

**Using CAD/CAM to assist
the Key Stage 2/3
Transition**

The Context

There is still a dip in pupils' performance at the beginning of Key Stage 3.

The Reasons

- **teaching and learning styles**
- **classroom organisation**
- **language and conventions used**
- **assessment and recording systems**
- **resources, tools equipment and materials**
- **time available and the way time is structured.**

The Context

- **After many years of trying to improve the situation, inertia in the system prevents the recognition and adoption of good practice outside the Core subjects.**
- **Many D&T activities lend themselves to helping improve the transition between key stages.**

Common
PoS

Schemes of
Work

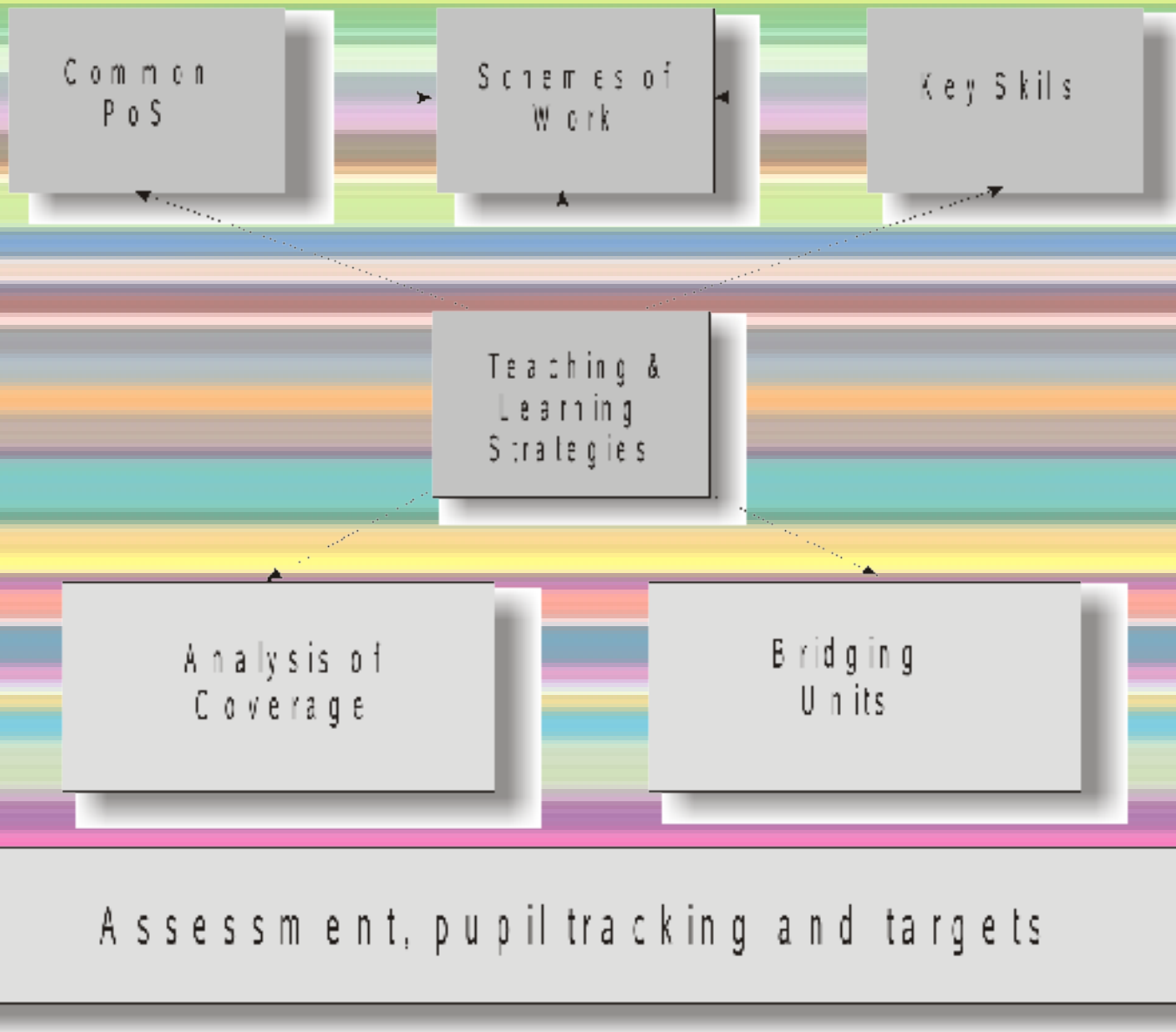
Key Skills

Teaching &
Learning
Strategies

Analysis of
Coverage

Bridging
Units

Assessment, pupil tracking and targets



THE NATIONAL
ASSOCIATION
OF ADMISERS &
INSPECTORS IN
DESIGN AND
TECHNOLOGY

CAD it! CAM it!

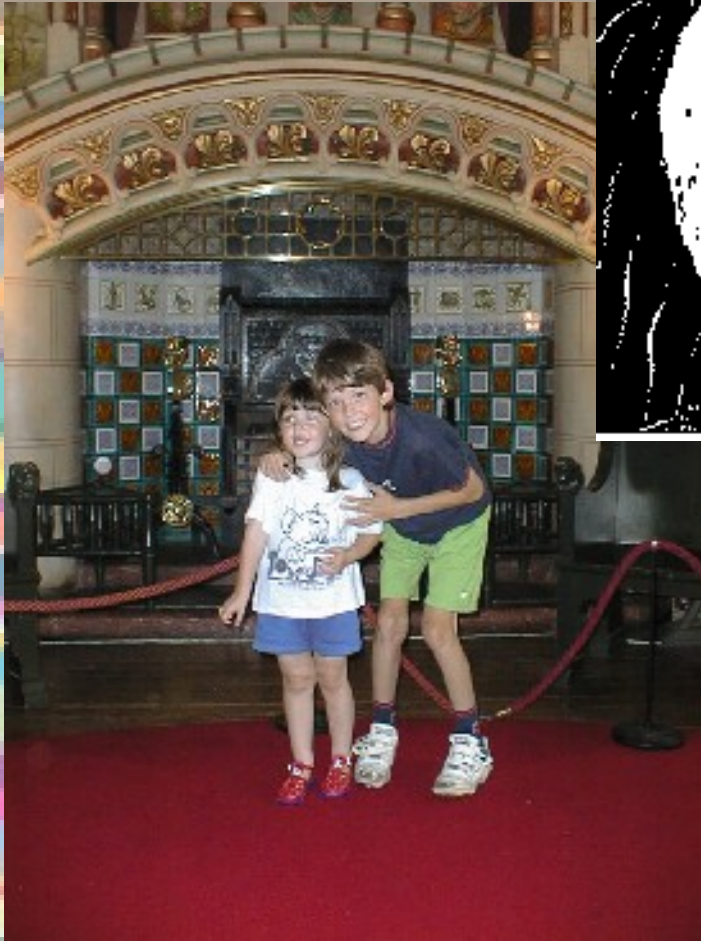
Computer-aided designing and making
for primary schools
A guide for teachers

Bob Cater



Graphic design

Digital image quality has improved



Free Software

Open Office

CAD/CAM and Learning

Computer aided designing (CAD) and computer aided manufacturing (CAM) are used widely in manufacturing industry. It is important for children to engage with these technologies so that they understand how products are designed and manufactured and so that some might become future exponents in these areas. Activities using these technologies are highly motivating and provide wonderful contexts for learning.

Extended Learning Opportunities

- **Through such activity pupils will not only operate at the highest levels with ICT software and equipment, but also develop and enhance a range of key skills.**
- **Learning will be meaningful and enjoyable through, what the pupils see to be, highly relevant contexts.**

KS2 Maths

- map references;
- first quadrant;
- estimates using standard measures;
- properties of 2D and 3D shapes;
- rotational and reflective symmetry;
- tessellations;
- simple angle properties

CAD and Nature!



Computer Fractal

CAD it! CAM it!

- **The book provides a series of structured activities initially intended to enable primary school teachers to introduce exciting CAD/CAM activities into the classroom.**
- **However, we have found that the availability of free software and the range of activities has become a valuable tool for secondary schools and their primary clusters.**
- **There is opportunity for progression, for example, designing and making a book mark and producing the net of a box and then moving on to more complex nets. As pupils progress they should develop more sophisticated skills in both their CAD capability and their designing.**

Software

There is a variety of software that can be used to carry out the projects. However, most have been demonstrated using Open Office Draw. This software can be downloaded free from the internet at www.openoffice.org It is a very powerful and versatile CAD programme. Because it is free its use ensures that all schools can implement the projects. Some of the activities require the use of Techsoft Primary Design which has additional drawing facilities and enables manufacturing on computer controlled manufacturing machines.

CAM?

The CAM aspect has been restricted mainly to the use of a colour printer to ensure all primary schools can undertake most of the activities.

Designing

Examples of finished products are shown for all the projects. However, good practice in design and technology requires that pupils develop their own design solutions. Examples are given to enable teachers to fully understand the nature of the tasks. The pupils should carry out preliminary design work before creating their designs on the computer. They can sketch, model and produce mock-ups to develop their designs and to prepare a prototype before producing their final product. They should consider colour, texture, shapes and materials. If they use clipart they should be able to explain why they have chosen particular items. In some projects pupils can also explore the ways that materials might be joined or fastened and make selections based on suitability for purpose.

Design Considerations

As part of any design and make activity pupils should think about the purpose, form and function of their products. Questions that might be considered are:

Purpose

- Who is it for?
- What does it do?
- Does its shape (form) suit its purpose?

Form

- **What shape best suits the product?**
- **Does the shape need to match other components being used?**
- **What colours might suit the purpose/user or location of the product?**
- **What font is most suitable?**
- **What graphic images (clipart, photographs) might be suitable?**
- **What construction processes can be used and which are best?**
- **Can different colour paper or card be used and how will this affect the design on the computer screen?**

Function

- How can it be made better for its purpose?
- Where will it be used?
- How will it be used?
- Has it got bits (components) that need to be replaced?
- Do the materials that will be used need any special properties?
- What materials are best for its construction?

Bookmarks



Badges



Fridge Magnets



Celebration Cards



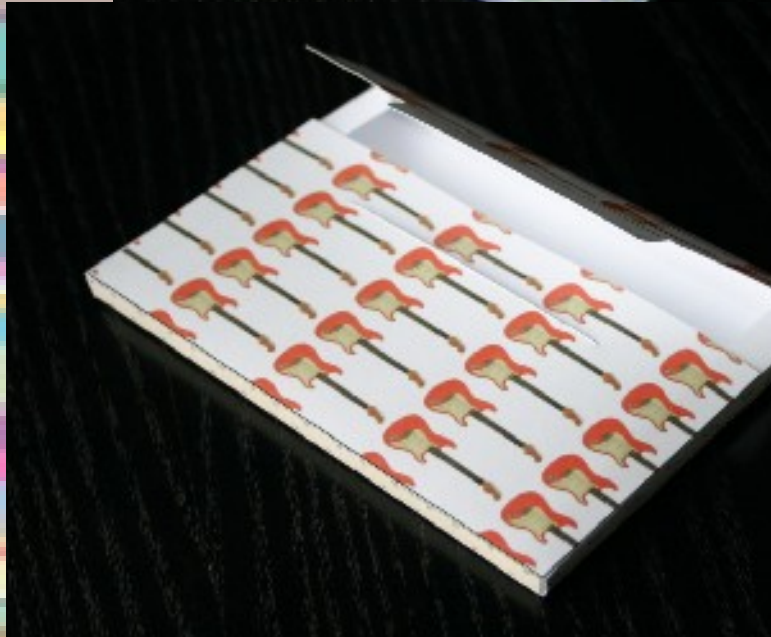
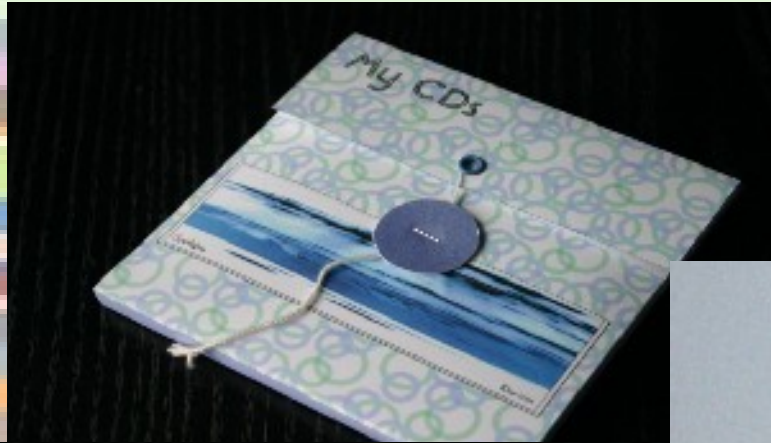
Boxes/Nets



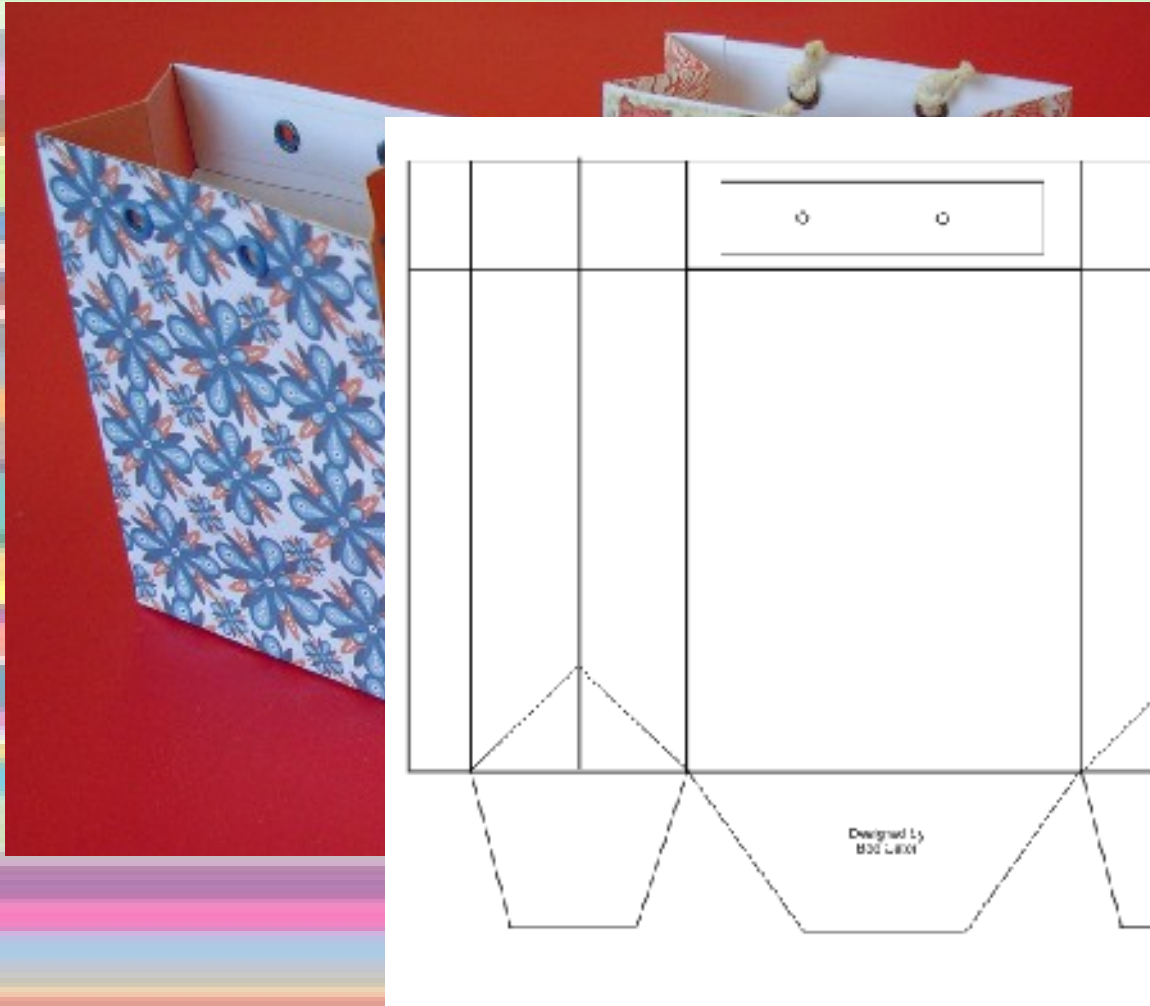
Boxes/Nets



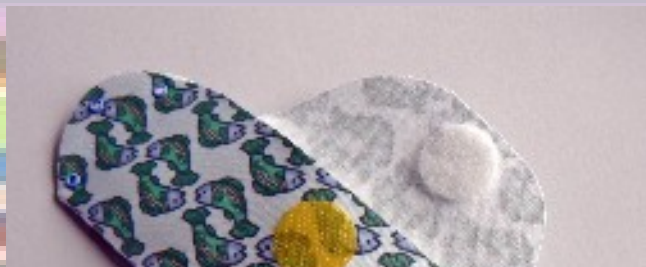
Other Nets



Gift Bags



Fabric Cases



Mouse Mats



Mobile Phone Stand



Calendars



Pen Pots



Clocks



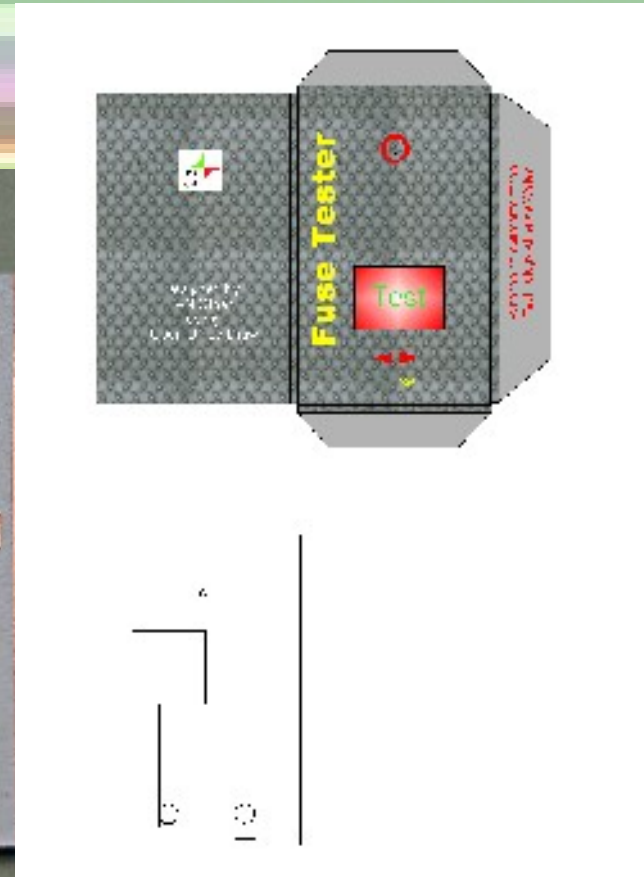
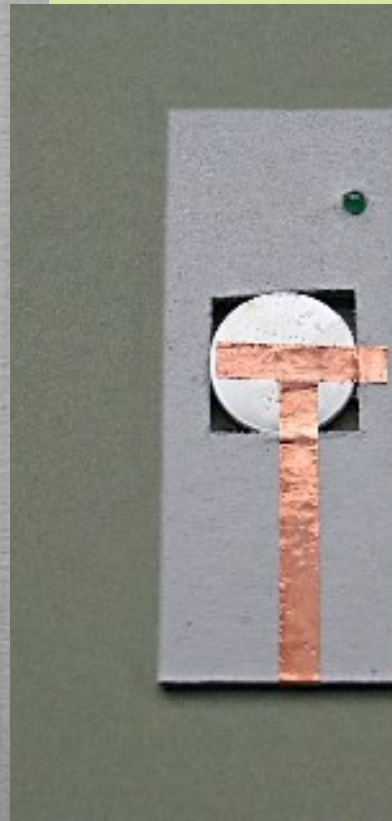
T Shirts



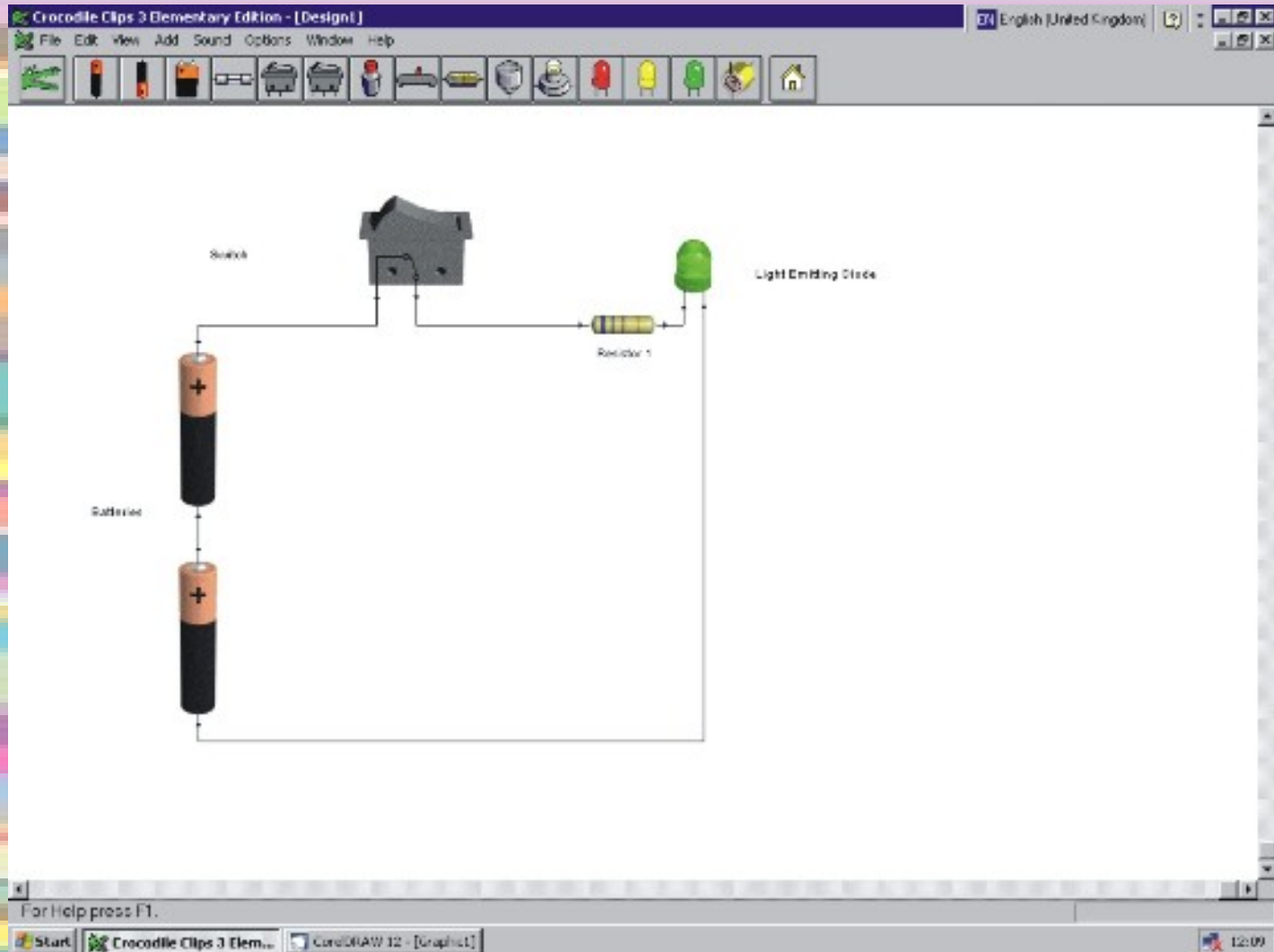
Door Signs



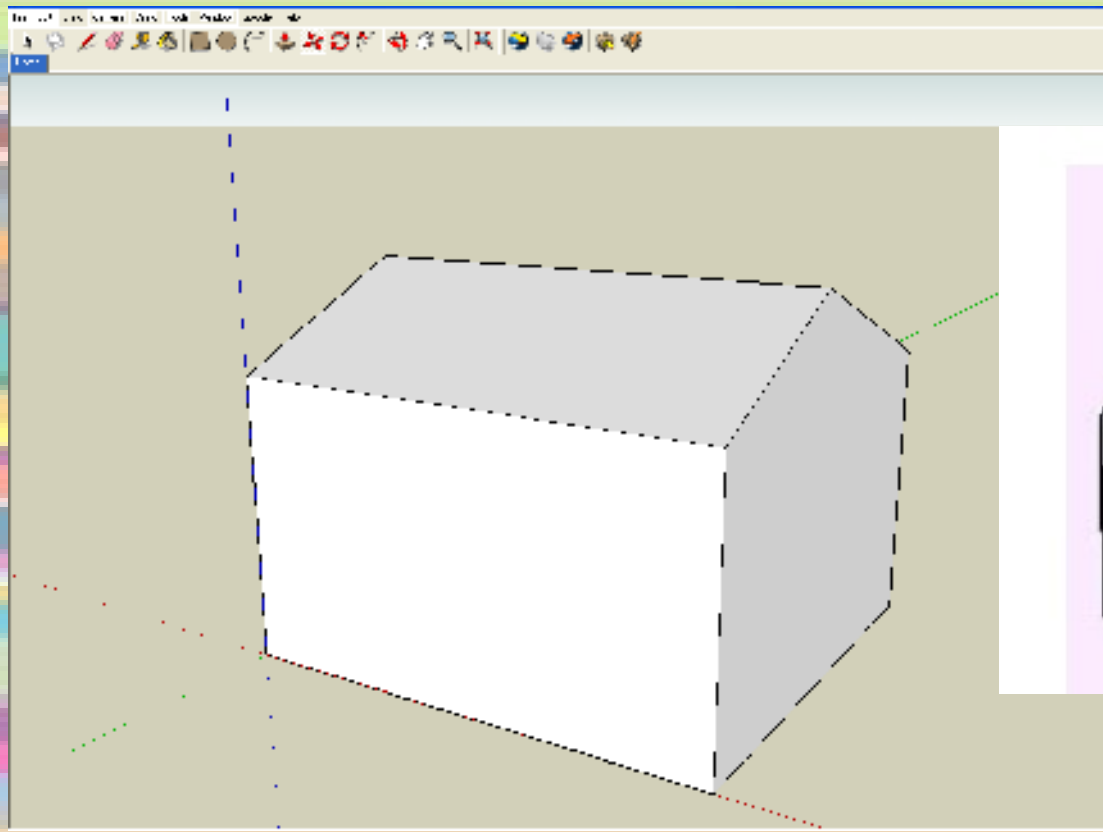
Fuse Tester



Crocodile Elementary



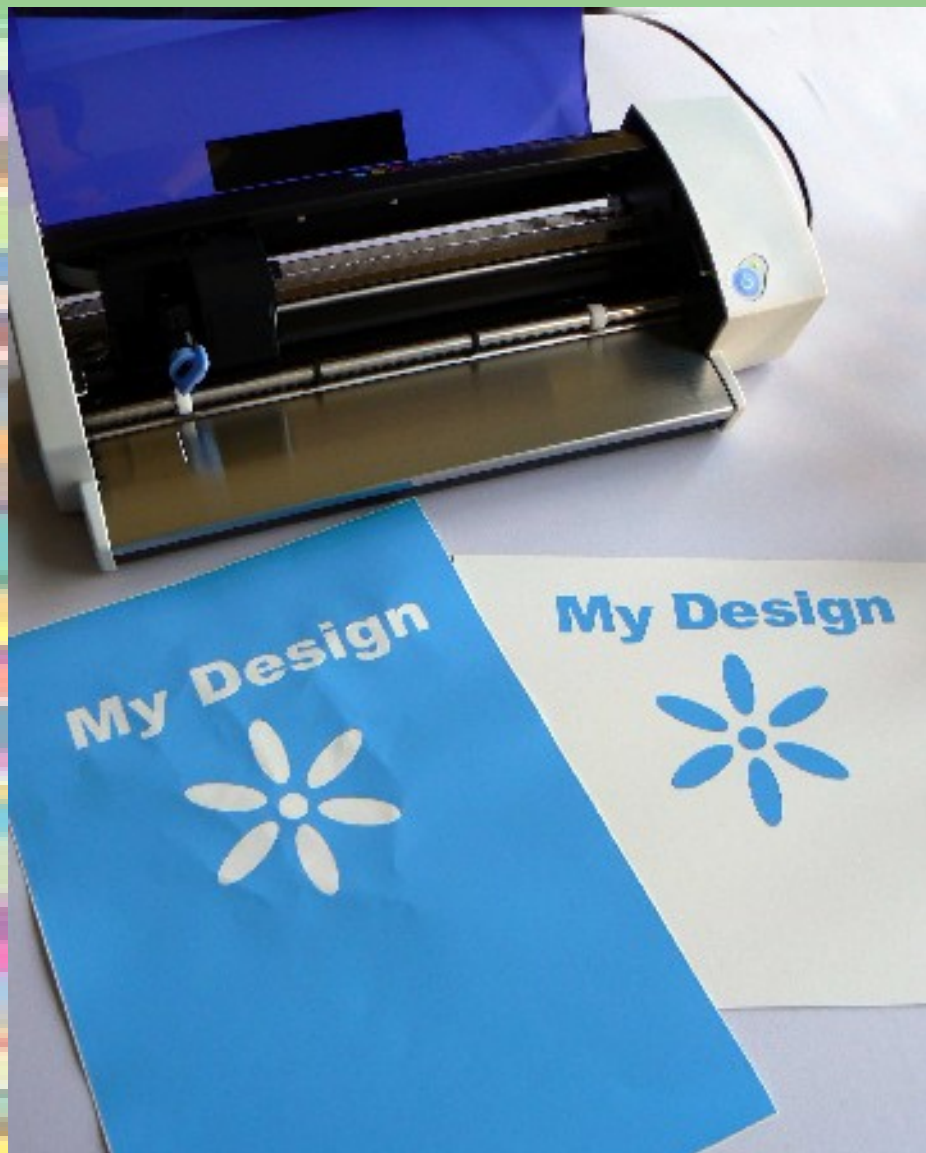
Sketch Up



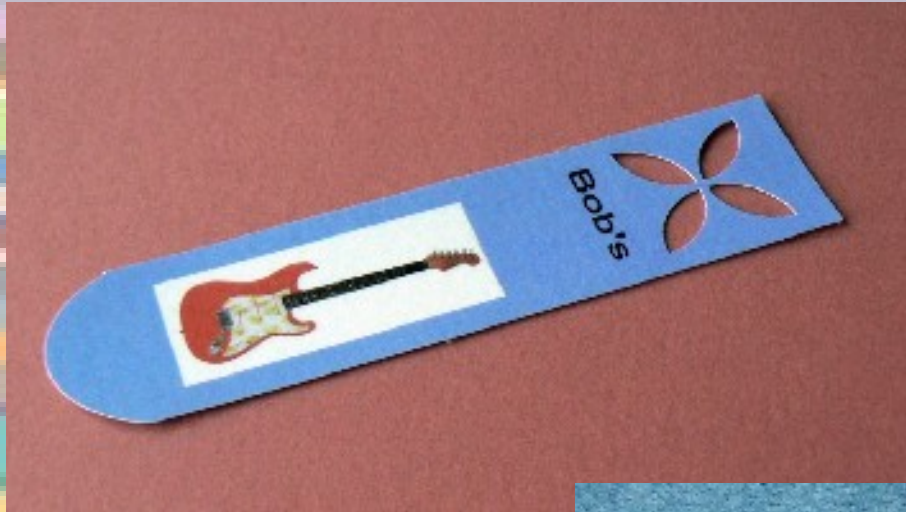
Techlink



Plotter Cutter



Using a Plotter/Cutter

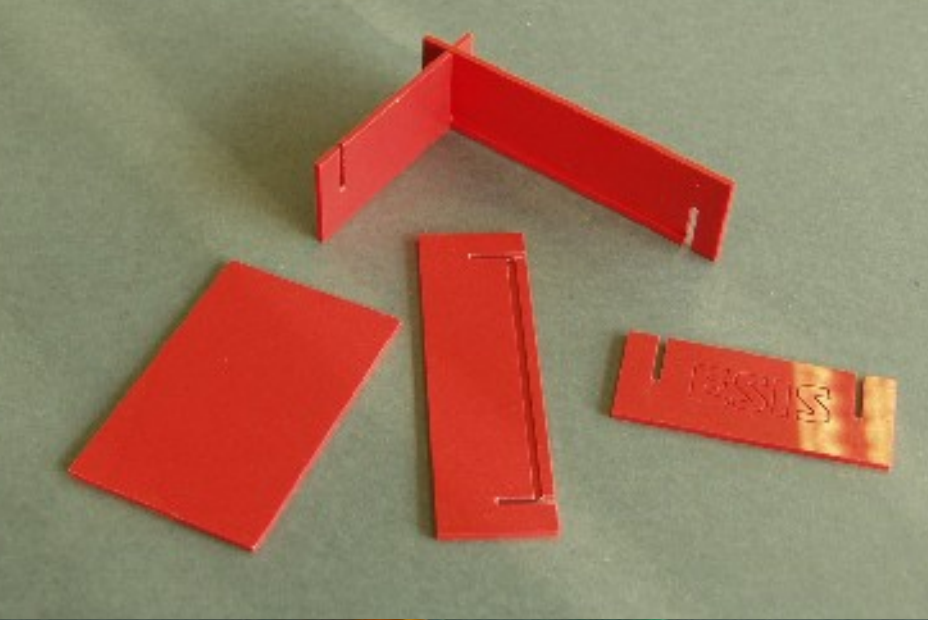


Products designed at KS2 and made at KS3



Products designed at KS2 and made at KS3





A Transition Project





CAD it-CAM it

Bookmarks

The design and making of a person for fibrecast is a good introductory project and would be best suited to Key Stage 1 or early Key Stage 2.

1

1. CHOOSE THE IMAGE
Select an image to use as a template for the bookmark.

Click on the **FILE** menu.



2

2. CHOOSE THE IMAGE
The size of the image is important. It should be large enough to fit on the bookmark.

Right-click on the image to open the context menu. Select **Copy** to copy the image to the clipboard.



3

3. PASTE THE IMAGE
Paste the image into the bookmark template by clicking on the **Paste** button.



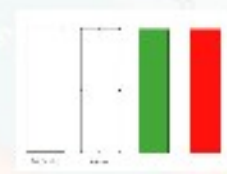
4

4. CHOOSE THE IMAGE
The size of the image is important. It should be large enough to fit on the bookmark. The image should be in color and suitable for printing.



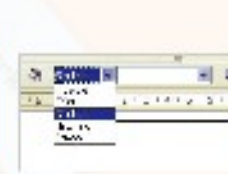
5

5. CHOOSE THE IMAGE
The size of the image is important. It should be large enough to fit on the bookmark. The image should be in color and suitable for printing.



6

6. CHOOSE THE IMAGE
The size of the image is important. It should be large enough to fit on the bookmark. The image should be in color and suitable for printing.



CAD it-CAM it



A range of fridge magnets with various designs.

7

Click on the top left corner of the design to be cut out for the magnet.

The size of the magnet supports is smaller than the size of the design, so change the size of the magnet supports.



8

Click on the top left corner of the design to be cut out for the magnet.



9

Click on the top left corner of the design to be cut out for the magnet.



Fridge magnets

With a small set of project using the tool gun, you can design a cutting activity. Magnetic paper is available that can be printed onto. A range of shapes can be designed and colour files for

and a great selection of patterns available. Designing a cutting activity is a good way to help people who are encouraged to identify their own designs. There is a variety of interesting designs that a Fridge magnet might fall in, so a nice idea is to bring a picture, exactly as it is, attached using a glue gun or double stick glue.

1

Click on the top left corner of the design to be cut out for the magnet.



Click on the top left corner of the design to be cut out for the magnet.

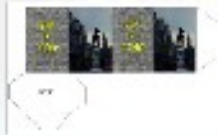


CAD it-CAM it



13

By using the **EDIT** tool of the **ALIGN** category, objects and planes generated by **EXPLODE** can be aligned. Here I am using **parallel** alignment. You can also align by using the **EDIT** tool on **edges**.



14

With the **EXTRUSION** tool, **EXTRUSION** is used as a sketch on the **XY** axis to extrude a solid **3D** object from a 2D sketch. **Extrusion** is used to create a **3D** object from a **2D** sketch.



15

With the **EXTRUSION** tool, **EXTRUSION** is used as a sketch on the **XY** axis to extrude a solid **3D** object from a 2D sketch. **Extrusion** is used to create a **3D** object from a **2D** sketch.



16

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17

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The **EXTRUSION** tool is used to create a **3D** object from a **2D** sketch. **Extrusion** is used to create a **3D** object from a **2D** sketch.

There are many other tools of **EXTRUSION** and **EXTRUSION** tools. **EXTRUSION** is used to create a **3D** object from a **2D** sketch. **Extrusion** is used to create a **3D** object from a **2D** sketch.



Models for Transition Teaching

- **Pupils visit the comprehensive school for a pre-transition day.**
- **Teachers work on projects at KS2 negotiated with secondary colleagues.**
- **Pupils start a project at KS2 which is completed at KS3**

Making Sense of the Changes

- **Using a common assessment process**
- **Common approaches to designing**
- **Building on previous experience**
- **Using common teaching strategies**
- **Using the same software**

The 21 century student





Interesting

Learning
Adapt it!