

Subject: Engineering

Year group: 10

Week beginning	Subject Topic	Key Learning points/big questions	Independent/Home learning	Linked Assessment	Resources
	Skills stick – Brazing	<p>Students are to develop their machining and manufacturing skills, as well as their knowledge surrounding these, to make various components, according to an orthographic drawing, that form the skills stick. Students will need to work independently to read and interpret engineering drawings that will enable them to understand the individual sizes of each component, along with materials and equipment.</p> <p>Students will need to work to specific tolerances in order to assemble each component. Students will need to evaluate their work in an ongoing manner, correct any mistakes and record these ready for evaluation at the end of the process.</p> <p><b>Drawing number 1:</b></p> <ol style="list-style-type: none"> <li>1. What process is used to join the two pieces shown in drawing number 1?</li> <li>2. What material is used in drawing number 1?</li> <li>3. What height in the square section in drawing number 1?</li> <li>4. Brazing rods are made of bronze. What metals does this consist of (3 in total)?</li> <li>5. Is this a permanent or temporary joint?</li> <li>6. Why do we need extraction when using the brazing hearth?</li> <li>7. What natural resource is used to create the flame?</li> <li>8. What is flux and why is it important?</li> <li>9. Explain oxidation?</li> <li>10. Explain capillary action?</li> <li>11. What is the hottest part of the flame?</li> <li>12. Why are fire bricks important in maintaining the temperature?</li> <li>13. What preparation needs to be completed in the metal prior to brazing?</li> <li>14. Explain how you should allow the metal to cool after brazing?</li> <li>15. What extra PPE should be worn whilst brazing?</li> </ol> <p>Types of metals PowerPoint – students to understand the difference between ferrous and non-ferrous and categorise specific metals</p>	Answer questions on brazing	<p><b>AC1.1</b> interpret engineering drawings</p> <p><b>AC1.2</b> interpret engineering information</p> <p><b>AC2.1</b> identify resources required</p> <p><b>AC2.2</b> sequence required activities</p> <p><b>AC3.1</b> use tools in production of engineering Products</p> <p><b>AC3.2</b> use equipment in production of engineering products</p> <p><b>AC4.1</b> use engineering processes in production of engineered products</p>	<a href="https://egguckland.sharepoint.com/Technology/Shared%20Documents/Staff%20Files/2021-2022%20Curriculum%20Planning/Year%2010/Engineering/Skills%20stick/Sand%20casting">https://egguckland.sharepoint.com/Technology/Shared%20Documents/Staff%20Files/2021-2022%20Curriculum%20Planning/Year%2010/Engineering/Skills%20stick/Sand%20casting</a>
		<p>Students are to develop their machining and manufacturing skills, as well as their knowledge surrounding these, to make various components, according to an orthographic drawing, that form the skills stick. Students will need to work independently to read and interpret engineering drawings that will enable them to understand the individual sizes of each component, along with materials and equipment.</p> <p>Students will need to work to specific tolerances in order to assemble each component. Students will need to evaluate their work in an ongoing manner, correct any mistakes and record these ready for evaluation at the end of the process.</p> <p><b>Drawing number 2:</b></p>	<p><b>Retrieval practice task</b></p> <p>Types of metals</p> <p>Page 5 &amp; 10 of booklet</p> <p><b>ENGINEERING KNOWLEDGE RETRIEVAL</b> </p>	<p><b>AC1.3</b> explain how environmental issues affect engineering applications</p>	<a href="https://egguckland.sharepoint.com/:f/g/Technology/EhxlkpKopKJFoc8WwWa0ekXgBjwkFN3x6YahQMvJfll1WpA?e=TppQza">https://egguckland.sharepoint.com/:f/g/Technology/EhxlkpKopKJFoc8WwWa0ekXgBjwkFN3x6YahQMvJfll1WpA?e=TppQza</a>

		<ol style="list-style-type: none"> <li>1. What material is used to make the part in drawing number 2?</li> <li>2. Explain what a tolerance is?</li> <li>3. Explain what a thread is?</li> <li>4. What tool is used to create a thread?</li> <li>5. Explain the importance of tapping compound?</li> <li>6. What diameter hole is needed to drill the holes in drilled acrylic part?</li> <li>7. What is a countersink?</li> <li>8. How far from the edges should the holes to be drilled?</li> <li>9. What are abrasive papers?</li> <li>10. In which order should they be used?</li> <li>11. What is a Vernier height gauge?</li> </ol>			
		<p>Students are to develop their machining and manufacturing skills, as well as their knowledge surrounding these, to make various components, according to an orthographic drawing, that form the skills stick. Students will need to work independently to read and interpret engineering drawings that will enable them to understand the individual sizes of each component, along with materials and equipment.</p> <p>Students will need to work to specific tolerances in order to assemble each component. Students will need to evaluate their work in an ongoing manner, correct any mistakes and record these ready for evaluation at the end of the process.</p> <p><b>Drawing number 3:</b></p> <ol style="list-style-type: none"> <li>1. What material is used to make the threaded boss?</li> <li>2. What are Vernier callipers?</li> <li>3. What is a tolerance?</li> <li>4. What is the cutting speed for steel?</li> <li>5. Why is cutting fluid necessary?</li> <li>6. What is parallel turning?</li> <li>7. What machine is used to turn metal?</li> <li>8. What chuck is used to hold your workpiece securely whilst turning?</li> <li>9. What is a centre drill?</li> <li>10. What is facing off?</li> <li>11. What do you tighten the chuck with?</li> <li>12. What must be done with this tool when not in use?</li> <li>13. What is the name of the waste metal created through turning?</li> <li>14. What is the term used to explain the speed at which the cutter is moved along to cut the work?</li> <li>15. What tool is used to cut an internal thread?</li> <li>16. How is this tool held when created an internal thread?</li> <li>17. What lubrication is required when cutting a thread?</li> <li>18. What tool is used to measure the depth of a blind hole?</li> <li>19. What handle moves the carriage left to right?</li> <li>20. What handle moves the toolpost forwards and backwards?</li> </ol>	<p><b>Marking out tools</b></p> <p><b>Retrieval practice task</b> page 6 &amp; 9</p> <p><b>ENGINEERING</b> <b>KNOWLEDGE</b> <b>RETRIEVAL</b></p> 	<p>AC1.2 identify features of engineered products that meet requirements of a brief</p> <p>AC1.3 explain how environmental issues affect engineering applications</p> <p>AC3.1 describe engineering processes</p>	<p><a href="https://egguckland.sharepoint.com/:/Technology/EhxlkpKopKlFoc8wWa0ekXgBjwKFN3x6YahQMvJfll1WpA?e=TrpQDza">https://egguckland.sharepoint.com/:/Technology/EhxlkpKopKlFoc8wWa0ekXgBjwKFN3x6YahQMvJfll1WpA?e=TrpQDza</a></p>
		<p>Students are to develop their machining and manufacturing skills, as well as their knowledge surrounding these, to make various components, according to an orthographic drawing, that form the skills stick. Students will need to work independently to read and interpret engineering</p>	Page 7	AC1.3 describe how engineered products function	<p><a href="https://egguckland.sharepoint.com/:/Technology/EhxlkpKopKlFoc8wWa0ekXgBjwKFN3x6YahQMvJfll1WpA?e=TrpQDza">https://egguckland.sharepoint.com/:/Technology/EhxlkpKopKlFoc8wWa0ekXgBjwKFN3x6YahQMvJfll1WpA?e=TrpQDza</a></p>

		<p>drawings that will enable them to understand the individual sizes of each component, along with materials and equipment.</p> <p>Students will need to work to specific tolerances in order to assemble each component. Students will need to evaluate their work in an ongoing manner, correct any mistakes and record these ready for evaluation at the end of the process.</p> <p><b>Drawing number 4:</b></p> <ol style="list-style-type: none"> <li>1. What material is used to manufacture component 4?</li> <li>2. Which grit abrasive paper should be used first when polishing metal?</li> <li>3. Why should you start with this level grit?</li> <li>4. Explain what a burr is?</li> <li>5. What tool should be used, prior to drilling, to increase accuracy?</li> <li>6. What makes your marked lines more visible?</li> <li>7. What tool is used to mark lines on metal?</li> <li>8. What diameter drill should be used to drill the hole?</li> <li>9. What is the diameter of the large curved element of the component?</li> <li>10. What is cross filing?</li> <li>11. What is draw filing?</li> <li>12. What is a countersink?</li> </ol>		<p>AC1.3 explain how environmental issues affect engineering applications</p> <p>AC2.1 describe properties required of materials for engineering products</p> <p>AC2.3 select materials for a purpose</p>	
		<p>Students are to develop their machining and manufacturing skills, as well as their knowledge surrounding these, to make various components, according to an orthographic drawing, that form the skills stick. Students will need to work independently to read and interpret engineering drawings that will enable them to understand the individual sizes of each component, along with materials and equipment.</p> <p>Students will need to work to specific tolerances in order to assemble each component. Students will need to evaluate their work in an ongoing manner, correct any mistakes and record these ready for evaluation at the end of the process.</p> <p><b>Drawing number 5:</b></p> <ol style="list-style-type: none"> <li>1. Name 2 ways of holding work down on the milling machine?</li> <li>2. What is an end mill?</li> <li>3. What is a slot drill?</li> <li>4. How many axes are controllable on a mill?</li> <li>5. What controls the Y axis?</li> <li>6. What controls the z axis?</li> <li>7. What controls the x axis?</li> </ol>	<p>Complete page 9 of booklet</p> <p><b>ENGINEERING KNOWLEDGE RETRIEVAL</b> </p>	<p>AC2.1 describe properties required of materials for engineering products</p> <p>AC2.3 select materials for a purpose</p>	<p><a href="https://eggbuckland.sharepoint.com/:f/g/Technology/EhxlkpKopKJFoc8Ww0ekXgBjwkFN3x6YahQMvJfll1WpA?e=TrpQDza">https://eggbuckland.sharepoint.com/:f/g/Technology/EhxlkpKopKJFoc8Ww0ekXgBjwkFN3x6YahQMvJfll1WpA?e=TrpQDza</a></p>
	Project evaluation	<ol style="list-style-type: none"> <li>1. Identify areas of strengths and weakness during the process of manufacturing each component</li> <li>2. Suggest areas for improvement to the final components</li> <li>3. Students to evaluate how well they met the individual tolerances for each component</li> <li>4. Students to evaluate their time management in relation to their Gantt charts</li> </ol>		<p>AC4.2 evaluate quality of engineered products</p>	<p><a href="https://eggbuckland.sharepoint.com/:f/g/Technology/EhxlkpKopKJFoc8Ww0ekXgBjwkFN3x6YahQMvJfll1WpA?e=TrpQDza">https://eggbuckland.sharepoint.com/:f/g/Technology/EhxlkpKopKJFoc8Ww0ekXgBjwkFN3x6YahQMvJfll1WpA?e=TrpQDza</a></p>
<b>Half term</b>					

**Drawing number 1:**

1. What process is used to join the two pieces shown in drawing number 1?
2. What material is used in drawing number 1?
3. What height in the square section in drawing number 1?
4. Brazing rods are made of bronze. What metals does this consist of (3 in total)?
5. Is this a permanent or temporary joint?
6. Why do we need extraction when using the brazing hearth?
7. What natural resource is used to create the flame?
8. What is flux and why is it important?
9. Explain oxidation?
10. Explain capillary action?
11. What is the hottest part of the flame?
12. Why are fire bricks important in maintaining the temperature?
13. What preparation needs to be completed in the metal prior to brazing?
14. Explain how you should allow the metal to cool after brazing?
15. What extra PPE should be worn whilst brazing?

**Drawing number 2:**

1. What material is used to make the part in drawing number 2?

2. Explain what a tolerance is?
3. Explain what a thread is?
4. What tool is used to create a thread?
5. Explain the importance of tapping compound?
6. What diameter hole is needed to drill the holes in drilled acrylic part?
7. What is a countersink?
8. How far from the edges should the holes to be drilled?
9. What are abrasive papers?
10. In which order should they be used?
11. What is a Vernier height gauge?

**Drawing number 3:**

1. What material is used to make the threaded boss?
2. What are Vernier callipers?
3. What is a tolerance?
4. What is the cutting speed for steel?
5. Why is cutting fluid necessary?
6. What is parallel turning?
7. What machine is used to turn metal?

8. What chuck is used to hold your workpiece securely whilst turning?
9. What is a centre drill?
10. What is facing off?
11. What do you tighten the chuck with?
12. What must be done with this tool when not in use?
13. What is the name of the waste metal created through turning?
14. What is the term used to explain the speed at which the cutter is moved along to cut the work?
15. What tool is used to cut an internal thread?
16. How is this tool held when created an internal thread?
17. What lubrication is required when cutting a thread?
18. What tool is used to measure the depth of a blind hole?
19. What handle moves the carriage left to right?
20. What handle moves the toolpost forwards and backwards?

Material	Spindle speeds (rev/min) for given diameters			
	Ø9 mm	Ø12 mm	Ø18 mm	Ø25 mm
Mild Steel	880	660	440	320
Plastics (e.g. Nylon)	1400	1050	700	500
Brass	2650	1990	1330	960
Aluminium	3000	2200	1400	1000

Material	Meters per min (MPM)
Steel (tough)	15 - 18
Mild Steel	30 - 38
Cast Iron (medium)	18 - 24
Alloy Steels	20 - 37
Carbon Steels	21 - 40
Bronzes	24 - 45
Aluminium	75 - 105
Brass	90 - 210

**Drawing number 4:**

1. What material is used to manufacture component 4?
2. Which grit abrasive paper should be used first when polishing metal?
3. Why should you start with this level grit?
4. Explain what a burr is?
5. What tool should be used, prior to drilling, to increase accuracy?
6. What makes your marked lines more visible?
7. What tool is used to mark lines on metal?
8. What diameter drill should be used to drill the hole?
9. What is the diameter of the large curved element of the component?
10. What is cross filing?
11. What is draw filing?
12. What is a countersink?

**Drawing number 5:**

1. Name 2 ways of holding work down on the milling machine?
2. What is an end mill?
3. What is a slot drill?
4. How many axes are controllable on a mill?

5. What controls the Y axis? **Feed handle**
6. What controls the z axis? **Vertical wheel**
7. What controls the x axis? **Cross wheel**
8. Should the spindle speed be set to fast or slow when milling steel?

What should be in place to protect you when using the vertical mill?