WJEC Level 1-2 Engineering Unit 1: Health and safety, implementing engineering processes and evaluating quality

Health and safety

Assessing potential risks is a process that is undertaken prior starting manufacture. It should identify what potential hazards and risks may be present. This should include both the working environment and the actual items of equipment to be used.

Deciding on control measures should focus on stating how the identified risks and hazards can be mitigated (made safe). This should include detailing about guards on equipment and specific any hazards around the working environment.

Personal protective equipment should also be identified for manufacturing stages and should only include appropriate choices suitable for the individual task being undertaken.

Health and safety should also form a part of the overall planning stages.

Implementing engineering processes

This involves the physical making of an engineering product using a range of processes to produce a product or part. These can include:

Marking out is a process where the required shape is marked onto the stock material.

Cutting can occur using a hand tool like a hacksaw, sheers or snips saw or fretsaw, or using machinery such as a metal bandsaw.

Milling uses a milling machine to cult slots in blocks of metals, and to face off edges.

Finishing is applied at the end stage of production. It could include a range of finishes such as polishing, knurling, enamelling, electroplating or anodizing.

Shaping can involve the removal of materials, called wasting, using saws, files or grinding equipment.

Drilling is a process used when a hole is required in a material. Drilling can be done using a hand drill, or drill press/pillar drill.

Brazing typically involves a brazing hearth to braze metals together forming a permanent joint.

Turning uses a machine called a lathe that can be used to turn a piece of metal to create differently shaped round pieces. It can also be used to create threads and to apply different knurled finishes.

Joining metals can be done permanently using welding, brazing, epoxy resin adhesives and soldering. Temporary methods include nuts and bolts, hinges, screws and rivets.

Soldering is used to heat join softer metals such as silver in jewellery (silver solder) or to attach electronic components to printed circuit boards.

Forming is a process used to change the shape of the material, for example by bending, compressing or extruding.

Evaluating the quality of engineered products

Engineers, manufacturers and designers need to constantly evaluate stages of manufacture to ensure that outcomes are produced in line with the given criteria. Typical examples are:

Inspection techniques can combine a range of methods that can be undertaken to ensure that the product or part meets the set criteria. They could include visual inspection, looking for manufacturing defects or sophisticated digital scanning techniques, which assess accuracy to a minute detail.

Evaluating against a success criteria requires the end product or part to be reviewed against information that may have been included in a brief or manufacturing specification.

Evaluating against engineering information requires checking against information obtained from engineering drawings. This could include checking sizes and finish details but also checking that the tolerances of the final parts are within the allowed parameters.

Quality inspection can include inspection of individual parts as they are manufactured or as they are assembled on the completed engineered product.