

Subject: Design and Technology/Resistant Materials

Faculty Leader	Subject Leader
E.Stott	H.Heanue
National Curriculum	
The Ecclesbourne School follows the National Curriculum Design and technology is an inspiring, rigorous and practical subject. Using creativity and imagination, pupils design and make products that solve real and relevant problems within a variety of contexts, considering their own and others’ needs, wants and values. They acquire a broad range of subject knowledge and draw on disciplines such as mathematics, science, engineering, computing and art. Pupils learn how to take risks, becoming resourceful, innovative, enterprising and capable citizens. Through the evaluation of past and present design and technology, they develop a critical understanding of its impact on daily life and the wider world. High-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation. Aims: The national curriculum for design and technology aims to ensure that all pupils: • develop the creative, technical, and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world. • build and apply a repertoire of knowledge, understanding and skills to design and make high-quality prototypes and products for a wide range of users • critique, evaluate and test their ideas and products and the work of others.	
Curriculum Intent	

Key stage 3

Pupils should be taught to develop their creativity and ideas, through Design and skillful academic practical work. Running throughout each project will be at least 2 of the 5 core themes of Design and Technology: Research, Design, Make/CAD, Evaluate and Knowledge.

Pupils should be taught:

- Research- How to gather and use relevant information to explore, inspire and guide their own ideas. How to gather relevant research and use it to inform design decisions and develop knowledge.
- Design- to use a range of communication skills to create, imagine, explore and develop possible solutions to given design briefs including, but not limited to sketching, modelling, 2D and 3D CAD modelling.
- Make- to use a range of techniques and media, including papers and boards, woods. Metals and plastics to practice practical skills and produce high quality working prototypes.
- Make- to increase their proficiency in the safe operation of a range of workshop tools and equipment, whilst working with Papers and boards, Woods, Metals and Plastics.
- Evaluate- to analyze and evaluate their own outcomes, and those of others, to inspire and develop their own ideas.
- Design/Make- To make effective use of developments within technology, such as CAD/CAM to reflect the ever-changing world around them and make our pupils ready for the future world of work and employment within a skills set that is desirable to many careers paths as well as within Design and Technology sectors.

The KS3 programme is devised to ensure students use the knowledge of Research, designing, manufacturing processes and evaluation to creatively respond to the world around them. It will ensure students are equipped and ready to extend their studies beyond KS3 at the end of year 9 should they wish to take a GCSE Resistant Materials or Level 2 in Engineering Manufacture.

Due to workshop and equipment requirements differing slightly for each project, the schedule of learning outlined below may not be studied in the same order by all students. All students however, by the end of each respective year and key stage, have had equal opportunity to access the curriculum plan outlined below.

Curriculum Implementation

			Term	Content	Assessment
Year 7	Autumn-Term	1		Real world problem: How can packaging be protective but still visually appealing for retail? Design Students will start their journey in year 7 by exploring the use of pencils and crayons to express their ideas in 2D. Ensuring a solid foundation can be built on before exploring 3D drawing. Evaluate Using paper, card, scissors, craft knives, as well as CAD to cut, crease and construct 3D card structures to protect products when being transported. Students will explore the medium through hands on experimentation to ensure confidence with cutting and shaping paper and card, before extending this learning to the use of pre-cut final prototypes. SMSC: Impact of packaging on the environment. Maths: Perimetre	Attainment: E = Emerging - Some effective areas S = Secure - Good / Consistent work M = Mastery - Excellent work Effort: 5 = Outstanding 4 = Good 3 = Satisfactory 2 = Cause for Concern 1 = Serious Cause for Concern Merits are awarded for work achieving M (MASTERY) or a 5 for effort. Graded Tasks – Research, Design, Making or Knowledge: will be marked using 9-1 grades (Refer to the Design and Technology Assessment criteria grid) and 5-1 effort levels. General homework activities will be marked using the E, S, M grades along with the 5-1 effort levels. All results will be recorded on the Design and Technology assessment sheets in student booklets.

	Spring Term	2	Real world problem: How designers can better understand the needs and wants of their clients. Assessment focus areas (Research/CAD skills) Research Investigation of a client, using moodboards and surveys. Product analysis to understand the requirements of similar products, how research can inform writing of specifications. Knowledge: Students will be introduced to basic components and their symbols, polymers and where they come from, alongside their research and making which allows for skilful academic practises imbedding this knowledge Students will learn about Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM), using TechSoft 2D Design and a laser cutter to create an acrylic plaque, which is illuminated and sits on the top of the vacuum formed base containing the electronics. SMSC: Impact of CAD/CAM on society Maths: Costing	Attainment: E = Emerging - Some effective areas S = Secure - Good / Consistent work M = Mastery - Excellent work Effort: 5 = Outstanding 4 = Good 3 = Satisfactory 2 = Cause for Concern 1 = Serious Cause for Concern Merits are awarded for work achieving M (MASTERY) or a 5 for effort. Graded Tasks – Research, Design, Making or Knowledge: will be marked using 9-1 grades (Refer to the Design and Technology Assessment criteria grid) and 5-1 effort levels. General homework activities will be marked using the E, S, M grades along with the 5-1 effort levels. All results will be recorded on the Design and Technology assessment sheets in student booklets.
--	-------------	---	---	--

Year 8	Summer Term	3	Real world problem: How lighting can reduce anxiety for children or adults to aid sleep Assessment focus areas (Knowledge/Make) Knowledge: Students will be reintroduced to the different categories of polymers; thermosetting and thermoplastics, and be able to identify the difference between them. Circuit symbols and diagrams as well as the theory of how circuits work. Knowledge of properties and uses of common Thermoplastic processes. Making: These will include an introductory opportunity to use electronic devices for the first-time including resistors, transistors, light dependent resistors, light emitting diodes and variable resistors and the function each component performs within the circuit. Students will recap the vacuum forming process and how to use a disc cutter, finishing edges of plastics then use this knowledge to form and cut out the case for their night light. Students will learn how to assemble, correctly identify components, populate and solder a printed circuit board in order to build a functioning nightlight. SMSC: Impact of Polymers on the environment and Inclusive design Maths: Volume	Attainment: E = Emerging - Some effective areas S = Secure - Good / Consistent work M = Mastery - Excellent work Effort: 5 = Outstanding 4 = Good 3 = Satisfactory 2 = Cause for Concern 1 = Serious Cause for Concern Merits are awarded for work achieving M (MASTERY) or a 5 for effort. Graded Tasks – Research, Design, Making or Knowledge: will be marked using 9-1 grades (Refer to the Design and Technology Assessment criteria grid) and 5-1 effort levels. General homework activities will be marked using the E, S, M grades along with the 5-1 effort levels. All results will be recorded on the Design and Technology assessment sheets in student booklets.
	Term		Content	Assessment
Year 8	Autumn Term	1	Real world problem: How can mechanisms be used to make a personal workspace more flexible for learning Assessment focus areas (Make/Evaluate) Make: Cutting and shaping of manufactured boards and metals, jigs and templates, Knowledge and execution of mechanisms, levers and linkages. Evaluate: Ongoing feedback through self-reflection making plans are created to ensure students are organised and can evaluate what they may need or not need to support the manufacture of their final prototypes. Written evaluations to formally discuss the success and failures of their designs. SMSC: How simple mechanisms can assist humans	Attainment: E = Emerging - Some effective areas S = Secure - Good / Consistent work M = Mastery - Excellent work Effort: 5 = Outstanding 4 = Good 3 = Satisfactory 2 = Cause for Concern 1 = Serious Cause for Concern Merits are awarded for work achieving M (MASTERY) or a 5 for effort. Graded Tasks – Research, Design, Making or Knowledge: will be marked using 9-1 grades (Refer to the Design and Technology Assessment criteria grid) and 5-1 effort levels.

			Meths: Reading Data	General homework activities will be marked using the E, S, M grades along with the 5-1 effort levels. All results will be recorded on the Design and Technology assessment sheets in student booklets..
	Spring Term	2	Real world Problem: How can we make everyday school essentials that support learning difficulties Assessment focus areas (Knowledge/CAD) Knowledge: CAD for technical drawing, third angle design communication style introduced and used to inform designs. Forces, stresses, tension/compression, material properties impact on material selection. Making: Working from technical drawings to generate accurate CAD drawings, laser cutting process. SMSC: Understanding the needs of SEND/inclusive design. Maths: Angle measuring	Attainment: E = Emerging - Some effective areas S = Secure - Good / Consistent work M = Mastery - Excellent work Effort: 5 = Outstanding 4 = Good 3 = Satisfactory 2 = Cause for Concern 1 = Serious Cause for Concern Merits are awarded for work achieving M (MASTERY) or a 5 for effort. Graded Tasks – Research, Design, Making or Knowledge: will be marked using 9-1 grades (Refer to the Design and Technology Assessment criteria grid) and 5-1 effort levels. General homework activities will be marked using the E, S, M grades along with the 5-1 effort levels. All results will be recorded on the Design and Technology assessment sheets in student booklets.
	Summer term	3	Real world Problem: How can the work of others inspire our designs Assessment focus areas (Design/Research) Design Using the work of Ettore Sottsass, students explore the use of geometric shapes and asymmetry to design innovative and creative designs for a desk organiser. Research Biomimicry using nature to inspire our design, researching the work of famous designers to inform design decisions. Understanding the 3D	Attainment: E = Emerging - Some effective areas S = Secure - Good / Consistent work M = Mastery - Excellent work Effort: 5 = Outstanding 4 = Good 3 = Satisfactory 2 = Cause for Concern 1 = Serious Cause for Concern Merits are awarded for work achieving M (MASTERY) or a 5 for effort.

			printing process, How smart materials can be used to enhance our designs. SMSC: How the natural world is used to inspire design Maths: Plotting graphs	Graded Tasks – Research, Design, Making or Knowledge: will be marked using 9-1 grades (Refer to the Design and Technology Assessment criteria grid) and 5-1 effort levels. General homework activities will be marked using the E, S, M grades along with the 5-1 effort levels. All results will be recorded on the Design and Technology assessment sheets in student booklets.
	Term		Content	Assessment
Year 9	Autumn Term	1	Real world problem: How can we help students manage focus, anxiety, or restlessness in the classroom without distracting others Assessment focus areas (CAD/knowledge) CAD Students are introduced to Fusion 360 CAD software to generate 3D printed parts for their fidget toy and using high definition rendering of final CAD designs. 2D design skills continue to be developed and revisiting of laser cutting process Knowledge: Gears, Gear ratios, motion types, making Manufactured board stock forms e.g. MDF. SMSC: Understanding the needs of others/Inclusive design. Impact of mass manufacturing on the environment/society.	Attainment: E = Emerging - Some effective areas S = Secure - Good / Consistent work M = Mastery - Excellent work Effort: 5 = Outstanding 4 = Good 3 = Satisfactory 2 = Cause for Concern 1 = Serious Cause for Concern Merits are awarded for work achieving M (MASTERY) or a 5 for effort. Graded Tasks – Research, Design, Making or Knowledge: will be marked using 9-1 grades (Refer to the Design and Technology Assessment criteria grid) and 5-1 effort levels. General homework activities will be marked using the E, S, M grades along with the 5-1 effort levels. All results will be recorded on the Design and Technology assessment sheets in student booklets.
	Spring term	2	Real world problem: How can we use traditional and modern methods of manufacturing come together to make a product Assessment focus area: (Evaluate/Making) Evaluate Students will sit an end of KEY STAGE 3 assessment of their knowledge, this will include knowledge of the following areas: Materials: woods, metals and polymer material properties, applications, adhesives and finishes. Process: how to work with safely and accurately mark out and cut a range of timber based materials.	Attainment: E = Emerging - Some effective areas S = Secure - Good / Consistent work M = Mastery - Excellent work Effort: 5 = Outstanding 4 = Good 3 = Satisfactory 2 = Cause for Concern 1 = Serious Cause for Concern

			Components and knock down fittings used in timber based products. Use of jigs and fixtures to work within tolerance. Scales of production: batch production, Timber material properties, Making: Traditional woodworking methods and joints, to construct more complex joints such as mortice and tenons and cross halving joint which are used to make the frame of the softwood table. KD fittings are utilised. Accurate measuring and marking out of wood is essential for a successful product outcome. The use of Jigs also builds on their knowledge from year 8 and supports students accuracy. SMSC:	Merits are awarded for work achieving M (MASTERY) or a 5 for effort. Graded Tasks – Research, Design, Making or Knowledge: will be marked using 9-1 grades (Refer to the Design and Technology Assessment criteria grid) and 5-1 effort levels. General homework activities will be marked using the E, S, M grades along with the 5-1 effort levels. All results will be recorded on the Design and Technology assessment sheets in student booklets.
Summer term	3	Real world problem: How can we design, protective, and appealing packaging for small tactile products like fidget toys Assessment focus area: (Design/Evaluate) Evaluate Evaluating user needs, Understanding design specifications and evaluating our finished products against a specification, Critical analysis and evaluation of products Design: Designing 2D creative and appealing packaging using photoshop SMSC: How design specifications can support the design of user centred design. Maths: Bar charts	Attainment: E = Emerging - Some effective areas S = Secure - Good / Consistent work M = Mastery - Excellent work Effort: 5 = Outstanding 4 = Good 3 = Satisfactory 2 = Cause for Concern 1 = Serious Cause for Concern Merits are awarded for work achieving M (MASTERY) or a 5 for effort. Graded Tasks – Research, Design, Making or Knowledge: will be marked using 9-1 grades (Refer to the Design and Technology Assessment criteria grid) and 5-1 effort levels. General homework activities will be marked using the E, S, M grades along with the 5-1 effort levels. All results will be recorded on the Design and Technology assessment sheets in student booklets.	

- **KS3** swift boxes
- **KS 4** Lunchtime/After school – Open access and homework support
- **KS 5** Lunchtime/After school – Open access and homework support

Resources

- Ecclesbourne School Design and Technology work displays in class room bases– exemplar material.
- Ecclesbourne School revision zone on the student portal: [Revision Zone - Technology](#)
- Show My Homework – quizzes and tasks
- Website
 - [For Education - D&T Association \(data.org.uk\)](#)
 - [GCSE Design and Technology - AQA - BBC Bitesize](#)
 - [Cambridge Nationals - Engineering Manufacture Level 1/Level 2 – J823](#)