



# Year 9 – Metal Casting: Pewter Casting – Jewellery/Key Ring Project

## Key Concepts – Core skills I am learning: learn about metal treatment and casting

- Learn how to **cast (melt metal)** using **Pewter** to create a **Key Ring or a Jewellery** item
- Learn **manufacturing techniques** such as the **Laser Cutter** and the **'FLAMFAST' machine** in order to create an interesting and **'Creative' product**
- Selection of appropriate tools and equipment.
- CNC: Laser Cutter, to create a frame that will the help of a mould will allow you to cast metal.**
- To follow all the **H&S instructions** and **H&S Code of Conduct** set by the **Technology Department at LECA.**

## Vocabulary

**Pewter:** Pewter is an alloy - Tin is the main component of pewter, is extracted from a mineral called 'cassiterite' or tinstone and is found, in nature, mixed with other **underground** mineral deposits. The procedures needed to separate the tinstone from the other minerals are demanding.

**Casting:** The process of **melting** metal to suite a **design need**. This is a **manufacturing process** with has greater **H&S risks and implications** and require great care and maturity.

**Mould:** Done using **MDF** (Medium Density Fibre Board)

**Frame:** This is made of Grey Card sheets, as is more economical and easier to cut.

**CAD/CAM:** (Computer Aided Design and Computer Aided Manufacturing).

**Manufacturing Process:** The Laser Cutter, CNC (Computer Numerical Control) process to help us cut the 'Frame' to a high precision (QA & QA).

## Tools & Equipment

**Coping saw** is used to cut rounded intricate shapes with accuracy. The coping saw blade has the teeth pointing towards the handle, therefore, cuts on the pull stroke.

**Hand Files** are useful tool used to remove fine amounts of material. Made of a steel bar of rectangular, square, triangular, or round cross-section, with a wooden or plastic handle.

**Hand drill/Pillar drill** is a too/machine fitted with a cutting tool attachment or driving tool attachment, usually a drill bit or driver bit, used for boring holes in various materials or fastening various materials together.

### MANUFACTURING PROCESS:

The **laser cutter (CNC: Computer Numerical Control)**. You should have also learnt about how to create a **'Frame'** using **2D Design** and the **laser** combined.

## Design Ideas – Creating a 'Frame'

After the **initial ideas** and **final idea** process, you created a **'Frame'** in 2D Design, which later you cut in the Laser Cutter. There is also **Testing & Evaluation**, imbedded in each activity, which is a very important aspect of DT, to teach you to take risks and problem solver.



## Numeracy

Reading dimensions and marking them out. 1cm = 10 mm. If there are no units on the drawing, it is mm by default.  
1 inch = 2.54 cm (25.4 mm).  
Length x Width = Area    Length x Width x Depth = Volume

## Properties and Characteristics of Pewter

**Pewter** is an **alloy**, which is a **substance** made by combining together two or more **elements** where the **primary** element is a metal. **Pewter** is mainly made up of Tin (95%), **Antimony** (4-5%) and **Copper** (0.5%). **Antimony** and **Copper** should be used in order to give **consistency** and **rigidity** to Tin. **Does pewter have lead in it?** No, every **toxic** element has been completely eliminated from modern alloys and the European Economic Community has dictated strict regulations regarding its composition. Antimony, copper and **bismuth** are carefully measured, to guarantee their use for table crockery. A small percentage of **silver** has been permitted in the alloy.

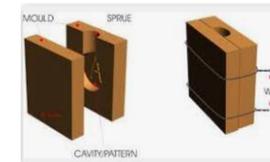


### Keywords: questions to ask:

- Aesthetics** – How it looks, its colour, shape, patterns, textures. If something is "aesthetically pleasing" it looks nice!
- Ergonomics** – How comfortable is it to hold or use? Does it "fit" the user well?
- Function** – How well do you think it works. Why do you think this?
- Target users** – Who do you think the users are and why?
- Environment** – Where would the box be used?
- CNC** – Computer Numerical Control
- Manufacturing Process** – ways to manufacture a product

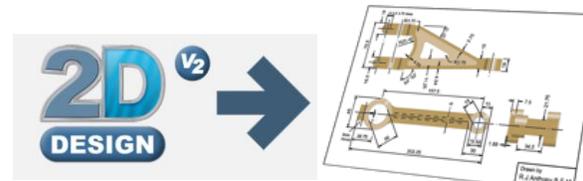
## Experimenting Casting Metal

Remember the **experimentation** lesson, were you had **fun learning how to Cast Metal** by using **existing frames**. You learnt about **manufacturing techniques** such as 'Casting" and CAD/CAM to later on in the unit create an interesting product. You also learnt about the and the **H&S** aspects of selection appropriate **tools and equipment** in the **workshop**.



## 2D Design:

This is the **software** you used to produce a **CAD (Computer Aided Design) drawing of your final: Night Light Design**. It offers the opportunity for combining **vector drawing with text, bitmaps, photographs or clip-art** to create stunning graphic products.



## Laser Cutting



This is a **manufacturing process** used to cut the material, in this case **Acrylic**. It is a **CNC process** that will provide **speed and precision** and will help you with the **Aesthetics**: Look and Feel of you final product.



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## Using Hand Tools and Equipment safely and accurately

### Pewter: Properties and Characteristics

#### Keywords:

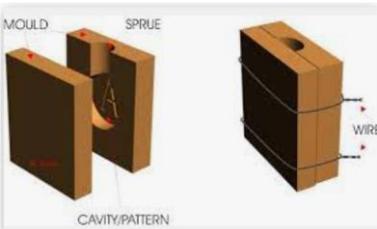
**Pewter:** Characteristics, uses advantages and disadvantages

**Casting Metal:** The process involved in melting Pewter in order to create a Key Ring or a piece of Jewellery Design

**Sustainability:** How much impact a product or material has on the environment.

### Manufacturing Processes:

#### The Laser and Casting & Metal Casting



### Casting Metal - Pewter



Refer to your unit booklet and notes taken to help you revise all the manufacturing processes you followed

### Tools & Equipment



Hack saw  
Cutting metals and plastics



Belt sander  
Sanding wood for a smooth finish



Fret saw  
Cutting intricate shapes



Pillar drill  
Drilling accurate vertical holes



Vice  
Holding material while working



Coping saw  
curved and internal cuts



Bench hook  
Resting material against while cutting



Pliers  
Gripping cutting and bending



Tri square  
Accurate marking and checking right angles



Hand file used for removing sharp edges and shaping material

### Material Properties

- Strength** – The amount of load or compression it can withstand.
- Toughness** – Absorption of energy through shock before splitting.
- Elasticity** - Will it return to shape after being compressed/stretched?
- Hardness** – How resistant is the surface? Will it survive scratches, knocks and abrasion?
- Ductility** – The ability to be drawn out (pulled or stretched) into a thin wire.
- Malleability** – The ability of a material to be pressed of hammered without breaking or cracking.



### Health and safety in the workshop



Long hair must be tied back



Eye protection must be worn



No running



Emergency stop



Wear protective apron



First aid



Danger Corrosive



Warning Highly flammable



No throwing

### 2D Design – CAD Technical Drawing

