

MODEL / PROTOTYPE
MANUFACTURE

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MODEL / PROTOTYPE MANUFACTURE

1. WHY MAKING MODELS AND
PROTOTYPES IS IMPORTANT?

2. MAKING A MODEL -
INTRODUCTION

3. MODEL MAKING TOOLS
AND EQUIPMENT

4. MODELLING MATERIALS

5. SAMPLE MODELS

MODELS AND PROTOTYPES WHY IMPORTANT ?

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TO TEST THE PRODUCT / DESIGN
IDENTIFICATION OF FAULTS
TO IDENTIFY DESIGN IMPROVEMENTS
TO SHOW POTENTIAL CUSTOMER
TO ESTABLISH SAFETY ISSUES
TO ASSESS POTENTIAL MATERIALS
EVALUATE FUNCTIONALITY
TO ASSESS AESTHETICS
FOR DISCUSSION WITH A FOCUS GROUP
TO REDUCE MANUFACTURING COSTS

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MAKING A MODEL - INTRODUCTION

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When designing a product there is a time when it is necessary to make a scaled model. This is a useful exercise as it allows the designer to select an idea and make a 3D representation. Usually a designer will make a number of models starting with quick card models progressing to more detailed scaled models manufactured from more expensive materials. Sometimes specialised modelling materials are used to produce hyper realistic models. Making a model or range of models is regarded as good industrial practice.

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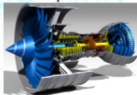


COMPUTER MODELLING

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1. A computer model can be as useful as it can be revolved, sectioned and viewed in a variety of ways.
2. Computer models allow the designer to apply colour and texture in seconds.
3. If a potential client is viewing the computer model it can be changed and updated at the time of the meeting / interview.
4. Computer software can be used to calculate the cost of the finished product and the volume of materials needed.
5. Spreadsheets can be used to calculate the cost of projects.
6. Flow charting software such as that used in GENIE software allows the programming of a PIC Microcontroller circuit to be stimulated, tested and improved.

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MAKING A REALISTIC MATERIALS BASED MODEL

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1. Making a model allows the designer to physically see the idea in 3D form.
2. It helps the designer identify potential faults and correct them as well as make further improvements.
3. It allows the designer to experiment with a range of materials, eventually selecting the best materials for the chosen design.
4. It allows a simple evaluation of the design by the designer and potential customers.
5. It is easier to record the views of others by showing them a 3D scaled model rather than a 'flat 2D' drawing.
6. A 3D model can be passed around a table of people who form a customer focus group.

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TOOLS AND EQUIPMENT

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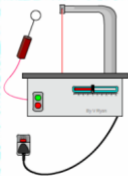
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A craft knife and cutting mat are essential model making tools.



A selection of scissors to cut shapes.



A hot wire cutter can be used to shape a variety of model making foams including Styrofoam.

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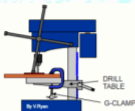
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TOOLS AND EQUIPMENT

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A small bench drill is used to drilling holes and they are cheap to purchase.



Fretsaws are used when cutting lightweight materials such as modelling materials.



A glue gun can be used to quickly fix materials together.



Glues such as UHU POR, POLY ZAP and Balso glue, are suitable for models.

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TOOLS AND EQUIPMENT

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Stick / gel glues such as Pritt Stick are used for gluing card and paper.



Spray Glue - paper / card can be peeled back and repositioned several times before the adhesive properties of the glue disappear.



Double sided tape is a semi-permanent method of joining modelling materials. It is very useful when joining plastic and card based materials.

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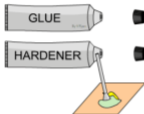
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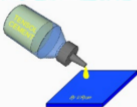
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Brass fasteners are very useful when joining modelling card together, especially if movement is needed.



Epoxy Resin is a two part adhesive. When the two 'glues' are mixed together the solution hardens very quickly.



Tensol cement is a glue suitable for plastics such as acrylic

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TOOLS AND EQUIPMENT

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Applied to both surfaces and left for ten minutes. Then pressed together. Solvent free adhesive is used on modelling foams



A range of modelling paints are available. Water based and solvent based paints are available



A china graph pencil or water based felt pen or even a pencil can be used to mark out model making materials.

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TOOLS AND EQUIPMENT

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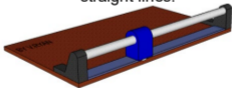
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A compass cutter is used to cut circles in paper and light card. It can be adjusted to cut a variety of accurate sizes.

A roller cutter is used to cut curves and arcs in paper and card. A cutting mat should be placed below the card.

Paper cutters are used to cut card and paper very accurately in straight lines.



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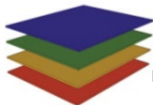
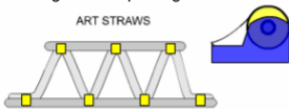


MODELLING MATERIALS

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Art straws are ideal for making model structures and for testing shapes for strength. They come in a range of colours, shapes and sizes and can be glued or taped together.



Coloured card is supplied in a range of colours, shades and thicknesses. Card that has different colours on each surface can even be bought

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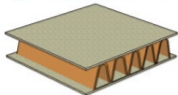
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MODELLING MATERIALS

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Corrugated card is quite thick and relatively strong. It is used for the manufacture of initial / rough models.

Foam boards are lightweight and easy to cut and shape. they are ideal for model making although they can be relatively expensive.

Card clad foam board is form with thick card applied to either surface.

DEPRON OR
ZEPRON FOAM

FOAM BOARD



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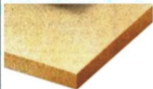
MODELLING MATERIALS

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Balsa wood is a traditional model making material. It is ideal for reproductions of wood based projects.



MDF is a cheap option for model making. It is supplied in a range of thicknesses and can be cut and shaped quite easily.



High Density Polystyrene also known as compressed polystyrene is ideal for model making. It is supplied in a range of colours, shades and thicknesses.

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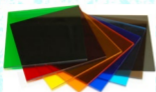
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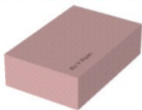
MODELLING MATERIALS

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Acrylic is supplied in a range of sections, shapes and sizes, opaque, transparent and translucent form



Styrofoam is an excellent model making material. It is very light and easy to cut and shape using a hot wire cutter.



Plasticine is a form of modelling clay. Although normally associated with children, this material is useful in the initial stages of design,

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REVISION CARDS AND QUESTIONS MODELLING MATERIALS

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Tap the link button below for Revision Cards on a range of materials



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SAMPLE MODELS

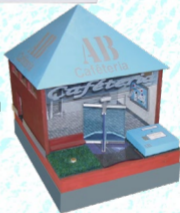
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The model below represents an educational toy.



This is a scaled model of a lunch hall.



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CARD BASED MODELS

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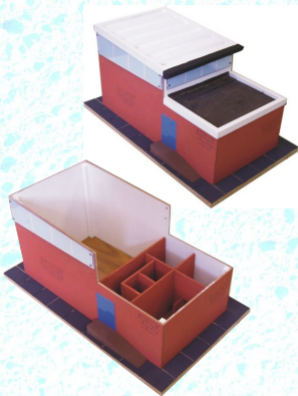
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ARCHITECTURAL MODELS

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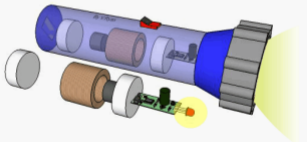
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COMPUTER GENERATED MODELS

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COMPUTER GENERATED SYSTEMS MODEL (SPREADSHEETS)

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TEMPERATURE SENSOR ROOM TEMPERATURE SENSORS

FIRE SENSING SYSTEM

	TEMP	SENSOR ONE	SENSOR TWO	SENSOR THREE	SENSOR FOUR
TEMPERATURE 1	82	FALSE			
TEMPERATURE 2	95		FIRE		
TEMPERATURE 3	80			FALSE	
TEMPERATURE 4	75				FALSE

FIRE SENSING SYSTEM

	TEMP	SENSOR ONE	SENSOR TWO	SENSOR THREE	SENSOR FOUR
TEMPERATURE 1	82	=IF(C7>90,"FIRE")			
TEMPERATURE 2	95		=IF(C8>90,"FIRE")		
TEMPERATURE 3	80			=IF(C11>90,"FIRE")	
TEMPERATURE 4	75				=IF(C13>90,"FIRE")

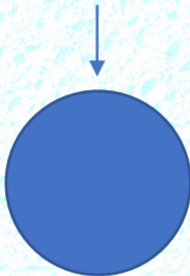
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Tap the link button to go to the complete modelling section, including examination questions.



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