

# Scanning the inner fabric

Sandy Black

The impact of new technology on every aspect of our daily lives can hardly be overstated. Its growth over the past decade has transformed both our working practices and our leisure activities in ways we have yet to fully comprehend.

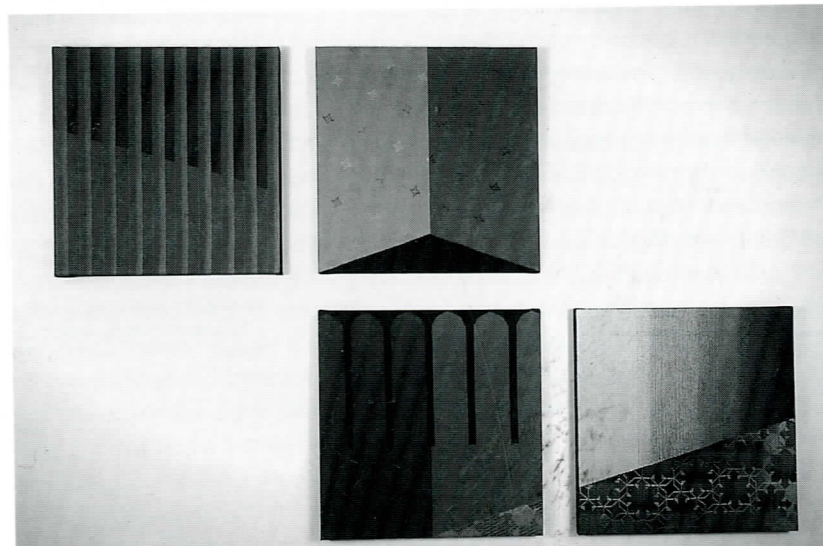
The benefits of computer technology for design and production – its ability to handle complex tasks, speed, cost-saving – have long been recognised and utilised in many fields from aerospace and automotive engineering to architecture and product design. However, it was the introduction of colour painting and drawing systems in the late seventies which was the catalyst for change in the graphic design profession and, more recently, the textiles and fashion industries.

In the textiles industry, as in many others, the technological revolution has transformed production processes; the ability to integrate design into computer-controlled systems has forced designers to rethink their approach to designing, and managers to rethink the role and position of design within company structures. The introduction of computer-aided design and manufacture – known as CAD/CAM – has opened up new opportunities which have yet to be fully explored. In the new computer-integrated manufacturing (CIM) the product and its design information are repositioned centrally within the

organisation; design has so often in the past been regarded as a peripheral activity.

As large textiles and fashion companies have begun to invest in the new technology, design has become the focus of attention. From tentative beginnings a few years ago, new highly sophisticated software tools have been developed, showing the benefits of recent collaborations between programmers and designer-users. Textile designers have had to change from traditional manual working methods with brush and paints, pens and point paper, to new and alien computer workstations; their environment has changed from a noisy but inspiring clutter to a sterile grey box. However, new devices for freehand drawing such as the pressure-sensitive stylus and digitising tablet are replacing the clumsier keyboard and mouse, and the introduction of the scanner has opened up the completely new area of computer imaging; almost anything can become the basis of a design once it is captured in digital format inside the machine. The computer is certainly the ultimate tool of image manipulation, as current films and advertising testify.

As the technology has evolved and prices have fallen, access to CAD has broadened, allowing smaller design companies and individuals to experiment with software based on the personal



**Patricia Kinsella**

'La Pergola', 1991 (detail)  
Cotton yarns mounted on  
wooden frames

Each square 61 x 61 cm  
H 132 cm W 203 cm

Patricia Kinsella works with a  
computer loom to create  
intricate woven structures  
made up of separate modules  
capable of being rearranged  
into different structures. In 'La  
Pergola' the vivid patterns are  
inspired by the formal language  
of the weaving process.

© The Collection of LongHouse  
Foundation

Photograph by Alessandro Pianti



**Ceri Isaac**

'Word Debris', 1993

Design for printed fabric,  
Athena scan collaged and  
manipulated

© Athena Design Systems

computer. Individual designers and artists are also able to access new technology through CAD bureaux or industry collaborations which are increasingly being established.

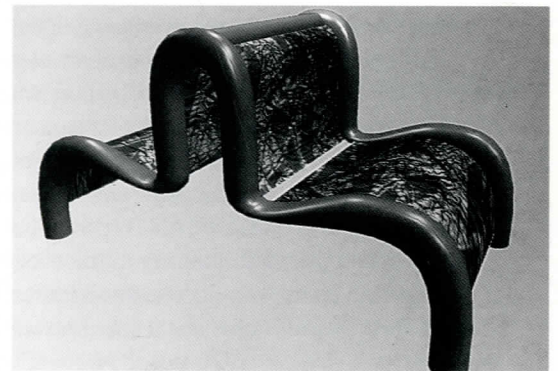
The changes that are taking place have forced a re-examination of the creative design process itself and there is a new excitement emerging as designers and artists are coming to terms with the new technology, and using it to explore some of the fundamental questions raised about ideas, process, technique, tools and media.

In this transitional phase, the potential of CAD/CAM is just beginning to be explored. Computer technology has generated a variety of reactions from designers and artists: it is viewed by some as a threat to traditional disciplines in art and design; by others as a box of tricks, a tool kit for easier, faster solutions to old problems; by yet others as a vehicle for untold experimentation. New tools need not be easy to use – just difficult enough to stimulate creative thought. The most innovative work results from an open-minded and experimental approach to the new medium, allowing the use of the computer to lead to results otherwise unobtainable and probably unforeseen. Existing boundaries and preconceptions must be broken down in order to allow new developments, and those working outside the constraints of

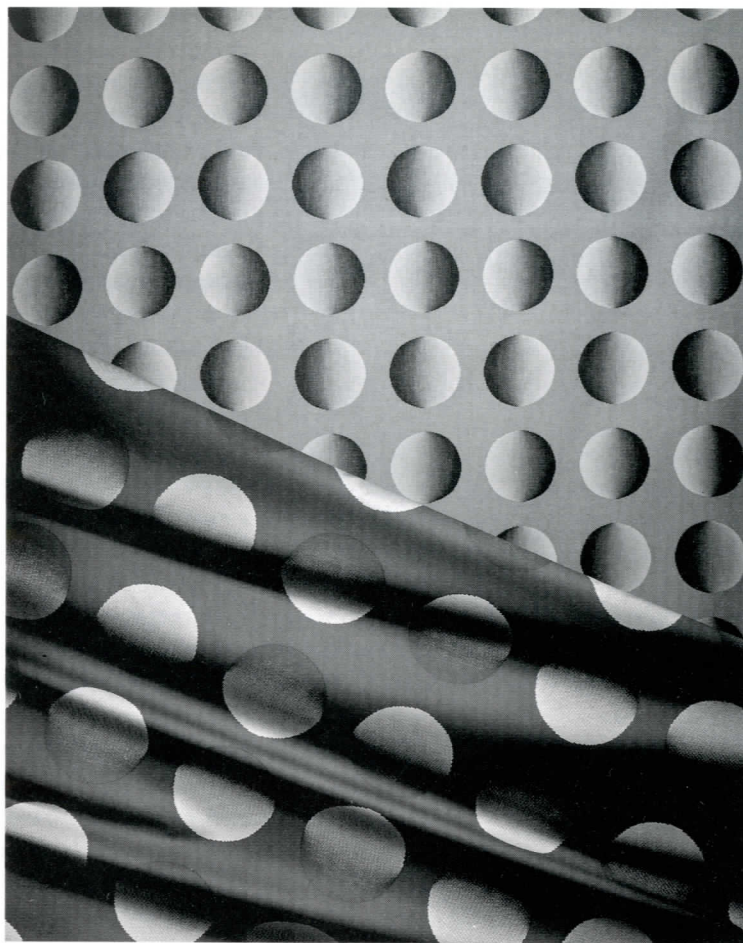
Philippa M Brock

Computer visualisation of seating unit, 1993

Woven fabric designed on  
Apple Macintosh, texture  
mapped to show effect





**Vibeke Riisberg**

'Reflektion', 1992

Cotton sation, designed on a  
Mac II and hand printed,  
manufactured by Kvadrat  
L 320 cm W 140 cm D 10 cm  
© Photographer Ole Akhøj/  
maker/Kvadrat

commercial environments may be best placed to achieve new results.

The use of computers in textile design within industry is now established, but not yet exploited for its true creative potential. The major areas of printed, knitted and woven textiles are at different stages of development within CAD/CAM. Weaving has a long established connection to the evolution of the computer, and now computer-assisted weaving has freed time previously spent on laborious processes for more creative work, benefitting both large- and small-scale users. Although CAD for knitted textiles is very advanced in the design and production of colour and stitch patterns for commercial knitwear design, access to production equipment by individuals is difficult outside industry or education. There remains a wide division between small CAD systems and machines for studio use, and large industrial CAD/CAM systems, but a great deal of interesting work is being achieved by manual methods.

Printed textile designer/artists have begun to use computer generated imagery for the basis of their print ideas, using the unique power of the computer for image manipulation. Original (or copied!) artwork, photographs and objects can be scanned in and combined with work generated on the screen and endlessly varied

to create collages of texture, line and image. In industry this can be an all too easy method of producing fast but poor quality designs based only on computer tricks: responsibility for the integrity of the design still rests on the skills and experience of the designer.

Accurate colour reproduction from computer screen to paper and fabric is of great importance to printed textiles, and has taken much research to perfect, which has delayed the general acceptance of CAD for print design. The designed Italian printed textiles company Ratti have developed their own integrated CAD/CAM system to match precisely the needs of their high fashion quality design for print production. The latest (third generation) computer software tools for print design are at last capturing the imagination of designers. One such, the Athena Design System, has just been launched with the aim of providing a natural and intuitive tool for creative working, developed with designers and artists for both small and large users. The scanning facility has been perfected to a high degree, with which multiple layers of images can be built up, and the system allows the individuality of the designer to be clearly expressed.

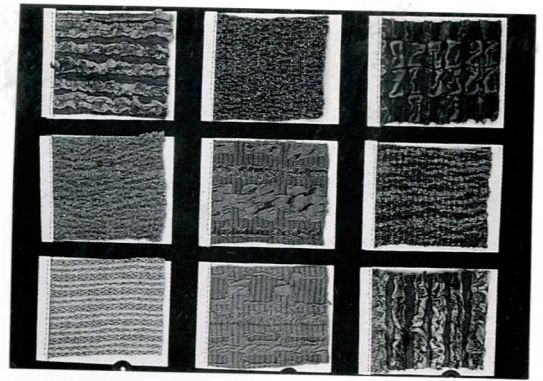
The scope of textiles for furnishings and interiors has been greatly extended by CAD/CAM developments, for example allowing large-scale

designs to be achieved with comparative ease. The printed fabric design exhibited by Jonathan Fuller has been generated and manipulated on computer but realised in the traditional manner by hand screen printing. The textures captured by scanning have been enlarged, exposing each pixel (picture element) of the image in great detail. Vibeke Riisberg uses the power of both repetition and scale within her work, starting from a computer generated image which is enhanced to explore a theme of light and illusory dimensionality in the printed fabric. A similar theme of graphic illusion is woven into the structure of Bobbi Shortlidge's *Woven Bands Series* with the aid of a computerised loom.

Anne Mieke Kooper designs woven pile fabrics for upholstery which have highly structured surfaces. Whether working within industry or on personal pieces, she likes to extend boundaries, and challenge the limitations of the industrial process, and of our perceptions. The fabrics in the exhibition are her most recent experiments in CAD/CAM. She says: 'When it is upholstery it should be possible to sit on it – if the feeling is strange or people do not dare to sit on it I think it is great, because it means that people react to it.'

The notion of functionality is one area where artists and designers begin to diverge – the designer is always constrained to some extent by the end use of the product (although the need to meet requirements can itself force creative solutions). In the opinion of Vibeke Vestby, lecturer, weaver and CAD/CAM expert, 'textiles were always made as a compromise between function and ornamentation', and industrial textile production has freed the textile artist to use qualities of fabric construction 'for purposes dictated by pure artistic and aesthetic concepts.' To this end, she has developed a software package specifically for hand weavers using computerised looms which allows complete design freedom by selection and control of each individual thread to 'focus on the unexplored possibilities of the architecture of interlacing.'

Some of the most inspiring work can be found where older craft-based skills meet new technology, not just through the computer screen (which in itself imposes hidden constraints), but in conjunction with new production methods combined with 'hands on' techniques. Artist Emily DuBois is deeply influenced by Taoist philosophy, and uses computer-aided weaving to create her work with a combination of traditional techniques including ikat and Japanese shibori resist dyeing, thus creating and imbuing the fabric with multiple layers of both process and interpretation. *Fragment* is one of a series of works inspired by patterns in nature, and which



**Karen Rolfe**

Three-dimensional jersey-knit samples, 1993

Wool and synthetics using Moratronic CAD/CAM system

L 38 cm W 15 cm

Photograph by Karen Rolfe

beautifully express the dualism between uncompromising computer-designed weave structures and the unpredictable dyeing processes. Textile designer Karen Rolfe recently graduated from the Royal College of Art in London where she designed knitted jersey fashion fabrics with complex three dimensional knit structures, effectively combining CAD/CAM technology with hand finishing and printing techniques to create distressed and aged qualities which are not obviously knitted.

The meeting of the artist with the computer is fascinating to observe. The computer environment is a modern cross-roads for the two cultures, scientific/technological and artistic/creative, which have since the Renaissance become separated. A convergence of disciplines is now made possible by the underlying structure of computer technology, bringing together artists, designers, mathematicians, computer programmers, production technologists and industrialists. This is not the first time that artists have worked with computers; during the sixties and seventies the ideas of artificial intelligence inspired such artists as Harold Cohen (see page 59) to produce computer-drawn artworks based on complex series of mathematical instructions and rules. It is interesting to note that during this phase of computer evolution (before the





#### Alexander McQueen

Jacket, autumn 1994 collection

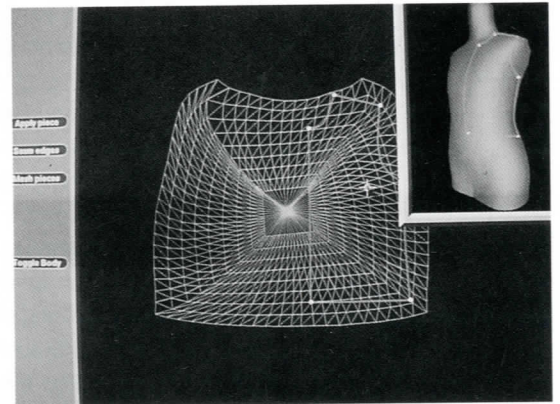
Jacket fabric with  
deconstructed images  
handprinted by Wilson and  
Brennan

Photograph by Anni Phillips

graphical screen interface), the experimental use of the computer was the province of the artist rather than the designer.

Both textile artists and textile designers are using CAD as a production tool for weaving, and some have access to design systems. One artist, Cynthia Schira, participated in the Art and Industry Jacquard weaving project, resulting in her work *Repeated Homage*. This forward-thinking project, undertaken in 1991 at the Müller-Zell weaving factory in Germany was devised to 'set artistic standards for the electronic revolution in Jacquard weaving' (previously a time-consuming and very costly mechanical process), and gave several textile artists access to the latest CAD/CAM facilities. Cynthia Schira's aim was to produce 'atypical' Jacquards and to avoid being too seduced by technique she worked in black and white. In contrast, Patricia Kinsella, another participant in the project, made dramatic use of scale and pattern in boldly patterned, colourful complex weaves.

For all weavers there is a common quest for fabric with integrity and inherent qualities which might be threatened by the process of designing and weaving through a computer screen. In using CAD for textiles, it is vital that the artist/designer/operator has a sound knowledge of fabric qualities – despite their impressive



#### CIMTEX

Virtual catwalk, 1994

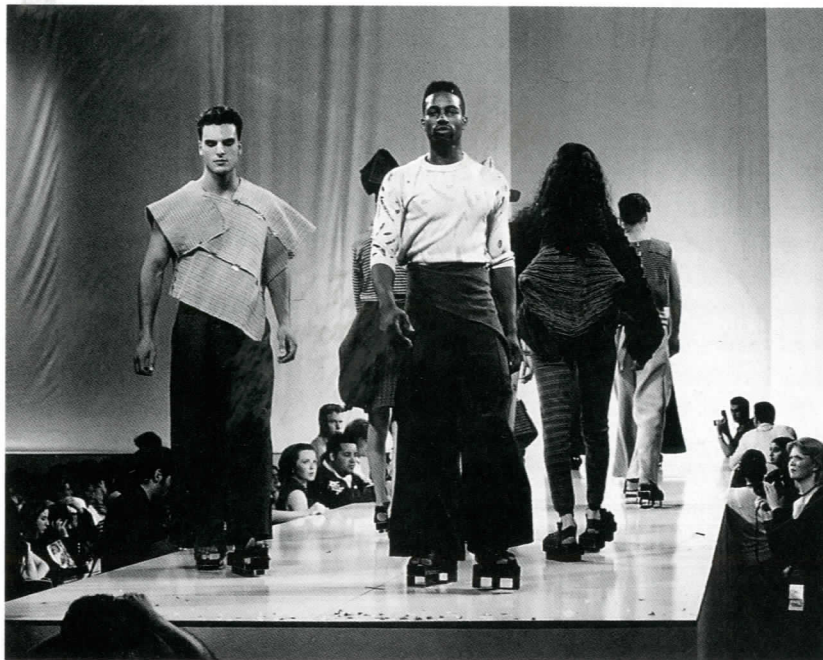
© Dr Gary Fozzard/De Montford  
University

**Emma Nixey**

Sculptured Lycra knitwear,  
1992

Produced using CAD/CAM  
system at the University of  
Brighton

Photograph by Bob Seago



capabilities for visualisation and simulation, CAD systems cannot (yet) substitute for tactile sensation, which is as important in textile design as visual qualities.

In the textiles and fashion industry, many CAD systems are used primarily for presentation and sales rather than design. Visualisation and simulation of fabrics on paper and on a photographic model have become an important communication tool, but often at the expense of design creativity. The most widely used systems are based on designing in two dimensions, with the third dimension visualised by complex body-mapping processes. Fashion design in three dimensions, taking into account fabric drape and handle, is the subject of much current research, notably by Stephen Gray of Nottingham Trent University, and the CIMTEX project at De Montfort University, led by Dr Gary Fozzard. A major part of these projects concerns modelling on virtual bodies within the computer, and Stephen Gray's team is creating its own 'virtual catwalk' show. Fashion design is a fast moving business, and the competitive advantages which can be gained with CAD/CAM are eagerly sought. The main challenge for fashion CAD is the translation of an often intuitive approach to designing, which moves freely between two and three dimensions,

with constant modifications being made.

Computer-aided design is here to stay and we must embrace the challenge. At its worst, CAD overwhelms and dazzles the user, who can easily produce banal work. At its best, the use of CAD frees the designer for greater experimentation. The use of the technology should be transparent, providing a means to access the underlying design and structural potential through the processes of creating, testing and selecting, but it should not be an end in itself. It is all too easy to be seduced by the powers of a CAD system and to be led astray by its wealth of techniques – the artist's/designer's vision must remain intact. However, in exploring a new medium, it is vital to retain a balance between fixed ideas and spontaneous outcomes which lead off in new directions. Many artists and designers thrive on the 'accidental' and the computer can initially seem restrictive to serendipity – everything is contained within its world – but that remains to be challenged. If the computer is used as a tool for the mind and not just the hand; not to replace existing practices, but to add to them; perhaps to synthesise a new visual and tactile language, rather than repeat what we already understand – then who knows what will happen?