

# FreeForm

Synapse Modelmaking gives its verdict on this high-end modelling hardware

BY BRYAN DRANSFIELD

**PRICE** \$21,450 (including first year of maintenance)

**SUPPLIER**  
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#### MINIMUM SYSTEM

- Dual Pentium II 300MHz processor or better
- 512MB
- Windows NT, 4.0 SP5 or 6
- High-end graphics card

#### MAIN FEATURES

- 3D Touch technology
- Digital clay
- Inbound/Outbound interfaces
- Copy and re-use model feature
- Control clay hardness in the touch of a button
- Import sketches to guide wire cuts
- Mirror and scale features
- Direct model interaction
- Output as OBJ files

Design is a dynamic, joyous, iterative process where the ends are substantially influenced by the means, and where the slightest touch makes the difference between a product that is outstanding and one that is pedestrian. It is precisely this that has for so long deterred many creative people from using digital design tools. While the tactile sensation of the pen or brush on the paper has to some extent been simulated in the more advanced 2D design packages, digital 3D modelling has remained in the dark ages of mouse and keyboard computer interaction... until the advent of FreeForm.

Increases in desktop computing power have resulted in major advances in 3D design systems but interaction tools have been limited to basic alphanumeric and select modes. With all the standard 3D modelling software, artists have to use a keyboard and mouse to sculpt three-dimensional organic shapes or, in some cases, have rejected digital systems as being altogether too clumsy, unobtrusive and downright difficult to use. SensAble

The FreeForm system uses voxels (similar to pixels but with the addition of 3D volume data) to create volumetric modelling and rendering. The initial experience of interacting with the system is rather strange, like suddenly discovering the ability to breathe underwater, but once you take the plunge FreeForm is astonishingly easy and natural to use. You can drill a digital hole in a digital object and feel the sides of the hole. You can be guided around a digital object by your sense of touch.

Sculpting with FreeForm is as simple as modelling in foam or clay, but with none of the mess and all of the immediate and subsequent editability of digital data. You can run through many design iterations very quickly and with no risk and you can experiment with extreme or outrageous ideas to see if they work visually.

Of our five senses, touch is the only one that's a two-way process, enabling us to send and receive information simultaneously. This makes it a very efficient method of communicating with our environment. We often 'see' with our

complex operation, only to be rewarded by completely unexpected result, will be delighted at how easy to use FreeForm is. You just take hold of the sculpting tool and start work.

#### DESIGN DEVELOPMENT

In the commercial world, conceptual design is the first step in the long process from the designer to the consumer, whether the product is a manufactured item or an entertainment project. The quality of the concept is key to the success of the final product, and anything that enhances the productivity of designers pays handsome dividends. That is why

## FreeForm uses touch to interact with data on-screen, so there's no learning curve

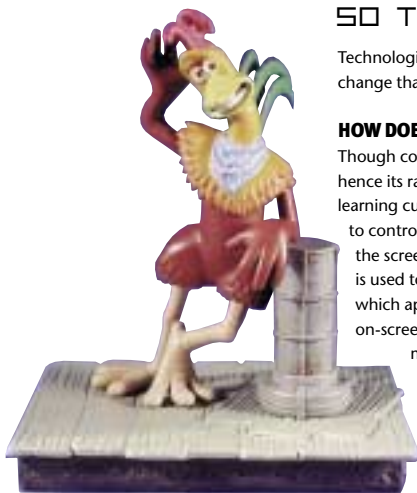
Technologies' FreeForm system aims to change that scenario.

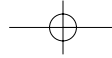
#### HOW DOES IT WORK?

Though costly, FreeForm is simple to use, hence its rapid productivity and flat-line learning curve. The designer uses a stylus to control a virtual modelling tool on the screen. This virtual carving device is used to model the digital object, which appears via the accompanying on-screen interface software. The virtual material can be modified to feel as hard as wood or as soft as butter, and materials can be added to or subtracted from the digital object.

fingers more clearly than with our eyes, particularly in the design of complex curves and changes of surface direction. Because FreeForm basically uses touch to interact directly with digital data on the screen, there is almost no learning curve associated with the product. This is in fact one of the most revolutionary aspects of the system.

There is no need for lengthy training before becoming productive, no tedious 17-volume technical manual. However, the user guide is both comprehensive and easily comprehensible. Anyone who has struggled to remember under which icon a particular function lurked or who has suffered the frustration of carrying out a





companies such as Disney and Hasbro work so hard to attract the best designers and offer them the most advanced tools, including FreeForm.

As a leading European modelmaker, Synapse employs 50 sculptors, finishers, designers and engineers, creating models ranging from cartoon characters to mobile phone casings. For Synapse, the speed of model creation and the ability to use digital data in the later processes of engineering and rapid prototyping is crucial. Roger Hulks, director, elaborates on this: "FreeForm has given a real boost to the creativity of our designers, as well as providing all the downstream

## INTERACTING WITH THE SYSTEM IS STRANGE. LIKE DISCOVERING THE ABILITY TO BREATHE UNDERWATER

advantages of digital data, such as the flexibility to make changes and export information into our rapid prototyping and tool-manufacturing processes. At Synapse, we've found using FreeForm to be as intuitive and expressive as physical modelling with clay or foam, but with the advantages of a digital model."

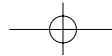
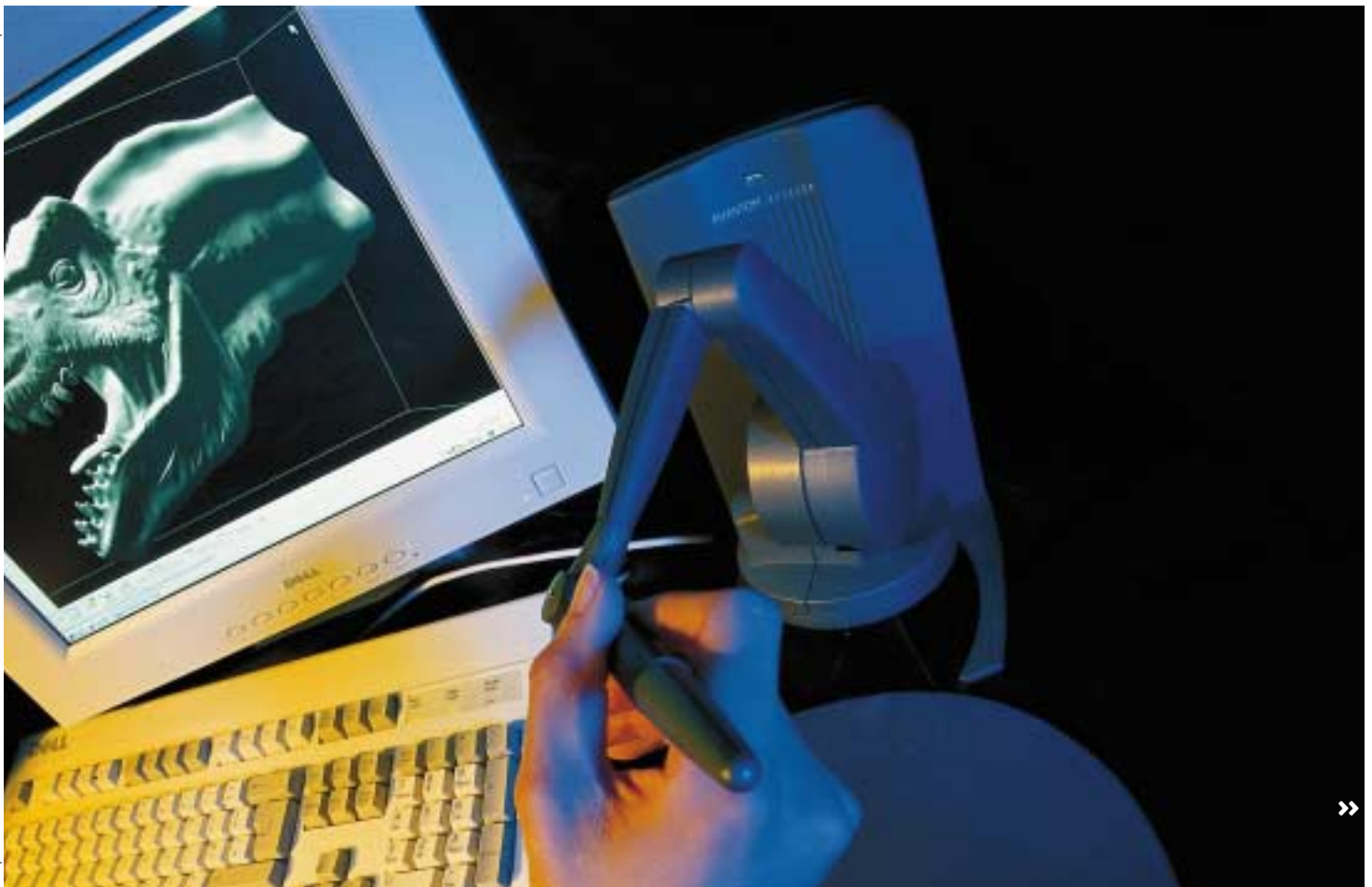
FreeForm enables sculptors to work the way they want to, without the constraints

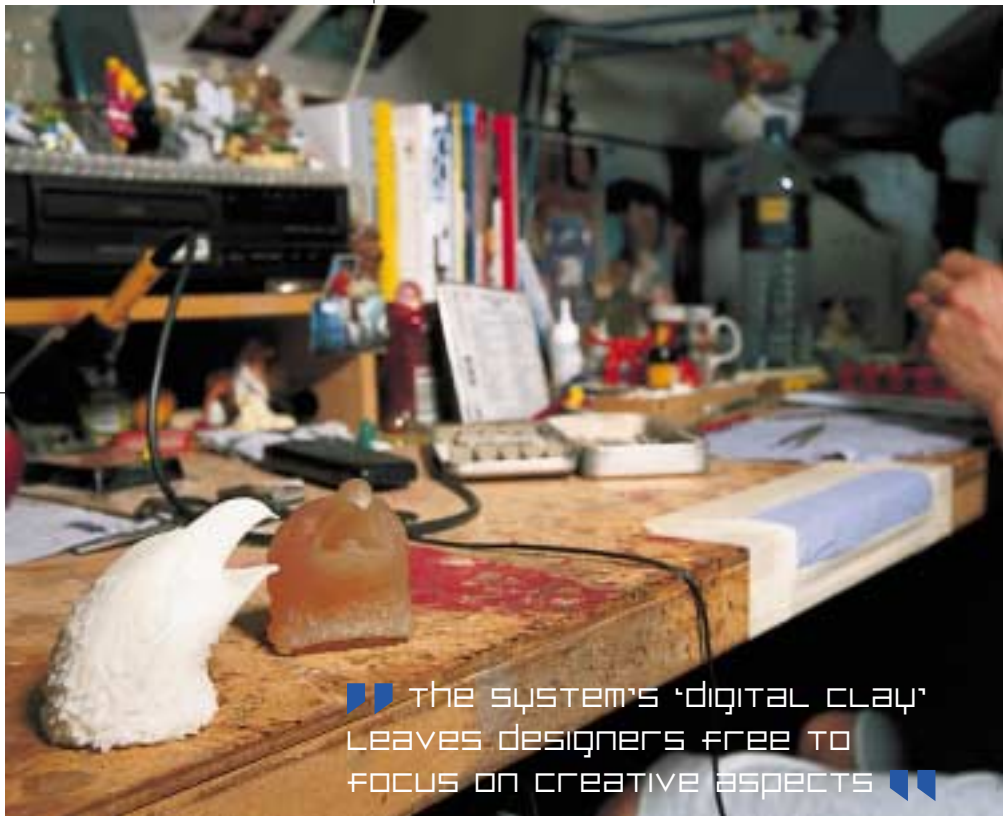
on their creativity that are often imposed by software user interfaces. And, more importantly, it gives them the freedom to experiment. With a digital model on screen, if you try something and don't like it, you can undo the step in an instant.

Because design is an iterative process and because FreeForm encourages experimentation, this level of freedom has a beneficial effect on the quality of

**FAR LEFT** FreeForm can be used to develop real-life models such as this *Chicken Run* toy, or digital ones to be used in the 3D application of your choice.

**BELOW** The FreeForm hardware provides a tactile, force-feedback approach to modelling that can be far more intuitive to users than any graphical interface.





■ The system's 'digital clay' leaves designers free to focus on creative aspects ■

designs. FreeForm uses familiar ideas such as wire cutting to enable designers to interact directly with the model, while controlling the tools by touch provides a real connection to the model, which you can never have with contemporary 3D modelling software. The slightest nuance can be captured and there is no need to worry about model geometry or topology. It is only with the appreciation of what tactile modelling can achieve that the restrictions inherent in traditional 3D design and CAD systems become apparent. So much in the traditional

systems is dedicated to providing specialised tools to overcome problems that are automatically resolved by the sense of touch.

FreeForm provides many advantages over traditional model-making without losing either simplicity or freedom; the system's 'digital clay' leaves designers free to focus on the all-important creative aspects of modelling.

As a direct result of user feedback from such early adopters as Synapse, Hasbro, Honda, Fisher-Price and Gentle Giant, SensAble announced a raft of additions

and enhancements to the original FreeForm system last March. Designers at Synapse Modelmaking have been particularly impressed by Version 2's improved sculpting feel of the new ultra-realistic 'soft clay'.

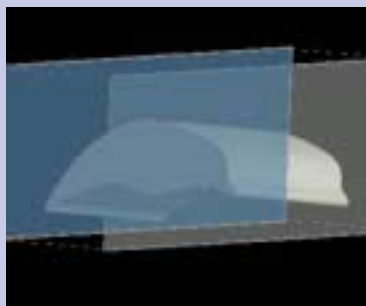
#### INTERACTIVE SMOOTHING

Other enhancements include a much more interactive smoothing tool to erase superfluous marks and surface roughness and a new facility to scale carving tool tips by rotating the stylus. A new tool enables the simple smudging and pushing of large

**ABOVE** Models output from the system can then be rendered in solid form through a stereo lithography machine.

## THE SCULPTOR'S TOOLS

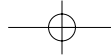
**HERE'S A DEMONSTRATION** of FreeForm being used by an artist at Synapse Modelmaking. The images indicate what the artist sees on screen while using the sculpting tools. Compared to traditional sculpting, the ability to work on-screen saves on materials and labour time – models can be tweaked to perfection. To the digital artist, however, the high-end equipment offers the potential for more intuitive, creative model design. When completed, Synapse will render a model like this via a stereo lithographic solid output device, but they can also be saved as OBJ files for use within most common 3D applications.



Starting with an empty design space, the sculptor begins the process by creating a basic form and drawing the outline of the required shape on to a plane in the work area. This zone is then filled with digital 'soft clay' to start building the object with the wirecut tool. The sculptor begins the design process.



The shape is now roughed out by shaping the 'clay' with a variety of sculpting tools, caving, smudging, attracting and smoothing. Different tool sizes are used and the feel of the clay can be adjusted to suit different tools and techniques.



CHICKEN RUN FIGURINES © HADDAM, DREAMWORKS AND PANTHE

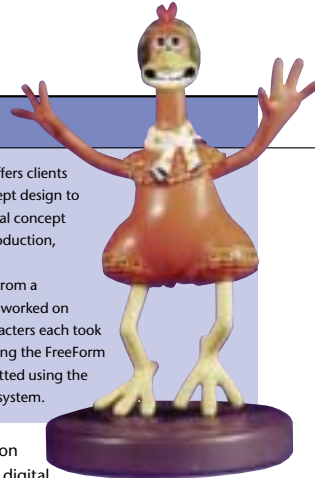
## THE SYNAPSE STORY

**THIS REVIEW WAS WRITTEN** with the assistance of Synapse Modelmaking. The company is a design and development company specialising in licensed and generic character three-dimensional products, working primarily with consultants, manufacturers and agencies. Based in Watford, it has been established for over 10 years and has extensive experience in a range of areas including toys, both retail and promotional, gifts, novelty items, consumer products and collectibles.

Synapse is the main Disney-approved 3D studio recommended by the European Creative Centre in Paris, with a growing clientele of major international licensees around the world including Nestlé,

Mattel and Hasbro. Synapse offers clients a range of services, from concept design to a complete service from original concept through to engineering for production, including rapid prototyping.

The figurine shown here is from a merchandising range Synapse worked on recently. The *Chicken Run* characters each took roughly four days to model using the FreeForm system. They were then outputted using the company's rapid-prototyping system.



areas of material around the model, and an Attractor magnetically draws voxels to itself. Functions relating to area masking and symmetrical modelling operations have been substantially improved, and the lighting controls have considerable additional flexibility.

Further improvements to import and export facilities have been incorporated in the new version. FreeForm files have historically been very large, however version 2 includes a 'decimator' to reduce files to a size that is more acceptable to more traditional 3D programs, while retaining detail where it is needed. STL files can also be generated to export to physical-world prototyping and fabrication devices such as Thermojet solid object printers. Most important to readers of *3D World*, OBJ files can

be exported into programs such as *Maya LightWave* and *MAX*. *Adobe Illustrator* file formats are also supported if you need to take your creations to flat planes.

### AND IN AN IDEAL WORLD?

Features we would like to see in the future include carving tools with convex curves and sharp points that are closer to their real-world equivalents. More use of colour would be appreciated, as would a version priced to make it more accessible to smaller enterprises. We would very much like the ability to create small file-size view-only models. These models would be useful when communicating designs with clients who often do not have access to powerful PCs.

Overall, FreeForm is a revolutionary system; it encourages creativity and

interaction with the digital model in a way that no other system comes close to matching. FreeForm really does mark the beginning of a new era in design computing.

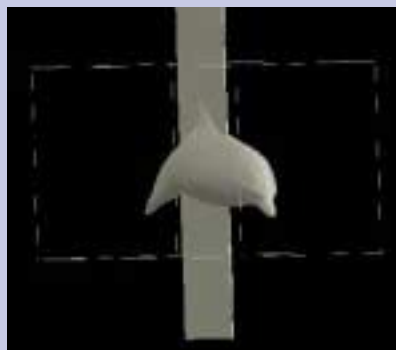


#### PROS

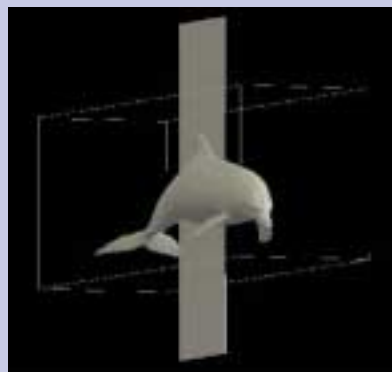
- Very easy to learn
- Improves productivity
- Enhances creativity
- Inbound and Outbound interfaces
- Simple to set up

#### CONS

- Requires top-end hardware
- Not priced for small companies



Time now to use the mirror tool. Many models can be created using symmetry and this is one of the ways digital modelling increases productivity over traditional sculpting.



Using the mirror tool again, but this time having changed the 'finessness' of the virtual clay, so that finer detail can be added.



The finished model. In the custom-setting, the finest details have been added, the surfaces smoothed and lines refined. This digital model is ready to be exported as an STL file to a rapid prototyping machine, or to a NURB-surfacing package for importing into a 3D design or CAD package.

