**Key Stage 3 Curriculum Journey: Subject year 9 carousel**

**Project 1 – Aluminium Coat Hook (10 weeks)**

**Key Content (know that… know how…):**

- Know that metals are classified as ferrous (contain iron, prone to rust) or non-ferrous (aluminium – lightweight, corrosion-resistant).
- Know how to interpret isometric/orthographic engineering drawings, including dimensions, tolerances and hidden detail.
- Know how to mark out aluminium accurately using engineers' rule, scriber, dividers and centre punch.
- Know how to cut aluminium using a hacksaw, holding securely in a vice, and keep to tolerance.
- Know how to file edges square and smooth using cross-filing and draw-filing.
- Know how to drill and countersink accurately using a pillar drill, and the importance of drilling speeds for metals.
- Know how to bend aluminium safely in a vice/jig to the required angle, considering material limits.
- Know how to apply a dip-coated thermoplastic finish after heating metal with a blowtorch.
- Know how to test the finished hook against the drawing and specification for function, strength and accuracy.

**Prior Knowledge:**

- From **Year 8 Project 1 (Organiser):** Pupils developed skills in accurate marking out, cutting, drilling and finishing timber, as well as bending acrylic with heat. This transfers into marking, cutting and bending aluminium with more precision.
- From **Year 8 Project 2 (Box with Engraved Lid):** Pupils experienced working to tighter tolerances (housing joints) and CAD/CAM precision. These reinforce the importance of accuracy when manufacturing to an engineering drawing.
- Builds on Year 8 evaluation: pupils move from "fit for purpose" evaluation to checking accuracy against **technical tolerances**.
- Builds resilience: working with aluminium is less forgiving than timber, so mistakes can't be easily sanded out.

**KS3 National Curriculum Link:**

- Select and use a broader range of specialist tools and equipment (metalworking tools, pillar drill, heat equipment).
- Apply knowledge of material properties (malleability, ductility, hardness) when choosing processes.
- Understand and apply the concept of tolerance and accuracy in manufacturing.
- Use drawings and diagrams to communicate precise technical information.
- Critique, test and evaluate products against a technical drawing/specification.

**Assessment:**

- **Knowledge:** Written task on metals classification and properties.
- **Making:** Accuracy of marking, cutting, drilling, bending, finishing.
- **Workshop Skills:** Safe and independent use of metalworking tools and machines.
- **Evaluation:** Testing hook against drawing dimensions/tolerances, functional load test.
- **Reflection:** Written evaluation including improvements and how issues could be resolved in industry.

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**Project 2 – Bauhaus USB Anglepoise Lamp (9 weeks)**

**Key Content (know that… know how…):**

- Know that the Bauhaus movement focused on functionality, simplicity, geometric form and “less is more”.
- Know how to research and analyse Bauhaus designs and apply principles to their own lamp design.
- Know that acrylic is a thermoplastic suitable for line bending and that HDPE is suitable for vacuum forming.
- Know how to measure, mark and cut acrylic arms, then bend using a strip heater and jig.
- Know how to vacuum form a HDPE base, using moulds and correct temperature control.

- Know how to design 2D profiles in Techsoft 2D Design and model assemblies in SketchUp (CAD).
- Know how to prepare CAD files for laser cutting and engraving (CAM).
- Know how to solder an LED to a USB cable safely, including polarity and insulation.
- Know how to assemble pivot joints to create adjustability in an anglepoise mechanism.
- Know how to evaluate the final lamp for safety, stability, usability, and aesthetic quality in line with Bauhaus principles.

**Prior Knowledge:**

- From **Year 8 Project 1 (Organiser):** Pupils learnt to bend acrylic safely, drill and assemble components. These skills transfer directly into producing acrylic arms for the lamp.
- From **Year 8 Project 2 (Box with Engraved Lid):** Pupils gained CAD/CAM skills (2D Design + laser cutting/engraving) and explored cultural influence on design. This builds towards using CAD/CAM again for laser-cut components, but now applying a **design movement** (Bauhaus) instead of a cultural motif.
- From **Year 9 Project 1 (Coat Hook):** Pupils reinforced accuracy, tolerances, and working with less forgiving materials. This progression prepares them for **multi-process projects** combining plastics, electronics and mechanics.
- Builds on evaluation progression: now pupils balance **functional testing** (light output, stability) with **aesthetic judgement** against a design movement.

**KS3 National Curriculum Link:**

- Research and apply design movements to inform product design.
- Select and use a wider range of materials (acrylic, HDPE, electronic components).
- Apply CAD/CAM technologies to design and manufacture functional components.
- Work accurately with thermoplastics, understanding heating/forming properties.
- Apply knowledge of electronics to create working products.
- Critique, test and evaluate products for both functional and aesthetic qualities.

**Assessment:**

- **Investigation:** Research Bauhaus movement and apply to design ideas.
- **Designing:** Sketching, CAD models (Techsoft & SketchUp), laser-cut components.
- **Making:** Accuracy of acrylic bending, vacuum forming, soldering and assembly.
- **Evaluation:** Peer and user testing (stability, light output, adjustability, Bauhaus style).
- **Reflection:** Written evaluation of success and suggested refinements for manufacture.