OCR
RECOGNISING ACHIEVEMENT

A- Level
Product Design

Subject Teachers: Mr Bailey & Mr Weir

Specification at a glance…

Contents Overview	Assessment Overview	
This paper is set out through four sets of questions that predominately cover technical principles within each endorsed title. Learners will be required to: ▪ Analyse existing products ▪ Demonstrate applied mathematical skills ▪ Demonstrate their technical knowledge of material, product functionality, manufacturing processes and techniques. ▪ Demonstrate their understanding of wider social, moral and environmental issues that impact on the design and manufacturing industries.	**Principles of…** **(01)** 75 marks 1 hour 30 minutes Written paper	**25%** Of total A level
This component has two sections that respond to selected tasks. ▪ **Section A** focuses on learners applying their knowledge, understanding and skills of designing and manufacturing prototypes and products. ▪ **Section B** requires learners to reflect on their design task in section A in relation to wider factors/ issues from the design principles.	**Unseen Challenge*** **(02)** 75 marks 2 hours 30 minutes Design/written paper	**25%** Of total A level
The 'Iterative Design Project' requires learners to undertake a substantial design, make and evaluate project centred on the iterative processes of explore, create and evaluate. Learners identify a design opportunity or problem from a context of their own choice, and create a portfolio of evidence in real time through the project to demonstrate their competence.	**Iterative Design Project*** **(03, 04)** 150 marks Approx. 45 hours Non-exam assessment	**50%** Of total A level

Inventor challenges pupils to come up with improvements for sledge

Design is a winter wonder

BY HANNAH HULME & MICHELLE CHOW

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WINNER: Design student Myles Smith, aged 16. Picture: Mark Scott

THE design skills of sixth form students were put to the test in a competition to try and help improve an invention featured on TV.

Keith Handy challenged pupils at Alleyne's High School to come up with improvements for his Bobskis.

The sledge, inspired by bobsleighs, snowboards and skis, debuted at the British Ski and Board Show in Birmingham in 2011 and has been featured on The Gadget Show.

Mr Handy said his Stone-based company will now keep all of the designs under review for future models.

"The quality of the entries was absolutely superb," he said. "I was really impressed."

Year 12 product design students handed in their designs in this month after nearly three months of work.

They were able to redesign any aspect of the Bobskis, from the logo and saddles of the sledge, to a new seat or steering system.

Competition winner Myles Smith, aged 16, came up with a new braking system.

Mr Handy praised his 'well thought out' design. Myles was awarded his own Bobskis, worth £49, as a prize.

Myles said: "I didn't think I would win because there's a lot of people who are really good in my design group.

"Hopefully it will snow and I will try and use it."

Classmate, Ryan Gauge, aged 17, said: "I was very impressed with Myles's design.

"I knew he would win because he put a lot of effort and hard work into it. Everyone in the class thought it was the best design."

Paul Marsh, a teacher in the school's technology faculty, said: "We've got a great reputation at the school for product design so we were delighted to give our students a chance to take part in a real-life brief for a fantastic local company. "The students did a great job with their designs. When you think that they've only been on the course since September, they did spectacularly.

"Myles worked really hard on his braking system."

The school is holding an open day tomorrow from 6pm.

Mr Marsh added: "If students and parents are interested in our product design course, or indeed any other course, they are welcome to come along and check it out."

Is your school involved in an interesting project? Email us at letters@thesentinel.co.uk

Extra-curricular Opportunities - EES

Sheffield Hallam University

INVESTOR IN PEOPLE

Microsoft IT Academy Platinum Member

Specialist Schools and Academies Trust
EXCELLENCE AND DIVERSITY

TECHNOLOGY COLLEGES

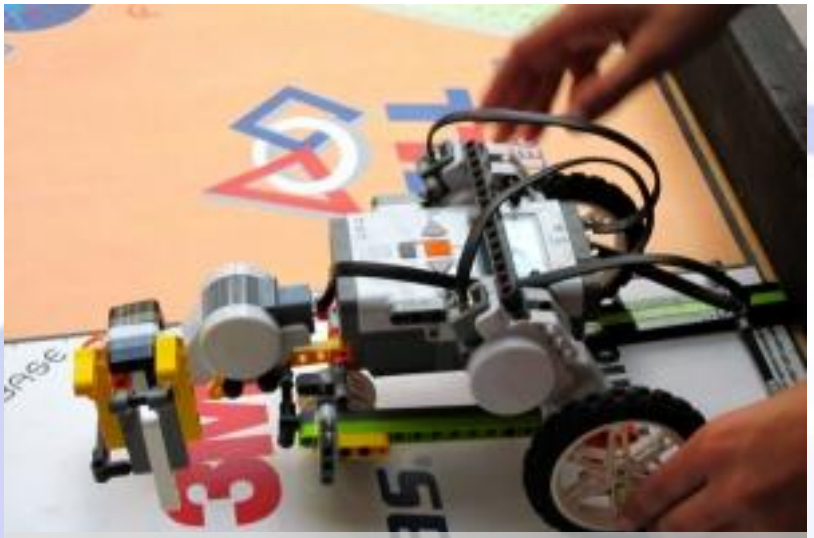
Healthy School

fmss

ict

Enrichment Opportunities

YEOTY Competition Mentors



Year 8 Transition Clubs

Year 9 Support

Local Work Experience Links

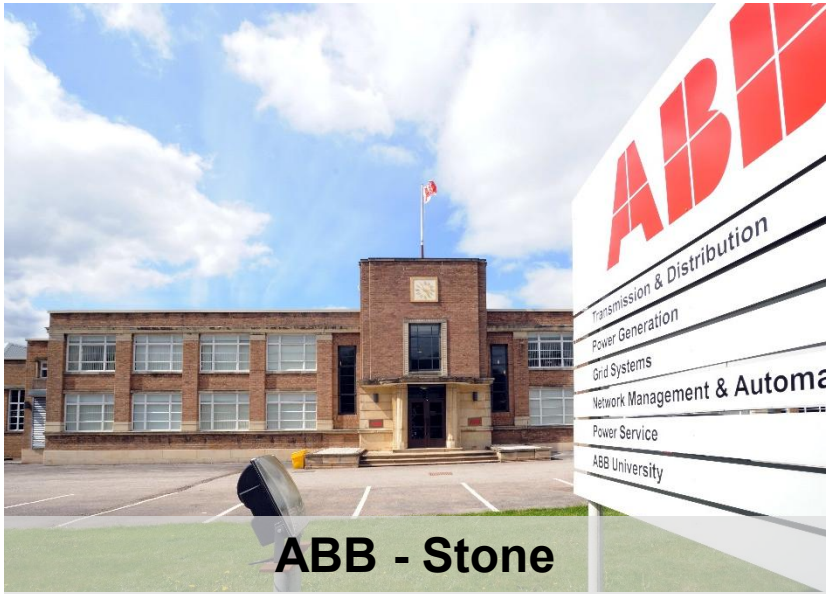


ABB - Stone

KMF - Newcastle

BRI STOR - Stafford

Capula - Stone

TECHNOLOGY FACULTY

PRODUCT DESIGN
INDEPENDENT LEARNING PLAN

AS Product Design

Criterion 1- Investigating the Design Context (6 Marks)

- ☐ **Situation/ Design Brief**, including analysis. *(1 page)*
- ☐ **Task Analysis**, including summary of content and action plan. *(1 page)*
- ☐ **Customer Profile**, including interview & collage *(1 page)*
- ☐ **Incentive Gifs Research**, include a justification of content and summary of findings. *(1 page)*
- ☐ **Existing/ Similar Products**, including detailed analysis using Dic ACCESS FM criteria. *(1 page)*
- ☐ **Product Analysis**, including images and summary. *(1 to 2 pages)*
- ☐ **Design Detailing Specification**, reflecting initial research and investigation. Use of ACCESS FM. *(1 page)*

Criterion 2- Development of Design Proposals (12 Marks)

- ☐ **Initial Concepts**, 6 to 10 designs using free- hand sketching techniques (or CAD), coloured and annotated using ACCESS FM. *(1 page)*
- ☐ **Concept Development**, further development of 1 to 3 initial concepts. Use a mixture of free- hand sketching techniques and CAD. *(1 to 2 pages)*
- ☐ **Prototype Development**, development of 1 chosen concept through modelling, to scale (if possible) so it can be tested. Include photographic evidence and detailed analysis of your finding, highlighting any problems and modifications. *(1 to 2 pages)*
- ☐ **Research**, relevant to the stages of development. You must identify how your product has implications of a wide range of issues including social, moral, environmental and sustainability.
- ☐ **Electronics**, justification of chosen technology, costing and evidence PCB development (if appropriate.) *(1 page)*
- ☐ **Final Design**, detailed images (using CAD) of the final design, including engineering drawings and final renderings. this can include the use of Photoshop. *(1 page)*
- ☐ **Manufacturing Specification**, this must be a detailed list of criteria which specifics exactly how the product will be manufactured.

Criterion 3- Making (12 marks)

- ☐ **Plan of Manufacture**, including a description of each stage, tools and equipment used, health and safety precautions and quality control/ assurance. *(1 to 2 pages)*
- ☐ **Final Product**, complete, working, a high quality finish, clear use of a range of skills/ techniques including Computer Aided Manufacture. *(1 page)*
- ☐ **Testing**, appropriate testing has been applied at necessary stages of the manufacture with photographic evidence.

Criterion 4- Testing and Evaluation (12 marks)

- ☐ **Testing**, photographic evidence of the product in use and feedback from the intended user. *(1 page)*
- ☐ **Evaluation**, comparing the finished product against the initial specification and identifying any further modifications highlighted during the testing. *(2 page)*
- ☐ **Industrial Processes**, links to how the product could be commercially manufactured. *(1 page)*

Criterion 5- Communication (6 marks)

- ☐ The number of A3 pages in the folder is kept within the 25 page limit.
- ☐ Spelling and punctuation is consistently of a high standard.
- ☐ Clear use of a range of communication skills, including ICT.

Criterion 1 Mark Band	Investigating the design context
7-8	• Discrimination shown when selecting and acquiring relevant research that will promote originality in designing • Excellent understanding and analysis of the design context • Detailed analysis of relevant existing products or systems undertaken related to design intentions • Comprehensive analysis of relevant and focussed research undertaken • Clear and specific design criteria identified, reflecting the analysis undertaken • Target market identified and the intended consumer/user profiled

Criterion 2 Mark Band	Development of design proposals (including modelling)
26-32	• Imaginative and innovative ideas have been developed, demonstrating creativity, flair and originality. Further developments made to take account of ongoing research • A coherent and appropriate design strategy, with clear evidence of a planned approach, adopted throughout • The implications of a wide range of issues including social, moral, environmental and sustainability, are taken into consideration and inform the development of the design proposals • Excellent development work through experimentation with a wide variety of techniques and modelling (including CAD where appropriate) in order to produce a final design solution • Appropriate materials/ingredients and components selected with full regard to their working properties • Fully detailed and justified product/manufacturing specification taking full account of the analysis undertaken

Criterion 3 Mark Band	Making
26-32	• Final outcome(s) shows a high level of making/modelling/finishing skills and accuracy • Selected and used appropriate tools, materials and/or technologies including, where appropriate, CAM correctly, skilfully and safely • Worked independently to produce a rigorous and demanding outcome • Quality controls are evident throughout the project and it is clear how accuracy has been achieved • The outcome has the potential to be commercially viable and is suitable for the target market

Criterion 4 Mark Band	Testing and Evaluation
9-12	• Detailed testing and evaluation as appropriate throughout the designing and making process taking account of client/user or third party opinion • All aspects of the final outcome have been tested against the design criteria and/or the product/manufacturing specification • Evaluate and justify the need for modifications to the product and consideration given as to how the outcome might need to be modified for commercial production

Criterion 5 Mark Band	Communication
5-6	• Design folder is focussed, concise and relevant and demonstrates an appropriate selection of material for inclusion • All decisions communicated in a clear and coherent manner with appropriate use of technical language • The text is legible, easily understood and shows a good grasp of grammar, punctuation and spelling

AS Unit 1 (PROD 1) Materials, Components & Application

Materials and Components

- To list the definitions of the different material and component groups. *(Knowledge)*
- To identify suitable applications (uses) for the materials and components. *(Application)*
- To describe why these materials and components affect the function, manufacture and aesthetics of a product. *(Evaluation)*

Student Levelometer (Weak – Secure)

Natural Woods (Hardwoods / Softwoods)	Oak ☐	Ash ☐	Mahogany ☐	Pine ☐	Spruce ☐	Douglas Fir ☐
Man-made Boards	Plywood ☐	Ply-ply ☐	MDF/ HDF ☐	Chipboard ☐	Blockboard ☐	Marine Ply ☐
Laminates & Veneers	Beech ☐	Ash ☐	Oak ☐	Formica ☐	Paper ☐	Foil Backed ☐
Ferrous Metals	Mild Steel ☐	High Carbon Steel ☐	Cast Iron ☐	Wrought Iron ☐	☐	☐
Non-Ferrous Metals	Aluminium ☐	Copper ☐	Gold ☐	Silver ☐	Zinc ☐	Titanium ☐
Alloys (Ferrous and Non-ferrous)	Stainless Steel ☐	High Speed Steel ☐	Die (Tool Steel) ☐	Brass ☐	Pewter ☐	Aluminium Alloys ☐
Polymers (Thermoplastic)	Acrylic (PMMA) ☐	High Impact Polystyrene(HIPS) ☐	ABS ☐	PET ☐	Expanded Polystyrene ☐	Low and High Density Polyethylene ☐
Polymers (Thermosets)	Epoxy Resins ☐	Polyester Resins ☐	Melamine Formaldehyde (MF) ☐	Urea Formaldehyde (UF) ☐	☐	☐

Duck Storage Unit...

Aesthetics:
To get the aesthetics of this product right, I designed it twice, both times using different colours (as can be seen below). I think the basic and simple colour scheme gives off a professional and high quality appearance. The colours used are gender neutral, as to suit both genders, and the simplicity of the design means that it appeals to both the customer (most likely adults) and the clients (most likely the children aged 4-8).

Cost:
To produce this product, I estimate that it would amount to approximately £90 depending on the materials used (hardwoods would increase the price, softwoods would decrease the price). I would therefore sell it for around £150, as to make a reasonable profit. This is, in my opinion, good value for money.

Customer:
My usual customer will most likely be adults, either parents, or members of staff at a primary school. Their preference will probably be a product which saves space, increases organisational skills and is accessible to both themselves and the children.

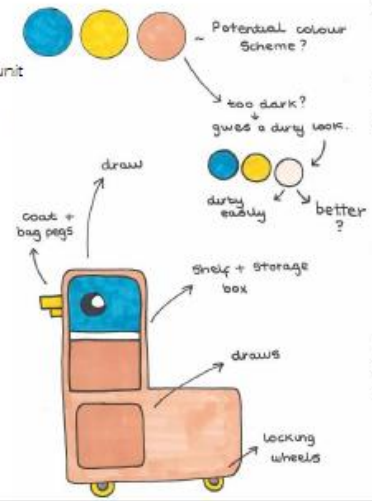
Environmental Impact:
In order to make this product environmentally friendly, I intend to make the majority of this product out of wood, as it is a renewable resource and can be recycled after use, reducing the use of fossil fuels e.g. Plastic, made of oil.

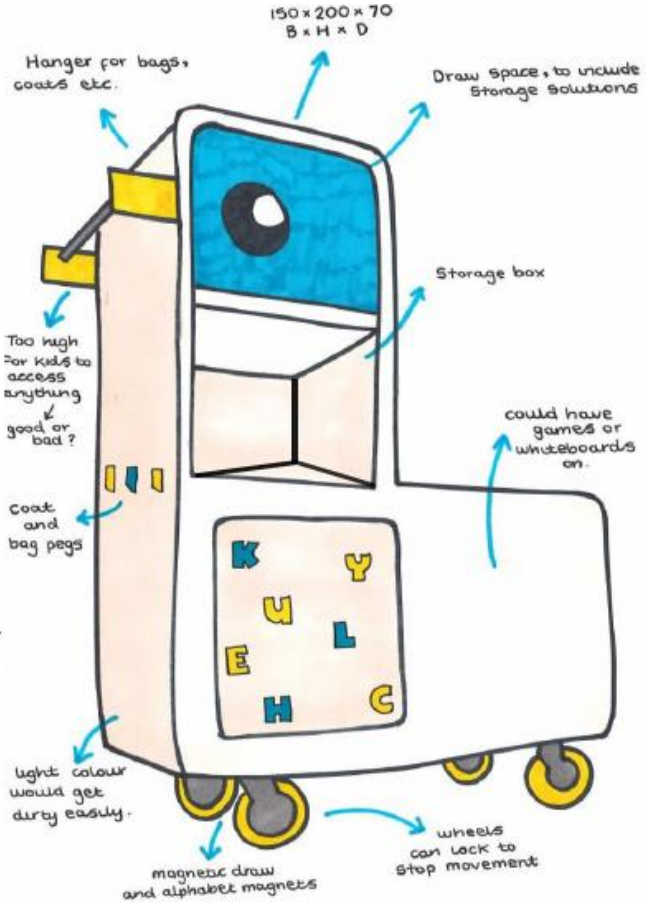
Safety:
To ensure that this product is as safe as possible, the wheels on the bottom of this unit lock into place, restricting its movement and avoiding it from moving in any way if necessary. Furthermore, as I plan to create this product from wood, to ensure its safety, I will file it down so there are no splinters or sharp edges.

Size:
The product will have a base of 120cm, a height of 180cm, and a depth of 70cm, providing a large storage space. I have worked these dimensions out on the basis that the storage units will contain book bags and lunch Boxes, which shouldn't take up much space.

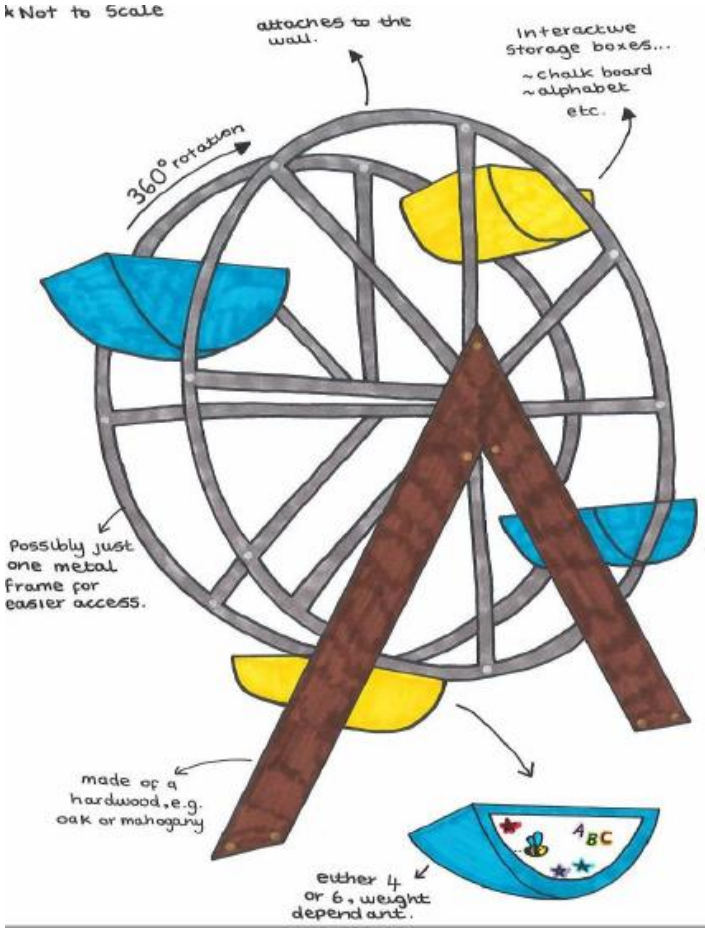
Function:
The role of this product is to improve the organization of the school. From speaking to my client, I understand that storage is something that the facility lacks, and my product helps tackle this in a multifunctional manner.

Manufacture:
I intend to make this product out of a softwood, for example pine or yew as it is less expensive than hardwoods like oak. I will also use a metal rod for the coat hanger and potentially a magnetic feature on the draw unit.





Communicating Design Ideas



Ferris Wheel Storage Unit...

Aesthetics:

To make this product aesthetically pleasing, I have kept it with a basic colour scheme that will fit in with any environment. As there is already a lot going on in the classroom regarding colours, patterns and displays, I have kept patterns to a minimum and tried to make a simple design and appearance.

Cost:

I have estimated that the cost to produce this product will be about £150, a price which should the result in a high quality and safe product. In order to make a sustainable profit, I will sell it for £210. If I were then to introduce the process of mass production, I could benefit from economies of scale, subsequently decreasing the cost and therefore selling price. In addition to this, I could also benefit from Just-in-time production, which would further decrease the cost.

Customer:

The person buying this product will most likely be adults, who will be purchasing the product for their children. In my case, the buyer will be whoever invests in furniture around the school, and the people using the product will be both the children and the staff. The staff will be looking for a product which is easily accessible and functional, whereas the children will want a fun, interactive product.

Environmental Impact:

To make this product environmentally friendly, I will try to keep the use of plastic to a minimum, I will also make my product high quality in order for it to have a long lifespan and not require any repairs. Furthermore, I will try to make my product fully recyclable, as to not impact the environment.

Safety:

There are a lot of aspects to this product which if misused could potentially be dangerous to the children. For this reason, I will put everything possible in place to reduce the risks that this product could pose. Firstly, I will ensure that there are no sharp edges or splinters on the wood. I will also ensure that the locking mechanism is only accessible to adults, as to not be misused by one of the children.

Size:

The dimensions of this product are 300cm by 300cm, however, I will firstly design and produce a ¼ scaled down model to ensure that the product works as intended. I must also re-visit my client and ensure that the dimensions of this product would fit in the classroom.

Function:

The role of this product is to be a storage unit with features at allow children to interact with it. As well as having 4 storage units, each box will also have some means to interactive activity for the children to benefit from, as can be seen in following slides.

Manufacture:

I will manufacture this product from wood, most likely softwood as it is cheaper and lighter than hardwoods, and acrylic plastic. I would also use machinery such as the CNC, laser cutter and 3D printer for aspects of the product.

Communicating Design Ideas

A Level Projects

A Level Projects

Communicating Design Ideas

A Level Projects

A Level Projects

Craft/Hobby Workstation

A2 Projects

A2 Projects

A2 Projects