Design in practice

International Baccalaureate · IB Diploma · Design Technology · HL · Vocabulary in context

Word	Example
model /ˈmɒdl/	This **model** keeps wages fixed so we can see the effect of one change.
mock-up	A cardboard **mock-up** shows the size of the product.
scale model	An architect builds a **scale model** of the building.
prototype /ˈprəʊtəʊtaɪp/	A **prototype** is an early version of the program.
fidelity	High **fidelity** means the model looks like the final product.
proof of concept	A **proof of concept** tests whether the main idea works.
iteration /ˌɪtəˈreɪʃn/	A loop is a kind of **iteration**.
computer-aided design	**Computer-aided design** (CAD) makes accurate 3D models. (CAD) 3D
virtual prototyping	**Virtual prototyping** tests a design on the computer.
finite element analysis	**Finite element analysis** predicts where a part will bend or break.
simulation /ˌsɪmjʊˈleɪʃn/	A computer **simulation** tests how air flows over a car.
thermoplastics	**Thermoplastics** soften when heated and can be reshaped.

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thermosetting polymer /ˈθɜːməsɪtɪŋ ˈpɒlɪmə/	A **thermosetting polymer** sets hard and cannot be melted again.
composite /ˈkɒmpəzɪt/	This **composite** combines strong fibres with a supporting matrix.
alloy /ˈælɔɪ/	Brass is an **alloy** containing copper and zinc.
smart material	A **smart material** changes when it is heated or lit.
density /ˈdensɪti/	Iron has a higher **density** than wood, so it sinks in water.
tensile strength	Steel has a high **tensile strength**: it is hard to pull apart.
stiffness /ˈstɪfnəs/	Greater **stiffness** means more force for the same extension.
hardness /ˈhɑːdnəs/	X-rays with more **hardness** go deeper into the body. X
toughness	**Toughness** measures energy absorbed per unit volume before fracture.
ductility /dʌkˈtɪlɪti/	Copper's **ductility** lets it be pulled into thin wires.
brittleness	The **brittleness** of glass makes it break suddenly.
elasticity /ɪlæˈstɪsɪti/	**Elasticity** lets rubber return to its shape after stretching.
plasticity	**Plasticity** lets clay be shaped without breaking.
stress /stres/	The **stress** in the wire is the force divided by its area.

Word	Example
strain /streɪn/	**Strain** is the extension divided by the original length.
Young's modulus	**Young's modulus** measures how stiff a material is.
strength-to-weight ratio	Aluminium has a high **strength-to-weight ratio**.
wasting	Drilling and sawing are **wasting** processes: they remove material.
forming /ˈfɔːmɪŋ/	Bending and moulding are **forming** processes.
injection moulding	**Injection moulding** makes thousands of identical plastic parts.
vacuum forming	**Vacuum forming** sucks hot plastic over a mould.
additive manufacturing	**Additive manufacturing** builds a part layer by layer.
computer-aided manufacture	**Computer-aided manufacture** (CAM) uses the CAD model to control machines. (CAM) CAD
computer numerical control	A **computer numerical control** (CNC) machine cuts parts automatically. (CNC)
one-off production	A wedding dress made for one person is **one-off production**.
batch production /bætʃ prəˈdʌkʃn/	Baking one group of rolls before changing recipes is **batch production**.
mass production	A continuous factory line uses **mass production**.

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mass customisation /mæs ˌkʌstəmaɪˈzeɪʃn/	With **mass customisation**, customers choose options for a mass-produced product.
automation /ˌɔːtəˈmeɪʃn/	**Automation** uses machines to do work that people used to do.
just-in-time /dʒʌst ɪn taɪm/	**Just-in-time** deliveries arrive when materials are needed.
Lean production /liːn prəˈdʌkʃn/	**Lean production** tries to remove all waste.
nominal size	Each part has a **nominal size** and a tolerance.
tolerance /ˈtɒlərəns/	The **tolerance** is the allowed difference between the size limits.
accuracy /ˈækjʊrəsi/	**Accuracy** tells you how close a result is to the true value.
precision /prɪˈsɪʒn/	Readings with high **precision** are all very close to each other.
fit /fɪt/	A clearance **fit** lets the shaft turn in its bore.
clearance fit	A **clearance fit** always leaves a gap between shaft and hole.
transition fit	A **transition fit** may have a tiny gap or a tiny overlap.
interference fit	In an **interference fit**, the shaft is slightly bigger than the hole.
clearance /ˈklɪərəns/	Leave enough **clearance** so the drawer slides freely.

Word	Example
tolerance stacking	**Tolerance stacking** happens when small errors add up.
quality control /ˈkwɒlɪti kənˈtrəʊl/	**Quality control** checks products for defects.
quality assurance /ˈkwɒlɪti əˈʃʊərəns/	**Quality assurance** tries to stop mistakes at every stage.
destructive testing	**Destructive testing** loads a sample until it breaks.
non-destructive testing	**Non-destructive testing** checks a part without damaging it.
user trial	In a **user trial**, real people try the prototype.

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