

## Digital furniture construction

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Robot insects? Digital design!

“Spider shelf” (above) and  
“Cactus table” (right) from  
the series “Nature sampling”

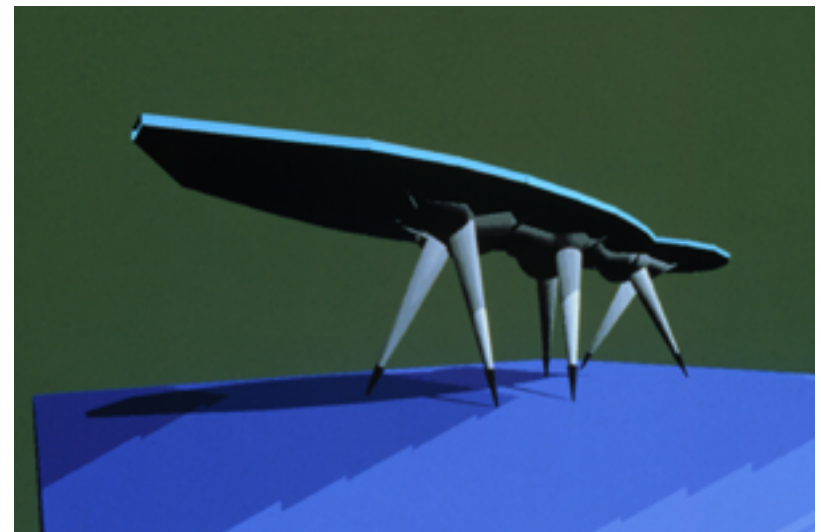
by Mike Meire

Operator: Joe Kinze



## New technologies: Forerunners of a new Aesthetics Bernard E. Bürdek on the use of computer-aided production in design and the craft trades

The digital future has started and the new technologies have already been tested in a research project at the “Stuttgart Institut für Innenarchitektur und Möbeldesign” (Institute for Interior Design and Furniture Design). Results show that the dictate of the circular saw - always straight - is broken.





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The sometimes all too simple strategies of the self-appointed “design managers” slowly obstruct the view of the area of design dedicated to development: research. Experiments that point the way ahead - as opposed to many management recipes - get little attention.

Certainly, not every “design experiment” lives up to its name. All too often the term “experiment” like the term “avant-garde” is being misused. The quickly formed or better tinkered prototype replaces intensive reflections on changing processes in society, and especially in the fast technological development of the present.

At the moment we are experiencing a rapid change which manifests itself not only in re-engineering, lean production or Kaizen-strategies, but also in design, which shall be discussed throughout this article.

New design and new technologies stay irreconcilable. Even Jochen Gros’ attempt at mediation has not changed much. His idea of connecting the term avant-garde with high-tech production has been without consequences.

Therefore furniture design in particular turned into a playground for disguised geniuses, whose concoctions receive attention only for a short while. Once the varnish was dried, the prototype already stood in a gallery or even in a museum. Design turned into fashion.



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### Research out of the Public Eye

Since the beginning of the eighties, the Institute for Interior and Furniture Design in Stuttgart researched, developed and designed, keeping calmly apart from all trends. Under the overall control of Arno Votteler an ambitious research project was started in May 1993: New Technologies in Furniture Construction. Prof. Votteler, who is among the pioneers of post-war design in Germany continually followed his own path through decades. The results are now available in a new documentation.

The research project in Stuttgart wanted to show the actual state of the art of this technology on one hand, and opened up new perspectives to the practice of small and medium-sized wood working firms on the other hand, bringing forth know-how or technology transfer in the best sense.

The project was competently led by Friedrich Sulzer, a qualified cabinet maker with a master craftsman's certificate and design diploma and since spring 1994, visiting professor at the Hochschule für Gestaltung in Offenbach (Offenbach Design School).

What is it about? Again and again it is being said that the computer is not just a simple tool, but a tool that requires rethinking. If this is the case, then its use changes the design process. Up to now this has become most obvious in graphic design where the use of desktop publishing and the related software tools make completely new forms of "visualization" possible.

Examples are rare in industrial design. The modelling workshop still seems to be the central place for the design process.



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But this is slowly changing. Martin Burckhardt describes in his impressive “History of Perception” how computer technologies constitute a new workshop: “We don’t deal any more with a material workshop at a specific location, but with one that exists only as a programming language in the head. The dimension of possibilities (the technology) therefore means: a workshop in the head.” Can this now be applied for the design of furniture?

Whenever we talk of a transfer of “hardware” to “software”, design “dematerializes”, which also concerns objects we live with.

## New Media - New Aesthetics

However, the contributions outlined in the Stuttgart research project fortunately are not limited to a technological debate. At last the focus is again on the content of design, for example on a “new aesthetics”.

The means of presentation of today’s computers make the creation of new realities possible. Every now and then designs are created which resemble robot insects. The dogma of the right angle (cost-effective with the circular saw) is broken, and the ornamental character is a topic again.

The new tools therefore change our perception, they widen our aesthetic horizon. The fact that this is being discussed again, is in my opinion the “progress” instigated by this research project. Its attempt to put the idea into practice is also exemplary.



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During the 11th Weissenhof Seminar (at which participated, among others, Jochen Gros from the Offenbach Design School and Michele de Lucchi from Milan) first examples of designs were sketched, transferred to the computer and then to some extent produced. Consequently they aimed to create interest in new technologies, with representatives of craft firms as well as industry participating at the seminar. A design project at the Stuttgart academy resulted in “furniture in C“, which was shown at the furniture fair in Cologne in January 1994.

## Examples from the Practice

For a few years now the product line “Architektur“ for the office by Holger Dannenberg (Werkhaus GmbH in Suhrendorf, Germany) has been using CNC-technology for the production of the “slot together“ systems which have been awarded many prizes since then.

Thomas Geyer already dealt with similar question in his degree dissertation at the Offenbach Design School in 1992. Today he cooperates with an interior fitting company (Marco Bosso) in Griesheim near Darmstadt. The clients are private customers who want one-off pieces of furniture, companies in need of furnishings for their commercial projects such as shops, restaurants etc. along with light construction furniture in the corporate design of the same company, used during trade shows.

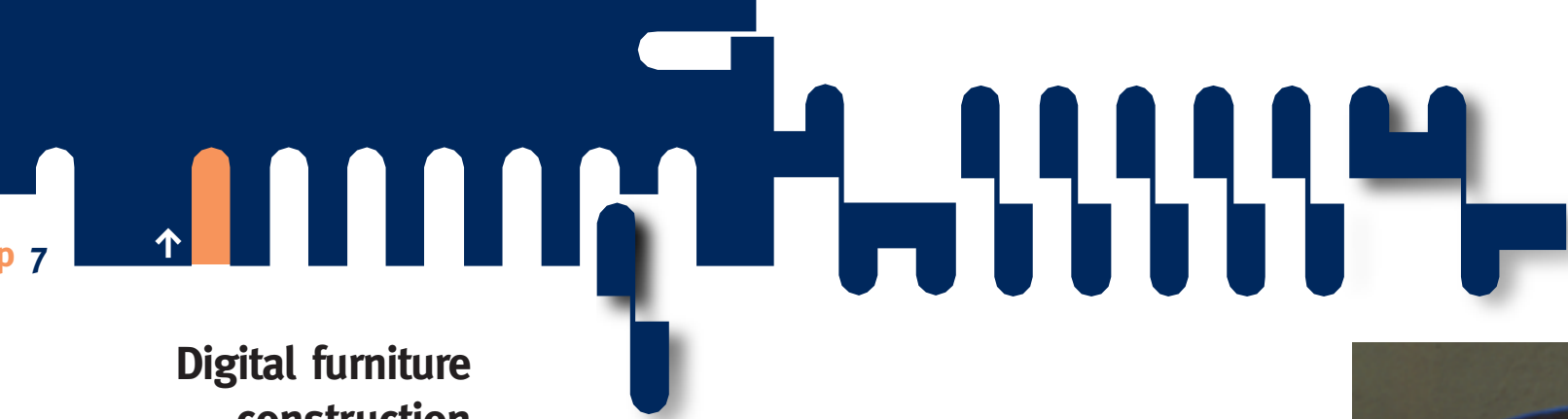


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The products of Xenoform are being designed on the computer (for example with “Freehand“ or “Corel Draw“), followed by a three-dimensional visualization on a CAD-system or a technical plan drawn with “Auto-Sketch“. The numerical translation is done with “Auto-Cad“, and it is transferred as a data file “on-line“ to the CNC-router in the workshop. Quotations, itemization and invoices are more or less automatically part of the system. Thomas Geyer states that “the on-demand production today is not more expensive any more than serial production. The table Contorno is made out of one board, the legs result out of the cutting. The individualization is done by the client through a choice from a range of surfaces, intarsia, etc.“

Ulrich Thierling, a participant of the Weissenhof Seminar, even plans his own edition of his company Lumcon in Filderstadt near Stuttgart. Equipped with a 5-axis CNC-machine center (workspace 360 x 360 cm), it already aims to leap into the new technology on a big scale.



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The table **Spiralo** by Friedrich Sulzer unites essential aspects of digital manufacturing: new forms and new ornaments. The evenly increasing spiral could not be produced manually. It is the result of the CNC-compatible manufacturing process.

Photo: Kai Loges.

### Progress in Details

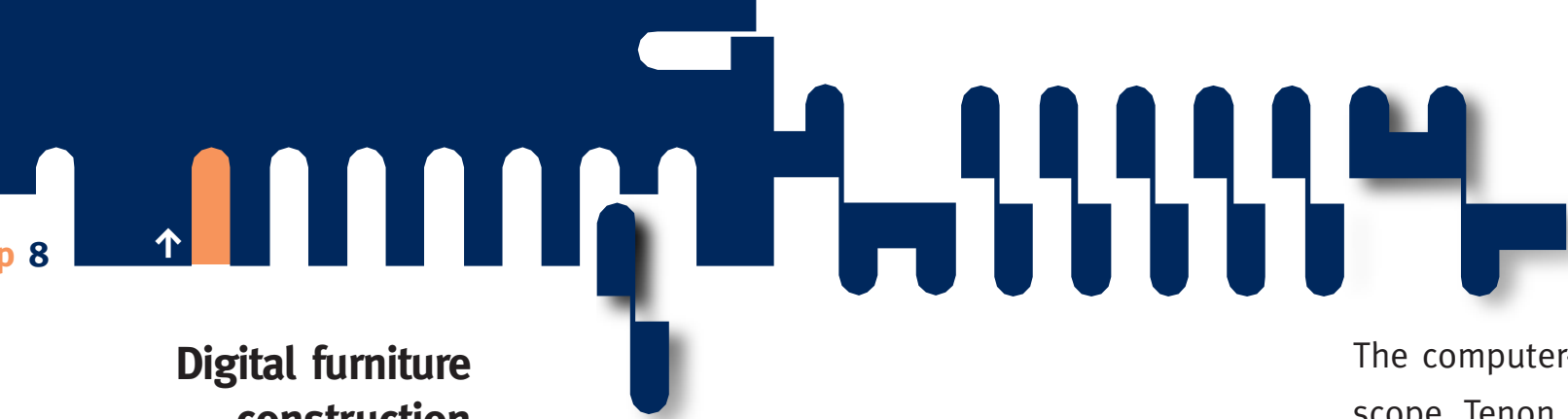
Since the summer term 1994, the product design department at the Offenbach Design School has been leading a rather intensive and design-related debate concerning the new CNC-technologies, especially product semantics.

What can be made out of a board was the topic of an introductory event by Jochen Gros and Friedrich Sulzer. The designs developed subsequently should put the findings into practice.

It seems important to me that a question is being asked again, which has already played a role at the beginning of this century. What does compatibility along with production mean, and what influence do technical aspects have on the form?



In furniture construction for example the CNC-router is used mostly 2 1/2-dimensional, as opposed to the vehicle design, where free form surfaces naturally need to be produced by five-axis-machines. The use of board material logically follows.



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The jointing technologies, i.e. tenon joints, clearly show what this means. Up to now planks and board were worked upon in a vertical position with the circular saw or router. Now the board is put in horizontally and worked upon by the router.

New kinds of corner joints are a result of this. Detailed research means using technology in a way that, for example, joints are created to hold even without glue. The technical skills required for tenon joints allowed a cabinet maker to use them exclusively for the production of an one-off piece of furniture. The extensive use of serial production eliminated this element.

The computer-aided technology now offers a new scope. Tenon joints can easily be changed or individualized. Traditional ways of manufacturing become economical again and can be applied efficiently. This high precision in wood working could not be achieved in this way before.

So far it is undisputed that the economic viability can be increased by the use of CNC-machines. Craft firms report a yearly increase of 5% and more.

Even though design examples are still modest, the reflections already contain a new factor. Beyond the meta-design debates popular with new design and media theorists, new answers emerge to old questions. If computer technologies change our lives and awareness, they subsequently change the daily routine of designing. To reflect upon this, and therefore to research, seems to me the primary quality of these works.



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Holger Dannenberg has been using CNC-technology for several years for his product line “architecture for the office” (Werkhaus GmbH in Suhldorf) to produce the meanwhile many times prize-winning slot together systems.



## Interface-Design in a New Light

This project also makes the currently so fashionable interface-design appear in a new light. In the course of the rapidly changing electronics in nearly all parts of life, we have lost the insight into the “essence” of things long ago. Users manuals need to cover up the poor interface-quality of products; they already become instructions for survival.

Typical for this is the take-away furniture which, neatly taken to pieces, is supposed to be picked up and put together by the customer. Who has not experienced the helplessness that overcomes oneself at home after having opened IKEA’s little bag and spread out its contents. The accompanying tools are pathetic, the assembly instructions “made in...“. And if one or two screws are missing then, everything collapses.



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Simple fittings without screws or hinges is how furniture can work as well. You get the construction plans on-line from a central place and the material from a local building material supplier.

How the pieces are fitted together is also a question of design. The natural “mappings“, according to Donald A. Norman, become noticeable again. The unpleasant side of electronics can be turned into the opposite through its meaningful use. Things become clear again, an effect strongly recommended to be used in furniture construction.

## Presenting a wide Variety

One remaining problem is how to convey to the potential customer the great variety made possible through new technologies. Of course, in every ordinary furniture store there are also only a few selected examples and thick catalogs completing the range. Bundles of paper resulting from “sample books“ of the craftsmen make choices more difficult for the customer. Can he “imagine“, or else “draw a picture“ of how things would look like in his home?

What would be the alternative? The market for new electronic storage media has been booming for two to three years now. About 600 MB of data can be stored on a CD-ROM: texts and numbers, still or moving pictures (digitized video sequences or films) and, of course, music. This media therefore suggests itself for the objectives that have been described here in order to be able to “draw oneself a picture“.



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The sample books become digital. Through interactive media, an up to now unknown multitude of possible combinations (so-called hyper-links) can be presented to the interested customer. The disk version of the book “Digitaler M<sup>e</sup>belbau“ (digital furniture construction), which has now been published in a Windows version, already has several advantages compared to the printed book. The linear nature of the book is broken, explanations, complementing picture material, names and terms - all this can be activated by a mouse click.

This certainly has advantages, even though the user surface of this version leaves a great deal to be desired. The enormous amount of text (directly taken from the book version) has not yet been visually adapted and reading from the monitor is quite exhausting.

The planned CD-ROM version will still go further. Proposed are construction plans, CNC-router programs for production or Quick-Time video clips (digitized video sequences) to explain the machines that were used for a particular process. The often questioned “added value“ of an electronic book as opposed to a printed book becomes obvious. Leafing through a book will give way to a journey through virtual spaces, whose destination can only be reached through intensive personal experiences. Japanese automobile companies have already put up interactive terminals in their “show-rooms“ where the customer can put together the car he desires, choosing from a multitude of components. The terminals are connected on-line with the factory and the delivery is due only a few days later.

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Plans for interactive TV in the USA even go one step further. You can chose products sitting on your sofa and order via back channel. Your credit



The table Contorno from the program of the company Xenofarm is made out of one board;

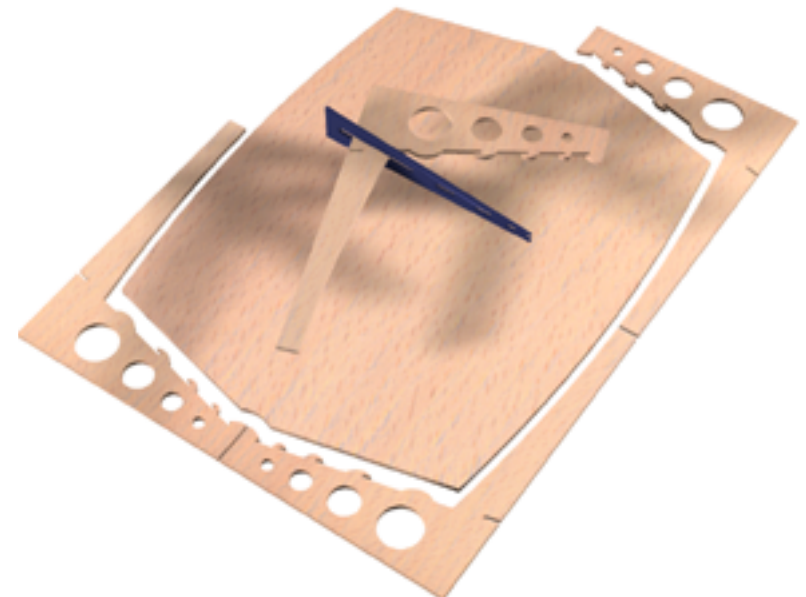
the form of the legs results out of the cut. Individual cutting is possible: various surfaces, intarsia, etc. can be

produced without problems.

card will be debited and all that is left to do is to fill up the peanut bowl and get beer from the refrigerator. However, these are exceptions. Experts agree, the new “media-variety” will look differently.

## Virtual Worlds

Not all of it is only for the future. A good example is the university library in Frankfurt/Main. In 1994 an “info-net” was put into operation which permits direct access to a CD-ROM server. On the server there are a multitude of silver discs which can be connected to from anywhere at any time. 450 reader desks are furnished with PCs which can be used for investigations even in libraries world-wide via a network and the World Wide Web (an information service of the Internet).





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With the increasing extension of ISDN-services, it will soon be possible for the individual to click into the net from anywhere, the home office for example.

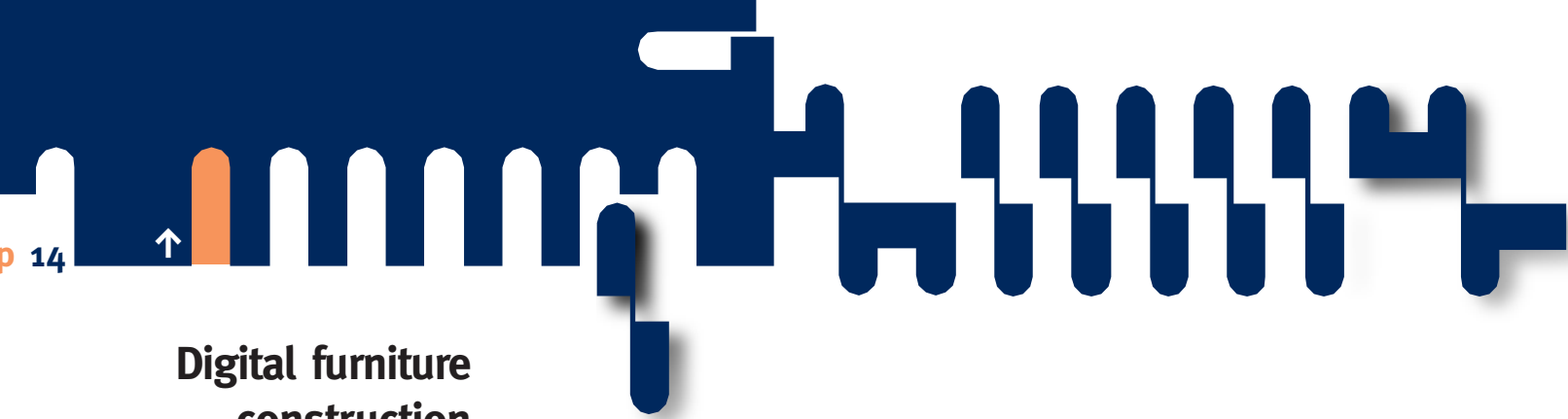
Not only investigation, but also “lending” will be organized differently soon. The library of congress in Washington, for example, is already open 7 days a week 24 hours a day for everybody. Via modem and the Internet it is possible to rummage or search for a specific subject. And when there are no copyrights restrictions, the desired documents can be transferred to anybody’s PC.

Keeping these visions in mind, the present CD-ROM boom is certainly only a “transitional technology“. Authors, publishers and distributors practice with these silver discs for the next generation of publications, which will be part of a global network and available any time and at any place.

## New Alliances

Consequently the “virtual companies“ will undoubtedly form an alliance with “virtual media“. So far only the outlines of the consequences of these new forms of technology become apparent. At the moment production and reception change at a high speed. As far as design is concerned, the much talked about “data super highway“ is not only technological, but foremost containing information. If our ways change through and with the new media, then things simply call for new “forms“. Design, whose business is visualization and communication, needs to face this challenge today.

The potential of new fields of activity is in the non-material, the software or the virtual and no longer in designing small chairs and tables plus their packaging.



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The media artist and theoretician Peter Weibel summed up current tendencies in art: The individual work of art fades, the coherence of the work is in the foreground.

What is most exciting about “digital furniture construction” is the whole context: customer, designer and producer come closer together - virtually of course. Then the networks make sense, whereas the 500 planned TV channels are senseless.

Paul Virilio, one of the promoters of the new media and acceleration theories, predicts: “The meta-design of customs and social behavior in the post industrial era will take over from the design of forms and objects in the industrial age.”

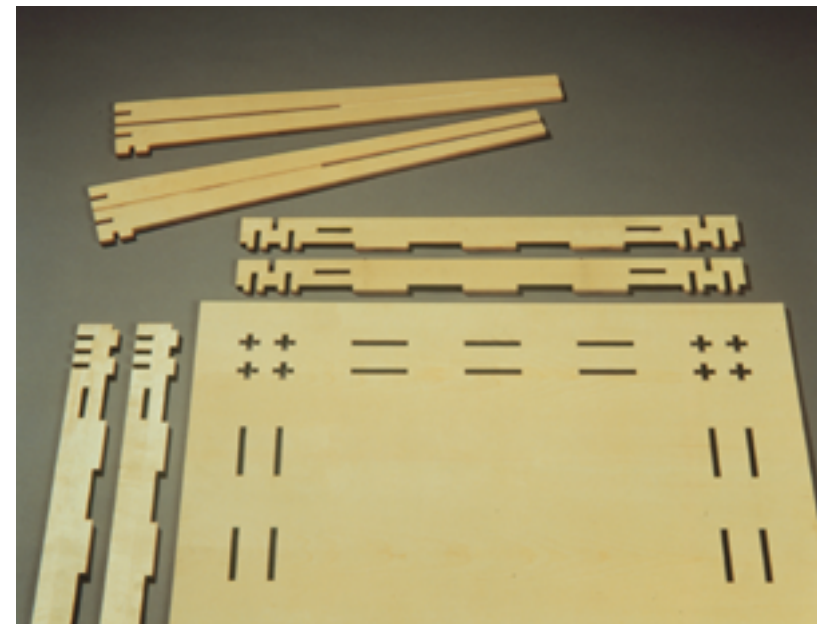
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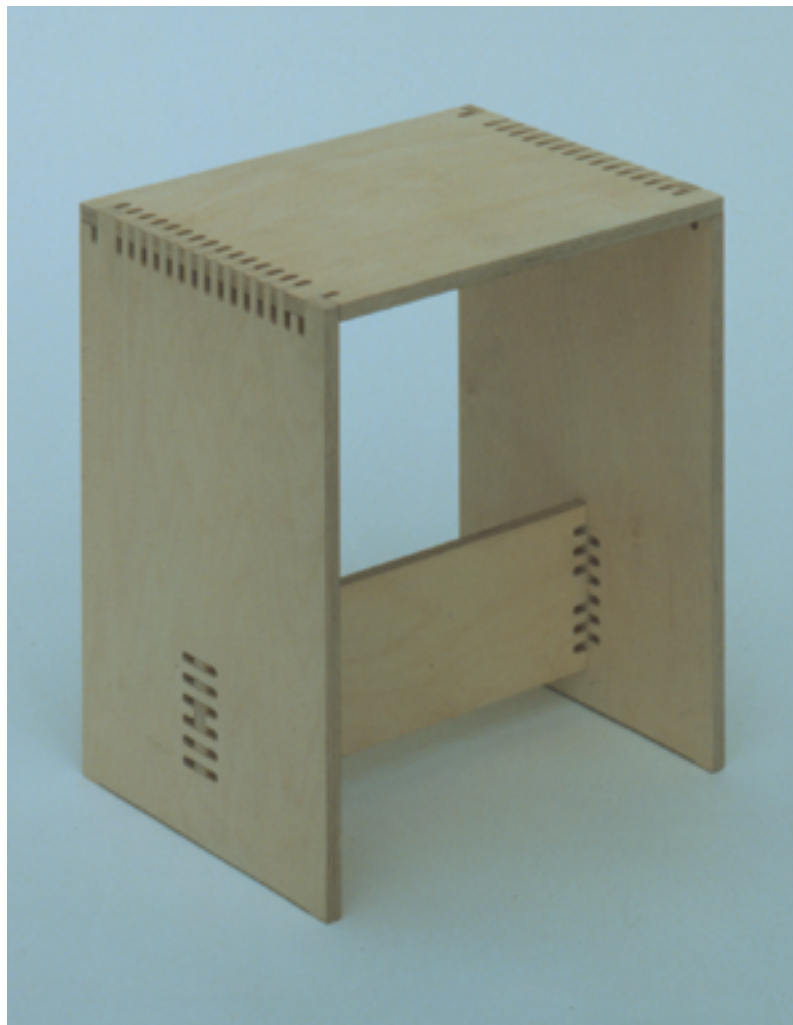
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Angular and round table by  
“Jahn Design“ in Stuttgart.  
Here as well the furniture is  
cut out of flat board, as is  
compatible with production,  
put together and glued.



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Clamping of the mold and press fit are well-known construction principles. New to woodwork is the combination of these two principles . The Ulm Stool - a homage to Max Bill by Jochen Gros - where the tenons press into each other and hold even without glue. Suddenly this design classic appears in a new light.



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What can be made out of a board: The side-table by Dirk Schöfer is being stabilized by a simple tenon and mortise joint. The design of the top shows: ornaments are possible again.

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A gentle click when it engages gives the user the appropriate feedback - it fits and is stable. When designed in this way the instruction becomes superfluous as things are brought back to life again, an effect which could be used very well particularly in furniture construction.

