 40 N use force with a design safety factor of 2.5. Target test load = use force × factor = 40×2.5 = 100 N. The factor is a design assumption to justify; it is not a substitute for a supervised safety review.

### ■ Common error

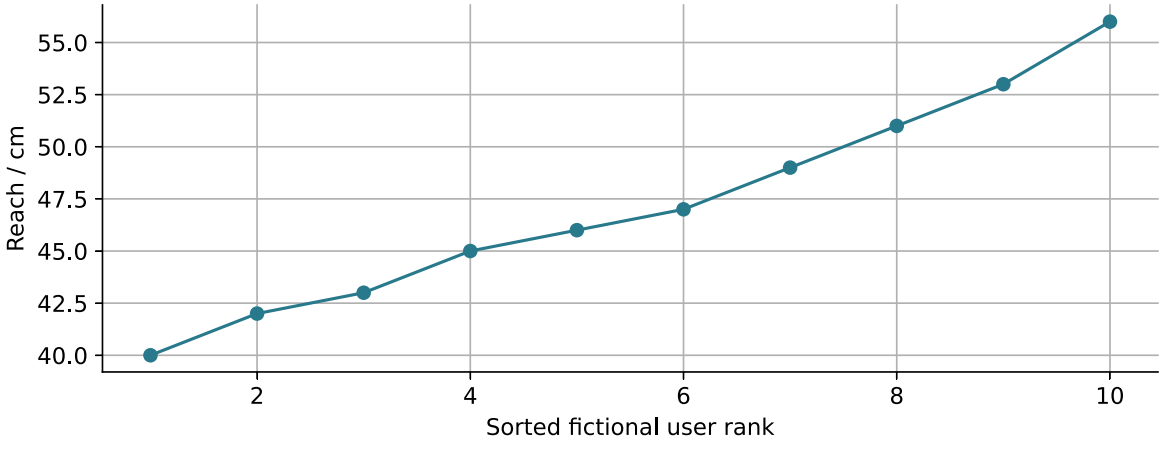
A specification is not a list of vague wishes such as nice or strong. User testing should evaluate measurable requirements and reveal conflicting needs.

## Ergonomics: fit a range of users

Official-unit focus: A Design in theory

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.

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.




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-


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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.

### Checked worked case

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 ceil(0.10×10)=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.

### Common error

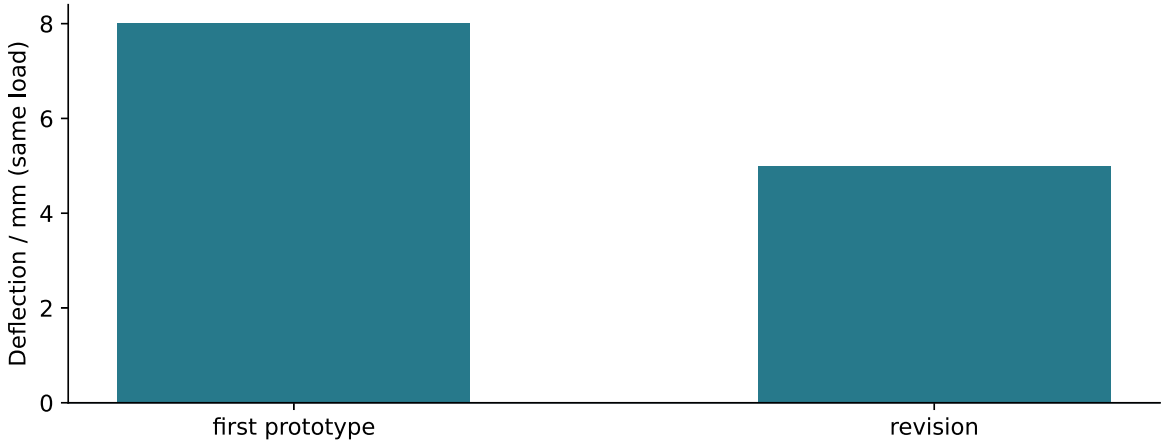
Percentile methods differ, especially for small samples. A percentile is not a percentage of a body dimension. An average dimension and a successful test by one user do not establish accessible design.

## Models, materials and iterative prototyping

Official-unit focus: B Design in practice; Project Design project

A cardboard prototype can reveal reach and arrangement without proving that the final material is strong enough. Different models answer different questions.

A model represents selected features of a design. A prototype supports testing before or during development. Material selection depends on mechanical properties, manufacture, use conditions and end-of-life choices.




State what each model includes and omits. Compare tests with the same load, geometry and conditions. Iteration means using evidence to revise a solution and testing the revision against the original success criteria.

Make a low-risk model under school workshop rules. Record dimensions, material, process and test method. Use photographs, measurements and user feedback as evidence.



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Machines and load tests require teacher supervision and approved guards.

### ■ Checked worked case

Known: a beam prototype deflects 8 mm under a stated load; a revision deflects 5 mm under the same conditions. Reduction = (8-5)/8×100 = 37.5%. The result supports greater stiffness in that test, not proof of every strength or fatigue property.

### ■ Common error

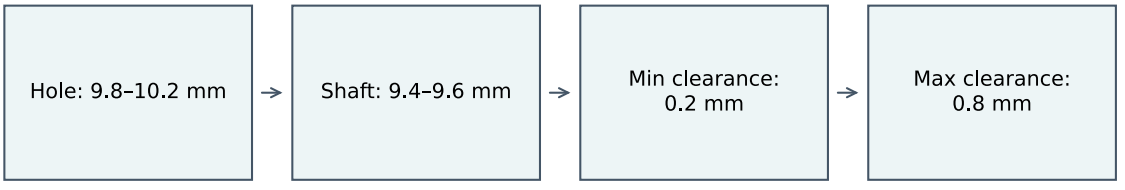
Stiffness is resistance to elastic deformation; strength concerns failure stress. A visually accurate model need not reproduce material behaviour.

## Manufacture: tolerances, variation and inspection

Official-unit focus: B Design in practice

Two parts can each match a nominal drawing yet fail to assemble if allowed variation has not been considered. Manufacture produces a range of dimensions.

A tolerance specifies an allowed dimensional range around or beside a nominal value. Precision concerns consistency of repeated measurements or production, while accuracy concerns agreement with a reference. Process selection must consider material, geometry, quantity, surface finish, waste and achievable variation rather than appearance alone.




For a worst-case clearance model, subtract the largest shaft from the smallest hole for minimum clearance, and the smallest shaft from the largest hole for maximum clearance. The calculation assumes the stated dimensional limits and ideal geometry. Shape, alignment, temperature and measurement uncertainty can affect actual assembly.

Use safe school-made models or a provided dimension dataset. Specify dimension units, nominal values and limits before testing. Measure with an appropriate calibrated instrument at agreed positions, record every result and classify against the specified range. Retain rejected pieces and explain whether the problem concerns the design


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limits, process variation or measurement method.

### Checked worked case

Known: a hole is 10.0±0.2 mm, giving 9.8–10.2 mm; a shaft is 9.5±0.1 mm, giving 9.4–9.6 mm. Minimum clearance is 9.8−9.6=0.2 mm and maximum is 10.2−9.4=0.8 mm. This model predicts positive clearance across the stated limits. It does not establish strength or fitness for a safety-critical application.

### Common error

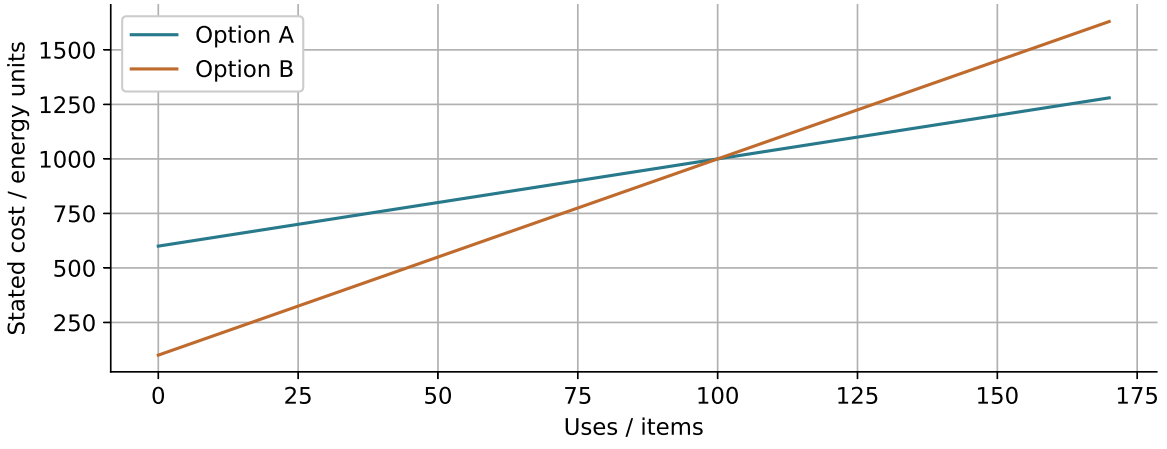
A tighter tolerance can increase cost, inspection time and waste, and may not improve the user outcome. A measuring instrument with a fine display does not automatically have the accuracy required to accept a part near its limit.

## Design sustainability and production choices

Official-unit focus: C Design in context

A repairable product may cost more initially but stay in service longer. A design decision needs evidence across manufacture, use and disposal.

Design for disassembly supports separation of materials and replacement of parts. Manufacturing choices depend on production volume, tolerances, material properties and cost. Sustainability includes environmental and social effects.




Compare a common service over a stated lifetime. Separate fixed tooling cost from cost per item. Include repair, energy, transport and realistic end-of-life pathways rather than using a recycled label as the whole judgement.

Create a bill of materials and an annotated assembly plan. Test whether a worn part can be replaced with normal tools. For HL project development, evaluate production feasibility and commercial assumptions against the applicable cohort guide.



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### ■ Checked worked case

Known: method A costs 600 fixed units plus 4 per item; method B costs 100 fixed units plus 9 per item. Equality: 600+4n = 100+9n. Rearranging: 500 = 5n, so n = 100 items. Other quality and sustainability criteria may change the choice.

### ■ Common error

A cheaper process is not automatically preferable. Cost estimates need currency, quantity and assumptions, and prototypes do not prove mass-production consistency.



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