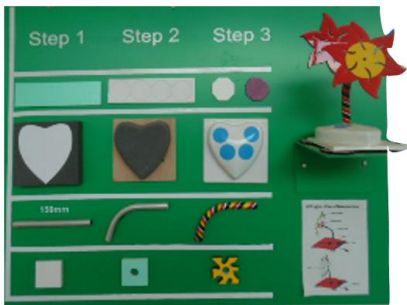


Year 9 Engineering Design Option

Year 9 Engineering design focuses on enhancing the skills and knowledge developed in Yr7 & Yr8 Design & Technology to provide students with the necessary skills, knowledge and understanding to independently complete coursework and examination content in Yr10. Students will complete a range of practical based projects to develop knowledge and skills using different materials, tools and equipment, including Computer Numerically Controlled (CNC) equipment. Students will also develop technical drawing (Engineering drawing conventions) and design skills, including the use of Computer Aided Design (CAD) packages. Students will also develop an understanding in areas such problem solving, critical thinking, sustainability, careers and work based qualities such as teamwork and communication.

Engineering Design students in year 9 will complete a range of projects and tasks, which include:

LED Lamp



Instruction Board

Project description: Students will design and manufacture a desk-top LED light.

Designing: Students will investigate user needs & target market groups to generate a specification, and then develop designs for the different parts of the LED light using CAD & sketching techniques.

Making: students will use a range of techniques, processes & equipment to shape, form & assemble their LED Lamps, including the manufacture of a laser cut shade with CNC vinyl produced graphics. Students will use a range of tools & equipment to produce a vacuumed formed base and central pole, and using a pipe bender (often used in plumbing) to form the shape of the main pole.

Evaluate: Students will analyse & test their own and others' products and test their ideas against user needs, including references to sustainability.

Technical Knowledge: Students will develop knowledge of material properties and sustainability issues, in addition to technical knowledge of using tools & equipment. Students will understand how basic light circuits could be used in their designs / products and how electronic products are manufactured.

Prototype Games Controller



Project description: Students will design and make a model games controller to further understand some concepts of product design such as ergonomics, anthropometrics, aesthetics and function.

Designing: Students will investigate existing products using ACCESSFM (criteria headings for analysis), and research anthropometric data and ergonomically designed products to create their own design for a games controller.

Making: Students will use a range of tools & equipment to produce a Styrofoam model of a games controller and then cut this in half to create a mould for creating a vacuum formed case. Students will design use the laser cutter and 3D printer to manufacture dials, buttons and joysticks, and use the CNC vinyl cutter to create graphics.

Evaluate: Students will study the history and evolution of games controller design and then analyse & test their own and others' products against user needs.

Technical Knowledge: Students will develop knowledge of material properties, plastic forming techniques, and computer aided manufacture techniques.

Pop Rivet Container



Project description: Students will design a container and use fabrication techniques, including pop riveting, manufacture their containers. Students will then use their creativity and innovation to develop the container into a marketable product.

Designing: Students will focus on marketing techniques to assess user requirements. They will then develop designs using freehand sketches and formal engineering drawing techniques to demonstrate design solutions. Students will then design additional features to create a marketable box e.g. secret locks, themes, lids, secret compartments.

Making: students will use a range of techniques, processes & equipment to shape, form & assemble their containers from an engineering drawing, using pop riveting to join the sides.

Evaluate: Students will evaluate their designs by undertaking a product analyses if each other's designs.

Technical Knowledge: Students will develop knowledge of material properties, plastic & aluminium forming techniques, and the use of fabrication techniques & fixings.

Bottle Opener



Project description: Students will use a provided engineering drawing to cut and shape a bottle opener blade from 3mm mild steel. They will then design and make a handle from PVC using knowledge of anthropometrics and ergonomics.

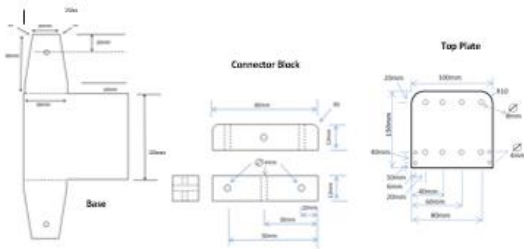
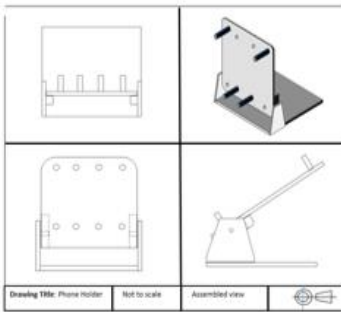
Designing: Students investigate user needs, including ergonomics, to design a handle for their bottle opener using CAD & sketching techniques.

Making: students will use a jig and pillar drill to create the initial hole, then use techniques, processes & equipment to cut and shape the bottle opener blade, as on the engineering drawing, including the use of taps to create a screwthread to attach a handle. Students will then use a range of equipment to produce a handle from 10mm PVC, which will be secured to the blade using machine screws.

Evaluate: Students will evaluate the accuracy of their product and the effective use of tools & equipment. They will then test the function of their products.

Technical Knowledge: Students will develop knowledge of material properties (Mild steel & PVC) and sustainability issues. Students will gain skills in using machinery and techniques of shaping and fabricating metal.

Mobile Phone Holder



Project description: Students will build on their knowledge of interpreting engineering drawings by manufacturing a mobile phone holder from an engineering drawing. Students will then use CNC vinyl cutters and laser cutters to add features to their phone holder.

Designing: Students will investigate user needs & target groups to generate a specification & ideas to address user requirements. Students will then use computer aided design to add features to their phone holder designs to meet a specific target group.

Making: students will use a range of techniques, processes & equipment to shape, form & assemble their phone holders. Students will use tools & equipment to shape a base and top section, then use machinery and hand tools to shape, drill and form aluminium connector blocks. The phone holder parts will then be assembled and students will add features.

Evaluate: Students will analyse & test their own and others' products and test their ideas against user needs.

Technical Knowledge: Students will develop knowledge of material properties (aluminium & PVC) and sustainability issues. Students develop further knowledge of reading engineering drawings and using CAD packages. Students will also gain knowledge of using machinery to shape aluminium & PVC.

Desk Top Speaker



Project description: Students will design and make a desk top speaker using an electronic circuit and speaker provided. Students will design and manufacture a case for their desk top speaker using a range of different materials.

Designing: Students will develop a specification and use this to create different 2D & 3D design ideas using sketching techniques and a range of rendering to present design ideas for their desk top speaker case.

Making: Students will use a range of tools, equipment and processes to manufacture their desk top speakers, including soldering components to their speaker circuits.

Evaluate: Students will test their designs against their specification, and carry out a product analysis against headings (using ACCESSFM)

Technical Knowledge: Students will develop knowledge of electronics and circuit construction, in addition to a range of fabrication and forming techniques.

Skills for Trades



Carpentry & Joinery Plumbing Building



Electrical Installation Bricklaying Plastering



Welding Automotive Shop fitting

Description: Students will complete different focused practical tasks throughout the year which are linked to various trades. These focused tasks will be predominantly in school; however, some tasks may be completed during visits and trips, or delivered by visiting trade specialists.

Technical Knowledge: Students will develop knowledge and skills related to a range of trades. For example, students may make a housing joint linked to carpentry & joinery, or wire a light socket linked to electrical installation.

Computer Aided Design & Computer Aided Manufacture



3D printing Laser Cutting CNC Vinyl Cutting

Description: Students will complete a range of Computer Aided Design (CAD) tasks using different packages, ranging from MS Word, Google-Sketch-Up and Techsoft 2D Design to Solid Works.

Technical Knowledge: Students will develop knowledge of CAD drawing techniques using a range of packages and to use Computer Aided Manufacturing (CAM) equipment such as laser cutters, vinyl cutters and 3D printing. Students will also gain knowledge of how CAD / CAM is used industry to manufacture products.

Focused Tasks



Product disassembly & analysis



Description: Students will complete a range of focused tasks to develop knowledge & skills. These tasks are mainly linked specifically to developing the knowledge required for examination work starting in year 10.

Technical Knowledge: Students will develop knowledge of key engineering design concepts such as:

Disassembly & Product analysis