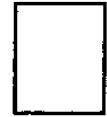


**GCSE in Manufacturing (Double Award).**

**Unit 2: Manufactured Products  
Graphics**



Proposed marks for Unit 2 - Graphic Products

				Allocated mark	Location of evidence
a1 describe a simple manufacturing process, using ICT as appropriate.	0 1 2 3	a2 produce a production plan that identifies the manufacturing processes and quality control.	4 5 6	7 8 9	A manufacturing process (page 1) and production plan (page 3) are identified. Key stages in production and quality control checks are referred to (page 2 and 4) but these could be developed more fully with greater reference to the project.
b1 describe the importance of accurate production planning and of meeting the product specification.	0 1 2 3	b2 identify in their production plan the schedule for manufacture and allocate roles to team members.	4 5	6 7	The need for careful planning and meeting the specification is outlined on page 5. Roles in the production plan have been allocated to team members on page 6. After considering how the team would work together on page 7 a revised schedule of manufacture has been produced. Further evaluation is needed of these areas.
c1 identify key control points during manufacture and describe the importance of health and safety.	0 1 2 3 4	c2 use quality control tests and carry out work with due regard to health and safety, including references to appropriate safety systems.	5 6 7	8 9	A list of key control points for making the project along with health and safety issues are given on page 8. Quality control is mentioned on page 9 and evidence of the group carrying out such work is evident on pages 10 - 12. How the production plan can be improved as well as details regarding safety systems could have been included in detail.
d1 describe the features of good teamwork in the manufacture of a product.	0 1 2 3 4 5	d2 identify effective teamwork for different aspects of manufacture, identify key roles during the preparation of materials, components, equipment and machinery in the manufacture of their product	6 7 8	9 10	Team organisation and features of a good team have been included on pages 13 and 14 but no consideration is given as to how improvements can be made as a result of buying ingredients or components.
e1 describe how they produced their product using appropriate tools and equipment.	0 1 2 3 4 5 6 7	e2 explain why the tools and equipment used were appropriate to the task and identify any changes they have made to their production plan.	8 9 10 11	6	A description of the development of the package style is given on pages 15 - 17. A plan of making with process sheet for the production of one part of the package (page 18) is given along with work progress sheet/diary of making (page 19). A description as to how the product was made identifying tools and equipment is given on page 16 but little explanation is made as to why these were appropriate. The evaluation on page 20 does suggest further improvements to the package and an explanation of how the product was made in a school situation is given on page 21. The real world manufacturing situation is considered on page 22 but only for part of the project, this aspect needs to be developed considerably.
Total mark				34	

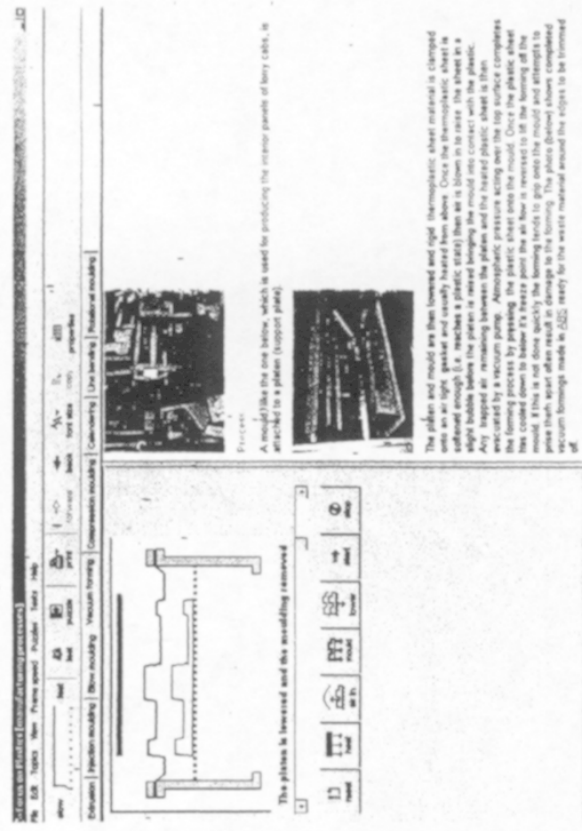
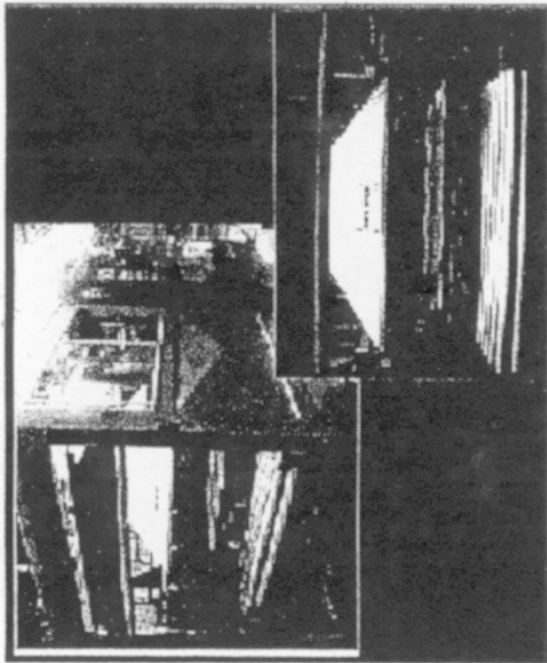


FIGURE 1.1 A mould like the one below, which is used for producing the interior panels of heavy cars, is attached to a plate (support plate).

The plates and mould are then lowered and cold thermoplastic sheet material is clamped onto an upper plate and carefully heated from above. Once the thermoplastic sheet is softened enough (i.e. reaches a plastic state) then it is blown to raise the sheet in a slight bubble below the plate or raised being the mould into contact with the plastic. Any trapped air remaining between the plate and the heated plastic sheet is then removed by sucking air through the holes in the upper plate. Once the plastic sheet has formed the desired shape, the upper plate is raised and the plastic sheet is cooled down to below its glass transition temperature. The thermoforming process then uses other tools to trim the sheet to the required size and shape. The thermoforming process is used to produce a wide range of products, including car interior panels, as shown in the photograph below.

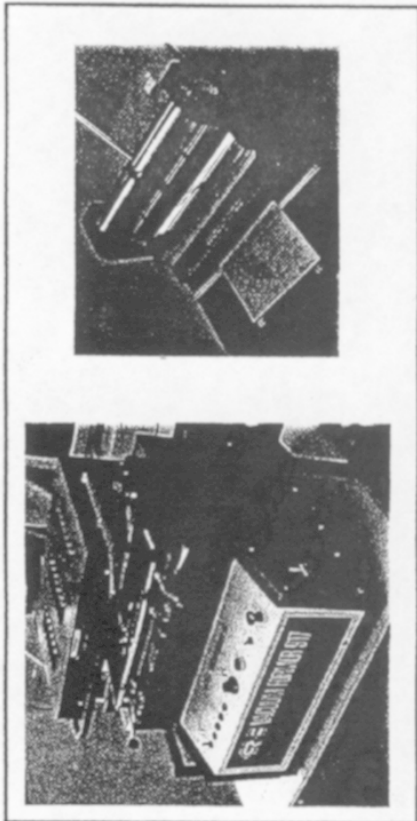


### INDUSTRIAL PROCESSES

The CD Rom showed two processes that are used in industry Vacuum Forming that can be used to form thin plastic sheets. The second process made use of a Die cutter and was used to punch out surface developments of boxes ready for assembly.

### SCHOOL WORKSHOP PROCESSES

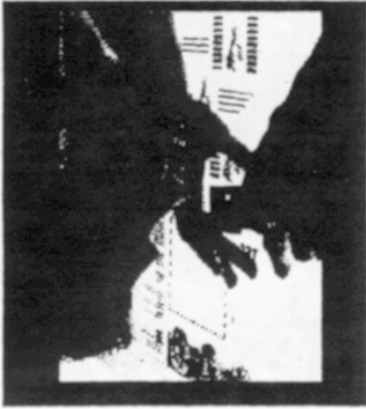
The same processes that were highlighted above can be used in school but on a much smaller scale. The machines used to carry out these processes in school are shown alongside.



### KEY STAGES OF PRODUCTION

The main stages of production which should be considered when planning are -

- Specification and design of product.
- Manufacture of prototype.
- Approval of client.
- Selection and ordering of materials.
- Machine setting and tooling.
- Quality control check on goods received.
- Preparation of parts for assembly.
- Assembly of Product.
- Quality control of product.
- Packaging.
- Distribution.



### MONITORING AND CONTROL OF THE MANUFACTURING PROCESS

Printing is a highly skilled profession and at many stages during the manufacturing process of a printed item expert judgement is needed when checks are carried out to see that the manufactured product is matching the quality required and fulfilling the identified specification.

Careful checking of printing film is crucial if a high quality printing plate is to be produced. This is particularly important in terms of registration and alignment.

The balance between the colours in the four colour process is very important as is the registration of one colour to the others.

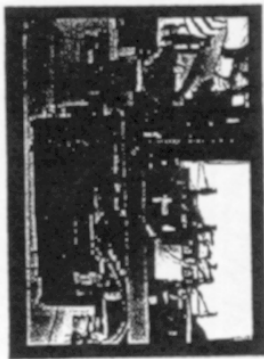
### PRODUCTION PLANS

Accurate planning is needed in order to analyse stages of production in such a way that the product is made and assembled as efficiently, accurately and as quickly as possible.

### PLAN FOR MAKING - PACKAGE and CONTAINER INSERT.

STAGE	OPERATION	MATERIALS/PARTS/ COMPONENTS	TOOLS & EQUIPMENT	RISK ASSESSMENT	High Medium Low	TIME TAKEN	
						Est.	Actual.
	<b>Making package.</b> Design layout - include net and images.	Use of PC and publisher package.	PC and software - Publisher and clipart.	Eye glare from PC.	L	100mins	
	Print out development.	Card	Colour printer A3 size	Take care card cuts.	L	25 mins.	
	Cut development to correct shape.	Card development from above section.	Stanley knife, safety rule, cutting mat	Take care when using Stanley knife.	L	25 mins.	
	Score correct lines for folds.	As above	Scissors, safety rule, cutting mat.	Take care when using sharp instruments.	L	20 mins.	
	Fold package to correct shape.	As above.		Avoid paper cuts.	L	30 mins.	
	Mark and cut acetate sheet to correct shape.	Acetate sheet.	Pencil, ruler, Stanley knife, safety rule, cutting mat.	Take care when using Stanley knife.	L	20 mins.	
	Glue acetate sheet into position.	Card development, pritt stick and acetate sheet.	Glue.	Care not to get glue all over.	L	15 mins.	
	Assemble package.	Pritt stick	Glue.	As above	L	30 mins.	
	<b>Making container inserts.</b> Design shape for insert.	Paper.	Pencil.			40 mins	
	Make former for mould.	Medium Density Fibreboard and hardboard	Marking out and cutting tools	Use tools correctly, wear an apron.	M	45 mins.	
	Form shape.	Clear polystyrene sheet.	Vacuum forming machine.	Keep fingers away from heater element.	M	15 mins.	
	Cut formed shapes to size.	Formed polystyrene sheet.	Stanley knife, cutting mat and safety rule.	Take care when using sharp tools.	L	30 mins.	
	Trim edges of insert.	Individual containers.	Sanding disc.	Keep fingers away from abrasive, wear goggles and apron.	M	45 mins.	
	<b>Assemble unit.</b> Put container inside package.	Card package and polystyrene container.		Paper cuts.	L	10 mins.	

Quality Assurance and Quality Control are vital parts of the manufacturing process in order to guarantee that the products made meet specifications set and the expectations of the client.



Checking the performance of a colour printing machine.



Carefully loading paper ready for printing.

## TYPES OF PRODUCTION

One off (job or custom) production is where a single item may be needed, such as a custom made item of furniture for a millionaire's home. This method is suitable for producing individual items often to a particular customer's requirements but at a high cost.

Checking the work as it progresses along the manufacturing line is important in order to make sure that the last product is exactly the same as the first item produced. By carrying out checks it will guarantee that the Quality of the product is maintained and that manufacturing standards are kept.

The use of Computer Aided Design to draw the layout of the package and producing the item using Computer Aided Manufacturing also helps to maintain the quality of the items as by using these methods repetition of exact pieces is guaranteed.

Quality Assurance is a very important part of the Manufacturing Process as if the customer knows that he/she is going to get a quality and reliable product then they will keep buying that companies products or keep returning to them to design new products.

Quality control is part of the quality assurance process. Production attitudes should follow an approach of all parts are right first time every time. The quality control unit should monitor the performance of products from the beginning of the manufacturing process through to the end. Quality control is applied in the manufacturing situation through inspection and testing.

Inspection is carried out to see if the product and the materials meet the specified design standards.

Testing is concerned with checking that the product works the way that it should and will continue to work over a period of time in different environments.

Batch production is where larger quantities of items are made. The method involves the same item being made repeatedly over a period of time such as 1000 loaves of bread made in a few hours daily in a bakery. The manufacturing system used can include elements of line and one off production. Batches produced can be increased or decreased according to demand. As this method produces a lot of items individual costing starts to reduce when compared to one off items.

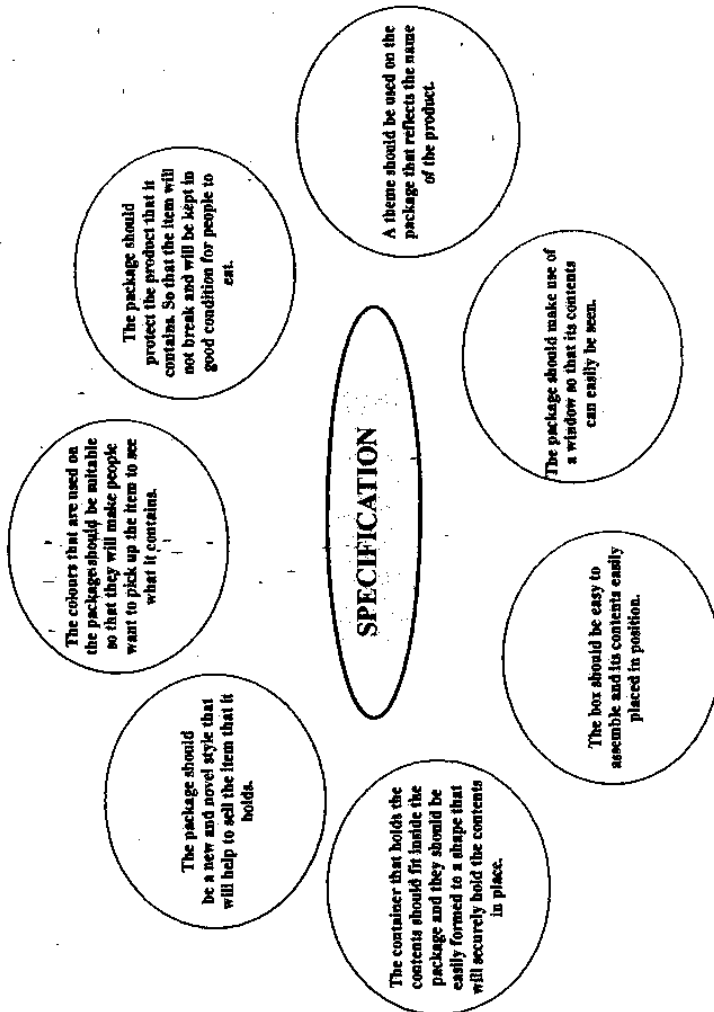
Mass Production High Volume Production can be carried out in a number of ways -

**Line production** where the products move continuously along the assembly line with processes being carried out or parts added in sequence. This type of production is used when making cars. As many items are produced the individual cost of items is reduced a great deal compared to batch and one off methods.

**Flow or continuous production** is used when products are sold on an ongoing basis and production is continuous, maybe 24 hours a day, over a long period of time.

Usually on these production lines a lot of money has been spent buying in specialised equipment which may involve automated control systems. Such machines keep production rates very high and therefore keep individual item costs very low. Nails and woodscrews can be produced using this method.

## Requirements of the Product



## Producing a product to meet the specification.

In order to produce a successful and quality product that meets the specification careful planning has to take place. This is not only for the assembly of the product but also as to how the members of the production team will be organised and identify what tasks they will carry out.

## The need for careful planning.

In order that the product is manufactured to a quality that meets the specification careful planning is needed. By doing this time and money can be saved. Time is saved due to the manufacturing procedure being organised so that the item is constructed in such a way that everyone knows what they are doing and at each stage progress is made towards the completion of the final artefact. Materials and tools need to be available in order for the progress to flow and to avoid any hold ups on the assembly line.

## PLAN of MAKING

Design the layout of the package.  
Insert the images onto the development of the package.  
Select the correct colour scheme.  
Print out the development of the package.  
Cut the package development to shape, including window.  
Score fold lines.  
Fold package to shape designed.  
Cut the acetate sheet to the required size.  
Glue the acetate sheet in correct position on the package.

Design the shape for the container insert.  
Make a mould that will allow the container to be shaped.  
Form the container on the vacuum former.  
Cut the formed sheet up into individual containers.  
Trim the edges of the container.

### WORKING as a TEAM

Emma and Liz are good at ICT and Art and especially like designing items.  
They have been selected by the group to carry out the designing and making of the package.  
They are both excellent attenders to school and mix well with other people.

Craig and Mark are best friends and they like Design and Technology. They both enjoy designing items but like making best.  
Craig and Mark are going to work on the plastics element of the project, designing and making the polystyrene containers.

6



## GANTT CHART TO SHOW MANUFACTURING SCHEDULE

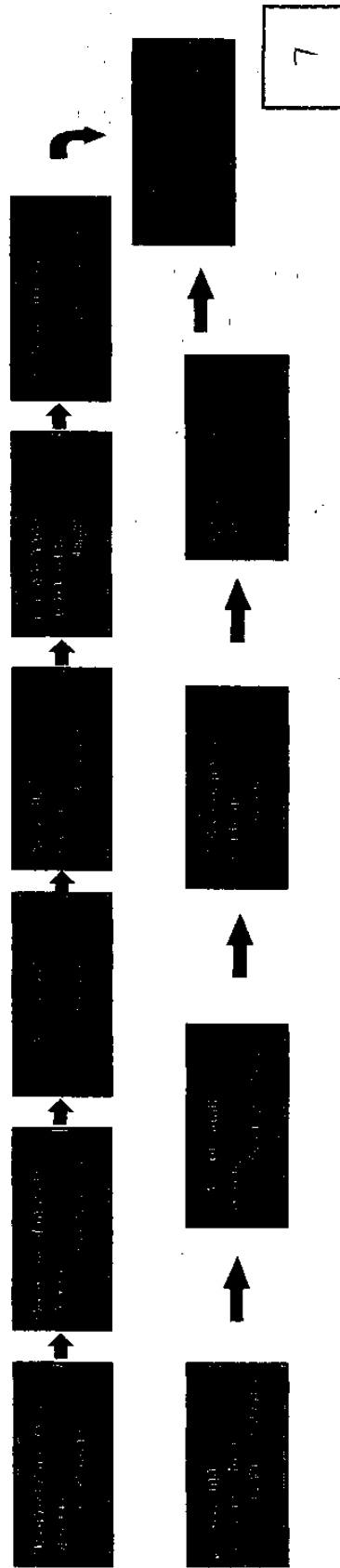
Stage	Process	Dept.	Month	Date
1	Design the layout of the package	Design		
2	Print out development of packages	Product		
3	Cut out package	Product		
4	Score package	Product		
5	Cut out acetate sheet	Product		
6	Glue acetate sheet into position	Product		
7	Assemble package	Product		
8	Design shape for container insert	Design		
9	Make mould for container	Product		
10	Produce container on the vacuum former	Product		
11	Cut out container inserts	Product		
12	Trim the edges of the inserts	Product		
13	Assemble product	Product		
14				

### WORKING AS A TEAM TO IMPROVE THE MANUFACTURING SCHEDULE.

As the team is made up of four members it would be more beneficial to the procedure if the group worked as a team and members were given tasks according to their strengths and interests. Emma and Liz will carry out all the work associated with the packaging and Craig and Mark will work on the polystyrene insert aspect.

The schedule can therefore be revised to show the groups carrying out the identified tasks.

### REVISED SCHEDULE -



## Quality Assurance of Packaging.

### Stages for checking during manufacturing -

#### BOX ASSEMBLY

- Check that the surface development is the correct size to allow insert to fit.
- Check that box can be assembled correctly and that all glue flaps are large enough so that when glued they will stay in position and not fall apart.
- Flaps on box lid should be big enough to prevent any gaps from appearing once the box is folded, check that box will assemble correctly and flaps do not get in way.
- Check that space for window is large enough to allow the acetate sheet to be glued into position and it will stay firm when package is used.

#### BOX PRINTING

- Check colours used on printing look out for fade, bleeds and overlap.
- Check layout of images and lettering.

#### INSERT

- Check size of insert, will it fit box?
- Check edges look out for sharp areas that may cut the user.
- Look at finish that is on the plastic is it up to specification? With no sign of overheating evident.



## Health and Safety Issues.

### Use of cutting out tools

- When using a cutting knife always use a safety rule so that if you slip when cutting the material you minimise the risk of cutting yourself.
- Always use a cutting board as backing when carry out cutting and scoring operations in order to avoid damage to work surfaces.
- Retract all exposed cutting surfaces when not in use.
- Avoid sharp edges on paper and card as these could cause paper cuts to the user/customer.

### Vacuum Forming machine



- Using the vacuum forming machine - keep fingers away from heater element.
- Check material as it is being heated do not allow the material to over heat as this could cause fumes to be given off and further heating could cause.
- Allow items to cool before removing from the machine.



### Completed product

- Avoid sharp corners and small loose parts.

## PRINTING PROCESSES THAT CAN BE USED IN SCHOOL AND OFFICE.

Ink jet printer makes use of spraying ink dots onto the surface area.



**Laser Printing**  
A sharper image is produced by this method of printing. Images can be received from PC, digital camera or a magnetic disc.



**Photocopier**  
This process works on the principle that opposite forces of charge attract each other. When an item is placed face down on the copier it is illuminated from below the image area reflects through the lens onto a rotating drum which has been given a positive static charge. The positive charged image is then coated with negative charged toner powder. The paper is heated and this fuses the powder onto it.



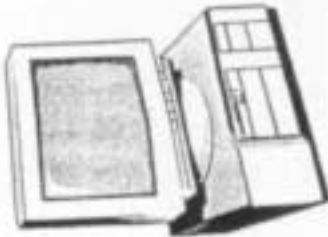
## PRODUCING THE PACKAGING IN SCHOOL

The package can be designed on a PC using a variety of packages including Word and Publisher. Images can be imported from many different sources including clipart and appropriate websites or they could be scanned and placed onto the surface development. Images could also be added using the digital camera.

By using the computer images can be altered easily and a variety of colour schemes can be tried out and accepted or rejected very quickly.

The completed surface development can be printed and then cut to the required shape using a stanley knife, safety rule and cutting mat.

The box will then need to be scored and folded into shape.



## PRODUCING THE INSERT IN SCHOOL

The polystyrene inserts will be produced as a group using the vacuum forming machine. Formers will have to be made prior to the process being carried out in order for the containers to be made to the specified shape.



Vacuum forming machine

## QUALITY CONTROL

It is vital that the package presents a good image for the company and the product that is being sold. The contents of the package must be carefully stored and should reach the customer in excellent condition. If this does not happen then the potential buyer will not be attracted to the product and hence will not get a good impression of the company.

In order to ensure that the product fully meets the specification many tests and inspections will need to take place during manufacture to ensure that the product meets the identified specifications.

Quality checks will need to be carried out at the following stages:

- Print layout and quality.
- Colour - used and alignment.
- Shape and size of surface development.
- Shape of assembled package.
- Quality of formed polystyrene insert - sharp edges/size.
- Fit of assembled wall.

**Quality checks carried out in making the packaging and insert.**



Check that the colour and alignment of lettering is correct.



Check that the surface development has been cut in the correct shape, size and that all folds and creases are cut scored.



Check that there are no sharp edges on the insert.



Check that the insert fits into the package.

**Health and Safety issues.**

Checking safety systems available in the school workshop

Health and Safety check sheets.		
Item	Location	Condition
Aprons		
Safety Goggles		
Dust Mask		
Ear protectors		
Water Supply		
Power cut off switch		
Fire Alarm		
Emergency Exit		
First Aid Equipment		
Ventilation Windows		
Ventilation Extractors		
Lighting Electric		
Light switches		
Electric sockets		

Overcome problems as they arise.

<b>CORRECTIVE ACTION REQUEST</b>	<b>Number: 1</b>
Request raised by	To:
Department:	Dept. or Supplier:
Date:	Copits to: Manufacturing Manager Quality Assurance Manager Others:
Signature:	
What is wrong (e.g. give details of parts, batch details, not working to procedures etc.)	
The mould can not be removed from the formed plastic after carrying out vacuum forming.	

<b>CORRECTIVE ACTION REPLY</b>	
From:	To:
The problem is:	The mould has not been produced correctly and may not have the required draft on its edges or corners are too sharp.
Immediate action to correct is:	Check that the sides have a taper on the edge. Check that all corners are rounded.
Action to prevent this happening again:	Carry out careful checks of all moulds that are produced for required draft, and tapers avoid square edges.
Signature	Signature
Date	Date

<b>CORRECTIVE ACTION</b>	
Completed <input type="checkbox"/>	Not Completed <input type="checkbox"/>
Signature	Date
<b>WHEN COMPLETED SEND THIS FORM TO QUALITY ASSURANCE DEPARTMENT</b>	
<b>QA DEPARTMENT ONLY</b>	
CHECK FOR EFFECTIVENESS	By:
Yes <input type="checkbox"/>	<input type="checkbox"/>
No <input type="checkbox"/>	<input type="checkbox"/>
Comments:	
Check moulds that are being used prior to carrying out the vacuum forming process.	
Signature	Date

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Overcome problems as they arise.

<b>CORRECTIVE ACTION REQUEST</b>	<b>Number: 2</b>
<b>Request raised by</b>	<b>To:</b>
<b>Department:</b>	<b>Dept. or Supplier:</b>
<b>Date:</b>	<b>Copies to:</b> Manufacturing Manager Quality Assurance Manager Others:
<b>Signature:</b>	
<b>What is wrong (e.g. give details of parts, batch details, not working to procedures etc.)</b>	
<b>Black outlines on the printing are not a definite line they are being printed as dashes.</b>	

<b>CORRECTIVE ACTION REPLY</b>	
<b>From:</b>	<b>To:</b>
<b>The problem is:</b> The ink levels in the printer cartridge are low or the printing head is blocked.	
<b>Immediate action to correct is:</b> Carry out a sample print on a blank piece of card/paper. Clean head on printer.	
<b>Action to prevent this happening again:</b> Carry out regular checks on print heads and monitor ink levels in the printer cartridge	
<b>Signature</b>	<b>Signature</b>
<b>Date</b>	<b>Date</b>

<b>CORRECTIVE ACTION</b>	<table border="1"> <tr> <td style="width: 50%; text-align: center;">Completed</td> <td style="width: 50%; text-align: center;">Not Completed</td> </tr> </table>	Completed	Not Completed
Completed	Not Completed		
<b>Signature</b>	<b>Date</b>		
<b>WHEN COMPLETED SEND THIS FORM TO QUALITY ASSURANCE DEPARTMENT</b>			
<b><u>QA DEPARTMENT ONLY</u></b>			
<b>CHECK FOR EFFECTIVENESS</b>	<b>By:</b>		
Yes	No		
<b>Comments:</b>			
Check ink levels at the beginning of each print run, have spare cartridges ready to replace existing one after 100 runs have been completed.			
<b>Signature</b>	<b>Date</b>		

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## Teamwork

### What do I think is important in a good team ?

A good team needs to communicate with each other. They need to share ideas with each other and not be offended when others don't agree with or do not like their ideas. The individual members need to be reliable and be good timekeepers, they should attend school regularly.

When carrying out tasks they should always try to produce their best. They should support each other and if one member is having a problem with a particular task or process then other members should support that person showing them ways to carry out the task or helping them with it. If one member of the team is behind with their work schedule and another is up to date it may be better if they pool their resources and work together to get everyone back on schedule and allow the work to progress as planned.

### Review of Group

Key - A = Excellent F = Poor

NAME	Attendance			Punctuality	Contribution	STRENGTHS	WEAKNESSES
Emma	B	A	B	A	B	Was very good with the design of the package as she could understand the layout of nets using publisher package.	Missed one or two lessons and others had to cover for her.
Liz	A	A	A	A	A	Great at making up the boxes was very accurate with marking out and scoring.	Wanted to do all the work herself, didn't think that others were as careful as her with the work.
Craig	A	A	A	A	A	Craig is really good at using hand tools and produces first class accurate pieces of work.	Tends to be a little slow as he wants everything to turn out perfect.
<p><b>How does team communicate and overcome problems as they arise?</b></p> <p>Sheets have been produced which are used whenever a problem occurs. These are passed on to a supervisor so that advice can be gained and action carried out to overcome the problem and avoid the problem happening again.</p>							
<p><b>How does team carry out quality control tasks?</b></p> <p>The group have been organised so that they will cover for each other if absent; they will also check each others work at identified intervals to see that all pieces manufactured meet the agreed specification.</p>							

## Teamwork

### Team Organisation

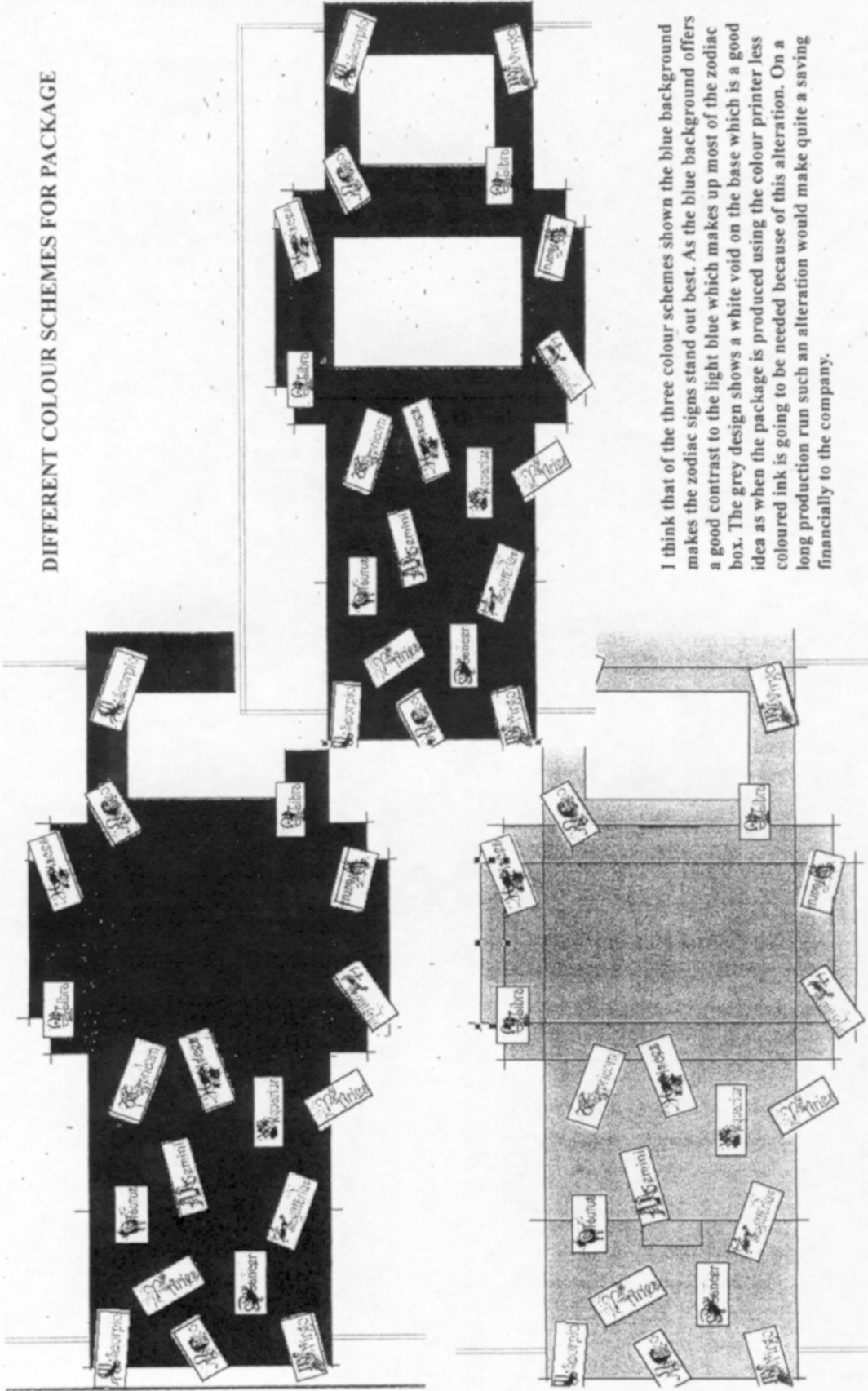
During the preparation, manufacturing and assembly of the project my team has to work together and it is important that people carry out a variety of different tasks in order for the egg timer to be produced efficiently.

<b>TEAMWORK - Allocating tasks.</b>					
<b>Team members -</b>	<b>1. Emma</b>	<b>2. Liz</b>			
	<b>3. Craig</b>	<b>4. Mark</b>			
	<b>5.</b>	<b>6.</b>			
<b>Design and purchasing the material.</b> Emma and Liz will design the layout for the package and order the correct quantity of card and acetate sheet for that part of the project. Craig and Mark will design the shape of the container to go into the package and check that the quantity of MDF to make the moulds is available, however they will need to order rolls of polystyrene for use on the vacuum forming machine.					
<b>Preparation of the material.</b> Emma and Liz will have to check the quality and amount of ink in the printer. Craig and Mark will have to check the condition of the seal on the vacuum forming machine, cut the polystyrene to the required size and check the draft on the moulds.					
<b>Equipment set up and basic assembly.</b> Emma and Liz will set up the printing and cutting equipment making sure that the necessary safety regulations and risk assessment has been carried out. Craig and Mark will set up the vacuum forming machine and identify the necessary hand tools needed, checking there condition before use.					
<b>Finishing.</b> The packages will be assembled by Emma and Liz with Craig and Mark trimming and fitting the containers into the packages.					
<b>Quality Assurance.</b> All students will check each others work at predetermined points and at the end quality control checks of each product that is manufactured will be carried out to ensure that the specification is met and quality maintained.					





DIFFERENT COLOUR SCHEMES FOR PACKAGE



I think that of the three colour schemes shown the blue background makes the zodiac signs stand out best. As the blue background offers a good contrast to the light blue which makes up most of the zodiac box. The grey design shows a white void on the base which is a good idea as when the package is produced using the colour printer less coloured ink is going to be needed because of this alteration. On a long production run such an alteration would make quite a saving financially to the company.



# MAIN PROJECT - CONFECTIONARY PACKAGE

## PLAN OF MAKING - Polystyrene containers.

### TASK

Making moulds.

### SUB TASK

Take a sheet of Medium Density Fibreboard from the store cupboard.  
 Mark out the size required.  
 Cut blank out to required size, remember to taper edges.  
 Assemble unit.  
 Place moulds in correct position on vacuum former tray.  
 Cover moulds with polystyrene sheet and clamp in position.  
 Heat up plastic.

Make polystyrene container.

### HEALTH & SAFETY

Care with lifting heavy items.  
 Care using hand tools.  
 Care using hand tools.

Avoid touching hot heater element.

As above.

Take care when handling hot material.

Use cutting mat and safety rule with Stanley knife.

Use goggles and apron.

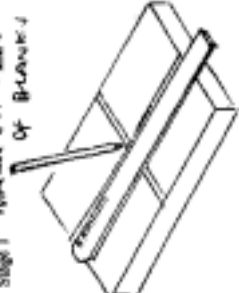


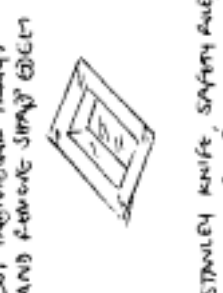

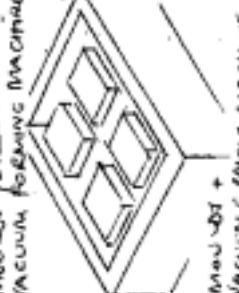

Turn on vacuum and form plastic over moulds.

Remove containers from vacuum forming machine.

Cut formed sheet up into individual items.

Trim edges of containers on sanding disc.

PROCESS SHEET to show stages to be carried out

 <p>STEP 1 MARK OUT SIZES OF BLANKS</p>	 <p>PENCIL, STEEL RULE</p> <p>REMOVE SHARP ALYUMINE</p>	 <p>CUT OUT BLANK</p> <p>TENON SAW</p>	 <p>CUT INDIVIDUAL TRAYS AND FORMING STRIP EDGE</p> <p>STANLEY KNIFE, SAFETY RUL, GLASSPAPER, SANDING DISC.</p>	 <p>TAPER EDGES ON MOUTH</p> <p>SANDING DISC.</p>	
 <p>MOULD PLACED IN VACUUM FORMING MACHINE</p>		 <p>HEATING UP PLASTIC</p> <p>POLYSTYRENE SHEET VACUUM FORMING MACHINE</p>		18	

**WORK PROGRESS**

DATE	WORK CARRIED OUT	TOOLS, MACHINES, PROCESSES	REPORT (changes, problems etc.)
WEEK 1.	<p>MARK OUT SHAPE OF MOULD BLANK ON M.D.F.            CUT OUT SHAPE AND ROUND EDGES (PUT TAPE ON SIDES).            PUT BLANKS IN VACUUM FORMING MACHINE COVER WITH POLYSTYRENE SHEET.            USE VACUUM FORMER TO CREATE TRAYS.</p>	<p>RULER, PENCIL            TENON SAW, SANDING DISC, PLANE, GLASS PAPER            VACUUM FORMING MACHINE</p>	<p>BLANKS GET STUCK INSIDE MOULD - NEED TO ADD MORE DRAFT.</p>
WEEK 2.	<p>CUT OUT INDIVIDUAL TRAYS FROM POLYSTYRENE SHEET.            CLEAN UP EDGES OF TRAYS.            DESIGN LAYOUT FOR PACKAGE.            PRINT OUT PACKAGES.</p>	<p>STANLEY KNIFE, SAFETY RULER            GLASS PAPER            P.C. PUBLISHER PACKAGE CLIPART, WORD PACKAGE            COLOUR PRINTER</p>	<p>COLOUR QUALITY FADED AFTER RUNNING OFF AN AMOUNT OF SHEETS - NEED TO CHECK THIS.</p>
WEEK 3.	<p>CUT OUT PACKAGES AND WINDOWS.            GLUE ACETATE INTO POSITION.            SCORE AND FOLD PACKAGES.            GLUE PACKAGES.</p>	<p>STANLEY KNIFE, CUTTING MAT, SAFETY RULER            ACETATE SHEET, DOUBLE SIDED TAPE            SCISSORS, SAFETY RULER            POLITIK</p>	<p>KEEPING BOXES TOGETHER UNTIL PAINT/DYE DRIED, NEEDED TO USE A SMALL AMOUNT OF MASKING TAPE TO HOLD IN POSITION.</p>
WEEK 4.	<p>LOAD TRAYS INTO PACKAGES.</p>		

## EVALUATION OF MANUFACTURED PRODUCT

I am pleased with the way that my project has turned out. The idea of the signs of the Zodiac will really appeal to a wide range of customers. Some people take a special interest in their star signs and therefore these chocolates could become a very popular product for the company. Even people who don't particularly take an interest in star signs may buy them as a present for someone's birthday. The background colour of the boxes compliments the signs very well but there is no reason why this colour can not be changed for others, maroon, green, orange may be suitable.

I think that the product may take time to assemble during the final manufacturing stage but this should be worth the while as a different type of package is being produced, with the opening door an extra feature to attract curiosity.

### Improving the product.

The product is quite good as it stands however small changes could be made to make it a little more hard wearing. Especially if the card used for the package was coated with a surface finish such as laminating or varnishing to give it a glossy appearance. The name of the product could also be embossed onto the surface to give it a better effect.

The polystyrene insert could be coloured blue to match the main colour of the packet.

### Buying in prepared components and parts.

Buying in ready moulded trays to fit in the packages would speed up the production time. As only the card would have to be printed and stamped to the required shape in the manufacturing line. However buying in the trays would possibly increase the cost of the individual packages as a second manufacturer/supplier would expect to have a profit margin built into the cost of the items. Although using a different manufacturer would take quality assurance for the trays away from the main manufacturer, if any problems were identified with the trays produced then they could be returned to the supply for correction or replacement.

The process could be further speeded up and costs saved at the main production base by contracting the assembly and inserting the tray to a different manufacturer. This would keep production time down at the main plant and would keep the work force down to a minimum.

However this idea would have to be priced to see how cost efficient it would be.

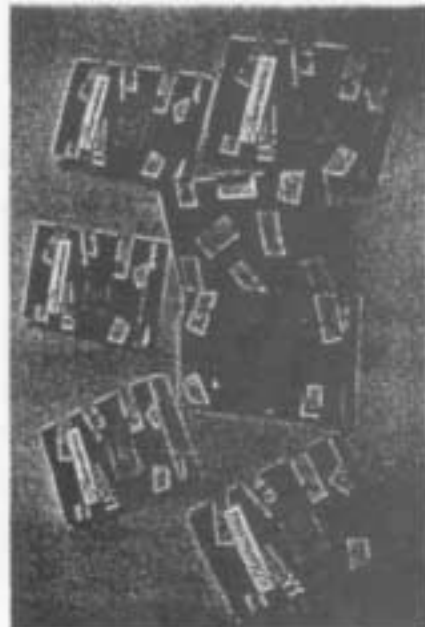
20

Close up of box produced

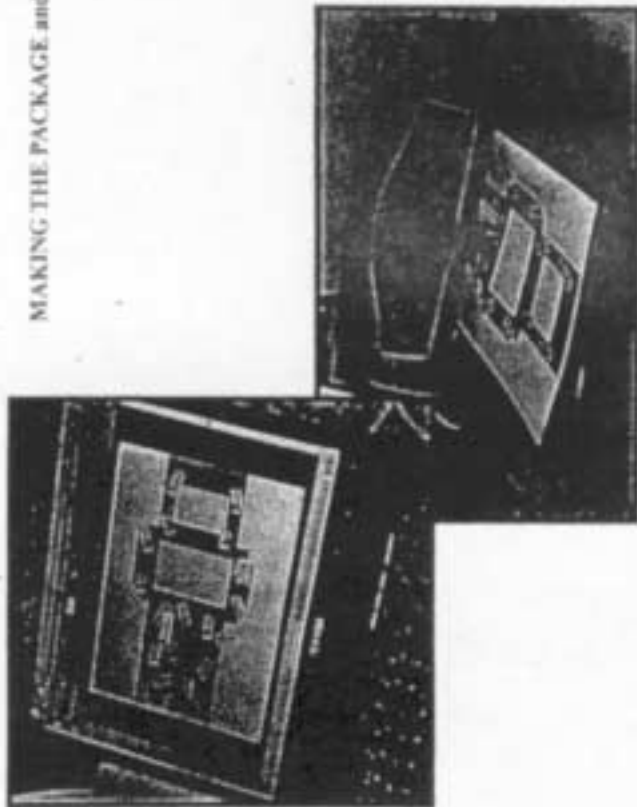


Boxes stacked ready for use.

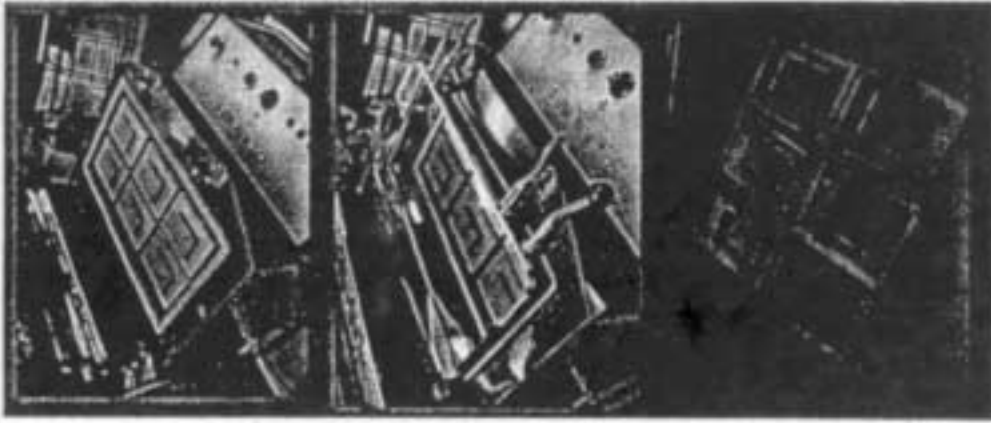
A batch of sweet packages.



MAKING THE PACKAGE and POLYSTYRENE INSERTS.



The layout for the package was designed on a PC and a variety of colours were tried before the final idea was selected. It was then printed six times using the colour printer.



A)

B)

C)

The polystyrene containers were produced using the vacuum forming machine.

- A) The six moulds are placed in the top of the vacuum forming machine with an equal gap between them.
- B) A sheet of polystyrene is clamped in position over the MDF moulds.
- C) After the polystyrene has been heated it is then formed to shape, it is allowed to cool and then removed from the machine. The sheet is then cut into individual units.

## MONITORING AND CONTROL OF THE MANUFACTURING PROCESS

Printing is a highly skilled profession and at many stages during the manufacturing process of a printed item expert judgement is needed when checks are carried out to see that the manufactured product is matching the quality required and fulfilling the identified specification.

Careful checking of printing film is crucial if a high quality printing plate is to be produced. This is particularly important in terms of registration and alignment.

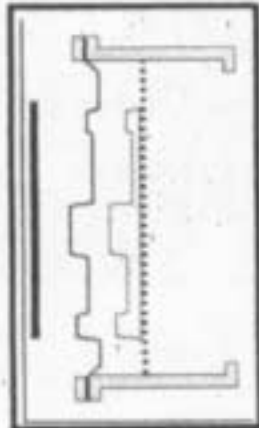
The balance between the colours in the four colour process is very important as is the registration of one colour to the others.



Checking the performance of a colour printing machine.



Carefully loading paper ready for printing.



The process shown is position ready for forming the inserts.



Process is position ready for process to begin.

### MANUFACTURING THE INSERTS

The inserts could be manufactured in industry using vacuum forming. A many similar items could be manufactured in one production run. The polystyrene inserts will need to be cut and finished to the correct size, making sure that there are no sharp edges.



Industrial Vacuum forming machine.