

Towards a new, digital era!

from: BM 12/96

Digital design permits the
graphic visualization of ideas
without necessarily including

production technology;

Spider Shelf from the Nature

Sampling series, computer

visualization; Design: Mike

Meirè; Computer

visualization: Bruno A.;

Photo: Meiré & Meiré

The interplay of design and computertechnology

According to economic experts, change is in the air. Going further than the question of choice of location, which at the moment is under heated discussion in the industrial sector, and also increasingly in the crafts, there are various approaches following up on the idea of decentralized production concepts. Based on linking computer and communication technology, these new concepts are as different to 20th century industrial businesses as the latter were to medieval craft workshops.

Today one particular development can already be seen clearly. More and more craft as well as industrial companies use the same computer-aided production technology, not only in the furniture industry. Added to this new production technology are computer-aided systems in other areas of the enterprise, for example construction, order handling,



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The table “Spiralo“ with an
evenly increasing spiral could
not be produced manually.

The table was made in the
course of the project “Furniture
in C“; Design: Friedrich

Sulzer; Manufacturer:

Harich Individueller

Innenausbau GmbH;

Photo: Kai Loges Fotodesign



accounting, marketing as well as internal and external communication. Linking up the individual systems with each other, this new approach to production, also called “virtual“ production, reconciles the advantages of flexible, customized production of the craft with industry’s technological advantages.

The following examples show how “virtual“ production starts to change the product range of the furniture industry. A common feature is that in times of stagnating markets, furniture is increasingly produced once it has already been sold. The advantage is that furniture is not being produced on stock. Just like craft companies work, furniture can be made according to the customers’ requests. This virtual production is being made possible by the use of computer-aided systems for planning and production, as well as modern communication technology.

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Desk range “Invent
your Office”; Waiko
Büromöbel-Vertriebs GmbH;

Photo: Waiko



“Invent your office“,

a concept by office furniture producer Waiko. At the 1996 Orgatec fair in Cologne the office furniture producer Waiko presented for the first time their concept “Invent your office”. Opening a new dimension to the organization of the office environment, it targets at the home office market with



Digital Catalogue “ProDecor
Programm”; Hettich Beschläge
GmbH & Co.

its big future potential. The core idea of the concept are desktops, whose outlines can be freely designed by the customer. They can be produced with various materials and finishes, and may be combined with supports and accessories already used in other programs. The only restriction to the outline of the desktops is two standard formats of the basic material. The price of those customized desktops is 25% higher than for standard tops. A processing fee is added for each desktop. Once the customized outline of the desktop is programmed, it can be produced in any number at one of



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the CNC machining centers. Afterwards the data will be filed and the customer can place an additional order at any time. Delivery time of the customized desks ranges from 4 to 6 weeks. Sales advice is offered with every specific trade, which is furnished with traditional sales material as well as design aids.

Customized furniture of the
brand Op Top, e.g. kitchen;

Photo: Op Top



“Op Top - Customized Furniture: at once!”

Producing customized furniture and installing it at the customer's premises within 72 hours is the program of the Italian furniture maker “Op Top”. To achieve this ambitious goal, computer-aided design tools are used right from the start, - as opposed to Waiko - together with local showrooms connected directly to high-tech production centers. At the core of the computer-aided system is a data bank. It features the outlines of various box furniture, which can be specified. Apart from geometrical data of the furniture, all information relevant for construction, calculation as well as production can be stored in the data bank. Models of the digital furniture can be assembled and changed in dimension and function (i.e. an open shelf or a revolving door), on the computer screen by the customer together with the sales consultant. The production program offers five different standard



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materials, which also can be used as a material mix. With the help of the computer-aided design system the customized furniture can be visualized on the computer screen at any moment and its price be calculated. If the client decides on “his” furniture, it is sufficient to start the computer-controlled production by pressing a single button on the keyboard.

Even though at first sight the customized furniture of the Op Top brand hardly distinguishes itself from those of the competition, it was developed from scratch in order to meet the marketing scheme, which is to produce customized furniture within 72 hours. This also enables to optimize the computer-controlled production process. According to Op Top, the estimated technology content is 80%. Due to this high technology content combined with the concept of decentralized production,

the immediate manufacture of customized furniture is made possible. Italy alone has planned 50 to 100 Op Top centers for the next five years. And all this at a price which is 20 to 30 percent below the price of comparable furniture out of industrial production.

What effects have concepts like customized industrial production on the craft?

By replacing serial with individual furniture production, the furniture industry invades a terrain which has been the domain of the craft, due to the industry's inflexible production structure. The job distribution between industry and craft seemed clear-cut for a long time. Industry delivered serial furniture which was only available in certain dimensions and materials at an affordable price. The strength of the craft was furniture made to measure.

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Side Table “Stand By“ by Dirk
Schäfer gets stability from
simple slot together joints;
The table “Stand By“ was
developed in the course of
the project “Furniture out of
a board“ by the C...Lab at the
Offenbach Design Academy



The days seem to be numbered, that a customer would come to the furniture maker with a catalog in hand, ordering the illustrated furniture in a different size or material or finish. The industry has also seen signals of the time and the market. Introducing concepts of customized production, particularly in the lucrative market segment of refined furniture. This change of strategy is being supported by the progress made in computer and communication technology.

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Slot together system table

for two table variants;

Design: Holger Jahn, Stuttgart;

Photo: Jahn Design



Even if computer-aided tools for planning and production are being introduced to the craft, and the same tools as in the industry are being used, its chances in this new economic constellation are not the same to begin with. This is mainly due to a lack of financial resources and lack of cooperation within small and medium-sized craft firms. In the craft today computer-aided tools are mainly used to rationalize existing work processes. Only in few cases buying decisions are made with a view of setting a strategic course for the future, with a vision going past the every day routine. The Internet, the prototype of future information and communication systems, as well as online services, meaning data banks of suppliers, i.e. producers of fittings, are almost unknown. CNC wood machining centers are usually operated by workshop oriented variation programming, without making use of the potential of CAD systems.

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Small furniture out of the
Puzzle series; Design: David
Kawecki; Manufacturer: 3D-
Interieurs, San Francisco, USA;

Photo: 3D-Interieurs



The precise slot joints
are cut with a laser;

Photo: Jahn Design

Since training courses were not necessary for previous generations of machines, most furniture makers think they can also get away without training the computer-aided tools. The result is, only a fraction of the new tools' potential is being used.

Most owners of small craft firms are rather busy with daily matters and therefore have no time to look into the future. Concepts like the “virtual company“, which show how the interconnection of computer and communication technology can effect the way companies are run, are mostly unknown. However, these concepts also present opportunities and possibilities for the craft industry, on the condition that it jumps on the technological bandwagon and consequently uses the technology for its strategy and aims.

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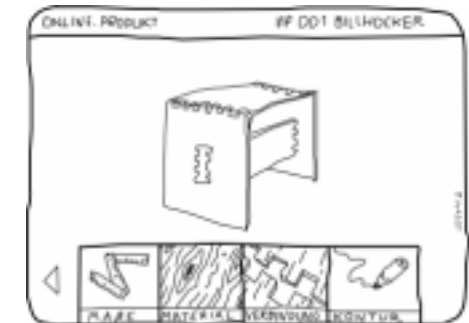
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Digital furniture design research

The research project “New Technologies in Furniture Making“, which was initiated by Prof. Arno Voteler at the Stuttgart Institute for Interior Design and Furniture Design in 1993, marks the beginning of digital furniture design research. Under the guidance of the designer Friedrich Sulzer the project pursued two main goals: to show the current state of computer-aided technology in furniture making and to analyze the design potentials of the new technology. In the course of a one year research project the team presented “Furniture in C“ at the International Furniture Fair 1994 in Cologne.



The illustrations show the visions of the retail trade, sales consultancy, and production in a virtual company. Above the “furniture publisher“



“Product finder“

“techno-factory“, the project “online.produkt“ was lanced at the C...Lab at the Offenbach Design Academy; Illustrations: C...Lab





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It also carried out the 11th “Weissenhof Seminar“ which was geared towards designers as well as participants from small and medium sized firms in the furniture industry. The aim of the seminar was to open new horizons to the participants concerning the practical use of the new technologies and to discuss connected problems and possibilities using practical examples.

In 1994 Friedrich Sulzer changed to the Hochschule für Gestaltung Offenbach (Offenbach Design School) and with the foundation of the C...Lab the center of research activities moved to Offenbach. Based on the experience gained in Stuttgart and on Prof. Jochen Gros’ work on “electronic craft“, the research of the C...Lab focuses on finding out the fundamentals of CNC-compatible design and the experimental development of virtual products.

The team was influenced by statements on “the company of the 21st century“ made in economic literature, for example in Davidow and Malone’s book “The virtual corporation“ which appeared in 1992. They concentrate on the virtual product as the center piece of the foreseen economic revolution and on the benefits gained by the customer. The “virtual“ product’s most important characteristic is its availability - any time, any place, any size or shape.

Since 1994 the C...Lab has tried to find out how these theoretical approaches can be practically applied. Taking furniture making as an example, it carried out various projects. Projects developing scenarios around virtual companies take turns with projects going into the design of virtual furniture or basic research on CNC-compatible wood joints.



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“Online product“

Scenarios within the Virtual Company

With increasing “virtual production“ as well as sales of products via the data highway, the project “online. product“ discussed changes for producer, trade and customer. The team worked out completely new technical and logistical possibilities of organization which will open to companies as well as customers in the near future by means of computer-aided design tools, computer-integrated production and worldwide communication through data networks. Central to the project was the simulation of a “virtual company“, a “product publisher“ for furniture. As opposed to traditional furniture companies the “product publisher“ does not produce any furniture, but digital data files.

This “digital“ furniture can be sold via the Internet and thus ordered anywhere in the world. A special software called “product finder“ helps the customer not only to select a desired furniture from an immense offer by a “product publisher“, but also to vary or modify it according to his needs and wishes. Once the customer has made up his furniture as a co-designer, the data file of the furniture will be transmitted to the nearest “techno-factory“ where it will be immediately produced on CNC machines. Those “techno-factories“ might develop from existing craft firms with CNC production machines and an access to the data highway.



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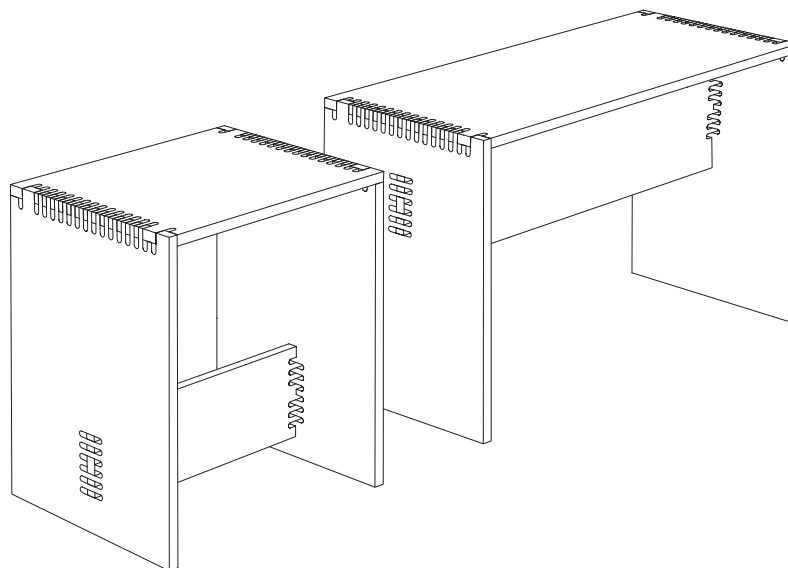
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The "Ulm Stool" - a homage
to Max Bill by Jochen Gros
- where the tenons press
into each other and hold
without glue;

Design: Prof. Jochen Gros;

Photo: C...Labor



Furniture for the "Virtual" production

While the project "online.produkt" mainly discussed models of new organizational forms - the scenarios were exemplary demonstrated with the help of Prof. Jochen Gros' CNC-compatible "Ulm Stool" - other projects developed so-called "virtual furniture". Pursuing thoughts that the concept of furniture to be sold world wide in form of digital data files can be produced everywhere using CNC machines, has consequences on the choice of material as well as the design of the furniture. The projects "Furniture out of flat boards" and "100% C...NC" aimed at developing furniture that can be produced entirely from flat boards customary in trade and on a CNC-machining center, completely without fittings or connectors. As a result from the projects came interesting furniture designs, like the side table "Stand By" by Dirk Schaefer, and of course also many questions concerning the technology as well as the design.



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“Virtual” furniture requires CNC-compatible joints

One question, for example, concerns CNC-compatible wood joints. In traditional furniture making visible joints had a functional but also a design aspect. They were sacrificed during the dictatorship of board material, circular saw and dowelling machine in industrial furniture production. Today with the introduction of CAD and CNC-machines it is again possible to produce joints economically. However, the traditional joints cannot simply be transferred to the CNC-router, the way they used to be made manually with saw and firmer chisel.

The project “Japanese wood joints...digital” shows how CNC-compatible, i.e. digital wood joints can look. Departing from the traditional Japanese models we tried in various steps to design CNC-compatible joints. This led to new types of wood joints under a functional as well as an esthetic aspect. The continual development or invention of wood joints at the C...Lab is done with the idea of having a computer-aided construction tool for CNC-compatible wood joints at the disposition of carpenters, furniture makers or architects in the not so far off future.

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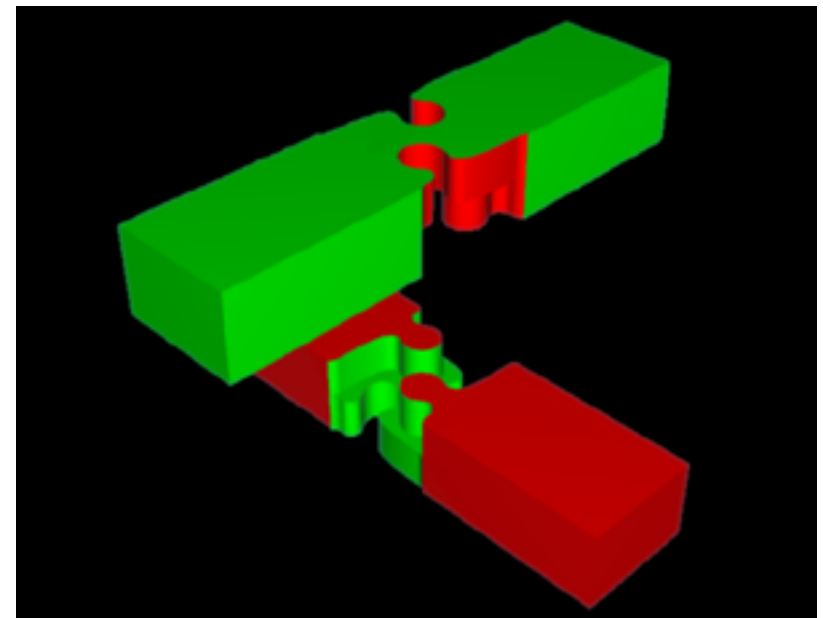
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The Jigsaw Cross Halving was created in the course of the project “Japanese wood joints ... digital” at the C...Lab at the Offenbach Design School. It is derived from the Dovetail Cross Halving. Common model of the joints is the Japanese common halving, the “Shi-ho-ari-kuni-te”; Computer visualisation: Friedrich Sulzer;

Photo: C...Lab

Design Research for Practice Means Dialogue!

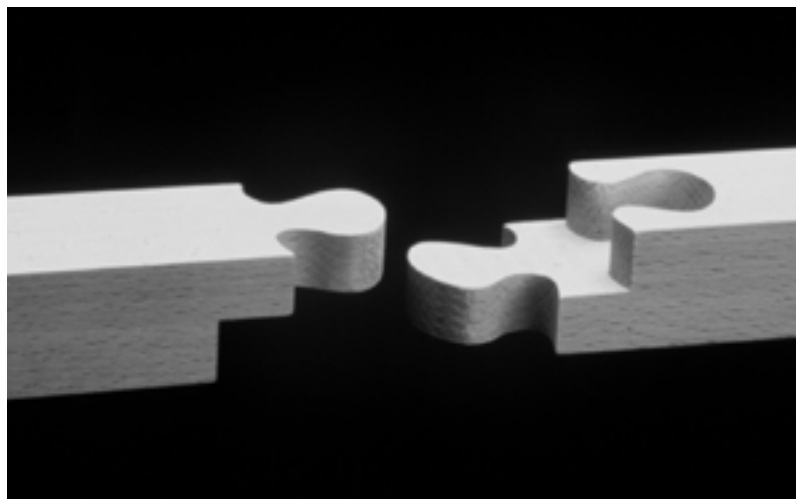
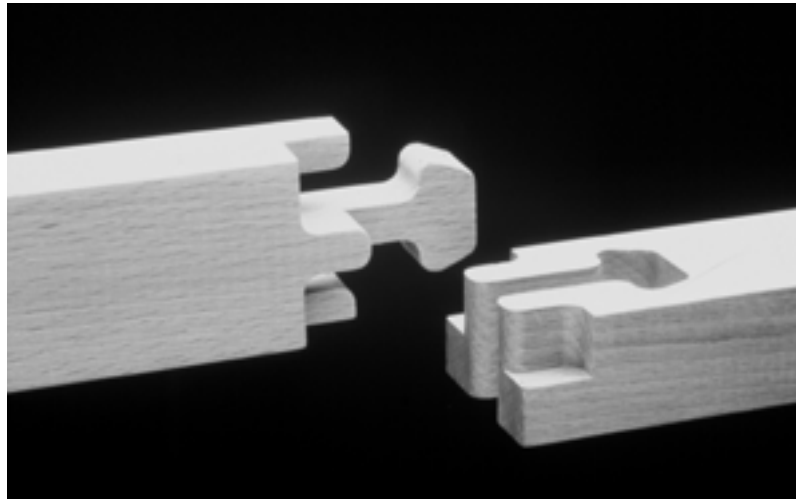
Working on publications as well as carrying out conferences and exhibitions are important activities of the C...Lab on top of the project work. Apart from presenting the projects to the public, the purpose of these activities is to create a platform for inter-disciplinary exchange. The scenarios, furniture and wood joints we worked on in projects are not supposed to be patent remedies or products ready to be put on the market, but rather an inspiration for thought on the digital future.



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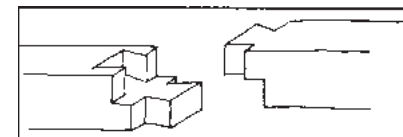
The Gooseneck Mortise and
Tenon Joint with Stub Tenons
is modelled after the Japanese
sickle tenon scarf with rabbet



With the conference “From the good to the virtual form - product design in the digital age” in 1995, the C...Lab continued the discussion of the theme which started with the “Weissenhof Seminar” in Stuttgart. Parallel to numerous lectures and forums in which experts of the most varied disciplines discussed the effects of the new technology on design, the exhibition “Digital furniture” took place in an empty furniture store. A selection of furniture was shown that was chosen for its CNC-compatible design, i.e. a design that consequently uses the potentials of computer technology.

**CNC-compatible Double
Jigsaw - based on the
Japanese double dovetail**

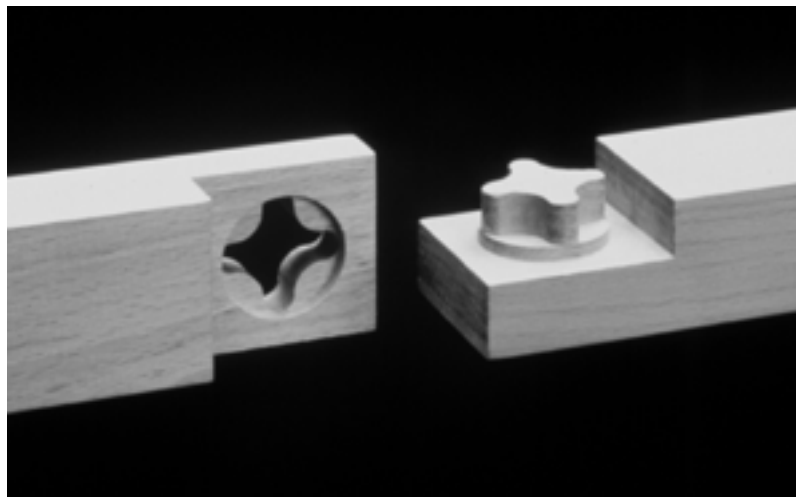
Photos: C...Labor



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The Open Cross Tenon Joint
can be used as corner joint
or as lengthening joint



Computer visualisation of the
“El Toro Chair” by Lumcom
GmbH, Sielmingen

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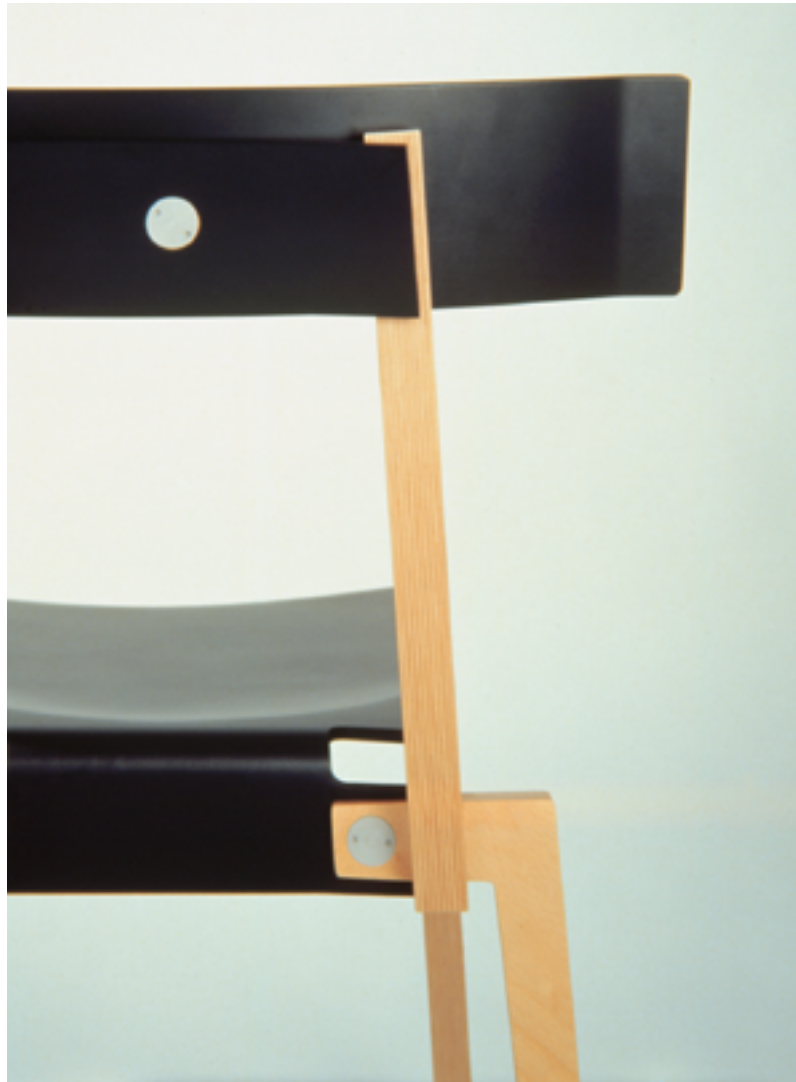
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The The “El-Toro chair” consists out of few individual parts and distinguishes itself through clever details.

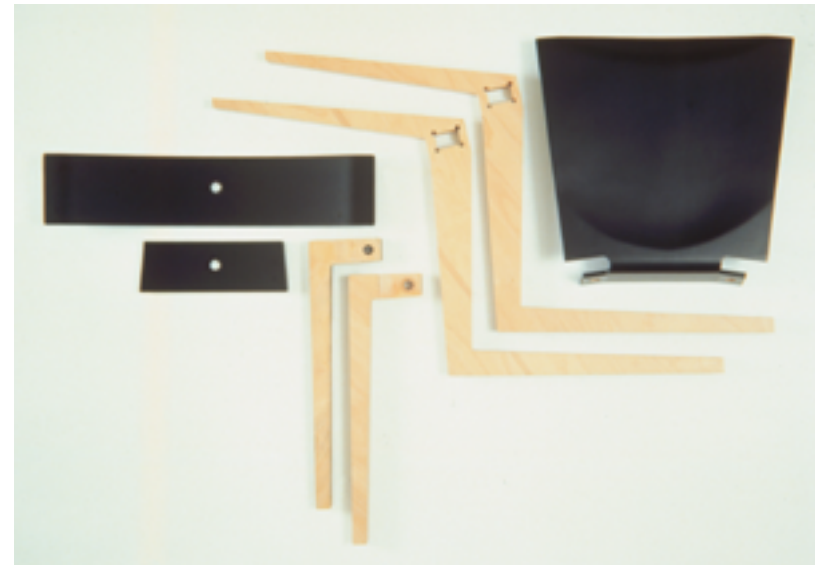
Manufacturer: Biesterfeld +

Weiss GmbH;

Photos: B + W



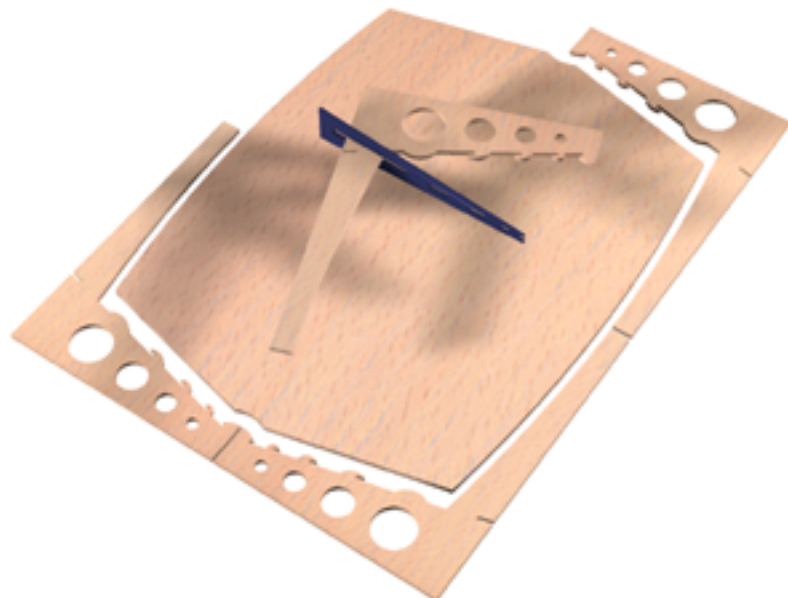
The “El-Toro Chair“ by
Thomas Starczewski, Ulm,
was especially designed for
CNC-production



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The “Contorno table” is made out of a single board. The form of the legs results directly from the contour of the tabletop. Design: Thom Geyer; Manufacturer: Marco Basso Innenausbau GmbH; Computer visualisation: Thom Geyer; The idee to the table was developed during the 11th Weißenhof-Seminar in Stuttgart



In November 1996 the series of events was continued with a conference on “Creativity & Technology” which was organized by the North Rhine/Westphalia Wood and Syntetic Materials Professional Association in cooperation with the C...Lab. The effects of technology on the furniture craft was chosen as its special theme.

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Side Board by Claudio
Möllinger; The side board
was developed in the course
of the project "Furniture out
of a Board" by the C...Lab at
the Offenbach Design School;

Photo: C...Lab



Detail of the hinge;

Photo: C...Labor



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Strategic Alliances for the Future

If the craft trade wants to keep its market position in furniture making in times of technological change, it needs to find answers to the new flexibility of industrial furniture production. However, due to the structure of most craft firms and to their notorious lack of resources, this is only possible through strategic alliances with partners from other fields, i.e. design, distribution, technology and innovation management, or from other trades. The model of the “virtual company” presents itself. It consists of a flexible network in which each of the partners can contribute his core competencies. To the customer the “virtual” organization appears to be a unity, but it does not need institutionalized functions like a central administration. Every partner who works towards a common business goal keeps his organizational independence.

At the center of the “virtual” organization are efficient information and communication systems which are responsible for the distribution and coordination of the tasks to be performed in a decentralized way. Models like the “product publisher” or the “techno factory” can only give a taste of how such “virtual” organizations in the craft might look like. However, to implement such models it needs not only the commitment of specialist associations, publishers and research institutes, but most of all the initiative of individual firms.

Friedrich Sulzer

