

**Learning intent: Know the forming processes of engineering materials (LO3)**

## **Engineering forming and processes**

**What the exam board say:**

LO3 know forming processes of engineering materials	AC3.1 describe engineering processes	5-12	8-20%
	AC3.2 describe applications of engineering processes		

**This means you need to be able to:**

- Identify different processes in Engineering
- Describe how these processes are used to produce different products
- Explain health and safety considerations
- Analyse how successful outcomes are made or corrections are made

**Learning intent:**

Understand how engineered products are made successfully and safely using different materials and tools/ machines appropriately.

**Success criteria:**

L2 Distinction: (**bold below**) Explain stages of making products in engineering including the health and safety and how to make an excellent outcome.

L2 Merit: (underlined below) Describe stages of making products in engineering including the health and safety and how to make a good outcome.

L2 Pass: (*italics below*) Identify stages of making products in engineering including how to make an outcome.


**WAGOLL:**

A pillar drill is a piece of engineering machinery which works by the *process of turning, creating friction and abrasion which will make a circular hole in a material.*

*It is used for both wooden and metallic materials, however a faster speed (higher gear) will be used on metallic materials to ensure it can drill. **If the faster speed is used on softer wooden material it can negatively impact the outcome as it can cause burn marks or ignite the material. Should especially hard materials e.g. mild steel, be used then either the material or the drill bit could be quenched in either water or oil to attempt to lower the temperature or improve the quality of the finish.** The drill bit can be varied to change the size of the hole produced, with particularly large holes being drilled by a Forstner bit. It is important that only light pressure applied with a drill to ensure that the drill bit does not break. The safety guard should always be used and safety goggles worn to prevent injury from swarf. The user should always be trained on how to use the machine properly and be aware of where the emergency stop is located. Finally, the user should not have long hair or loose clothing which will prevent injury from entanglement.*



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<b>Name (identify)</b>	<b>Picture</b>	<b>Describe what used for (L2 Merit)</b>	<b>Explain how used to produce good outcome (L2 Distinction)</b>
Tennon saw		A Tennon saw is used for cutting straight lines in wooden material. It remains straight due to a rigid brass bar at the top of the blade.	It is used correctly by applying pressure with a bench hook holding material in a vice. When using your finger should align with the blade to ensure a straight cut.
Hack saw			
Coping saw			
Vernier Callipers			
Odd leg Callipers			
File			
Scriber			
Centre punch			
Hammer			

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Mallet			
Engineers square			
Taps			
Dies			
Chisel			
Tri square			
Centre marker			
Screwdriver			
Engineers rule			

## Engineering processes – Marking out



- Use an engineers rule to mark a component in millimeters (mm)
- Mark wood with a sharp pencil and shade the area to be removed
- Mark metal with a scriber
- If the metal is bright in colour (aluminium) use a scriber to scratch the surface.
- Make sure space is left for cutting room on the component to ensure accurate size within tolerance.



## Engineering processes - Drilling

- Drilling involves cutting a material (either wood or metal) to create a circular hole.
- The drill bit turns and the material stays in the same place.
- The faster speed is used for metal and the slower speed for wood.
- The material/ drill bit may need to be quenched (dipped in water) to stop it overheating.



## Engineering processes - Polishing

- Wet and dry paper can be used on metal to polish and create a shinier finish where dry creates a smoother finish.
- Different grades of wire wool may also be used to polish the outside.
- A buffer may be used to polish material by machine, where gloves will need to be worn to prevent burning from the friction causing the material to heat up.



## Engineering processes - Turning

- This is where the component turns in a machine and pressure is applied to make a certain finish.
- The lathe cutting tool can be used to remove some of the surface and cause it to reduce/ be polished in appearance.
- The lathe knurling tool could be used to make a hatched print on the material being processed.
- The lathe can be manually or Computer Numerical Code (CNC) controlled where the CNC is more accurate.



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**Research the processes below and explain these using the format of the examples above.**

- **Sanding**

- Identify when the process is done and different tools and machines used.
- Describe what happens so the process is done safely and successfully
- Explain where the process is applied and how a high-quality finish is achieved. Explain how the process changes for different materials.

- **Milling**

- Identify when the process is done and different tools and machines used.
- Describe what happens so the process is done safely and successfully
- Explain where the process is applied and how a high-quality finish is achieved. Explain how the process changes for different materials.

- **Sawing**

- Identify when the process is done and different tools and machines used.
- Describe what happens so the process is done safely and successfully
- Explain where the process is applied and how a high-quality finish is achieved. Explain how the process changes for different materials.

- **Annealing**

- Identify when the process is done and different tools and machines used.
- Describe what happens so the process is done safely and successfully
- Explain where the process is applied and how a high-quality finish is achieved. Explain how the process changes for different materials.

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- **Brazing**
  - Identify when the process is done and different tools and machines used.
  
  - Describe what happens so the process is done safely and successfully
  
  - Explain where the process is applied and how a high-quality finish is achieved. Explain how the process changes for different materials.
  
- **Casting**
  - Identify when the process is done and different tools and machines used.
  
  - Describe what happens so the process is done safely and successfully
  
  - Explain where the process is applied and how a high-quality finish is achieved. Explain how the process changes for different materials.
  
- **Joining (permanent and temporary)**
  - Identify when the process is done and different tools and machines used.
  
  - Describe what happens so the process is done safely and successfully
  
  - Explain where the process is applied and how a high-quality finish is achieved. Explain how the process changes for different materials.
  
- **Preparing materials**
  - Identify when the process is done and different tools and machines used.
  
  - Describe what happens so the process is done safely and successfully
  
  - Explain where the process is applied and how a high-quality finish is achieved. Explain how the process changes for different materials.

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**Computer uses in Engineering**

***Identify the following terms:***

CNC – Computer Numerical Code

Datum Point – The point where a computer starts on a material.

G-Codes -

CAD -

CAM -

***Describe applications where CAM is used in Engineering.***

***Explain the advantages and disadvantages of computer aided manufacture over manually producing an engineered component.***

Parts of machines

