

**The Brief:**

You are working part time in a cycle supply and repair shop and your manager is impressed with the work you have been producing. He now wants you to make a replacement handy spanner key fob.

**The Task:**

Use CAD, CAM and casting techniques to produce an exact replica spanner.

**Successful solution?**



**Unsuccessful solution?**

**Pewter** (Non Ferrous Alloy) – a malleable metal alloy. It is traditionally composed of 85–99% tin, mixed with copper, antimony, bismuth, and sometimes silver or lead, although the use of lead is less common today. Pewter is 100% recyclable.

**Casting** - Casting is a manufacturing process in which a liquid material is usually poured into a mold, which contains a hollow cavity of the desired shape, and then allowed to solidify. The solidified part is also known as a casting, which is ejected or broken out of the mold to complete the process.

Pewter casting  
Name..... Your target.....  
Name..... Class..... Date.....



Record of making – the casting process.

Date.....

| Stage - diagram | Description of stage | Tools and equipment | Health and safety |
|-----------------|----------------------|---------------------|-------------------|
|                 |                      |                     |                   |
|                 |                      |                     |                   |
|                 |                      |                     |                   |
|                 |                      |                     |                   |
|                 |                      |                     |                   |

WWW -

EBI -



## Opportunities

1

2

3

## Constraints

1

2

3

What information do I need to gather?

1

2

3

4

Date.....

## The design criteria - my specification

List 6 targets that your final pewter product must meet.

1

2

3

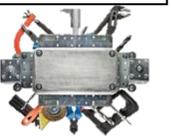
4

5

6

WWW -

EBI -



**FHS DT**

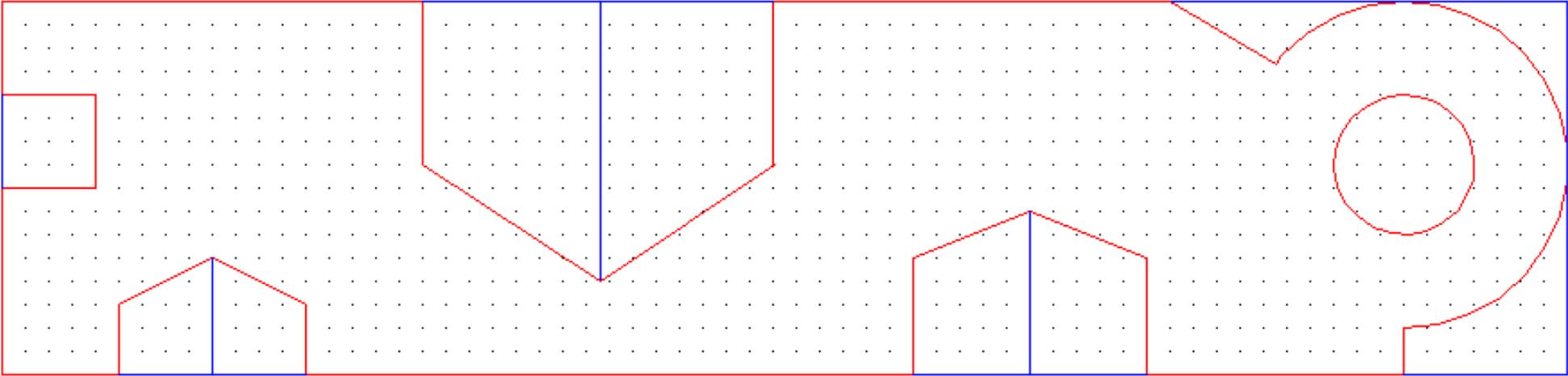
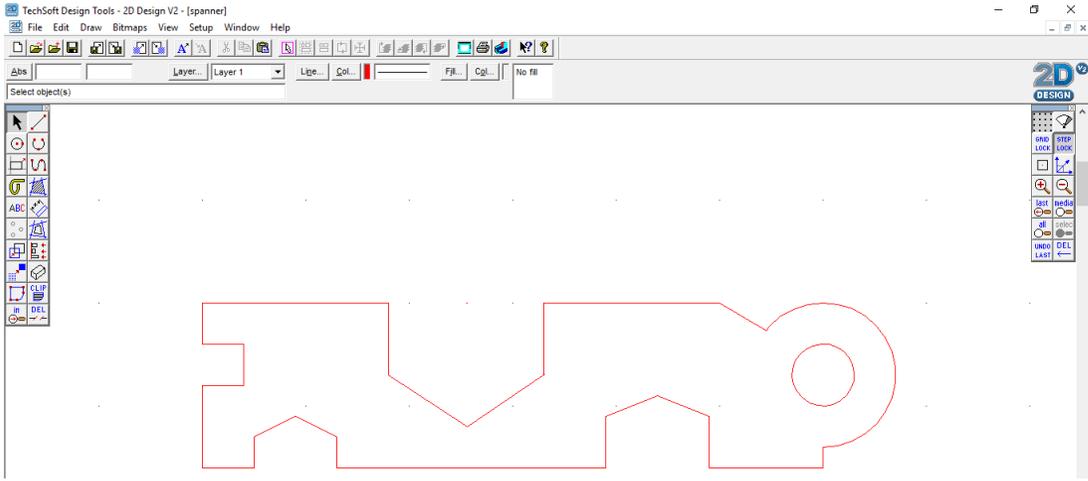
# Pewter and casting fact sheet – HWK 1

Date.....

WWW -  
EBI -



# Size and measurement – Product audit and planning



Date.....

# 2d design print screen of final idea



Pewter

- 1
- 2
- 1
- 2

Review – problems faced creating mould

Review – what worked well creating mould

Date.....

WWW -  
EBI -



Health and safety test – Date.....

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 12
- 13

Spelling test - Date.....

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

Final score of each test     /10     /10

Total percentage



|                                   | <b>Safety record</b>  | Date | Sign |
|-----------------------------------|---|------|------|
| Making and health and safety      | I have been told the basic workshop safety rules?                         |      |      |
|                                   | I understand the basic workshop safety rules?                             |      |      |
|                                   | I use the basic workshop safety rules?                                    |      |      |
|                                   | I have seen the demonstration on how to cast pewter safely                |      |      |
|                                   | I can cast pewter safely  |      |      |
|                                   | I have seen the demonstration on how to use the hacksaw safely            |      |      |
|                                   | I can use the hacksaw safely  |      |      |
|                                   | I have seen the demonstration on how to use the file safely               |      |      |
|                                   | I can use the file safely   |      |      |
|                                   | I have seen the demonstration on how to use emery paper and brasso safely |      |      |
|                                   | I can use the emery paper and the brasso safely                           |      |      |
|                                   | I have seen the demonstration on how to use the Buffer safely             |      |      |
|                                   | I can use the Buffer safely   |      |      |
|                                   | I have seen the demonstration on how to use the Pillar Drill safely       |      |      |
| I can use the Pillar Drill safely |   |      |      |

Health and safety record

WWW -  
EBI -



**FHS DT**

# Assessment

Name.....

**Halfway review** of project progress - 

Date.....

I rate my progress with this project as a .....

**1 2 3 4**

What is working well in the project? WWW

What feedback have you been given?

How has the feedback made a difference?

What can you now do better or differently? EBI

What target would you set yourself for the second half of this project?

Are you on track to make expected progress?

Current photo –

include your name in photo



Teacher feedback **1 2 3 4**

**WWW**

**EBI**

Target.....

Current assessment %



|                     |   | Engineering skills<br>Assessment |  | Sometimes<br>Basically<br>Lots of support<br>Basic quality<br><b>3-5</b><br><b>35%-55%</b> |         | Mostly<br>Some detail<br>A little support<br>Good quality<br><b>5-7</b><br><b>56%-75%</b> |         | Always<br>In-depth<br>Independently<br>High quality<br><b>7-9</b><br><b>76%-100%</b> |         |
|---------------------|---|----------------------------------|--|--|---------|---|---------|--|---------|
|                     |   |                                  |  | Self   | Teacher | Self  | Teacher | Self   | Teacher |
| Half way assessment | I respond creatively to a brief   |                                  |  |  |         |   |         |  |         |
|                     | I easily select the right information to support solutions to the design problem            |                                  |  |  |         |   |         |  |         |
|                     | I can create a detailed specification   |                                  |  |  |         |   |         |  |         |
|                     | I seek out further information to help my thinking  |                                  |  |  |         |   |         |  |         |
|                     | I recognize the opportunities and constraints of the project and can design effectively     |                                  |  |  |         |   |         |  |         |
|                     | I can model ideas and understand how to improve my solution                                 |                                  |  |  |         |   |         |  |         |
|                     | I evaluate and modify my ideas to solve technical problems                                  |                                  |  |  |         |   |         |  |         |
|                     | I work independently with all tools , equipment, and machines to a high degree of precision |                                  |  |  |         |   |         |  |         |
| Final assessment    | I can make products which are reliable and high quality                                     |                                  |  |  |         |   |         |  |         |
|                     | My design fully meets the requirements of the brief and specification                       |                                  |  |  |         |   |         |  |         |
|                     | I evaluate, reflect and improve consistently  |                                  |  |  |         |   |         |  |         |
|                     | I show full appreciation of all of the materials and technology available                   |                                  |  |  |         |   |         |  |         |
|                     | I can use materials and technology with ease and explain what makes them suitable to use    |                                  |  |  |         |   |         |  |         |

Date.....



# Assessment

Name.....

**Final review** of project progress -



Date.....

I rate my progress with this project as a .....

1 2 3 4

What has worked well in the project? WWW

What effective feedback have you been given?

How has the feedback made a difference?

What could you have done better or differently? EBI

Are you on track to make expected progress?

What would be your future target in this subject?

Final photo –

include your name in photo



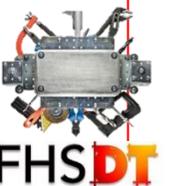
Teacher feedback 1 2 3 4

**WWW**

**EBI**

Target.....

Current assessment %



**The Brief:** You are working part time in a cycle supply and repair shop and your manager is impressed with the work you have been producing. He now wants you to make a replacement handy spanner key fob.

**The Task:** Use CAD, CAM and casting techniques to produce an exact replica spanner.

**CAD CAM:**

|                       |  |
|-----------------------|--|
| 2D design<br>- CAD    | Computer software for drawing flat parts       |
| Laser cutter<br>- CAM | A machine which cuts and engraves with a laser |



**The Design Criteria:**

A list of targets that you set for yourself to achieve with your product.

**The Engineering Design Process:**

- Response to brief
- Research
- Design criteria
- Ideas
- Compare to design criteria
- Develop
- Test
- Make
- Test
- Modify
- Test
- Evaluate

**Melting point of Pewter: 170°C - 230°C**

**Materials:**

**Pewter** (Non Ferrous Alloy) – a malleable metal alloy. It is traditionally composed of 85–99% tin, mixed with copper, antimony, bismuth, and sometimes silver or lead, although the use of lead is less common today. Pewter is 100% recyclable.

**MDF** (Manufactured board) – an engineered wood product made by breaking down recycled hardwood or softwood residuals and then gluing the fibers back together with a resin. The MDF is laser grade MDF.

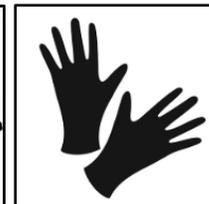
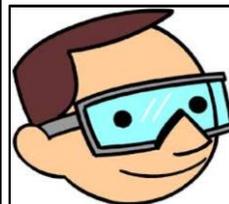
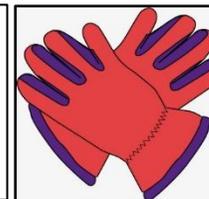
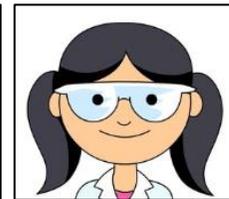
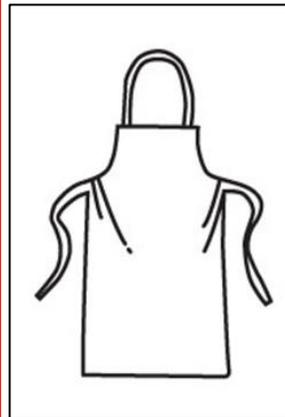
**The Making Stages:**

- Audit and measure
- CAD mould
- CAM production
- Cutting Pewter
- Preparing mould
- Heating Pewter
- Casting Pewter
- Remove excess
- Emery
- Buff
- Polish
- Drill

**Key words:**

- Alloy
- Casting
- Ferrous
- Non ferrous
- Malleable
- Composition
- Iterative
- Modifications
- Sustainability
- ore

**Health and Safety:**



**Assessment:**

60% Product and folder  
40% Exam



## Year 8 Engineering – Pewter casting



Hack Saw



Heat proof gloves



Senior hack saw



Scribe



Brasso



Camping stove



Buffer



Hand vice



Needle files



Pillar Drill



Pewter casting ladle



Emery paper



File



2D design



Laser cutter

Pewter

## Good

**Explain the difference between thermoplastics and thermosetting plastics.**

Find out about different types of plastics (Thermoplastics and Thermosetting plastics). Produce a fact sheet including names of plastics and examples products made from plastics. Use [www.technologystudent.com](http://www.technologystudent.com) to help you.

M

**Identify 5 keywords used in this subject and write a dictionary of terms.**

Find out the definitions of the key words, write them down and learn the spellings.

M



**D&T**  
**Yr. 8 Takeaway**  
**Homework**

## Even better

**Create a fact sheet on the environmental impacts of plastics and metals.**

Your leaflet must include interesting facts, images and information about the impact these materials have on the environment.

M  
2

**Create a story board, which shows the pewter casting process.**

Produce a step-by-step story board, which shows the main stages of the pewter casting process. Underneath each drawing write a brief description of the process being carried out.

M  
2

**Produce a newspaper article on 3D printing.**

Write newspaper article about 3D printing and the impact it has had on the world. Remember to include a headline and some images. Make sure you do not copy and paste any existing article.

M  
2

## Excellent

**Make a good quality product from reused plastic bottles.**

Collect a range of plastic bottles or other waste plastic items and make a product. Make sure the product is made to a good standard. (research example on the internet).

You must take photos of you making your product and you need to explain how it has been made. This needs to be presented on an A3 page.

D

**Create a short video clip to show a process or technique**

Video yourself demonstrating a process or technique that you have learnt in D & T.

If the video is done to a high standard, it will feature on the school website!

D

**Year 8 Engineering – Pewter casting**



# Homework

Alloy

Casting

Ferrous

Non ferrous

Malleable

Composition

Iterative

Modifications

Sustainability

ore