Design and Technology: Product Design

A Level Design & Technology is suited to students who are creative, curious and enjoy solving problems through both thinking and making. It is particularly valuable for students who enjoy understanding how things work, developing ideas, working with materials and technology, and refining solutions through testing and iteration. Students do not need to have a specific career in mind, but the course is well suited to those considering engineering, product or industrial design, architecture, manufacturing, technology, robotics, innovation or creative industries. It also suits students who enjoy working independently, taking on challenges, learning from mistakes and combining academic knowledge with practical application.

Studying A Level Design and Technology (AQA Product Design) is a creative yet academic endeavour, and as such, students should be studying design and technology at GCSE from any of the exam boards who offer it. The Subject supports the development of creative, analytical and practical skills, equipping students to identify problems, generate innovative solutions and transform ideas into high-quality, functional products. There is a moderate amount applied maths in the course that will feature in the examinations.

The subject strongly aligns to High Performance Learning characteristics by encouraging intellectual curiosity, critical thinking, perseverance, collaboration, independence and the willingness to take risks, learn from failure and refine ideas through iterative design. Alongside developing technical expertise in materials, manufacturing, CAD and emerging technologies, students gain valuable life skills in project management, communication, organisation, decision-making and problem-solving.

Scheme of assessment

Paper 1 – Technical Principles: 2 hours 30 minutes, 25% of A Level.

Questions covering materials, manufacturing, technical knowledge and applied design principles.

Paper 2 – Designing and Making Principles: 1 hour 30 minutes, 25% of A Level.

Questions focused on designing, developing, evaluating and manufacturing products.

NEA – Practical Application: 50% of A Level.

Students complete a substantial design and make project, producing a prototype/product and a supporting portfolio of evidence, that responds to a real-world problem/context.

Through the NEA, students identify, investigate, design, develop, manufacture, analyse and evaluate a product, demonstrating their ability to take a design from initial concept through to a considered final outcome.

AQA Specification content

The course content is broken down into two main areas: Technical Principles, and Design and Making Principles. Within these students will cover a wide range of relatable and transferable knowledge.

Technical principles:

- **Materials and their properties** – timbers, metals, polymers, composites and smart materials.
- **Material selection** – suitability, performance, sustainability, availability and cost.
- **Forces and stresses** – tension, compression, bending, torsion and shear.
- **Mechanical systems** – gears, pulleys, levers, cams, linkages and mechanisms.
- **Electronic systems** – components, circuits, sensors, inputs, outputs and control.
- **Digital technologies** – CAD, CAM, CNC manufacture, 3D printing and laser cutting.

- **Manufacturing processes** – primary and secondary processes, forming, shaping, joining and finishing.
- **Production systems** – one-off, batch and mass production, including automation.
- **Design for manufacture** – tolerances, accuracy, standardisation, quality control and quality assurance.
- **Joining and assembly** – permanent and temporary methods, fixings and adhesives.
- **Ergonomics and anthropometrics** – designing for human interaction, comfort and usability.
- **Product analysis** – function, performance, aesthetics, user needs and commercial considerations.
- **Sustainability** – lifecycle analysis, energy use, waste, recycling and the circular economy.
- **Health and safety** – safe use of materials, tools, machinery and manufacturing processes.
- **Emerging technologies** – developments in materials, manufacturing and digital technologies.
- **Commercial manufacture** – economies of scale, lean manufacture, stock forms and supply chains.
- **Design strategies** – iterative design, prototyping, modelling, testing and evaluation.

Designing and making principles:

- **Identifying opportunities** – investigating needs, wants, problems and market opportunities.
- **Design briefs and specifications** – defining clear, measurable design requirements.
- **Research and investigation** – gathering, analysing and evaluating relevant information.
- **User-centred design** – understanding users, clients, lifestyles, needs and accessibility.
- **Design strategies** – applying creative approaches to generate and develop ideas.
- **Idea generation** – sketching, brainstorming, mind mapping and other creative techniques.
- **Design development** – refining ideas through iteration, experimentation and decision-making.
- **Modelling and prototyping** – using physical and digital models to test and communicate ideas.
- **CAD and digital design** – creating, developing and communicating designs using digital tools.
- **Materials and manufacturing selection** – matching materials and processes to the product and intended production volume.
- **Design for manufacture and assembly** – considering production, assembly, efficiency and cost from the outset.
- **Function and aesthetics** – balancing performance, usability, appearance and user experience.
- **Ergonomics and anthropometrics** – designing products that are comfortable, accessible and appropriate for users.
- **Testing and evaluation** – testing against the specification, analysing results and identifying improvements.
- **Iteration** – using testing, feedback and reflection to improve designs and prototypes.
- **Quality and accuracy** – applying tolerances, precision, quality control and quality assurance.
- **Sustainability** –environmental impact, lifecycle, resources, energy, waste and end-of-life.
- **Commercial considerations** – cost, marketability, production, scale and consumer demand.
- **Communication** – presenting and communicating ideas through sketches, technical drawings, CAD, models and written explanation.
- **Project management** – planning, organising and managing the design and manufacture of a product from initial brief through to final evaluation.
  Design methods and processes.

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