

Exemplar Candidate Work

GCSE D&T: Industrial Technology

OCR GCSE in D&T: Industrial Technology: J304 / J044

Unit A543: Making quality products

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Introduction

This exemplar material serves as a general guide. It provides the following benefits to a teacher:

- Gives teachers an appreciation of the variety of work that can be produced for this unit
- Shows how the mark scheme has been applied by a senior assessor
- Provides examples of both good and weak application of different parts of the mark scheme
- Provides real examples of work conducted under controlled assessment conditions.

It is important to make the point that the teacher support materials play a secondary role to the Specification itself. The Specification is the document on which assessment is based and specifies what content and skills need to be covered in delivering the course. At all times, therefore, this teacher support should be read in conjunction with the Specification. If clarification on a particular point is sought then that clarification should be found in the Specification itself.

Moderator's Commentary:

Theme – Hole Punch

This portfolio illustrates the work of a candidate who has worked competently in all three focus areas of the unit. Marks in the highest band of the Assessment Criteria have been awarded for the work presented in each of the three areas of the portfolio.

Designing

Some consideration of the requirements of the users and the design need has been shown, through analysis of existing similar products. A detailed specification for the hole punch has been presented in response to the given design brief.

Design ideas have been generated using pencil sketching of somewhat limited quality, supplemented by CAD produced detail drawings of the component parts of the final design. Simple modelling can also be used in this section if it is felt necessary, but should not be used simply as a matter of course. It is important to consider the marks available for the section when allocating time to it.

It should be noted that computer generated drawings or images are not a requirement in this section of the project, and well annotated sketching is a perfectly appropriate form of communication for design ideas

Mark: 3 + 10 = 13 (Max 16)

Making

The candidate could have made good use of a cutting list here, as reference to materials is limited without referring back to the CAD drawings and the 'Making Diary'. The selection and use of appropriate tools and equipment is evidenced in the planning sheet and the making diary. Digital photography has been used to show the operations carried out and also to evidence the completion of the product and the quality of making. Centre teaching staff have assessed the candidate's ability to work safely and independently.

Some evidence of the candidate's ability to solve simple technical problems is contained in the evaluation section, but this could usefully have been included in an additional column in the 'production diary'.

The device has been made to a high standard and this has been evidenced by good quality digital photographs, which also show that the device has been tested appropriately. Although in this example the device has been finished by painting this is not essential, and thought should be given to the time factor in order to decide on the appropriateness of such finishing.

Key stages in the making have been recorded in the production diary with comprehensive notes and photographic evidence being provided. Good use of digital photography is made throughout the making section of the portfolio.

Mark: 20 + 3 + 5 = 28 (Max. 36)

Critical Evaluation

Detailed testing of the finished product has been carried out and physical evidence of the testing has been shown on the accompanying photographs. It is important that clear evidence is presented in some form, as written comments from 'users' can, at best, only be considered as superficial. In addition to the detailed testing, the candidate has carried out an evaluation of the finished product, with some direct reference to the specification.

Overall the portfolio is well structured and clearly presented with a minimum of superfluous material. The candidate has used specialist terminology where appropriate and has demonstrated competence in the use of spelling, punctuation and grammar, fulfilling the requirement for the QWC assessment in this section.

Mark: 7 (Max 8)

Total mark for portfolio:- 48 (Max. 60)

Marking criteria

Unit A543

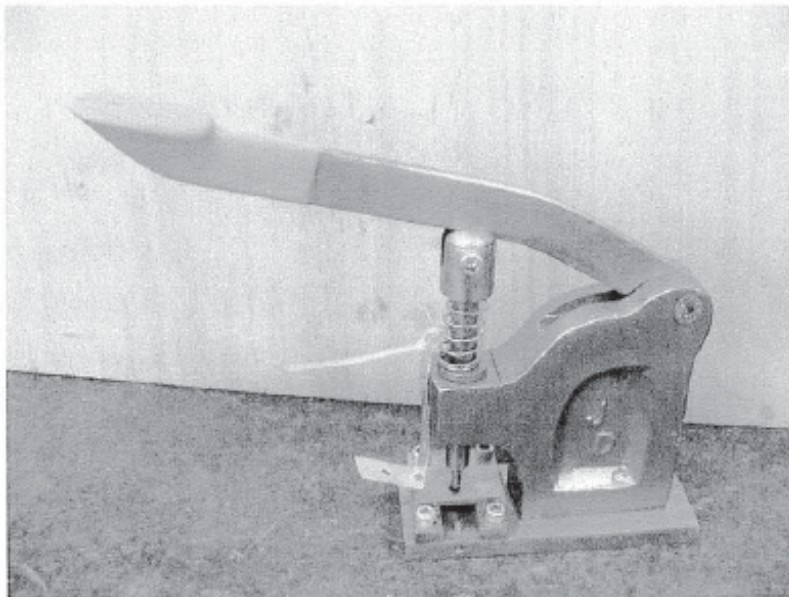
Basic ability	Demonstrates ability	Works competently
<p>Designing</p> <ul style="list-style-type: none"> • Demonstrate a limited response to a brief and produce a simple specification for a product. [0-1] • Produce one or two simple design ideas using a limited range of strategies. [0-5] 	<p>Designing</p> <ul style="list-style-type: none"> • Demonstrate an appropriate response to a brief and produce a suitable specification for a product as a result of analysis. [2-3] • Produce a range of creative ideas and communicate these by using appropriate strategies. [6-8] 	<p>Designing</p> <ul style="list-style-type: none"> • Demonstrate an appropriate and considered response to a brief and produce a detailed specification for a product as a result of analysis. (AO2) [4] • Produce creative and original ideas by generating, developing and communicating designs using a range of appropriate strategies. (AO2) [9-12]
<p>Making</p> <ul style="list-style-type: none"> • Plan and organise activities: <ul style="list-style-type: none"> ○ Select and use appropriate materials ○ Select and use hand and machine tools as appropriate to the material area. • Work safely to shape, form, assemble and finish materials and components as appropriate when making products. • Use workshop facilities as appropriate to the material area. • The product will exhibit a low standard of outcome and may not be successfully completed. [0-9] • Demonstrate a simple understanding of how to solve technical problems as they arise. [0-2] • Simply record the making of the product using notes and/or photographic evidence. [0-2] 	<p>Making</p> <ul style="list-style-type: none"> • Plan and organise activities: <ul style="list-style-type: none"> ○ Select and use appropriate materials ○ Select and use hand and machine tools as appropriate to the material area. • Work effectively and safely to shape, form, assemble and finish materials and components as appropriate when making quality products. • Select and use workshop facilities as appropriate to the material area. • The product will be completed to a good standard and will meet most of the requirements of the final product specification. [10-17] • Demonstrate a practical understanding and ability in the solving of some technical problems as they arise. [3-4] • Record key stages involved in the making of the product; provide notes and photographic evidence. [3-4] 	<p>Making</p> <ul style="list-style-type: none"> • Plan and organise activities: <ul style="list-style-type: none"> ○ Select and use appropriate materials. (AO2) ○ Select and use hand and machine tools as appropriate to the material area. (AO2) • Work skilfully and safely to shape, form, assemble and finish materials and components as appropriate when making quality products. (AO2) • Assess and apply knowledge in the workshop facilities as appropriate to the material area. (AO2) • The product will be completed to a high standard and will fully meet the requirements of the final product specification. (AO2) [18-24] • Demonstrate a practical and thorough understanding in the solving of technical problems effectively and efficiently as they arise. (AO2/AO3) [5-6] • Record key stages involved in the making of the product; provide comprehensive notes and photographic evidence. (AO2) [5-6]

Basic ability	Demonstrates ability	Works competently
<p>Critical evaluation</p> <ul style="list-style-type: none"> • Give a limited evaluation of the finished product with some reference to the specification. • There is no evidence of testing the product in use. • There will be little or no use of specialist terms. • Answers may be ambiguous or disorganised. • Errors of spelling, punctuation and grammar may be intrusive. <p style="text-align: right;">[0-2]</p>	<p>Critical evaluation</p> <ul style="list-style-type: none"> • Give an evaluation of the finished product with reference to the specification. • Show superficial testing and reflect on how to improve the product. • There will be some use of specialist terms, although these may not be always be used appropriately. • The information will be presented for the most part in a structured format. • There may be occasional errors in spelling, punctuation and grammar. <p style="text-align: right;">[3-5]</p>	<p>Critical evaluation</p> <ul style="list-style-type: none"> • Critically evaluate the finished product against the specification. (AO3) • Undertake detailed testing; present meaningful conclusions leading to proposals for modifications to improve the product. (AO3) • Specialist terms will be used appropriately and correctly. • The information will be presented in a structured format. • The candidate can demonstrate the accurate use of spelling, punctuation and grammar. <p style="text-align: right;">[6-8]</p>

Candidate's work

Industrial Technology

Hole Punch Project



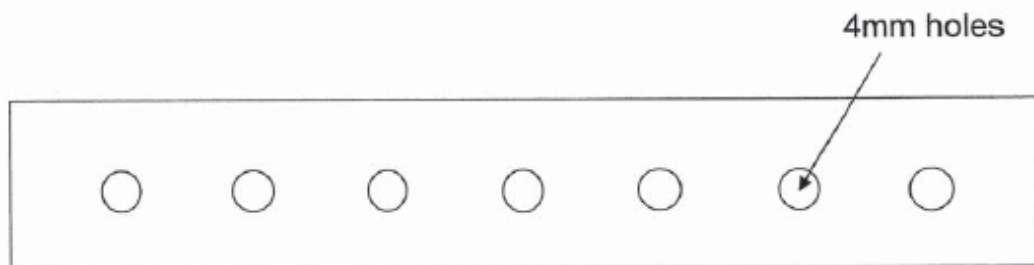
Design Brief

Design a hole punch suitable for use by Key Stage 3 pupils.

The punch will be used to punch 4mm hole in strips of 1.5mm thick aluminium alloy to make parts for a simple construction kit.

It is important that all the strips produced are identical, with holes equally spaced along the centre of the strip.

The hole punch will have to be safe and easy to use as both boys and girl will be using it.



Aluminium strips to be produced by the Key Stage 3 pupils using the hole punch.

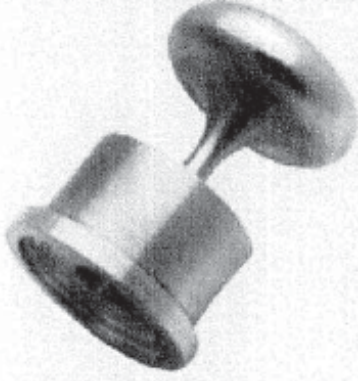
User needs and expectations


User needs and expectations are as followed:

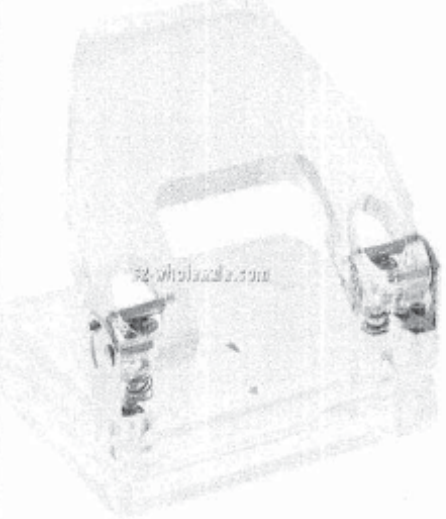
- The hole punch should be easy to use.
- To be taken apart to be repaired.
- Punch holes efficiently and accurately.
- Should be able to with stand 50 aluminium strips punched individually.
- Right and left people should be able to use it.
- It should feel comfortable to use.
- It should be stable ever in a vice or on a flat work surface.

User's requirements are as following:

- The hole punched cleanly with out distortion.
- Holes 4mm in diameter.
- Punched accurately along the length.
- The holes centrally spaced.

<p><u>The handle</u> The handle is hard metal but smoothed out. However it looks uncomfortable to use after so many uses.</p>	<p><u>Accuracy</u> The accuracy depends on how you centralize the punch, so it depends on who uses the punch; however I believe that if it's in the right position then it's accurate.</p>	<p><u>Distortion</u> I don't think there's going to be too much distortion, as the edges of the base stop the metal from bending making it distortion free.</p>
<p><u>Design</u> The design is small and compact, and looks like it's robust, to withstand the workshop.</p>		<p><u>Punching</u> The punch is connected to the handle and can only be seen if the device is turned upside down.</p>
<p><u>User requirements</u></p> <ul style="list-style-type: none"> • This tool can be used by left and right handed pupils. • This can be taken to pieces to repair if required. 		
<p><u>Alterations</u></p> <ul style="list-style-type: none"> • To make a more accurate punch system. 		

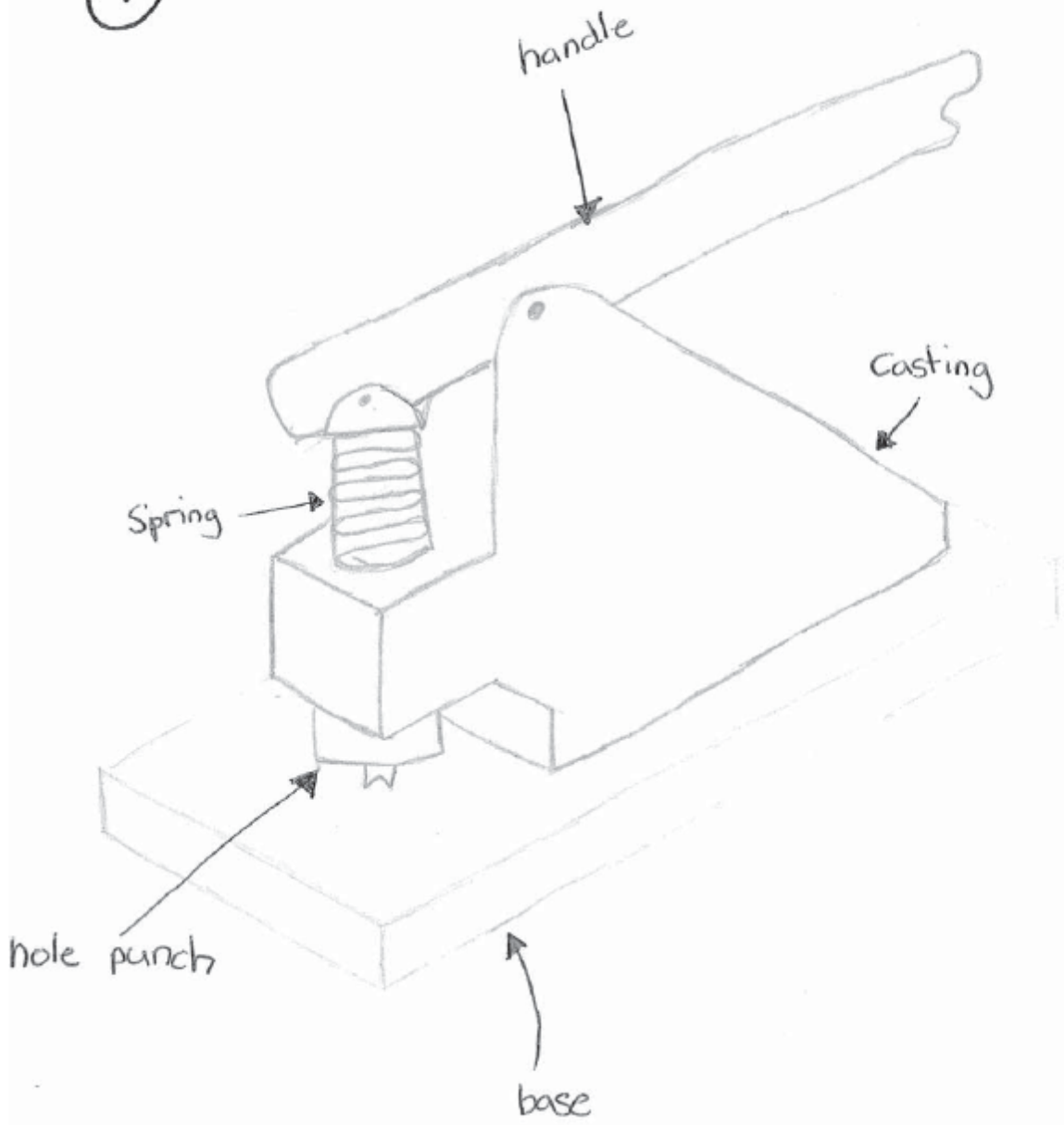
<p><u>The handle</u> The handle is plastic covered, and looks comfortable to grip.</p>	<p><u>Accuracy</u> The accuracy depends on the person who uses the device so I suggest that you scribe where you won't to punch.</p>	<p><u>Distortion</u> I think there is a good chance of distortion from this device as the aluminium could get stuck on the end of the punch.</p>
<p><u>Design</u> The design is small and can fit in a pocket; the force that can be applied depends on the person using it.</p>		<p><u>Punching</u> The punch is on the two bars at the bottom of the punch, and there's a screw to tighten the punch if it's to louse.</p>
<p><u>User requirements</u></p> <ul style="list-style-type: none"> • This tool can be used by left and right handed pupils. 		
<p><u>Alterations</u></p> <ul style="list-style-type: none"> • Make a safety device as there is a possibility of punching yourself. 		

<p><u>The handle</u></p> <p>The handle could be comfortable to use as it is not too big and not too small for the palm of the hand. It's of a good thickness shows its not going to be broken easily.</p>	<p><u>Accuracy</u></p> <p>There are good guides to this tool which allows an equally spaced area between the holes.</p>	<p><u>Distortion</u></p> <p>There is a plastic gap where the paper is slotted into place and can be easily punched but it also works as a strip to stop the paper from sticking to the metal punches.</p>
<p><u>Design</u></p> <p>The design is small and compact, square like, it can apply a lot of force. The handle and punch are connected; it has two springs that allow the punches to be brought back up easily. It is made of a soft but dense material so it can be strong, but I cant see it being very robust, it will work well but only in a friendly work place like an office.</p>		<p><u>Punching</u></p> <p>The punch is openly seen but is still unable to punch fingers, there are two springs that are openly seen to allow the punches to let the paper but quickly.</p>
<p><u>User requirements</u></p> <ul style="list-style-type: none"> • This tool can be used by left and right handed pupils. • The tool is stable due to the large base it won't wobble over. • This can be taken to pieces to repair if required. 		
<p><u>Alterations</u></p> <ul style="list-style-type: none"> • Use a stronger material, to make it i.e. metal. 		

Specification

1. Device used by Key Stage 3 pupils so it must be easy to use/operate.
2. It must be safe to use so no injuries on purpose or accident can accrue.
3. The hole punch should be able to be taken apart in order to fix it if it brakes.
4. The hole punch should be robust so it can withstand the conditions in the workshop and miss handled.
5. The device should be able to produce 50 aluminium strips that are 0.7-0.5mm.
6. The holes in the aluminium strip should be consistent between the batch of 50.
7. A system should be made to ensure a repetitive accuracy when the holes are punched.
8. It should be a bench or vice mount in order to keep it steady/stable.
9. It should be made so it's comfortable to use.
10. It should be able to be used by either right or left handed pupils.
11. It should produce cleanly cut holes.
12. The device must produce distortion free aluminium strips.
13. A system should be made to ensure repetition and accuracy.

①

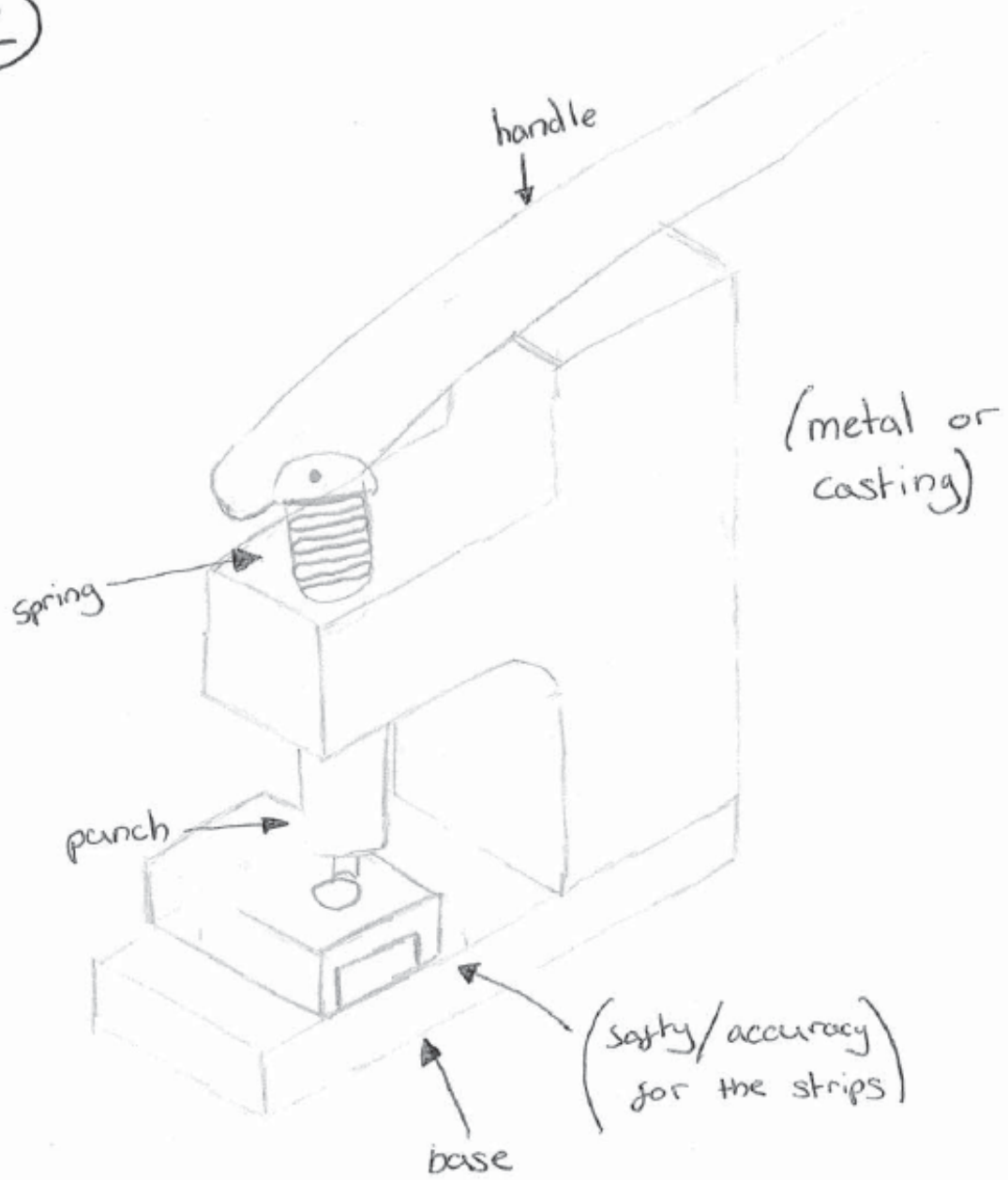


①

Comparison to Specification

	Specification-Points		Comments (Met/not met) Alterations
1	Used by KS3 easily.	✓	Push down mechanism
2	Safe to use by all.	✓	
3	Should be able to disassemble for repairs.	✓	un Screw screws In base and to join the handle.
4	Must be robust.	✓	strong metals
5	Be able to produce holed aluminium strips.	✓	
6	Must produce a consistently accurate batch of 50 strips.	✓	
7	System for accuracy when holes are punched.	X	no example shown In design.
8	Vice mount.		no vice mount shown
9	Comfortable to use.		no example of comfort.
10	Used by right or left handed pupils.	✓	
11	Must produce clean holes.	✓	
12	Must be distortion free.	✓	
<p>• Final comments</p> <ul style="list-style-type: none"> • looks uncomfortable to use • has no example of accuracy • plus, hard to make so might not be as robust. 			

2

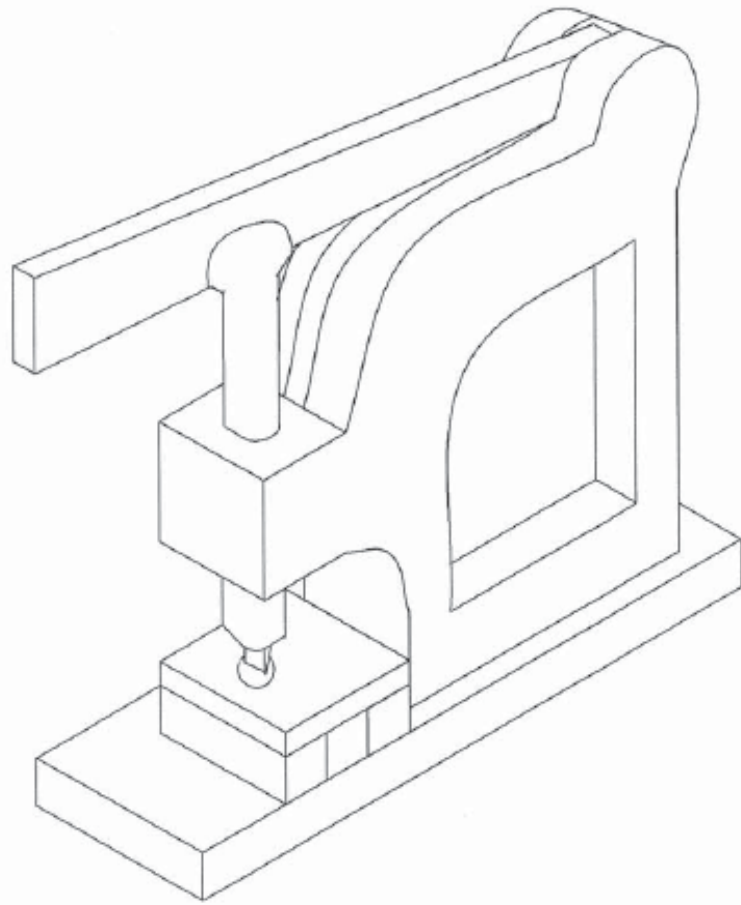


2

Comparison to Specification

	Specification-Points		Comments (Met/not met) Alterations
1	Used by KS3 easily.	✓	Push down mechanism
2	Safe to use by all.		looks like fingers can get caught in punch.
3	Should be able to disassemble for repairs.	✓	Screws at bottom of base.
4	Must be robust.	✓	hard steel
5	Be able to produce holed aluminium strips.	✓	
6	Must produce a consistently accurate batch of 50 strips.	✓	
7	System for accuracy when holes are punched.	✓	a simple box mechanism that's able to guide the punch
8	Vice mount.		no vice mount.
9	Comfortable to use.		no sign of a comfortable handle.
10	Used by right or left handed pupils.	✓	
11	Must produce clean holes.	✓	the accuracy box guides the punch straight.
12	Must be distortion free.	✓	
<ul style="list-style-type: none"> • Final comments ◦ looks uncomfortable after a couple of uses ◦ not safe people could get there fingers punched if not careful. 			

3



3

Comparison to Specification

	Specification-Points		Comments (Met/not met) Alterations
1	Used by KS3 easily.	✓	a push down mechanism
2	Safe to use by all.	✓	Fingers cant be caught in because of the softy mechanism
3	Should be able to disassemble for repairs.	✓	Screws at the bottom of the base, also connecting the base handle to the base and punch.
4	Must be robust.	✓	aluminium casting.
5	Be able to produce holed aluminium strips.	✓	the punch is guided by the accuracy mechanism to produce needed strips.
6	Must produce a consistently accurate batch of 50 strips.	✓	
7	System for accuracy when holes are punched.	✓	two pieces of metal are for the strips of metal to go through and a piece on top of that to guide the punch.
8	Vice mount.	X	no vice mount used for on top of work benches
9	Comfortable to use.	✓	a plate on top of the handle so it can be pushed down with palm of the hand
10	Used by right or left handed pupils.	✓	
11	Must produce clean holes.	✓	
12	Must be distortion free.	✓	the accuracy mechanism stops the aluminium from distortion.
<ul style="list-style-type: none"> Final comments 			

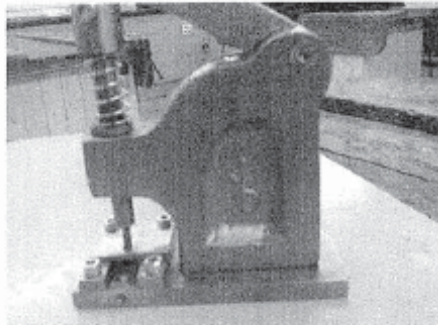
Evaluation

My project is all complete however it was a close call, as I encountered several problems with the metal work and the folder, but in the end I finished on time.

	Specification-Points	How my work met the specification.
1	Used by KS3 easily.	It can be used by any one, in key stage 3.
2	Safe to use by all.	It's safe because, nobody can catch their fingers on the punch because of the stripping plate, and also there are no sharp edges.
3	Should be able to disassemble for repairs.	It can all be disassembled with an Allen key.
4	Must be robust.	It's made of steel and solid aluminium and is robust enough for the work in the workshop.
5	Be able to produce holed aluminium strips.	The punch system allows the production of aluminium strips.
6	Must produce a consistently accurate batch of 50 strips.	The punch and guide system helps make an accurate batch of strips.
7	System for accuracy when holes are punched.	The guide strips and stop helps make an accurate punched strip of aluminium.
8	Vice mount.	It's not vice mountable; however it's a bench mount which is equally effective.
9	Comfortable to use.	It's comfortable to use because I've added a plastic coating on the handle.
10	Used by right or left handed pupils.	It's able to be used by left and right handed pupils, all they have to do is turn the punch around for them to grip.
11	Must produce clean holes.	The punch, with help from a

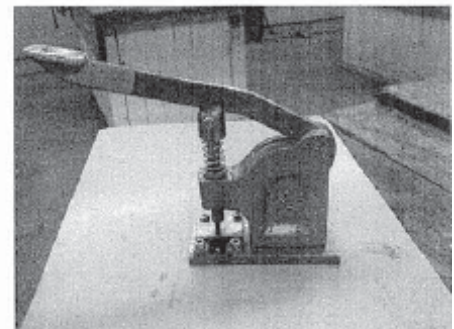
		bit of cutting grease allows the production of clean holes.
12	Must be distortion free.	The stripping plate, get's rid of any distortion from the aluminium strips.

My hole punch fits in with my original design brief, however some changes have been made, like the plastic coating added to handle and plate, also I decided to add my initials on to the casting.



The metal work in my opinion is safe to use as it doesn't catch fingers or have any sharp edges, however because of the long handle it tilts forward when punched, but the back of the body casting is a perfect grip to solve this problem, or simply a vice mount could be added to solve this problem.

The metal work looks good as I painted the body casting blue, and shined up the rest of the steel, which was the punch, base, guide strips, stripping plate and handle. I also added an orange plastic coating over the handle and plate to make it comfortable, but also look good. Over all my design is original, as it's a casting, and has my initials JD casted to the side, which no body else has done.



The hole punch works well, however the punch has to be greased with cutting grease in order for it to produce clean holes. At one stage I had a problem where it was ever the stripping place or a drilled hole on the base which caused the punch not to work well as it got stuck, but I over came this by undoing the guide strips and moving them a fracture to make the punch work well, also the punch has the turned a certain way for it to punch with out catching and getting stuck, but that again is due to the stripping plate or the guide strips.

From the users that have tested my hole punch, I have had a mixed rating and views, some say,

Key stage 3 student " The design is original, but the only problem is that it's not easy to punch as it tilts forward ",

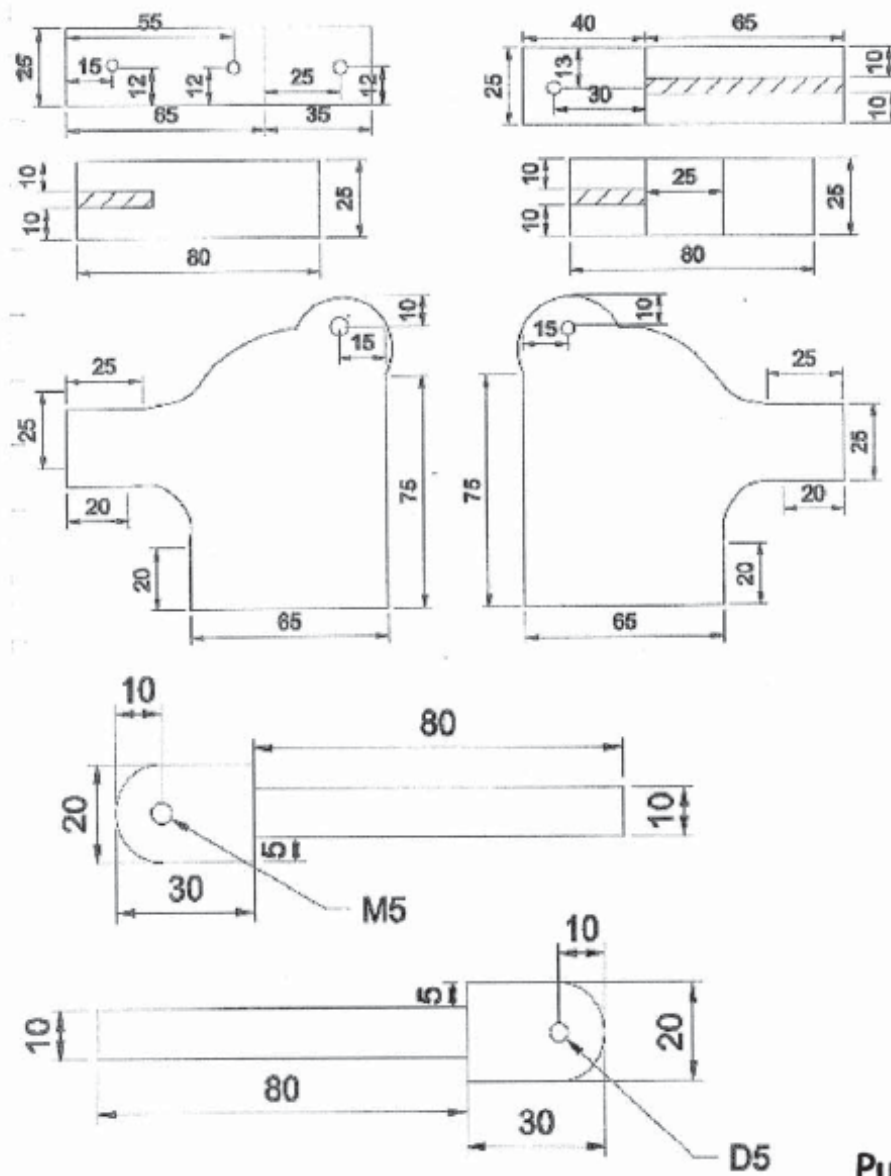
Key stage 4 student " The tilt forwards is a problem however it can be solved by griping the back but saying that it, takes a lot more time to

punch, that's the only real downfall of the work, everything else seems to be fine "

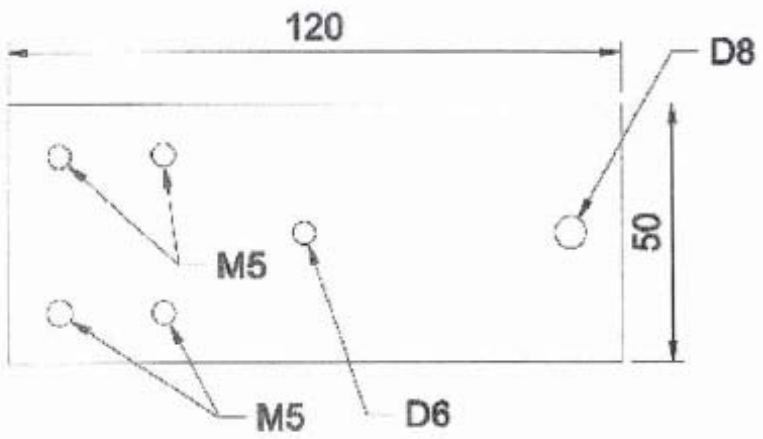
From evaluating my project and friendly criticism from friends, if I was doing this project again I would have made my metal work a vice mount, and have had more people test it out and see what they say about it, also I would have made the guide strips again as if there not in the right position the punch sticks.

CAD Drawings

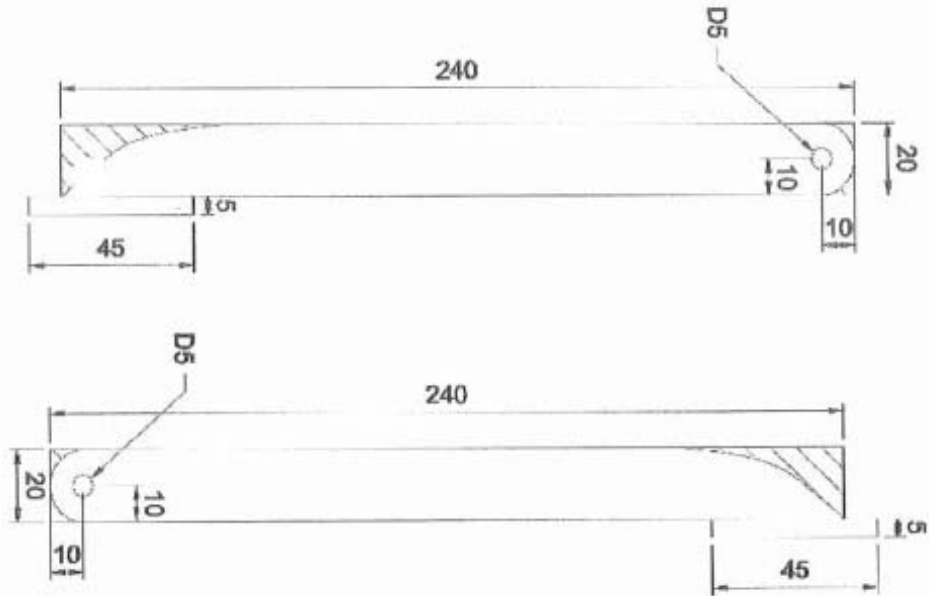
Body - Cast Aluminium



Base - BDMS



Handle - BDMS

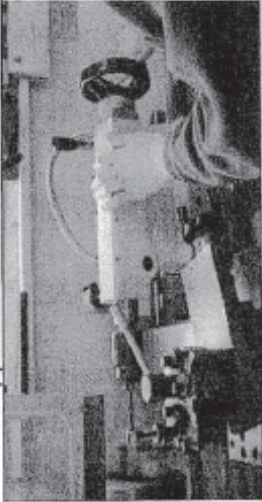
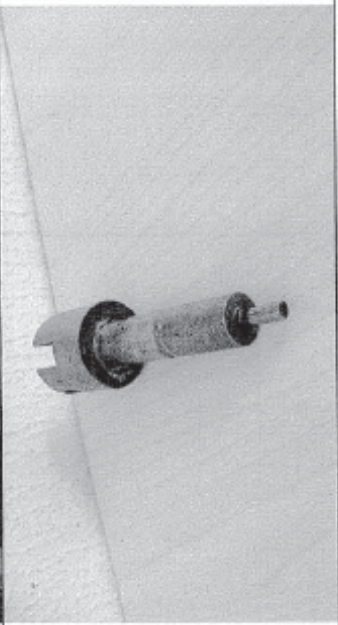


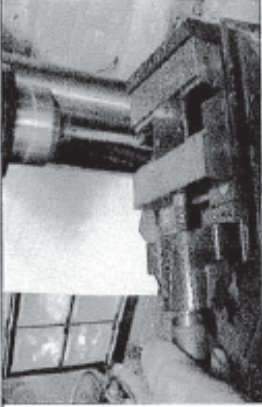
Planning for Making

Stage	Part	Process	Tools	Health and Safety	Quality Control
1	Body	Milling Slot Drilling Punch Hole Drilling and tapping fixing holes	Milling machine S&F cutter Drilling machine Drills M6 Taps	Goggles Machine guards Machine vice	Make sure casting is vertical when drilling hole for punch
2	Punch	Turning, facing & drilling head Facing & drilling body Slotting & drilling head	Centre lathe Facing tool Drills Milling machine	Goggles Machine guards Machine vice	Use centre drill before drilling. Drill at right angles to slot in head.
3	Assembling punch	Soft Soldering	Brazing hearth	Avoid contact with acid flux.	Make sure solder runs into joint. Wash off flux after soldering.
4	Base plate	Marking out Cutting & filing Drilling and tapping	Try square, scriber, centre punch. Hacksaw and file. Drilling machine Tap and tap wrench	Goggles Drilling machine guards Machine vice	Centre punch hole centres before drilling. Make sure tap is vertical.
5	Guides and stripper plate	Marking out Cutting & filing Drilling	Try square, scriber, centre punch. Hacksaw and file. Drilling machine	Goggles Drilling machine guards Machine vice	Make sure holes line up with the ones in the base plate

Stage	Part	Process	Tools	Health and Safety	Quality Control
6	Handle	Cutting & filing Drilling Brazing Plastic coating	Hacksaw & file Drilling machine Brazing hearth	Goggles Drilling machine guards Machine vice Care with hot metal	Make sure pad is square to the main handle when brazing. Leave to cool before moving
7	Finishing and assembly	Painting Assembling	Paint brush Try Square Allen keys		Paint left to dry overnight before assembly.

Making Diary

Stage	Description	Process	Materials	Time	Details
1	Machining body	Milling Drilling Threading	Aluminium casting (pre-manufactured)	1hr 45	Position of hole marked out using marking blue and centre punch. Try square used to check casting is vertical before drilling hole for punch. Holes tapped for allen screws.
2	Making punch parts	Turning Drilling Milling slot	Ø20 BDMS Ø12 BDMS	1Hr 15	
3	Assembling punch	Soldering	Ø4 Silver steel Soft solder	20mins	
4	Making base plate	Sawing Filing Marking out Drilling	50x10 BDMS	30mins	Positions of holes marked out using marking blue, try square, scriber and centre punch before drilling

Stage	Description	Process	Materials	Time	Details
5	Cut and drill metal for guides and stripper plates	Sawing Filing Drilling	25x3 BDMS 12x5 BDMS	45mins	 <p>Holes marked out and drilled to match base plate.</p>
6	Thread holes in body, punch head and base plate	Tapping	M6 Tap M5 Tap	20mins	<p>Made sure that tap was vertical when it started to cut. Taper tap used first.</p> <p>NOTE: I had to wait to use the taps so I tapped all the holes at the same time instead of one part at a time.</p>
7	Make handle	Bending Brazing Drilling Plastic coating	20x35 BDMS 20x3 BDMS M6 Drill Plastic powder	30mins	<p>Brazed pad on end of handle after drilling. Powder coated end of handle.</p>
8	Paint body and assemble punch	Painting Assembly	Paint Spring Allen screws	1Hr	<p>Paint left to dry overnight before assembling punch.</p>