

Year 10

The key stage four course is structured with a deliberate blend of theory and practical instruction and practice, weaved together to secure pupil understanding of concepts and give opportunity to apply knowledge to the making process. Using the course time we begin units with clear subject theory instruction, sharing key concepts and examples of processes. Explicit links are made to relevant ideas from key stage 3 such as those relating to construction and making with wood, metal and plastic. The year 10 course builds on this for example deepening student understanding of metalwork such as joining, finishing and industrial concepts like: scale, pressing, stamping and shaping.

All the while, the substantive knowledge taught early on in units is revisited and added to throughout the unit by during teacher demonstrations, homework assignments and class feedback. As each unit progresses students move from research to the design and production phase with increased modelling and practice of practical skills related to the concepts they have learned.

The course starts with the design and make of a metal bottle opener. We choose to teach about the material and the processes associated with metal in depth, introducing ideas as the students explore the raw material. Metal makes sense to begin with as it is a material that offers pupils versatility in terms of what they can mould, shape and create from - it is a material that is more forgiving, than say wood, for pupils to work with and therefore they can produce something of substance at the end of the project, which genuinely excites.

This initial project also enables the students to develop their iterative design skills - the bottle opener is a perfect item for this because it affords the opportunity to create something unique in look and also functional. The iterative design skills we teach are sketching and modelling techniques - we call 'squiggle and blend' - which are used to enable pupils to explore shape and look differently at aesthetics, getting them away from default ideas about what items, such as an opener, would look like. This all happens before students improve their making skills in metal.

We feel card modelling is extremely important in the development of a product. Students are encouraged to explore, make errors, assess function and shape of their bottle opener.

They reconsider ergonomics and develop a range of creative designs. These skills help them to be creative when faced with the GCSE project.

The metal used is a thicker gauge aluminium than they are used to, to allow for complex durable designs to be made. This allows them to experience the use of junior hacksaws and hacksaws, to use metal vices and a range of abrading hand tools. Drilling thicker gauge metal develops understanding of the problems associated with machining more substantial materials, including the health and safety issues around machine tools. Students use a range of 'finishing' processes to create a quality artefact. At this stage we then introduce the vacuum forming process and students produce a graphic design suitable for a blister- pack which they finally make to encase their product ready for sale.

The students move on to a challenging focused practical task to construct a wooden box. This is taught at this stage to develop students' ability to assemble various parts, understanding that they must work as a whole and that fit and accuracy is extremely important when making a quality product. This wood based project also allows us to develop students' construction skills. They learn how to make finger joints and lap joints and the theory of other types of joints. This gives them the knowledge to make informative decisions when designing for making. They gain an understanding of timber and the impact that it has on the environment when it is used. This is beneficial in giving them an understanding of the complex environmental issues associated with using this material. Accuracy is improved with the tools used include those suitable for marking-out on wood alongside

cutting tools including chisels, the tenon saw, coping saws and the electric fret saw. Assembly is looked at ensuring quality assurance with fit, using PVA adhesive and a range of clamping devices. Different types of wood finish are taught and their suitability to different applications considered and students wax their designs. Skills appropriate to working with Plastics are taught to allow students to experience more assembly techniques so that they can make a tray that fits inside the box. This allows students to produce it in card as a template followed by plastic using the hot wire strip heater.

After that project, students make a plastic picture frame. This is another focused practical task that helps students develop skills and knowledge in shaping. This is a quick project that improves confidence with working in this versatile material. It is taught at this stage to show students the process of forming and to also teach injection moulding and blow moulding. Students use coping saws, electric fret saw, files, wet and dry paper to recap skills already taught so that they can be ready for their GCSE project.

Alongside these projects, students will develop and improve their computer aided design skills using various computer packages. This could be using programs like 2D Design V2 or Sketchup to present their designs as final designs and in orthographic. These skills are revisited throughout Yr10 as students tend to forget them if they do not use them on a regular basis. These skills are considered to be essential in design and help students communicate their ideas in a professional way.

In the month of June in Year 10, students start their main project for GCSE assessment. In preparation for this, they are given materials to test-out and improve joining, drilling and cutting skills used in the previous projects. This is a good recap for the students and highlights any weaknesses they still might have with the skills they have learnt over the year. This is recorded for future use. Following on from this, they brain-storm and start to research their GCSE task.