Engineering

Year 7

Health and Safety
Throughout Year 7, students will learn about the Health and Safety rules to consider when working on computers, using CAM, and when doing practical in the workshop.

Hardwoods and Softwoods
Students will develop their knowledge of timber and sheet materials. They will investigate the properties of hardwoods and softwoods and how they are stocked. Further research is made into the sustainability of woods and how the wood is sourced and transported.

Manmade Boards
Students will gain a theoretical and practical working knowledge and understanding of manufactured boards. Students will gain an understanding of how they are made, the uses of the woods. Pupils will have the choice of choosing between MDF and Plywood and evaluations are carried out to justify their choices.

Manufacturing Processes
Students will learn how to manufacture products using manmade boards, hardwoods, and softwoods. They will explore the health and safety of the different materials and will investigate the different finishing options.

Communication
Students will study the different communication methods used by engineers. They will start by investigating the primary methods of communicating globally such as email, conference video calling and using data clouds. Pupils will then look into the different types of engineering drawings, with a primary focus on Isometric and Perspective Drawing.

Practical Skills
The students will apply the theoretical skills developed throughout the term and will create a practical product. They will manufacture an MDF and Plywood Jigsaw using CAD/CAM and wood working tools: coping saw / tenon saw / hand files / scroll saw / belt sander.

Year 8

Health and Safety
Throughout Year 7, students will learn about the Health and Safety rules to consider when working on computers, using CAM, and when doing practical in the workshop.

Communication
Students will study the different communication methods used by engineers. They will develop their isometric and perspective sketching. Pupils will then look into the different types of engineering drawings, with a primary focus on Orthographic Sketching on paper and on SolidWorks.

Polymers
Students will develop their knowledge of thermosetting and thermoforming plastics. They will investigate the properties of the different polymers and how they are stocked. Further research is made into the sustainability of polymers and how they are sourced and transported.

SMART Materials
Students will investigate Smart Materials and the external factors which cause a change on the Smart materials. They will investigate the properties of the different Smart Materials and the benefit of using them for a range of age groups.

Year 9

Health and Safety
Throughout Year 7, students will learn about the Health and Safety rules to consider when working on computers, using CAM, and when doing practical in the workshop.

Communication
Students will study the different communication methods used by engineers. They will develop their orthographic drawings, and isometric and perspective sketching. Pupils will then investigate the different types of engineering drawings, with a primary focus on exploded drawings in perspective.

Manufacturing Processes
Students will learn how to manufacture products using thermoforming and thermosetting polymers, and smart materials. They will explore the health and safety of the different materials and will investigate the different finishing options.

Practical Skills
The students will apply the theoretical skills developed throughout the term and will create a practical product. They will manufacture an acrylic lamp using CAD/CAM and workshop tools: laser cutter / acrylic adhesives / jigs / wet and dry sheets / hot wire bender.

Year 10

Engineering Drawings
Students will recap the basic engineering drawings they have learn in Key Stage 3 and will develop on these skills. Pupils will learn about orthographic template sheets and using tolerances in drawings. Pupils will have a secondary focus on disassembling an engineered product then creating an isometric exploded drawing.

Communicating Design Ideas
Students will study a wide range of methods used in industry when communicating ideas and drawings. Pupils will explore the advantages and disadvantages of using cloud software packages. Pupils will also investigate the interpretation of drawings and the engineering language used in engineering drawings and engineering documents to ensure communicating is smooth and thorough.

Materials and Properties
Students must have a theoretical and practical working knowledge and understanding of how materials and properties are classified. Pupils will carry out a practical based on their theoretical knowledge of materials.

Manufacturing Processes
Students will learn how to manufacture products using ferrous and non-ferrous materials and alloys. They will explore the health and safety of the different materials and will investigate the different finishing options.

Practical Skills
The students will apply the theoretical skills developed throughout the term and will create a practical product. They will manufacture an aluminium rose using soldering skills for electrics and workshop tools: wet and dry sheets / tin snips / scriber / hand files / pillar drill / deburring tool.

Metals
Students will develop their knowledge of ferrous and non-ferrous metals. They will investigate the properties of the different metals and how they are stocked. Further research is made into the sustainability of metals and how they are sourced and transported.

Alloys and Composite Materials
Students will investigate composite materials and alloys and the benefits of combining the two materials together and enhancing their properties. They will investigate the properties of the different materials and the benefit of using them for specific uses.

Working Products
The disassembly of an engineered product and the subsequent creation of isometric exploded drawings will be the secondary focus for the students. Pupils will carry out further research on the legislative requirements of developing a product and pushing it into the market.

Design Brief and Specification
Students will understand the significance of creating a design brief and will subsequently learn how to create a design brief. Pupils will then create a design specification, with the aim of making it detailed. A practical will be carried out to manufacture a product for which the students have created a design specification,

Unit 2 NEA (20%)

- Unit 2 consists of 40 marks and is graded from Level 1 Pass to Level 2 Distinction*
- Pupils will apply their knowledge acquired into a design-and-make project.
- Unit 2 is carried out in Year 10 as the design and make aspects of the course are not required in the exam, and Unit 1 NEA content is included in the Year 11 coursework.

Mock exam
Students will be given this opportunity to assess their knowledge and understanding of the units and areas of focus for Year 11.

Year 11

Unit 1 NEA (40%)

- Unit 1 consists of 80 marks and is graded from Level 1 Pass to Level 2 Distinction*
- Pupils will apply their knowledge acquired into a making product consisting of the Year 10 topics and the following topics:

1. Managing and Evaluating Production
2. Health and Safety in the Workshop
3. Tools, Equipment and Processes
4. Engineering Achievements
5. Mathematical Techniques

Unit 3 – Exam (40%)

Unit 3 consists of 80 marks and is graded from Level 1 Pass to Level 2 Distinction*.

Students will be assessed on the units covered across years 10 to 11.

These are:

- Engineering drawings
- Materials and Properties
- Working Products
- Design Specifications
- Tools, equipment, and Processes
- Engineering Achievements
- Mathematical techniques

FORTIS Academy