

**WHAT ARE THE BIG AIMS OF YEAR 9 ENGINEERING?**

Pupils have a broad knowledge and understanding of materials although not in relation to their use and application in an engineering setting. Pupils will experience some elements of the first year of a manufacturing engineering apprenticeship.

They will know how to set and operate a range of machines including CNC machines.

They will understand how to simulate and build electronic circuits.

CAD/CAM will be used proficiently and seen as one of a number of possible manufacturing methods

**WHAT WILL EXCELLENCE LOOK LIKE IN YEAR 9?**

Pupils will understand and be able to articulate the uses of a range of electronic components, hand tools, machines and equipment and also key terminology relating to the working properties of a range of metals and other engineering materials

They will be able to produce and understand engineering drawings using correct conventions from an isometric view, on paper and computer. Pupils can use CAD/CAM to produce moulds that work effectively and produce accurate 2D and 3D engineering drawings.

Pupils can build and test their own electronic circuits.

Pupils will be able to safely manufacture products from a range of engineering materials.

**WHAT KNOWLEDGE DO THE PUPILS NEED TO ACQUIRE?**

- The working properties and uses of 5 metals (including mild steel, brass and aluminium).
- The specific meanings of properties (e.g. malleability, tensile strength) and how these affect material choice.
- Names, symbols and uses of a range of electronic components
- What is meant by “quality assurance” and “quality control”
- An appreciation of the selection and application of materials.
- What is the most appropriate manufacturing method for a given task.

**WHAT SKILLS DO THE PUPILS NEED TO DEVELOP?**

- Hand-eye coordination so that marking out is within tolerance.
- The ability to control hand tools so that practical work meets the specification.
- They will know how to produce and read accurate orthographic drawings.
- Pupils will be able set machines so that jobs can be re-produced consistently (batch production).
- Pupils will improve 2 and 3 dimensional CAD skills.
- Ability to manufacture products safely and accurately in a range of engineering materials including metals and electronics.

**WHAT MISCONCEPTIONS MAY THEY HAVE FROM PREVIOUS LEARNING?**

All metals are tough/hard. Using machines is always better than using hand tools. Engineering is a ‘boys’ subject. Electronics and engineering are separate disciplines.

**WHAT ASSESSMENTS WILL BE USED ACROSS THE YEAR TO DEMONSTRATE HOW THE PUPILS HAVE ACQUIRED THE KNOWLEDGE AND DEVELOPED THE SKILLS?**

Written responses based on material properties and uses, electronic components and their function in circuits and the stages of the casting process. Manufacturing skills will be taught and assessed via a series of focused practical tasks: PCB production and soldering of a project board, setting and operation of pewter casting equipment, drilling and polishing machines. Pupils will also produce a low carbon steel workpiece that uses most of the hand and machine tools available.