

Using The Design Processor

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The Design Processor is a suite of programs for the Archimedes, developed by NAAIDT and Oak Solutions to support D&T; Geoff Howard, who was closely involved in its development, describes some of its applications

The Design Processor sprang originally from the combined musings of members of the East Midlands and Yorkshire regional group of NAAIDT: how useful it would be if there were some kind of management program which presented the same user interface to pupils and yet allowed them to use different software packages and to transfer work from one to another. What was needed was a design package for pupils which would integrate information for design in the same way as desktop publishing does for words and pictures.

At its simplest, The Design Processor enables pupils to access database files covering packaging, kitchen design, food and electronics, edit them, join them together, manipulate them and even translate from one format to another — 2-D to 3-D kitchen design, for example, or system block diagram to schematic to finished PCB layout. The database is linked to a suite of 11 RISCOS applications, including some well known CAD and D&T software: WorraCAD, Oak PCB, Genesis and Euclid, for example.

■ What The Design Processor offers

There are three distinct layers of entry to enable maximum accessibility by pupils. At the heart of the program is the large database which informs pupils about components and processes and provides a rich source of pre-drawn files which give pupils a flying start in their own designs. All database files can be fully edited and transferred to other RISCOS

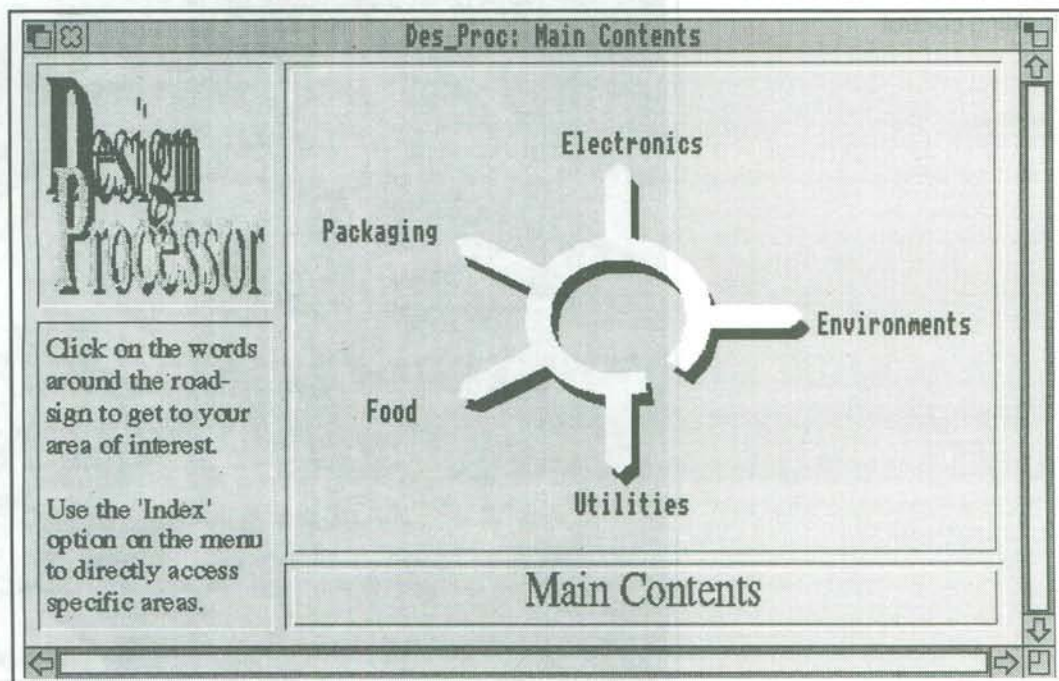
applications. Using Draw, for example, pupils can produce their own designs by adapting and adding a file from the database. At the third level, complete design projects are included, also fully editable, which enable pupils as young as Year 7 to achieve success from otherwise complex CAD packages.

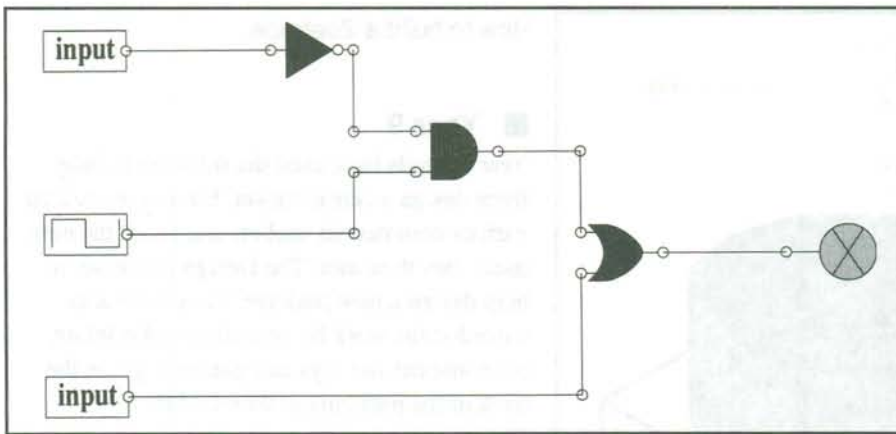
A built-in Logic Simulator matches the original concept very closely: logic circuits are built on screen using the mouse to place icons representing logic gates. The database can be interrogated for information on each item and once the symbols are linked together using a simple rubber banding technique, the circuit can be operated on screen to test its effectiveness. It is hoped that further development will enable the screen circuit to respond to inputs and control outputs via the printer and/or user ports — making design and make activities almost simultaneous!

The current database contains an impressive library of 'objects', and by simply dragging an icon of the object into the screen application, it is displayed automatically in the appropriate form. Once objects have been loaded into an application (or editor), they can be modified, rearranged or added to as required. At any time pupils can interrogate the database to find out more about the objects being used, or to seek information on related topics — how to design a kitchen layout, for example.

A range of tools are available which allow new parts to be created or suitable materials to be chosen, or, for example, to calculate an

The Design Processor menu screen



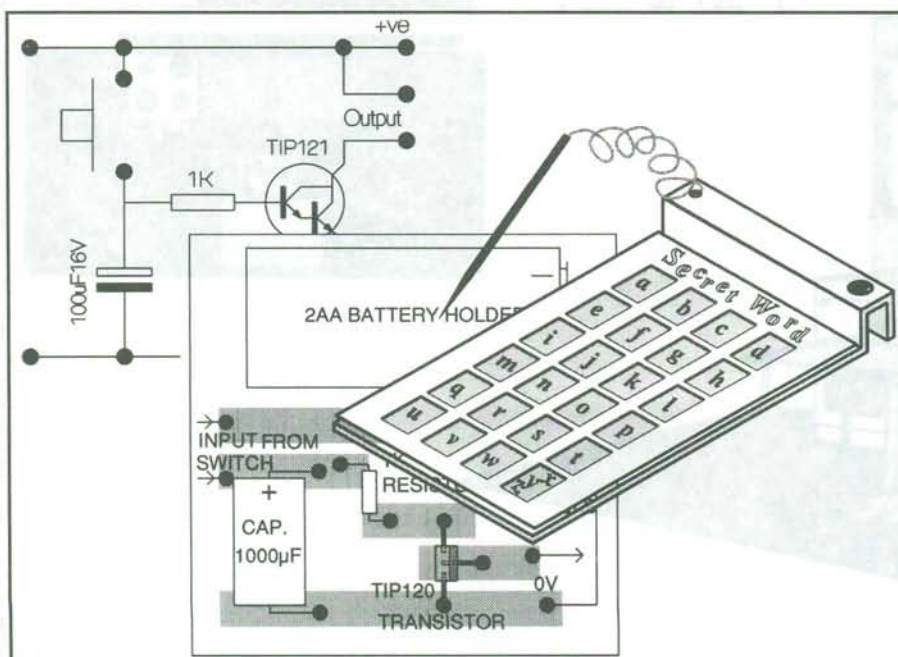


Circuit design using ready-made icons

appropriate resistor value. The ability to use additional tools such as nutrition analysers, calendar and bar-code generators would be a valuable extra feature, and work is continuing on developing this capacity.

The package also contains Draw Print and Draw Plot, to enable a variety of printed outputs. Draw Print links with the printer driver to enable users to scale and preview their work and, most usefully, to enable the printing of extra-large images which can be joined by tiling; full-size patterns for clothing, for example, can easily be printed out like this. Draw Plot enables the user to print out anything in a Draw File, including outline fonts and sprites, and output not only to printers and plotters but to cutters and engravers too.

Designing a quiz-card guessing game



■ Using The Design Processor in the Classroom

But how to use this wealth of resources in a D&T scheme of work? Design and technology is fundamentally about providing children with a personal experience of designing and making high-quality products which can be tested in use. IT widens the range of tools and equipment available to children, and through its integrated system, The Design Processor gives children access to a broader range of IT applications.

Most of The Design Processor's applications can simply be run as content-free CAD software if required, but many pupils find it helpful to load pre-drawn objects to get them started.

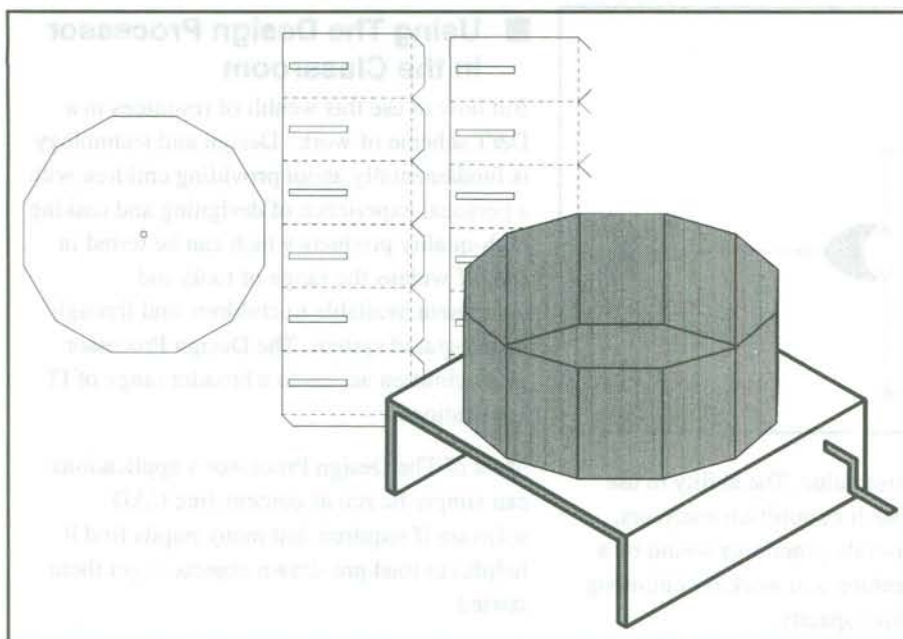
Year 7

A popular project with Year 7 pupils is the designing and making of simple guessing games or quiz cards. Many now use copper tape to produce the circuits and a number of commercially available materials exist to support this theme. Using The Design Processor, pupils can retrieve suitable circuits, interrogate the database to find out about them and adapt them using Draw. The print-out (including artwork) of the finished design can be stuck onto thin card and laminated using the usual school equipment. Alternatively, they could lightly spray some sheets of OHT film with adhesive and sandwich the print-out between them.

If this project were to be done as an Enterprise-type activity then advertising materials based on the original artwork could also be produced in Draw and printed out at full poster size using Draw Print — and be a useful back-up for the next school fair!

Year 8

Some Year 8 pupils have used The Design Processor more directly, with the Project route. They retrieved the design of a simple Zoetrope from a database file and modified it to fit their own designs. The net of the design was then plotted directly onto card using Draw Plot. The teacher had already provided a pro forma to help them design their own animated sequences for homework, so the Zoetropes could be spun by hand to test them. Animations could also have been produced using Draw or programs such as Tween.



How to build a Zoetrope

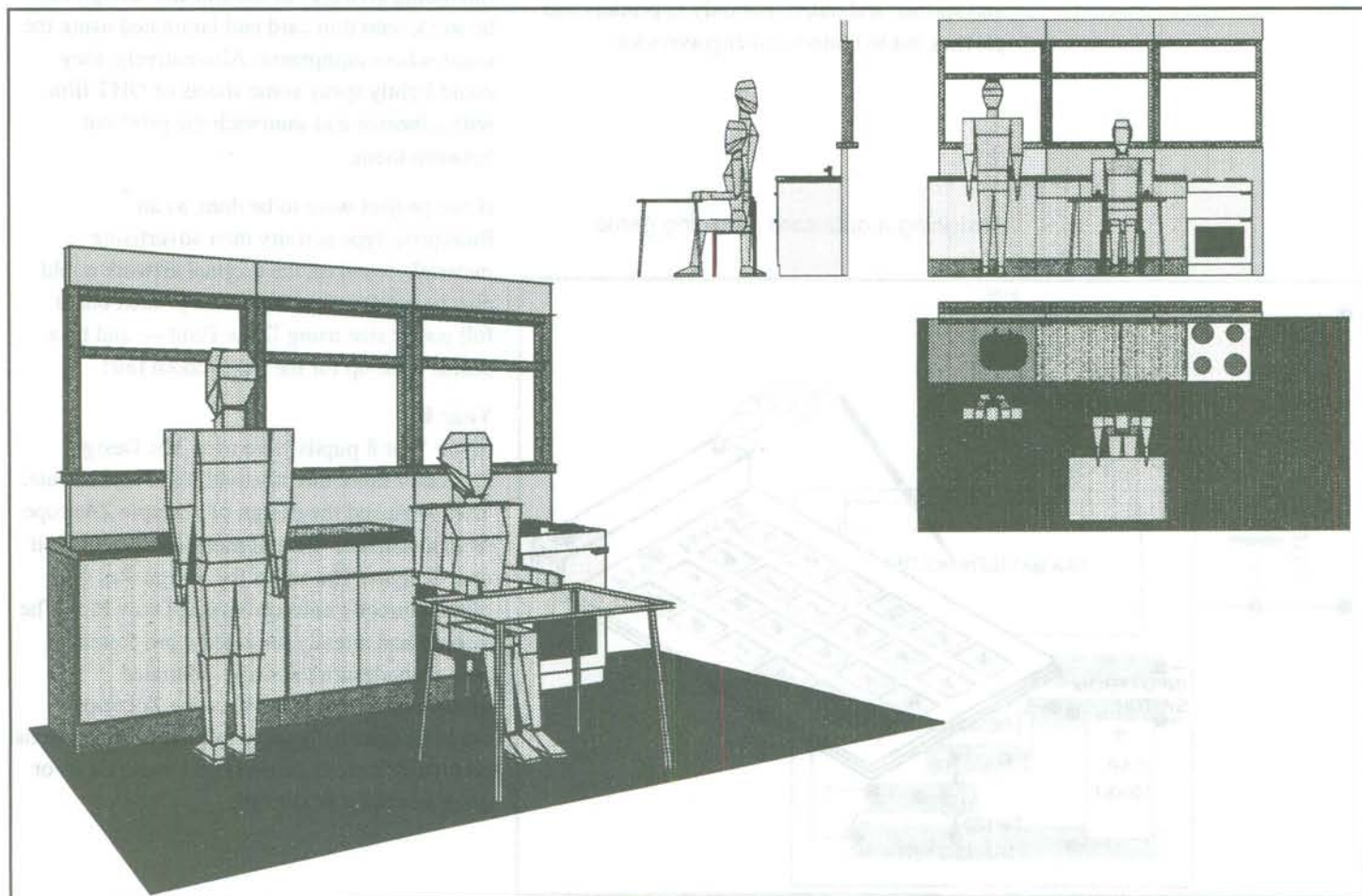
■ Year 9

Year 9 pupils have used the software to help them design a cereal packet. Having opened up various commercial packets and noted the nets used, they then used The Design Processor to help design a new package. They have also extended the work by designing and printing out some cut-out toys and games to go on the back of the pack, using WorraCAD.

Building on this experience, they then used one of The Design Processor's many nets as a starting point for one of the optional SATs. The Handled Box, for example, could easily be adapted to suit the requirements for a sports shoe manufacturer and the Fast Food Carton could form the basis of a container for use during plays and concerts. Using PDT View (a parametric drawing tool), the sizes would be altered and then the net could be transferred to Draw to be further modified or for graphics to be added. The finished net could be plotted out full size on card, and high-quality colour print-outs made of the labels.

From 2D to 3D in kitchen design

During the following lessons they designed and made bases for the Zoetropes out of sheet aluminium or acrylic and included a hand crank to turn the completed device. The final isometric drawings could be produced using Draw using elements captured from Design Processor, or WorraCAD be used to produce dimensioned orthographic diagrams if they were needed.



Years 10 and 11

As part of the Year 10 common core for technology, pupils might explore the use of IT as a modelling tool by creating a design for their own kitchen at home. The Design Processor provides standard kitchen units from its database which can be positioned on a WorraCAD scale drawing of their own floor plan, and then translated into 3D. Plans can also be viewed from different positions and under different lighting conditions, and even 'film' produced so the viewer can 'fly' through the completed design.

Students taking the Graphics extension are able to use this to aid their visualisation and to print out different projections including isometric, orthographic and perspective. The print-outs are available both in wire frame and solid and could provide raw material on which pupils can develop their rendering skills.

Using the same intuitive techniques, pupils doing the Food extension can explore the database to discover the effects of a range of menus which might be offered to specific people with particular dietary needs. The packaging section helps all who wish to design and make products in any of the design and technology materials.

Pupils have also used The Design Processor as a logic simulator to try out ideas and then used electronic systems kits to model a working circuit. After adjustments and experimentation with the hardware, they selected and adapted suitable PCB files, interrogated a database to find out more about them, edited them and printed them out. They were then able to photocopy their designs onto OHT film to produce a cell for photo-etching.

The Future

The future of technology continues to unfold, but is likely that there will be greater use of electronics, plastics, white metals, textiles, manufactured boards and card to generate more batch-produced items or production prototypes as an enterprise activity or a direct consequence of a link with local industry.

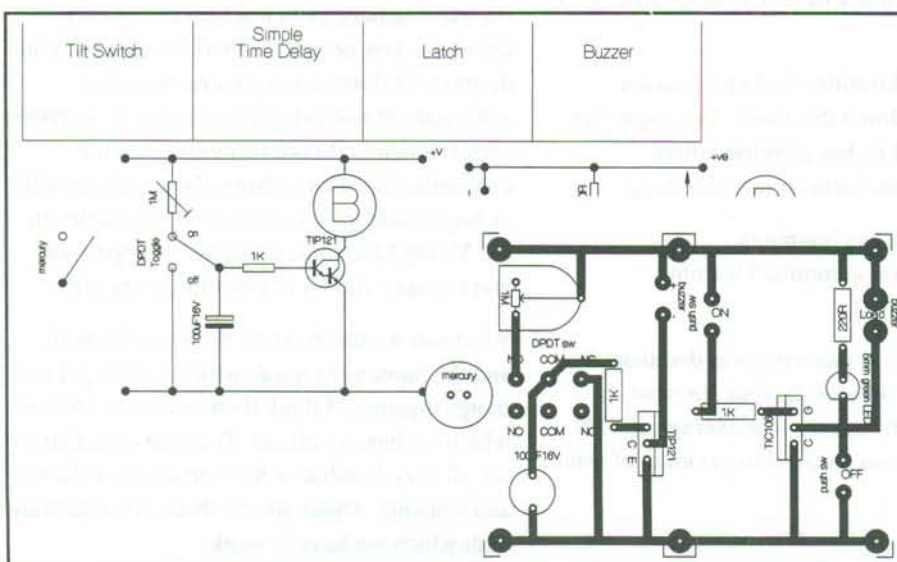
At Key Stage 4, we envisage that food will continue as an important extension material and that it will still be essential to develop a high degree of designing and making skills in construction materials during the years up to Key Stage 4 when they will be put to good use assembling, fitting and finishing more sophisticated products.

In North Yorkshire we are keen to promote the use of IT where the computer neither dominates nor detracts from the essential purpose of designing and making but enhances it by empowering pupils and motivating them to make high-quality outcomes — often comparable with commercially available products!

We have advocated that:

- software be designed to be used intuitively
- applications are flexible in that they are not tied to a single peripheral
- applications are compatible in that they accommodate file exchanges between different types of computer.

The Design Processor already goes much of the way towards this and the Archimedes enables files to be saved directly in MS-DOS format. Taking the pupil's own floppy disc to be the 'workpiece', an analogy would be that pupils are able to use a range of machine tools and move the workpiece from lathe to drill to milling machine, for example, to complete a task — so why not a range of computers?



From system diagram through circuit diagram to PCB layout