

Exemplar Candidate Work

GCSE D&T: Industrial Technology

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

Unit A541: Introduction to designing and making

Portfolio 2: Theme – Can Crusher

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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 – Can Crusher

This portfolio exemplifies the work of a candidate working at a level that demonstrates ability in all sections of the project.

Creativity

The candidate has carried out some analysis of existing products related to the needs of users, but has failed to identify details of good design or technical principles. Although evidence in this section of the portfolio is limited, the candidate has also demonstrated some creativity in the designing and making elements of the project.

Mark: 5 (Max 10)

Designing

A reasonably detailed specification has been presented, although not obviously resulting from any earlier analysis.

Design ideas show some creativity and are presented using simple pencil sketches. Although the sketches themselves are of limited quality, they are well annotated and show the development of the chosen design.

Mark: 9 (Max 14)

Making

A basic plan has been presented, giving some detail of materials and construction techniques used, and making brief reference to health and safety.

The parts for the prototype have been made to a generally good standard, using materials that are appropriate to the requirements of a prototype. The prototype is complete, as evidenced by digital photographs, and would be suitable for testing, although this has not been shown.

Centre staff have assessed the candidate's ability to work safely and independently, and to solve technical problems as they arise.

Photographic evidence of the candidate working on the project is presented in the 'Record of Production'. More detail of the processes carried out would be useful here, and a tabular method of presentation is a particularly well suited approach to this element.

Mark: 13 + 3 + 2 = 18 (Max 28)

Critical Evaluation

It should be emphasized that it is the processes involved in the designing and making that are evaluated in this unit and NOT the finished prototype.

The candidate has evaluated his finished prototype here and, although the evaluation itself does not meet the requirements of the Assessment Criteria for this section, the information is presented to a reasonable standard in terms of QWC. The marks awarded for this section are, therefore, given for the candidates 'Quality of Written Communication'.

Mark: 2 (Max 8)

Total mark for portfolio:- 34 (Max. 60)

Marking criteria

Unit A541

Basic ability	Demonstrates ability	Works competently
<p>Creativity</p> <ul style="list-style-type: none"> • Make simple/limited links between principles of good design and technological knowledge, showing limited awareness of the user. • Identify one or two trends in existing solutions and use this understanding in a design context. <p>[0 - 3]</p>	<p>Creativity</p> <ul style="list-style-type: none"> • Identify associations linking principles of good design and technological knowledge, relating products to users' needs. • Demonstrate the significance of research that identifies trends in existing solutions; interpret and apply this understanding in a design context. <p>[4 - 7]</p>	<p>Creativity</p> <ul style="list-style-type: none"> • Identify complex associations linking principles of good design and technological knowledge, relating products to users' needs and wants. (AO1) • Demonstrate and understand the significance of trends in existing solutions; reinterpret and apply this understanding in imaginative ways. (AO1) <p>[8 - 10]</p>
<p>Designing</p> <ul style="list-style-type: none"> • Demonstrate a limited response to a brief and produce a simple specification for a prototype. • Produce one or two simple design ideas using a limited range of strategies. <p>[0 - 4]</p>	<p>Designing</p> <ul style="list-style-type: none"> • Demonstrate an appropriate response to a brief and produce a suitable specification for a prototype as a result of analysis. • Produce a range of creative ideas and communicate these by using appropriate strategies. <p>[5 - 10]</p>	<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 prototype as a result of analysis. (AO2) • Produce creative and original ideas by generating, developing and communicating designs using appropriate strategies. (AO2) <p>[11 - 14]</p>

Basic ability	Demonstrates ability	Works competently
<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 realise the product. • Work safely to assemble, construct and finish materials and components as appropriate to generate a prototype. • Use workshop/design studio facilities as appropriate to realise the prototype. <p style="text-align: right;">[0 - 6]</p> <ul style="list-style-type: none"> • Demonstrate a simple understanding of how to solve technical problems as they arise. <p style="text-align: right;">[0 - 1]</p> <ul style="list-style-type: none"> • Simply record the making of the prototype using notes and/or photographic evidence. <p style="text-align: right;">[0 - 1]</p>	<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 realise the product. • Work effectively and safely to assemble, construct and finish materials and components as appropriate to achieve a good quality prototype. • Choose and use workshop/design studio facilities as appropriate to realise the prototype. <p style="text-align: right;">[7 - 13]</p> <ul style="list-style-type: none"> • Demonstrate a practical understanding and ability in solving some technical problems as they arise. <p style="text-align: right;">[2 - 3]</p> <ul style="list-style-type: none"> • Record key stages involved in the making of the prototype; provide notes and photographic evidence. <p style="text-align: right;">[2 - 3]</p>	<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 realise the product. (AO1/AO2) • Work skilfully and safely to assemble, construct and finish materials and components as appropriate to achieve a high quality prototype. (AO2) • Assess and apply knowledge of the workshop/design studio facilities as appropriate to realise the prototype. (AO1/AO2) <p style="text-align: right;">[14 - 20]</p> <ul style="list-style-type: none"> • Demonstrate a practical and thorough understanding and ability in solving technical problems effectively and efficiently as they arise. (AO2) <p style="text-align: right;">[4]</p> <ul style="list-style-type: none"> • Record key stages involved in the making of the prototype; provide comprehensive notes and photographic evidence. (AO2) <p style="text-align: right;">[4]</p>
<p>Critical evaluation</p> <ul style="list-style-type: none"> • Give a limited evaluation of the modelling and prototyping process. • 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 making process. • Reflect on how to improve the modelling and prototyping process. • There will be some use of specialist terms, although these may not 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 processes involved in designing and making the prototype. (AO3) • Reflect and suggest modifications to improve the modelling and prototyping process. (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

OCR Industrial Technology

Unit A541 Introduction to Designing and Making

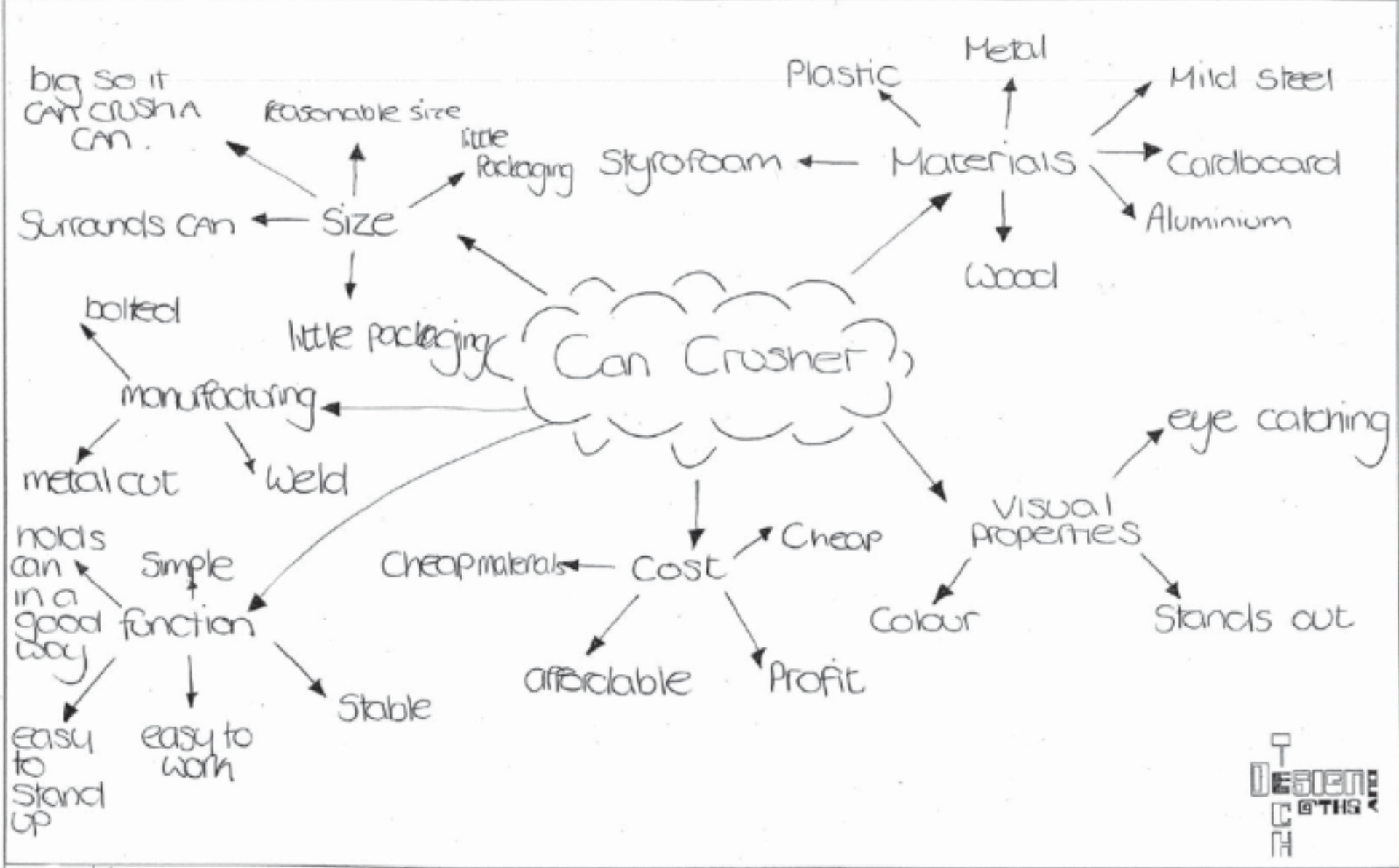
School

Centre No

Student name

Candidate No

Obj 1. Need and Brief	Obj 2. Research and Specification	Obj 3. Generate Ideas	Obj 4. Product Development	Obj 5. Planning and Realisation	Obj 6. Evaluation and Testing
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GCSE Industrial Technology Name:

Obj 1. Need and Brief	Obj 2. Research and Specification	Obj 3. Generate Ideas	Obj 4. Product Development	Obj 5. Planning and Realisation	Obj 6. Evaluation and Testing
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Cost

- When I got this picture off the internet there was no price but I estimate it to be about £15 pounds.

Size

- When I found this product on the internet there was no measurements but I estimate it at 350 - 400 ml

Weight

- This product is not very heavy because it needs to be portable

Materials used

- This product is made from metal maybe steel.

Existing Products

Safety Features.

- This product looks very safe because it has no sharp edges.



Methods of construction

- Made by a bending machines and fixed together by machine or man.

finish that has been applied

- This product may have been powder coated.

features of product

- This product is different to others because you can stand on it.

features that are common to some of the existing products.

- this product can crush the same variety of cans of others.

Production methods.

- I would say this has been made by a machine.



Obj 1. Need and Brief	Obj 2. Research and Specification	Obj 3. Generate Ideas	Obj 4. Product Development	Obj 5. Planning and Realisation	Obj 6. Evaluation and Testing
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Cost

- When I got this picture off a website it was valued at \$27, £14

Size

- When I got this picture off the internet, there was no details about the size.

- I estimate the size at 300 mm

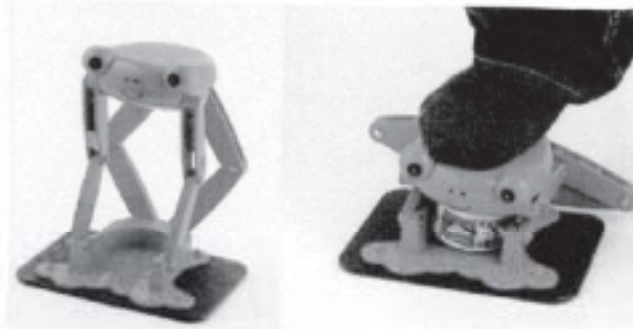
Weight

This product is not very heavy because it needs to be portable and also needs to be a household product.

Existing products

Safety features

this product has no sharp edges that you could cut yourself on.



materials used

This product is made from plastic and metals.

Methods of construction

made by machine

finish that has been applied

This product may have been powder coated or painted finished.

features of product

this product has a frog theme to it


features that are common to some of the existing products.

it crushes the same variety of coins

Production methods

I would say this product has been man built with a powder coat of green.



Obj 1. Need and Brief	Obj 2. Research and Specification	Obj 3. Generate Ideas	Obj 4. Product Development	Obj 5. Planning and Realisation	Obj 6. Evaluation and Testing
<p><u>User group</u></p> <p>The can crusher is to be used in schools and help them recycle. The school collects used tin cans to raise money by selling them to a recycling firm. By making them a can crusher they will be able to collect more tin cans. This product will be targeting primary school children.</p> <p><u>Design brief</u></p> <p>I am going to design a can crusher that will allow primary school children to crush cans more easily.</p> <p><u>Specification</u></p> <p><u>Use & Performance</u></p> <ul style="list-style-type: none"> • it must be able to crush cans • it must have a lever to pull down. 			<p><u>Safety</u></p> <ul style="list-style-type: none"> • it must have no sharp edges • must be safe for young children to use. <p><u>Size</u></p> <ul style="list-style-type: none"> • it must be able to crush all kinds of cans so it must be bigger than the kinds. <p><u>Weight</u></p> <ul style="list-style-type: none"> • this product must be able to be moved around and portable so this product should be fairly light. <p><u>Appearance</u></p> <ul style="list-style-type: none"> • this product must relate to the young children • This product should be bright so that the children can interact with it. 		
			<p>GCSE Industrial Technology Name: _____</p>		

Sec 1. Analysis of existing products	Sec 2. Designing	Sec 3. Planning and production	Sec 4. Solving technical problems	Sec 5. Record of production	Sec 6. Evaluation
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5 w's

Who will use the product?

This product will be used by all kinds of people ranging from young children at primary school to the elderly.

Where will the product be used?

This product could be used anywhere, but mainly places like households for creating more space in their recycling bins.

Why is the product needed?


This product is needed to create more space in peoples recycling bins so they can fit twice as many cans in than before.

What precisely does the product have to do?

This product has to be able to crush a variety of cans ranging from small to tall and skinny to fat.

When will the product be used?

This product can be used at anytime. it depends on when you want to crush cans.

Obj 1. Need and Brief	Obj 2. Research and Specification	Obj 3. Generate Ideas	Obj 4. Product Development	Obj 5. Planning and Realisation	Obj 6. Evaluation and Testing
<p><u>Specification Continued</u></p> <p><u>Cost</u></p> <ul style="list-style-type: none"> • It must be affordable to everyone • It must be a cheap price because the product is made out of recycled goods. <p><u>Expected life</u></p> <ul style="list-style-type: none"> • This product must last for about 5 - 7 years • When this product completely rusts you must buy a new one. <p><u>Maintenance</u></p> <ul style="list-style-type: none"> • It must be checked every six months to see how good the can crusher still works. <p><u>Environmental requirements</u></p> <ul style="list-style-type: none"> • This product must be made from recycled goods. 			<p><u>Ergonomics</u></p> <p><u>Sight</u> - This product must be eye catching due to young children using it.</p> <p><u>Sound</u> - This product must not squeek, it must have a smooth movement.</p> <p><u>Smell</u> - This product requires no smell.</p> <p><u>taste</u> - This product requires no taste because you are crushing cans not eating it.</p> <p><u>touch</u> - This product must not be sharp, it must be smooth due to young children using it.</p> 		
			<p>GCSE Industrial Technology Name: _____</p>		

Obj 1. Need and Brief

Obj 2. Research and Specification

Obj 3. Generate Ideas

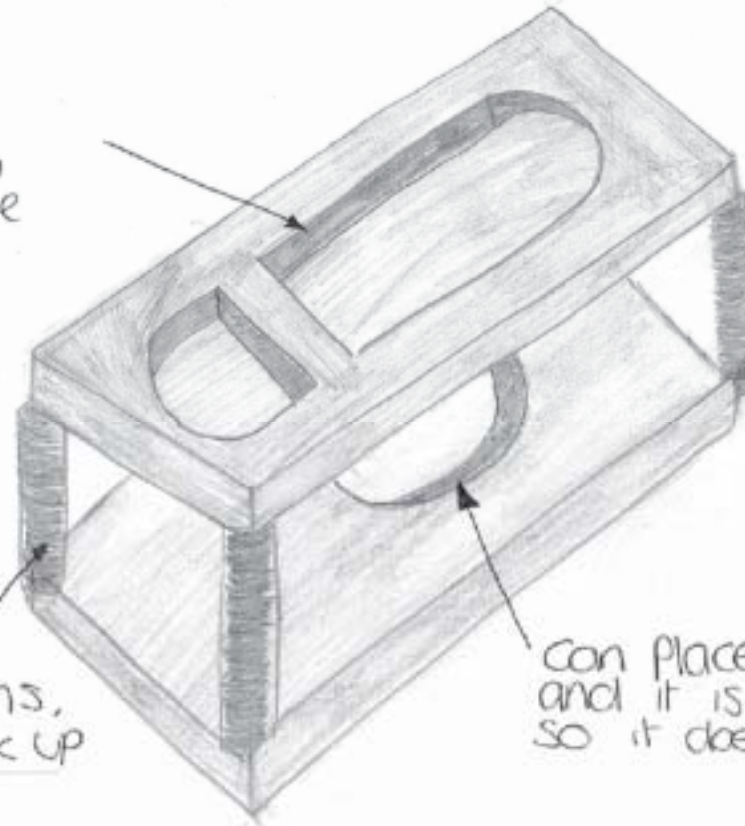
Obj 4. Product Development

Obj 5. Planning and Realisation

Obj 6. Evaluation and Testing

Design 1

Foot is placed here, you apply force to the springs



Guide bars are placed at each corner to support the springs and keep them in place.

Springs help to crush cans, and springs back up into a upright position.

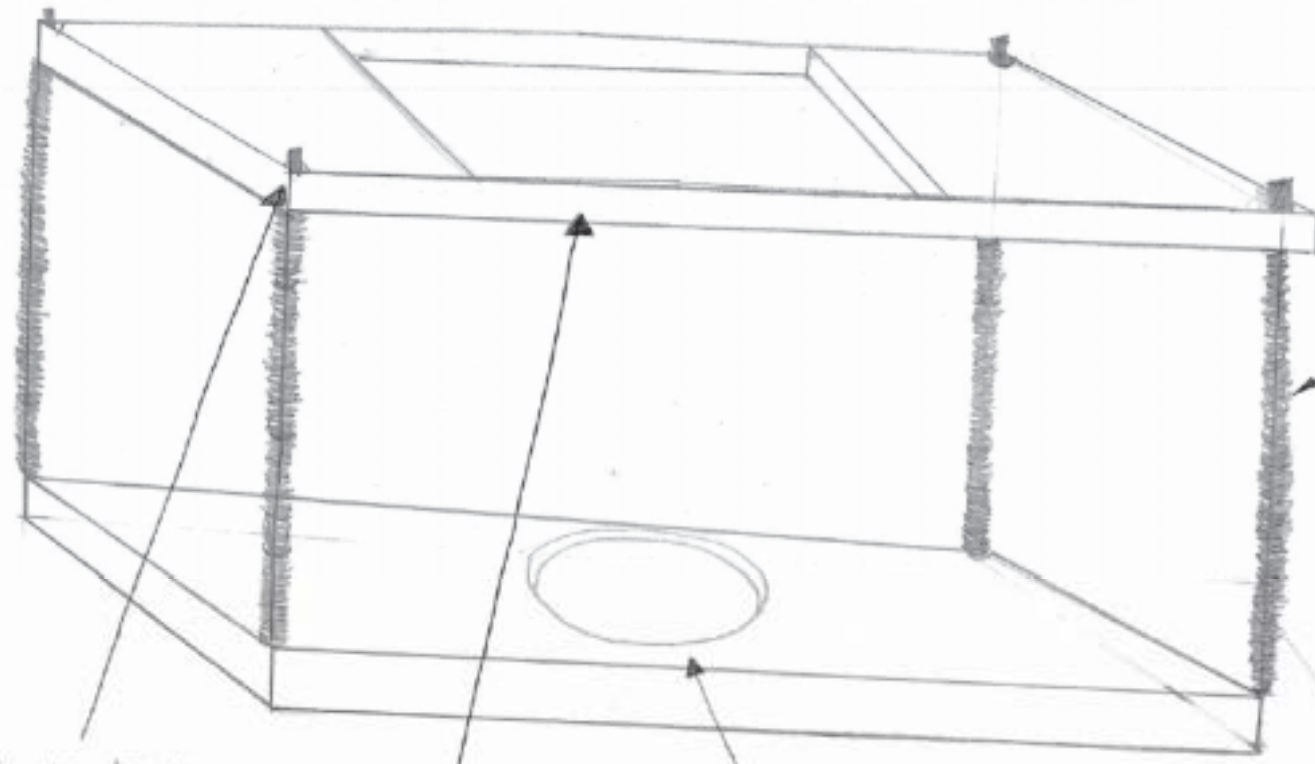
Can placed here and it is supported so it does not move.



GCSE Industrial Technology Name:

Sec 1. Analysis of existing products	Sec 2. Designing	Sec 3. Planning and production	Sec 4. Solving technical problems	Sec 5. Record of production	Sec 6. Evaluation
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design 1



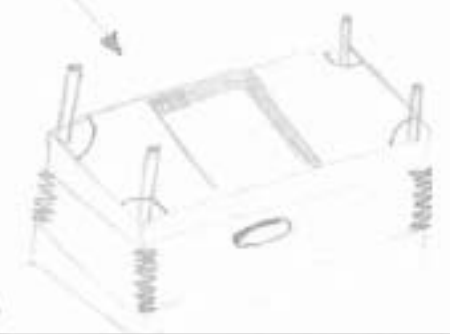
Springs help the can get crushed by allowing both metal plates at the top to move down & up.

Guide bars placed in middle of springs to give them support and so they do not move out of place

the gap here is for your foot to be placed, so you can crush it with your foot

Can will be placed here, this also makes the can while being crushed.

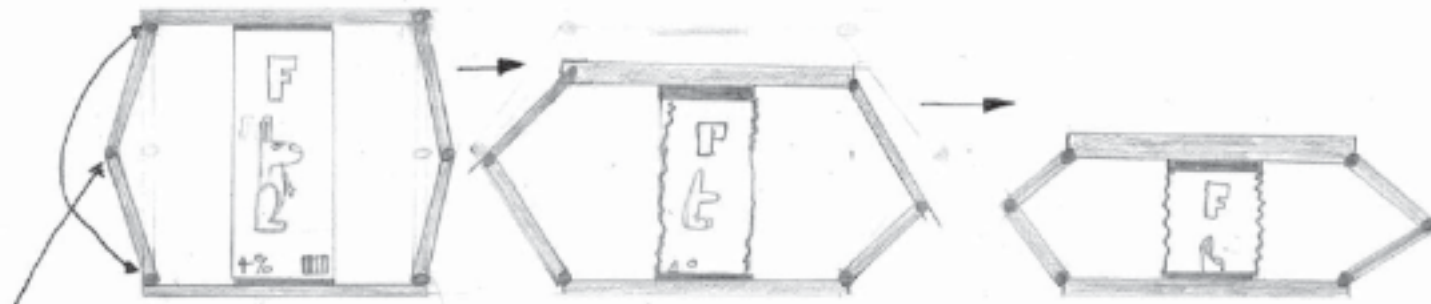
When springs are compressed the guide bars stop through the holes



	GCSE Industrial Technology	Name: _____
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Obj 1. Need and Brief	Obj 2. Research and Specification	Obj 3. Generate Ideas	Obj 4. Product Development	Obj 5. Planning and Realisation	Obj 6. Evaluation and Testing
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design 2



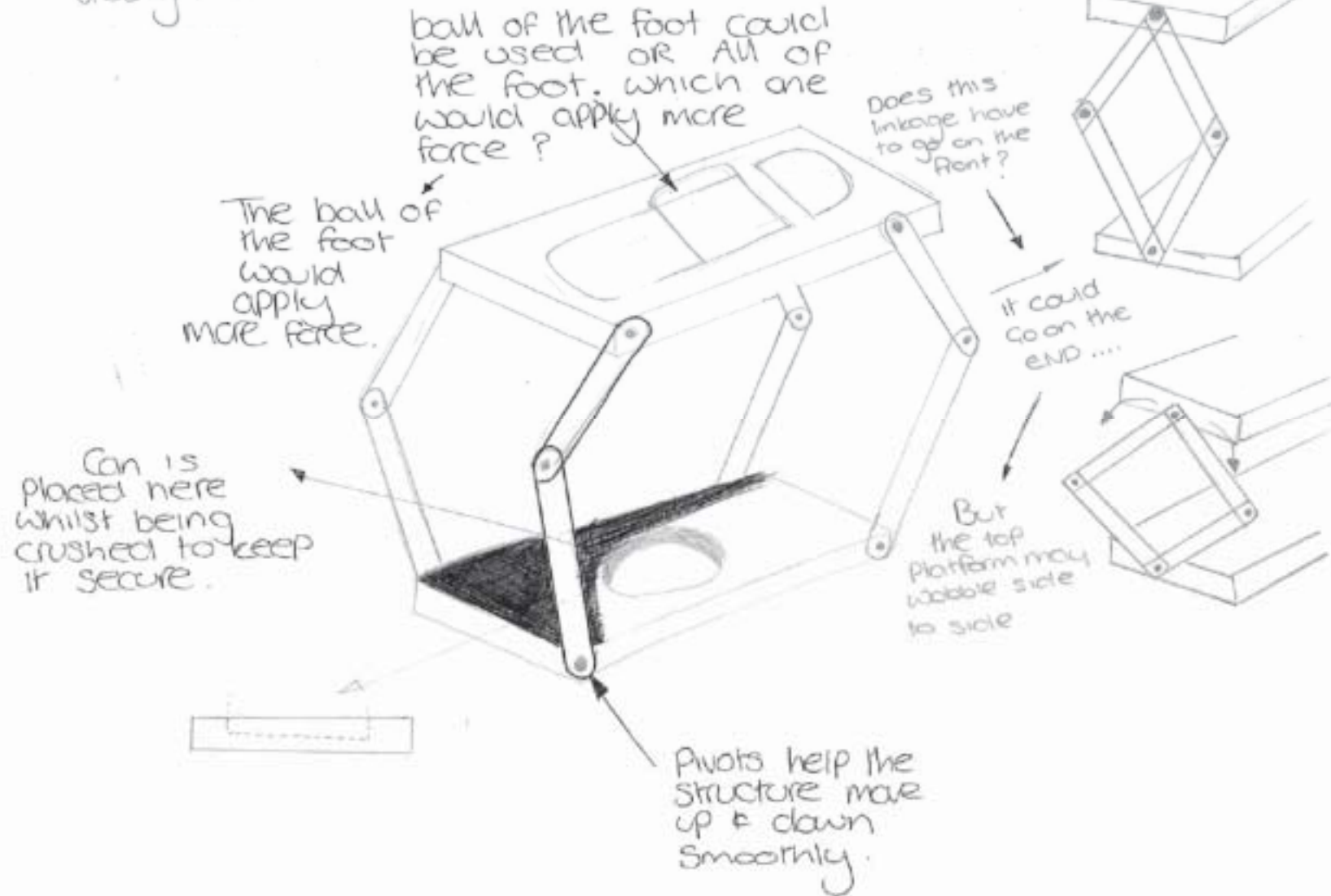
Pivots help the structure move smoothly up & down



GCSE Industrial Technology Name:

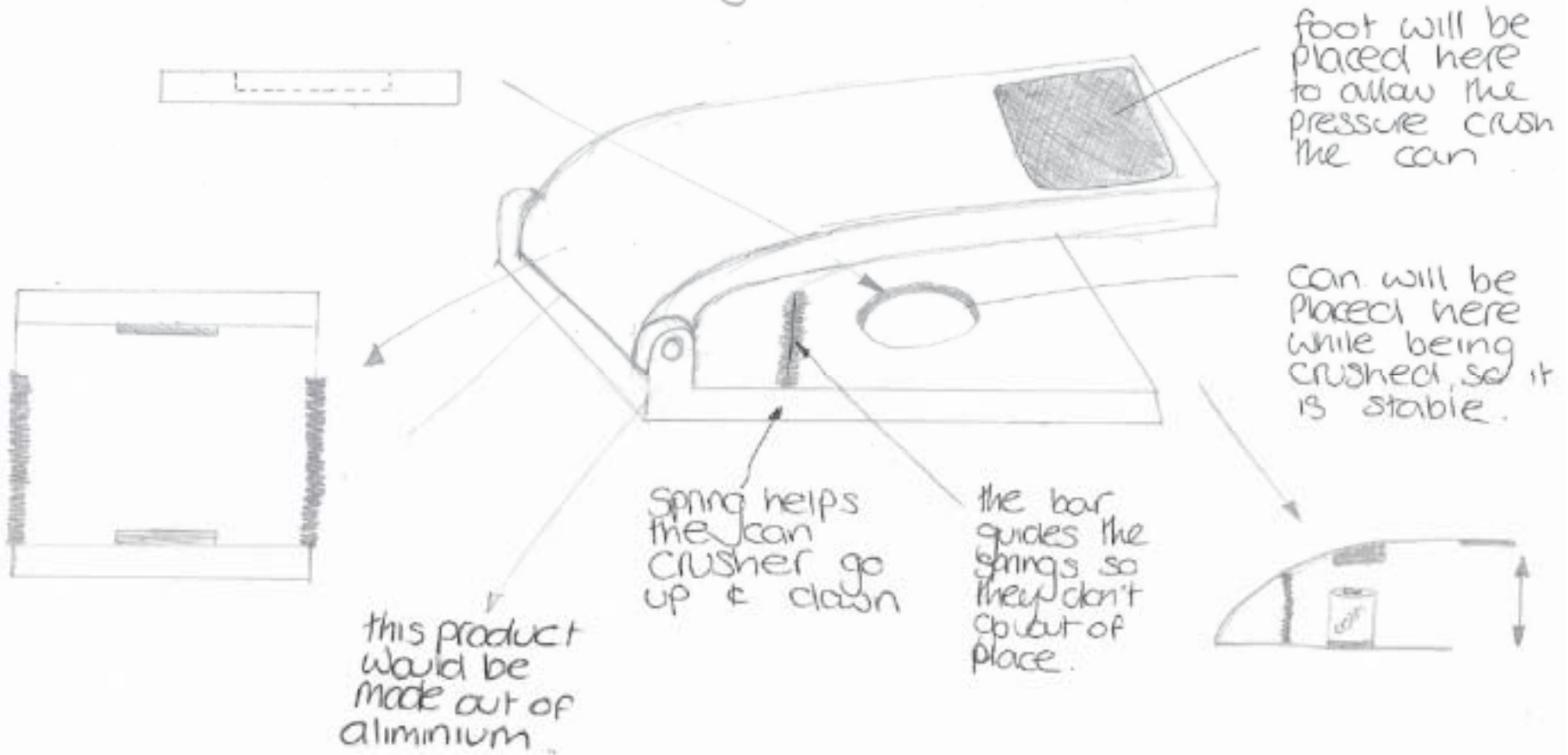
Sec 1. Analysis of existing products	Sec 2. Designing	Sec 3. Planning and production	Sec 4. Solving technical problems	Sec 5. Record of production	Sec 6. Evaluation
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design 2



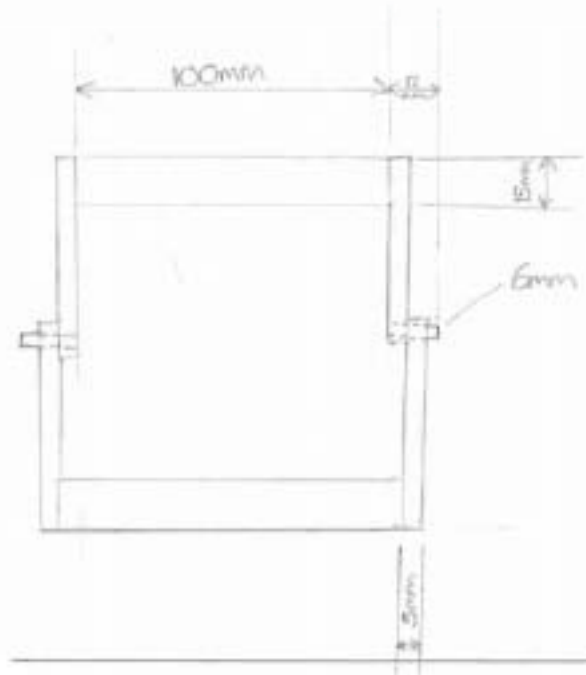
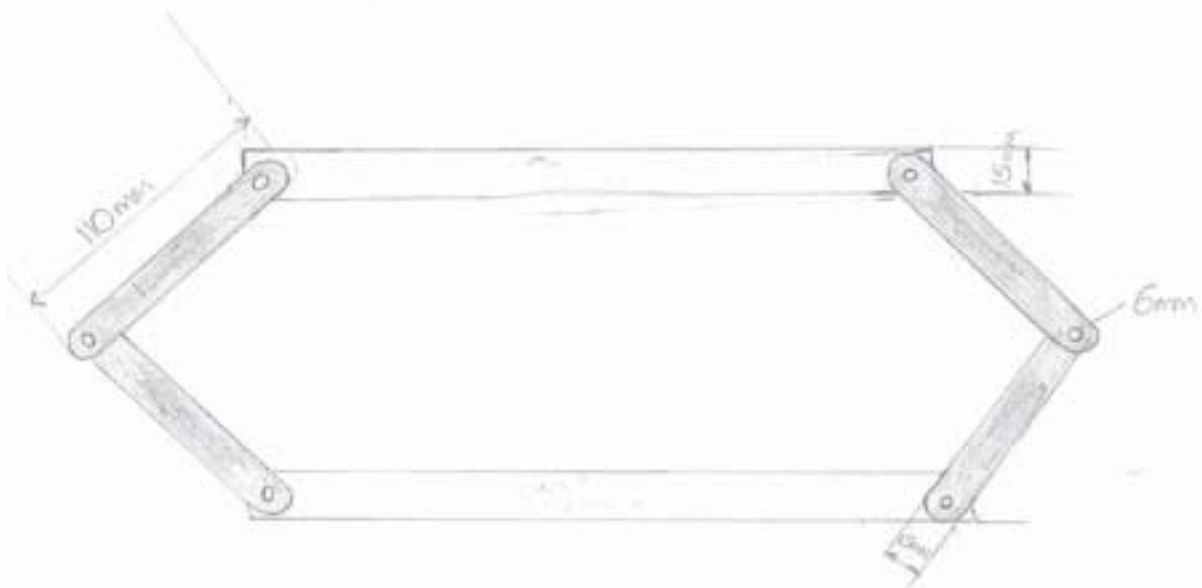
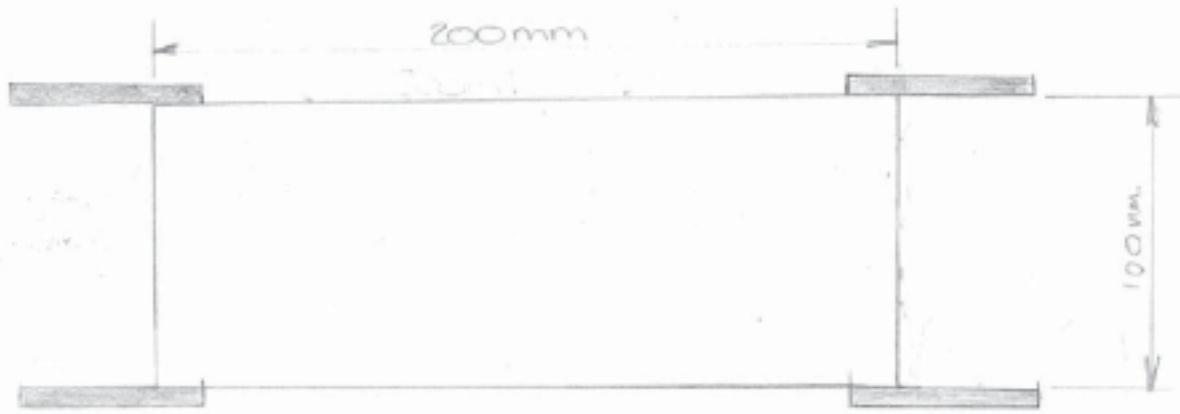
Sec 1. Analysis of existing products	Sec 2. Designing	Sec 3. Planning and production	Sec 4. Solving technical problems	Sec 5. Record of production	Sec 6. Evaluation
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design 3



Sec 1. Analysis of existing products	Sec 2. Designing	Sec 3. Planning and production	Sec 4. Solving technical problems	Sec 5. Record of production	Sec 6. Evaluation
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Final idea - orthographic drawing



Sec 1. Analysis of existing products	Sec 2. Designing	Sec 3. Planning and production	Sec 4. Solving technical problems	Sec 5. Record of production	Sec 6. Evaluation
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Production Plan

To make my product I need to make some can crusher ideas. I will not be using a computer to design my ideas. I will be just drawing sketches and annotating them well.

Health and safety is very important when using machinery. You should take the necessary precautions such as; making sure the safety guards on the machine you are using are in place, your work is securely clamped, and the operator is wearing face protection and a Apron.

Base

- I will get two pieces of 9mm thick plywood.
- I will measure them to 200mm by 100mm
- I will then mark it out
- I will then cut out across the

marked wood.

- I will then find out the center of both pieces of wood
- Once I have found the center of both I will cut out a circular hole in both pieces of wood using a hole saw on the pillar drill
- I will then drill 8 holes in total, four in each piece of wood, two on either side. These holes will be 6mm wide.
- I will use one of these pieces of wood for my base and the other piece will be used as the top of my can crusher.

Pivots

- I will cut four 15mm long pieces of dowel. These will be used to connect my linkages to my base and also to my top piece of wood.
- I will then cut eight 30mm long pieces of dowel. These will be used to connect

Sec 1. Analysis of existing products	Sec 2. Designing	Sec 3. Planning and production	Sec 4. Solving technical problems	Sec 5. Record of production	Sec 6. Evaluation
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Production plan continued

my linkages to my base and top of my can crusher. These will be placed into the 6mm wide holes I drilled into the sides of the base and the top of my can crusher.

Linkages

- I will cut eight pieces of pine wood at 110mm long and 15mm wide.
- once I have cut out all eight pieces of pine wood, I can start to drill 6mm holes at either end of each piece of wood.
- Before I can cut out the 6mm hole, I need to measure out where these holes must be placed, they must all be identical.
- once I have measured out where to drill I can drill the holes using a 6mm drill on a pillar drill.

Assembling

- firstly I will attach all eight of the 30mm long pivots into the side holes of the base and the top of my can crusher.
- Secondly I will attach two linkages together using a 15mm pivot, and repeat this until I have four linkages.
- finally I will attach all four linkages to my base and top of my can crusher using the 30mm pivots I inserted into the base and top earlier.

Sec 1. Analysis of existing products

Sec 2. Designing

Sec 3. Planning and production

Sec 4. Solving technical problems

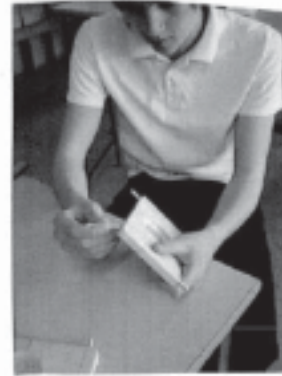
Sec 5. Record of production

Sec 6. Evaluation

Record of Production



I started by cutting a circular hole to fit a can in it. to cut this hole I used a hole saw on the pillar drill.



Here I am placing my pivots into the cut holes I drilled earlier.



Secondly I made some pivots to attach my linkages to the base of my can crusher and the top of my can crusher. These pivots will help my can crusher move smoothly.



Here I am fixing my linkages to the pivots secured into my base of my can crusher.

Sec 1. Analysis of existing products

Sec 2. Designing

Sec 3. Planning and production

Sec 4. Solving technical problems

Sec 5. Record of production

Sec 6. Evaluation

Record of Production

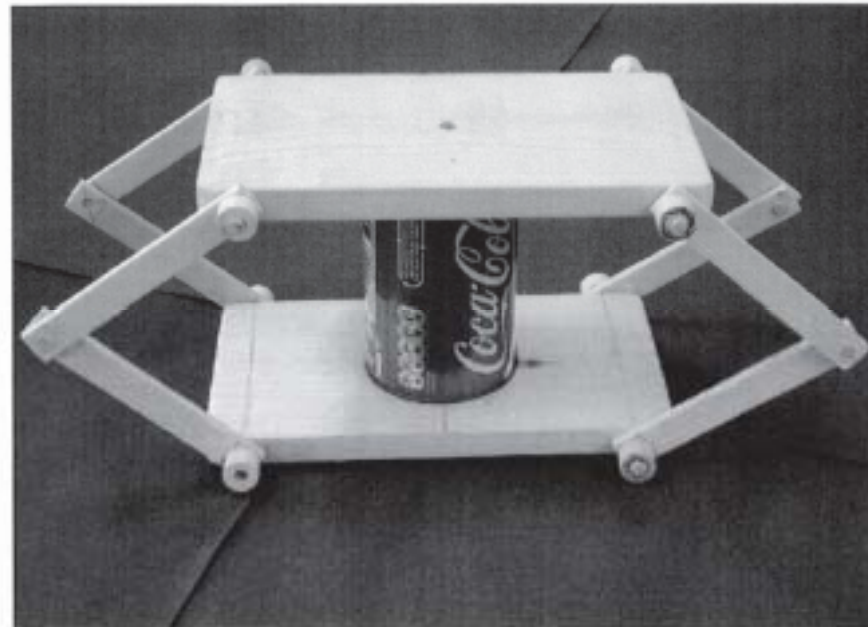


Here I am assembling the final parts to my can crusher.



This is the final product.

Sec 1. Analysis of existing products	Sec 2. Designing	Sec 3. Planning and production	Sec 4. Solving technical problems	Sec 5. Record of production	Sec 6. Evaluation
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Sec 1. Analysis of existing products	Sec 2. Designing	Sec 3. Planning and production	Sec 4. Solving technical problems	Sec 5. Record of production	Sec 6. Evaluation
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Evaluation

To improve my prototype, I have decided that I could make my linkages using metal. This would enable my model to move more smoothly. If the linkages do get stiff I could use WD40 to lubricate the joints. Another advantage of having metal linkages is that it would make my prototype more steady.

Also I have decided that I could use real pop rivets to act as my pivot. At the minute I am just using a piece of 15mm dowel, this does not connect my linkages very well. By using pop rivets would ensure me that my linkages would stay together.

The materials I have used to make my prototype are very cheap, for my base and top of my can crusher I have used ply wood. For my linkages I have used pine wood. I have used

dowel to act as my pivot, my prototype would be better if I made my base and top of my can crusher out of aluminium. This would make the product more expensive but would ensure that it would not rust. I would also prefer to use aluminium as my linkages, again this would make the product much more expensive, but would ensure that it would last longer. I also would use real pop rivets as my pivots, this would make the product last longer as it would hold the product together longer.

The production of my prototype took quite a long time, I could have spent more time on the written side of the work,

My finished product was filed down using glass paper to get rid of any unsafe areas and ~~rough~~ rough patches.