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 4 core strands of Design and Technology: Research, Design, Make and Evaluate.

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 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, 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 course.

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, the year 7 packaging project being the exception. 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	**Project: Packaging** **Assessment focus areas (Design)** **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. **Making:** Using paper, card, scissors, craft knifes, as well as CAD to cut, crease and construct 3D card structures for the new Ecclesbourne inspired chocolate confectionery. 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.	**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	**Project: Nightlight** **Assessment focus areas (Knowledge/Research/making)** **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. **Research**: Knowledge of properties and uses of common Thermoplastic's, global festivals on light mood-board, Components used with in their circuit including dimensions of components, product analysis of exiting nightlights and client profile. **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. 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. 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 thies knowledge SMSC: Cultural links to global festivals of light: St. Lucia's Day in Sweden, Hanukkah, Loi Krathong Festival in Thailand, Diwali in India, Christmas in the Philippines and Bonfire night—UK	**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	**Project: Tangram** **Assessment focus areas (Knowldge/Make)** **Knowledge:** The difference between hardwood, softwoods, and manufactured boards. Properties and uses for a range of timber based materials How to accurately measure and mark out timber Working out surface areas. **Making:** Cutting and shaping of woods and manufactured boards using a Tenon saw as well as edge finishing, surface treatments and assembling using glue. Cutting wood joints and measuring and marking out with accuracy and introduction to the use of templates to support accuracy of marking out and cutting. SMSC: Deforestation and how the use of colour in Chinese culture differs to others.	**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	**Project: Table centre piece** **Assessment focus areas (Design/Evaluate)** **Design:** In year 8 students start to explore how design can be iterative and develop from sketching to 3D modelling using a mixture of paper and card to communicate their design ideas. Freehand sketching is used to explore early designs One point perspective drawing is introduced to refine and finalise ideas. 2D paper and 3D card modelling is then explored to communicate their developed ideas further and explore the limits of their ideas. **Evaluate:** Ongoing feedback through group discussions is used to enable developments of ideas to evolve. 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.	**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**.

			Written evaluations to formally discuss the success and failures of their designs. Peer discussions and feedback support students modifying their designs. Drawing and modelling is used to communicate improved ideas. Writing of specifications and evaluating the effectiveness of their lamp against their specification. SMSC: SIXR's, how they can be used to improve a design and reduce its impact on the environment.	**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	**Project: Angle poise lamp** **Assessment focus areas (Research/Make/evaluate)** Knowledge: Revisit the properties and uses of manufactured boards and adhesives used on timber-based products. Students will be able to name common wood working tools and the health and safety required to work with them safely. How to process timber based materials, mark out, cut and shape safely and accurately. How jigs can be used to increase accuracy and work within a tolerance. Introduce common knock down fittings and components used within timber-based manufacturing. **Research:** Students will learn how to research and draw conclusions about the design of their product by looking at existing products. Use of mood boards/images and product analysis to inform and inspire their design thinking. **Making:** Accuracy of drilling will be achieved through the use of jigs. An open brief for students to develop their own lamp shade solution out of either laser cut/engraved acrylic or ply wood, further developing and enhancing student's design decision making and knowledge of the physical and aesthetic properties of materials, whilst further refining CAD/CAM skills. SMSC: How electricity is generated and the impact of burning of fossil fuels on the environment.	**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 9	Autumn Term	1	Project: V&A Challenge **Assessment focus areas (Research/Design/Evaluate)** **Research:** Students initially discuss and explore possible themes given to them from the V&A each year (23-24 themes are Play, Restore, Sense) Students use mind-maps can be used to explore themes and discuss possible directions their research may need to go. Students are shown inspirational work of others via video which can be used to inspire their thinking around what research is and how to gather it. The exploration of the work of others through images and tasks to challenge their perceptions and encourage out of the box thinking. Product analysis of existing products through observations and annotation to inspire and focus their own design thinking. Working in teams to cover a varied range of research areas to ensure their product is fit for purpose. Using research to write their own design briefs and specifications. **Design** In year 9 students solidify their ability to design and develop from sketching to 3D modelling using a mixture of paper and card to communicate their design ideas. Freehand sketching is used to explore early designs. Isometric drawing is revisited to further develop and finalise design ideas. 2D paper and 3D card modelling is then explored to communicate their developed ideas further and explore the limits of their ideas. **Evaluate:** Ongoing feedback through group work and client feedback is used to enable developments of ideas to evolve. Written evaluations to formally discuss the success and failures of their designs. Peer discussions and feedback support students modifying their designs. Drawing and modelling is used to communicate improved ideas. Writing of specifications and evaluating the effectiveness of their final design against their specification. Modified sketches can be used to communicate alternative outcomes based on client and third-party feedback. SMSC: Opportunity for students to work with local communities and groups to explore their given themes.	**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.

		2	**Cultural coffee table project** **Assessment focus area: (Research/ Knowledge/Making)** **Research**: Students initially explore the idea of culture to gain an understanding of what it encompasses and how different cultures embody certain colours, patterns and styles. Students research a culture of their own choosing and produce a carefully considered inspiration board to illustrate that culture. Students also conduct research into their different joining methods they will be using in the manufacture of their coffee table. These include traditional joint methods of Mortise and Tenon and Cross-halving joints. In contrast to contemporary KD fittings including scan fittings and modesty blocks. Students research Hardwoods and softwoods to gain an understanding of their properties and uses. **Knowledge:** 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. Components and knock down fittings used in timber based products. Use of jigs and fixtures to work within tolerance. Maths: surface areas, volume and simple costing. What a specification is and how to write a design specification. **Making:** Traditional woodworking methods and joints, which will build on the practical experiences they had in Year 7 and 8 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, building on knowledge from year 8. 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. Decoration and protective finishing techniques are applied to the table. SMSC: Research of cultural styles and imagery from across the globe.	**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.

Extra-Curricular Opportunities

- **KS3** swift boxes- open to year 9 only.
- **KS3:** Graphic communication skills club- open to all KS3.
- **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 website – exemplar projects and resources
- Show My Homework – quizzes and tasks
- Websites:
  ENGINEERING - DESIGN AND TECHNOLOGY (technologystudent.com)
  :: Welcome to www.mr-dt.com - A Design & Technology Website ::
  For Education - D&T Association (data.org.uk)
  GCSE Design and Technology - AQA - BBC Bitesize