

# UNFOLDED

PAPER IN DESIGN, ART, ARCHITECTURE AND INDUSTRY



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PAPER IN DESIGN, ART,  
ARCHITECTURE AND INDUSTRY

PETRA SCHMIDT AND NICOLA STATTMANN

BIRKHÄUSER

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# PROJECTS

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Petra Schmidt and Nicola Stattmann

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# PREFACE



# HOW PAPER UNFOLDS

Petra Schmidt and Nicola Stattmann



We have not always had an easy rapport with paper. Closely interwoven with schooltime experiences, the start of our relationship with paper was frequently troubled. There were homework books, report cards, and dictation books. The notebook was nothing more than a bound record of achievement. However, a book that was new and still untouched was something else. We could dare to dream. The first page still blank, virginal, with no words or pictures. The purity of the new material let our imagination take flight and allowed us to forget old errors and bad grades. Who wanted to think about reality looking at a new, untainted sheet of paper? During this brief moment we felt like model students. Unchallenged, ingenious, without fault.

Yet making a fresh start is not always easy. Looking at a blank sheet of paper, even years after school, many people still feel an emptiness and expanse that inhibits them. So-called writer's block is the jam that results from too much freedom. It is the fear of failure, triggered by a plain piece of paper, or perhaps an empty screen, the blank page of the twenty-first century. But what is it that is so challenging about a sheet of paper? It is probably the fear of committing ourselves. On paper our abilities become manifest. Scant facts, garrulousness, or perhaps even talent: here it all becomes visible. For on paper it is not easy to hide inadequacies. Those who write record something, sometimes for eternity, sometimes just for a moment.

The material's unstoppable career as part of media communication began as soon as Johannes Gutenberg invented the printing press with movable letters in 1436. Plain paper, which cost considerably less to produce than the parchment generally used in the fifteenth century, was ideal for mass distribution via the printing press and the publishing houses that sprang up shortly after its invention. Then there was no stopping it. And it was indeed the case that schools played a considerable role in the mass distribution of paper. For the introduction of compulsory education was a further, dramatic turning point in the material's history. It was tantamount to a revolution and led to huge demand for books, newspapers, magazines, dime novels, and comics.

As authors of the book »Unfolded,« we have developed our very own perspective on paper. We are not interested in its

function as a bearer of cultural heritage, or even as a means of mass communication. Rather, we have succumbed to its special appeal and possibilities in terms of three-dimensional design. We see paper as a sculptural material: the title »Unfolded« is also intended to make reference to spatial design with paper. This book addresses spaces, buildings, items of clothing, objects, sculptures, and photographs that explore paper or similar materials. Paper is valuable as a material as it is easy to produce and can be used in manifold ways. We can make it, shape it, fold, cut, and emboss it to create new forms.

Yet hitherto, paper and also cardboard have been considered simple and unsophisticated, ephemeral and fragile: basic materials at best suitable for packaging and hygiene products. Toilet tissue, egg boxes, and cardboard boxes bear witness to this. Paper and especially cardboard are throwaway materials or at best substitutes we are pleased to get rid of when we have finished with them. Thus, for example, in the 1960s paper party dresses with colorful patterns or printed with political or advertising slogans were very popular, and simply landed in the trash can after the big night. Today we still use paper tablecloths, napkins, and plates which we simply throw away after use, to save time cleaning, washing and ironing them.

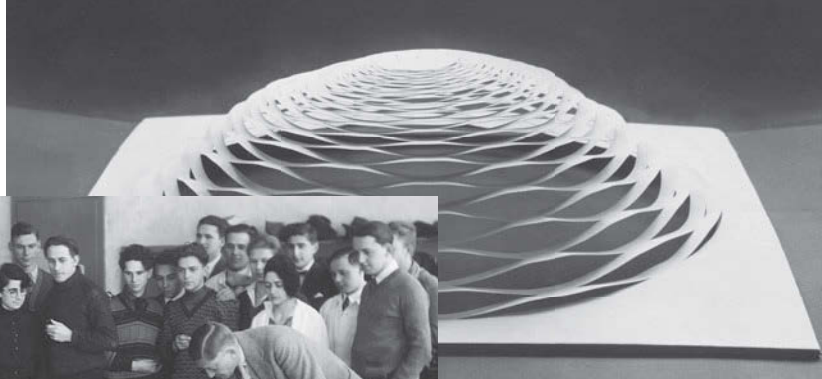
Our book »Unfolded« is designed to show how artists, architects, designers, manufacturers, and material scientists approach this well-known material and what value they place on it. Thus, for instance, the British designer Sam Hecht has given the paper cup a makeover by replacing the usual, white card with transparent paper. A simple idea, yet were this design in production, we would be able to enjoy our drink much more. Moreover, it would not require the use of precious crude oil which is necessary for the production of plastic.

Yet it was only a few years ago that product designers also started recognizing the value of paper. Apart from the sculptor Isamu Noguchi's Akari luminaires and a few items of paper furniture, for example by Peter Raacke and Frank Gehry, as well as Ferdinand Kramer's paper umbrella, most designers use paper as a material for making models. For paper is not just easy to work with, it also offers the stability required for a model and, unlike on virtual computer models,

marks remain visible. It is these properties that still justify paper's special significance in model making today. Structures can be enlarged or reduced with little effort. We can remove parts or add new ones. There is hardly a great architect around who has not glued together cardboard models. Even Josef Albers had his students build them on the preliminary course at the Bauhaus, attaching the utmost importance to »economy of means.« Even when they were just using cardboard or newspaper, nothing was to be wasted.

Frank Gehry designed much more freely with the simple and strong material. He not only used cardboard for his architectural models, but also for furniture. His designs in the cardboard furniture series »Easy Edges« (1969–1972) attest to a wasteful approach to the material. »The nice thing about it is that you can simply tear off a bit and throw it away if you don't like it,« he explained laconically, in reference to his famous furniture classics. And thus, for example, for his »Wiggle Side Chair« he transformed large quantities of corrugated cardboard into a curving, meandering seat sculpture. Even though Gehry enjoyed early success with his cardboard furniture, which was put on show at the time at Bloomingdale's, he finally ceased work on the project. He did not want to become known as a furniture designer, but as an architect, probably distrusting the material as much as he did the profession of designer. He probably wanted to construct something »permanent,« or become known with »lasting« materials, even if it was only corrugated sheet metal, which features so often in his buildings.

Yet paper as substitute also has its appeal. The Danish artist Tommy Støckel deliberately plays with the meaning of paper as a surrogate, taking great pleasure in orchestrating it. He creates entire worlds of paper, foam, and decorative elements that look as unreal as a stage design. Støckel values art as a reproductive technique, after all this dogma dominated the history of art for 2,000 years. It was not until Modernism that artists liberated themselves from mimesis and started constructing their own, »nonfigurative« worlds. Støckel is still fascinated by the reconstruction of nature and architecture. In his fantastic installations he combines the art of trompe l'œil painting with the perfect illusory worlds of modern computer games to form a scenario of kitsch and decoration, in which nothing is allowed to appear real, let alone serious.



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JOSEF ALBERS TEACHING THE VORKURS 1926

Bauhaus Dessau

/1 Exercise by Walter Tralau, Construction and Stability  
 Courtesy Josef and Anni Albers Foundation  
 © VG Bildkunst, Bonn

/2 Meeting with students  
 Courtesy Kicken Gallery, Berlin

/3 THE ARMCHAIR OTTO BY PETER RAACKE 1968

Industrially manufactured cardboard seat  
 50x74x65 cm

AKARI BY ISAMU NOGUCHI 1960

/4 Three Akari  
 © vitra


/5 Isamu Noguchi in his Long Island studio  
 Courtesy The Noguchi Foundation, New York

The artist Thomas Demand's approach is even more consistent. His paper worlds are so similar to reality that you cannot tell the two apart, only we cannot enter them, as he creates them solely to photograph in his studio. He does not reconstruct the history of art, but rather the suggestive images and stories of the media, in order to expose them as constructions of reality. Thus his work »Klause« refers to a sensational case of suspected child abuse, which allegedly took place in the Tosa-Klause bar in Saarbrücken. At the time the suspected perpetrators made dramatic and abhorrent confessions about gravely maltreating and killing a child. However, the body was never found. In the end the accused retracted their statements and walked free. A real scoop for the media. For lack of other pictures, newspapers and magazines showed the building and premises of the gloomy restaurant in their incessant reports. As the premises were converted and re-let just four months after the alleged crime, the police reconstructed the restaurant. Demand went a step further and built his version of the premises using paper. Demand's »Klause« cycle is an ambiguous confusion of reconstructions and speculation that sparks trepidation. Behind the facade of flawless and »untainted« colored paper and under the colorful streamers, a crime has likely been committed.

For a few years now, designers in particular have been working on rehabilitating paper. They want to turn the substitute material into a construction material. Paper, cheap and unworthy as it is, is suddenly the focus of attention. Where for years it was considered to have no intrinsic value as a material, designers are now playing with connotations of the ephemeral, the frail and vulnerable surface, and are lending it the necessary strength with skilled construction methods, as did the team of architects Ball and Nogues, for example, whose powerful paper waves can be entered and explored. They have even worked on advancing the centuries-old technique of origami. The American Robert J. Lang has lent this Asian tradition such precision, with the help of his own specially developed computer program »Treemaker,« that he can even fold delicate insects including their feelers and feet from just one sheet of paper without using scissors or glue. He applies his knowledge in diverse ways and also produces folding patterns for car airbags. It is this blend of experimentation and suitability for daily use that is fascinating about

paper, especially when it comes to recycling, as illustrated in the »Cabbage Chair« by the Japanese designer Nendo. He constructed this chair, shaped like a cascade and made of old, pleated paper, at the fashion designer Issey Miyake's suggestion. The latter no longer wanted to see the huge amounts of resin-impregnated paper he used in the production of the pleated material go to waste.

Paper is a material we will see more from in the years to come, especially in terms of improving the quality of the material itself. The last chapter of the book presents spectacular new as well as traditional materials such as washi in a compendium. It includes particularly hard-wearing materials which were either developed from paper or are synthetic materials that display paper-like properties. This is where we find the material's strengths. Tear-proof, fire-retardant, and water-repellent versions will hopefully open up a new world of possibilities to paper in the near future. Our book is just a start.



# PROJECTS

# NORIKO AMBE

## /1 A Thousand of Self 2007

Cuts in the book »1000 on 42nd Street«  
by Neil Selkirk  
23.2×37.5×1.6cm  
Courtesy Pierogi Gallery

## /2 A Piece of Flat Globe Vol. 4 2008

Cuts in synthetic paper (Yupo)  
15.2×22×15.5cm

Noriko Ambe laboriously uses a handheld knife to cut through several layers of paper and create precise landscapes. She frequently works with everyday objects such as books, atlases, and encyclopedias, or forms her works out of innumerable sheets of paper.

Ambe's works are paradoxical, appearing to be both filigree and harsh. Even the cutting process has something violent about it. In »A Thousand of Self,« for example, she indented a book of portraits with such force that they take on a frightening and fascinating depth.

The sculpture »A Piece of Flat Globe« consists of hundreds of white sheets precisely cut by Ambe and layered on top of each other. This way she creates fissured ravines reminiscent of grottos and lunar landscapes. She works with the translucent yupo, which is not actually paper but a chemical fiber with a paper-like feel to it.





# ATELIER OÏ

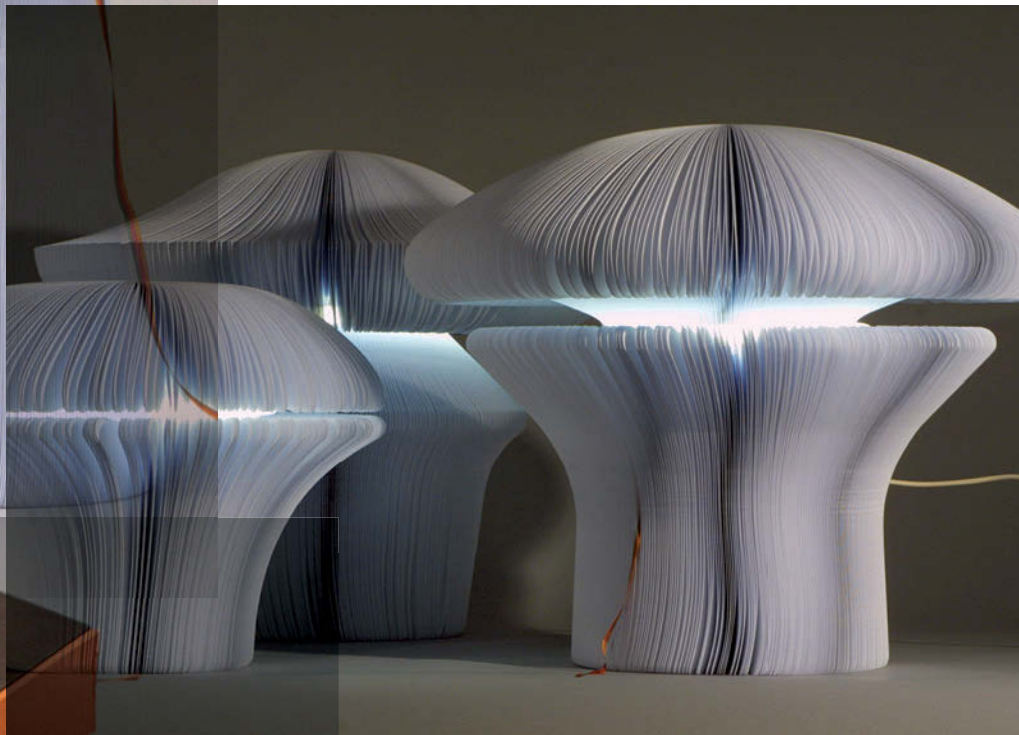
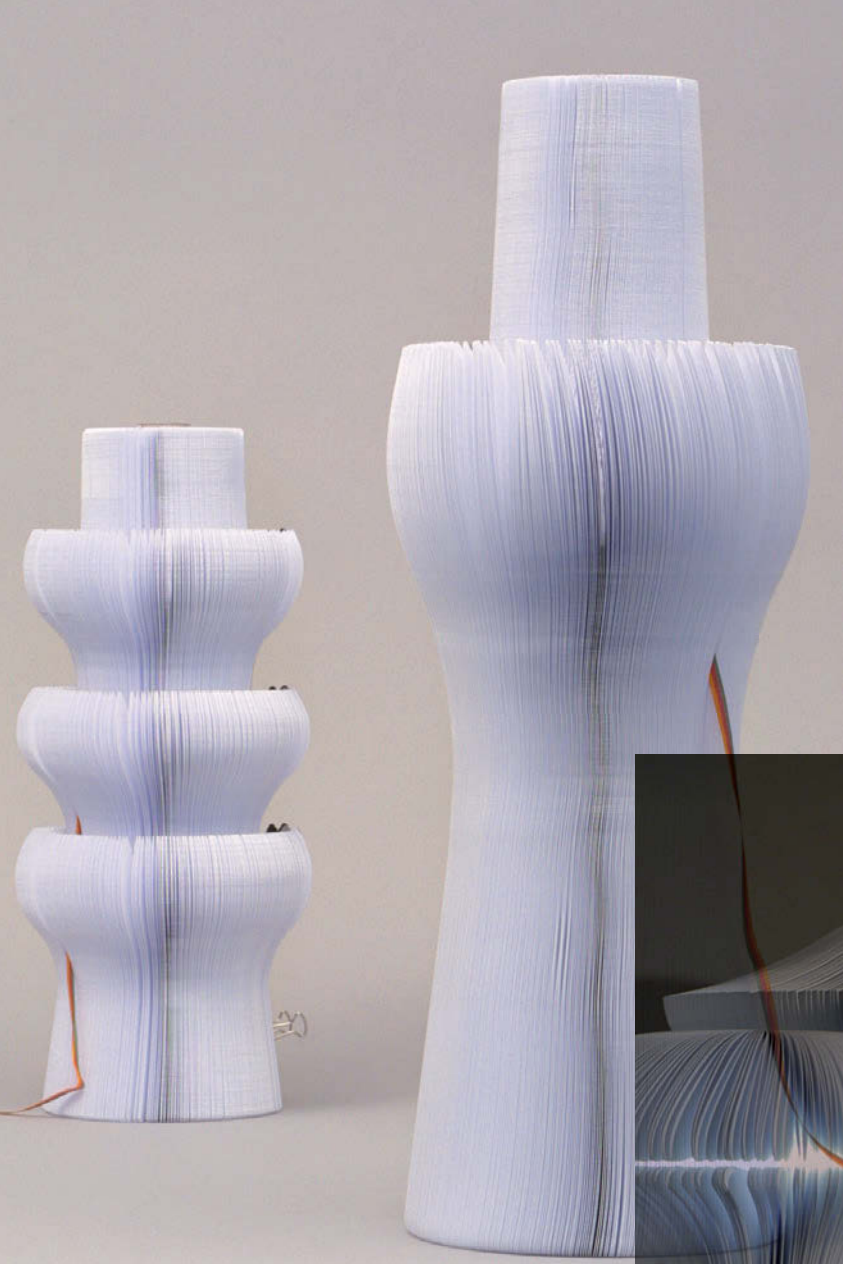
## Tome 2005

Lamp made of paper, cardboard, and canvas



At first glance, »Tome« seems like a normal book with an unusually curved edge. As soon as you open it and fan out the pages, however, the metamorphosis into a luminaire begins. The six hundred pages are reminiscent of a mushroom's gills and reflect the light emerging from within the book. »Tome« is a straightforward design. The luminaire is bound like a book and cut to shape while closed. The project came about after the three designers Armand Louis, Patrick Reymond and Aurel Aebi from Atelier Oï had completed a publication on their work. At the time they wanted to continue working with paper and books in a playful way. They presented the finished paper luminaire for the first time in April 2005 at the Milan Furniture Fair.





# ATOPOS

## /1 Teepee Paper Dress

New York, 1967–1968

## /2 Checker Paper Dress

California, 1966–1968

## /3 »The three circles« Paper Dress

North Carolina, 1966–1968

## /4 Robert Kennedy Electoral Campaign Dress

New York, 1968

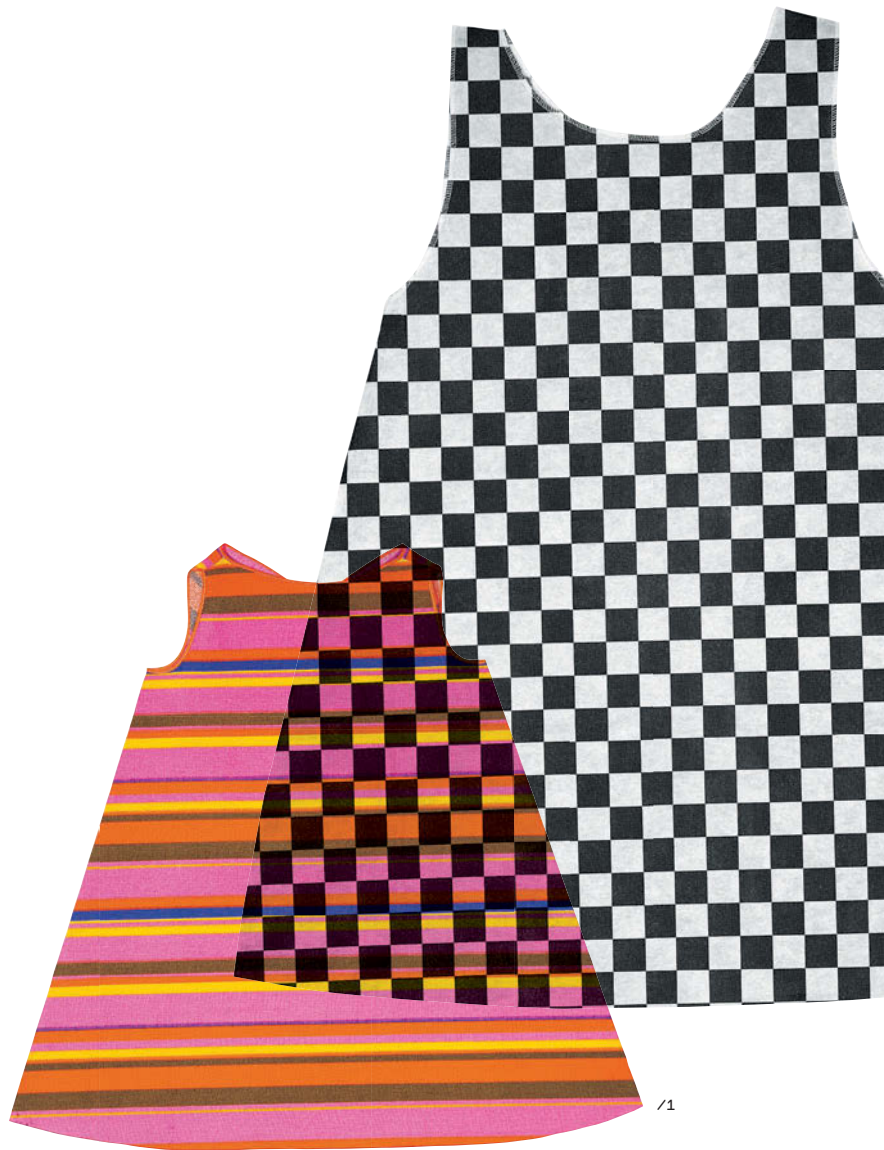
## /5 Paper Dress

North Carolina, 1966

## /6 The Paper Keyhole-Neck Dress

North Carolina, 1966

Courtesy ATOPOS Collection, Athens



The Greek cultural organization's interest in paper fashion began with the discovery of 1960s' American paper clothing. In 1966, the Scott Paper Company launched throwaway paper clothing as promotional items on the American market. The cellulose, cotton, and synthetic fiber-based clothes hit the spot in a society that favored disposability. A market for mass-produced disposable clothes quickly grew. They were decorated with Pop Art and Op Art motifs, boasted psychedelic patterns, and were used as advertising for companies and even presidential candidates. However, two years later with the rise of ecological consciousness, the trend disappeared just as quickly as it had emerged. Fascinated by the aesthetics of this fragile clothing, Atopos has gathered more than four hundred examples, including hats and accessories, which are used as the basis for the »RRRIPP!! Paper Fashion« exhibition, a comprehensive collection of paper clothes from various cultures and eras. The exhibits range from sixteenth-century Japanese clothing to contemporary models by renowned designers such as Issey Miyake, John Galliano, and Raf Simons.



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# SANDRA BACKLUND

## /1 Ink Blot Test 2007

Gray and black top out of foldings  
Ink Blot Test Collection

## /2 Blank Page 2005

Ivory white minidress  
Blank Page Collection

For Sandra Backlund craft is fundamental to her designs, in which she uses a wide range of materials and techniques. She knits, folds, attaches, and glues. Here, she loves the challenge of mastering new techniques, step by step, in order to experiment with them. In her work, Sandra Backlund is not concerned with functional, comfortable clothing; rather she is fascinated with distorting the human body. »I build my garments by hand from a couple of basic bricks which I attach to each other in different ways to discover the shape that I want. In that sense I approach fashion more like a sculptor than a tailor.«

The dress in the »Blank Page« collection, for example, also came about using origami. The particular rigidity of the paper gives it an extremely striking silhouette.

Her work »Ink Blot Test« was inspired by the Rorschach test, which is used to draw conclusions about personality characteristics from a person's interpretation of ink blots. The grayish black top is made entirely of paper and consists of interleaved folded elements. The butterfly-like silhouette is indeed reminiscent of the test's familiar folded paper.



# BALL-NOGUES STUDIO

## Rip Curl Canyon 2006

Installation at the Rice Gallery, Houston  
Laminated cardboard, plywood armature

The »Rip Curl Canyon« is a mythical place in the American West where land and water collide. The synonymous cardboard installation Benjamin Ball and Gaston Nogues designed for the Rice Gallery in Houston is just as spectacular. From the highest point the waves sloped down steeply before breaking apart into curling waves. Visitors were even able to climb up the installation, each footstep leaving its imprint in the raw surface. Ball-Nogues' version of the »Rip Curl Canyon« was the result of laborious planning and calculations. They tested the corrugated cardboard's characteristics beforehand on models. With the help of a digital study they further developed the individual results to construct the complex, resilient model. To achieve a higher load-bearing capacity the cardboard parts were laminated in a wooden framework, with the lower sections serving as supporting pillars. After the exhibition in 2006 the installation was destroyed and the paper recycled. It comprised some 20,000 individual components.









# SHIGERU BAN

→ see materials/technologies #69

## /1 Paper Log House 2001

Temporary dwellings for earthquake victims in Bhuj, India

Paper tubes, bamboo, cane mats, tarpaulin

## /2 Theatre Dome 2003

Cardboard structure in Utrecht, the Netherlands

o 25m, h 10m

In collaboration with Mick Eekhout and Octatube BV

## /3 Japan Pavilion 2000

Expo 2000 in Hanover, Germany

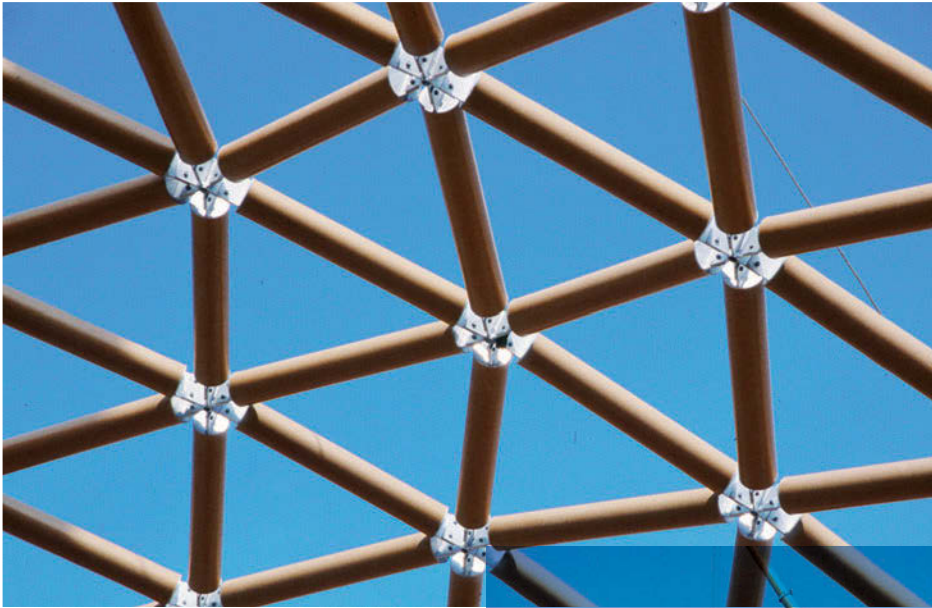
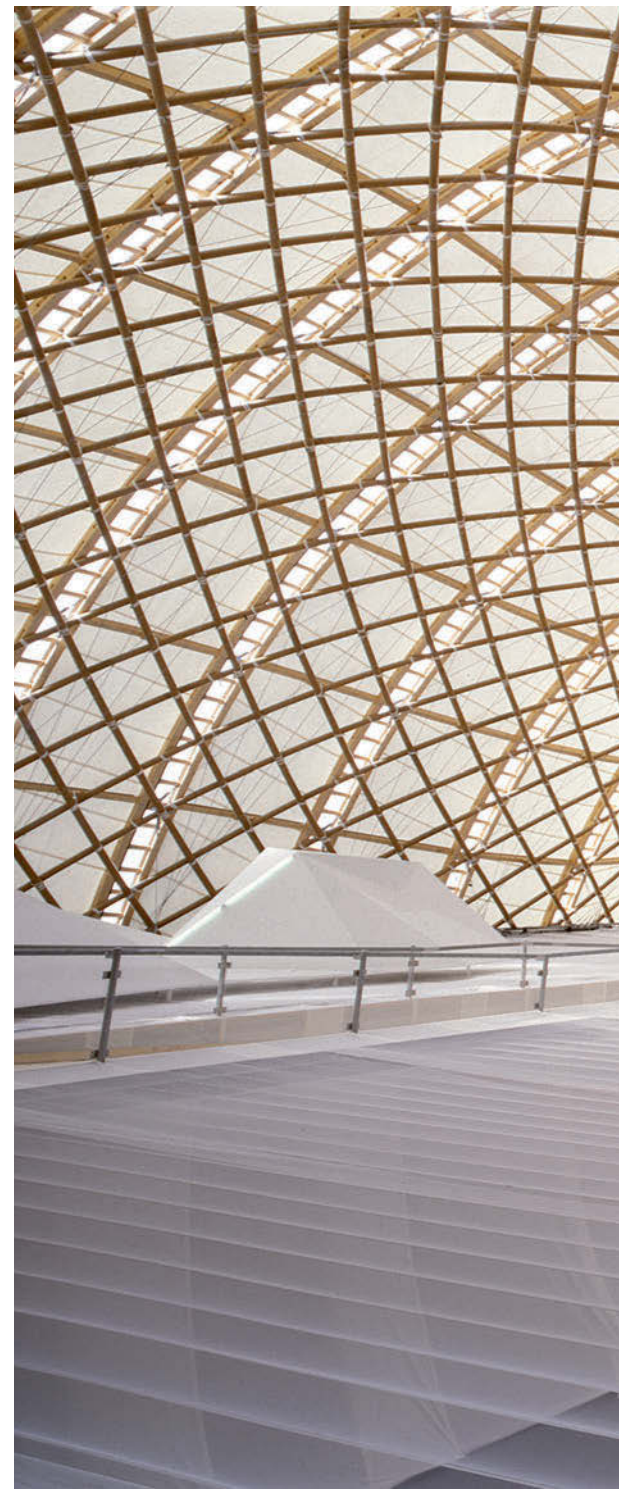
In collaboration with Frei Otto and Buro Happold

Shigeru Ban is well known in architecture for his innovative work with paper and cardboard. He values the low-cost ecological material because it can be recycled. The architect rose to fame for his temporary Log Houses, designed to house earthquake victims in Kobe, Japan, in Kaynasli, Turkey, and in Bhuj, India. These buildings are reminiscent of traditional Japanese bamboo structures, but were made of cardboard tubes with 4 millimeter thick walls. Waterproof strips between the tubes provide the requisite insulation. The material for a 52 m<sup>2</sup> living area costs no more than 2,000 US dollars. In collaboration with Frei Otto and the engineering company Buro Happold, Shigeru Ban created the Japanese pavilion for Expo 2000 in Hanover. The pavilion's concept was based on a temporary structure intended to produce as little waste as possible. The 72 meter long mesh structure of cardboard tubes was sheathed with a waterproof membrane. The cardboard tubes were connected using metal adhesive tape, while supporting wooden pillars added further stability. The pavilion is considered to be one of the great milestones in paper architecture.



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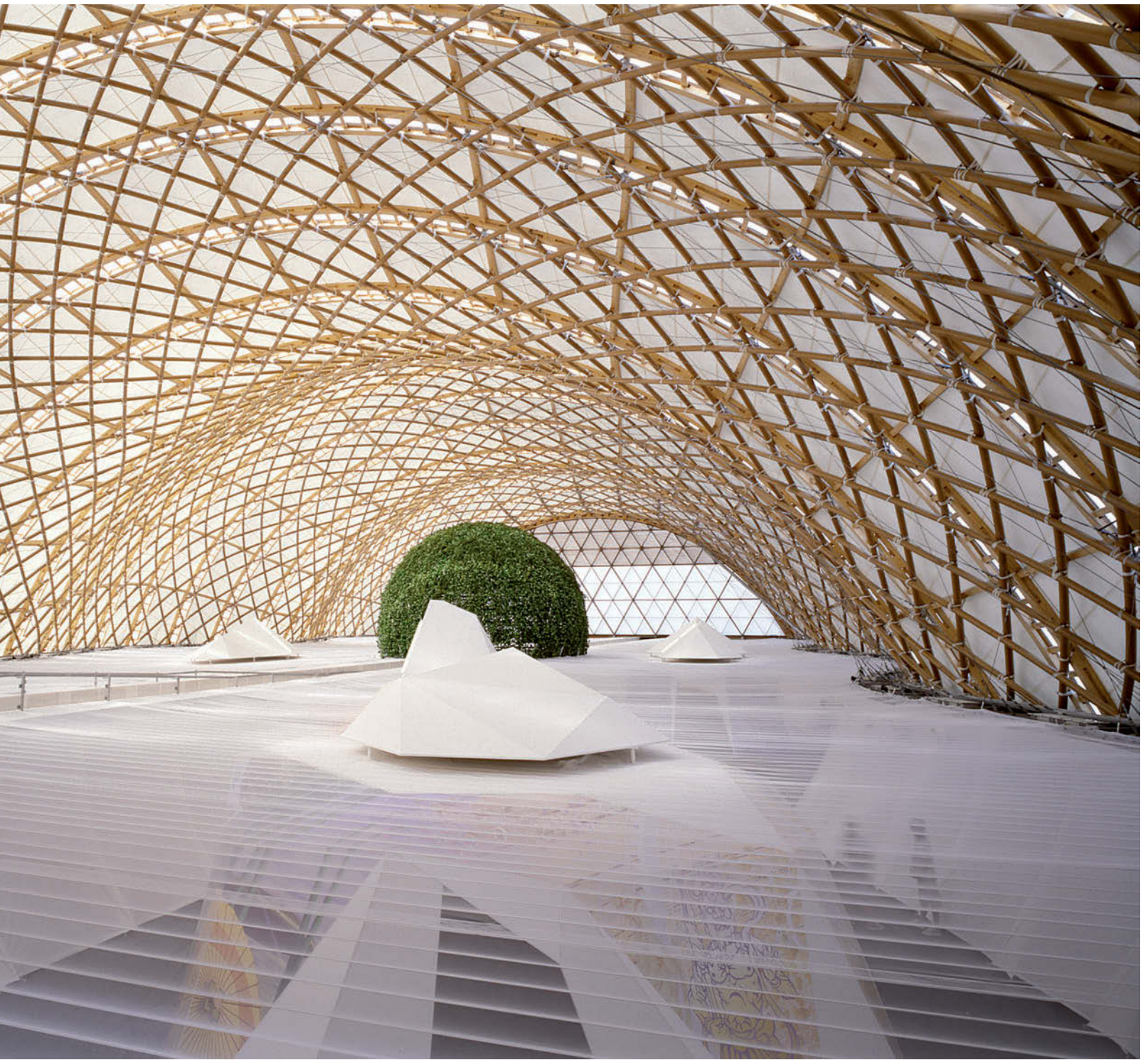




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# SHIGERU BAN

&

# ARTEK

→ [see materials/technologies #67](#)

## The Space of Silence 2007

Artek Pavilion at the  
Triennale Park, Milan  
Milan Furniture Fair, 2007  
In collaboration with the  
Finnish companies UPM and Artek

At the 2007 Milan Furniture Fair, Finnish furniture manufacturer Artek presented an unusual, sensational exhibition pavilion entitled »The Space of Silence.« The simple light-gray building is a pioneering ecological structure, which the Japanese architect Shigeru Ban made principally from waste material of the paper industry. The raw material for the load-bearing structure and planking was extruded profiles made for the most part from the waste paper produced by the Finnish company UPM in the manufacture of self-adhesive labels. The composite material proved to be so resilient and moisture resistant that it is also used for the flooring ProFI Deck by UPM.

After Milan, the pavilion was installed next to the Design Museum in Helsinki and in 2007 was again exhibited at the American Design Miami fair. A mere six months later the building changed hands. Entitled »Important 20th Century Design« it was auctioned at Sotheby's in New York for over 600,000 US dollars. It would seem that the new owners, the New York gallery Sebastian + Barquet, are expecting the building to become a design classic and rise even further in value.



# MICHAEL BEUTLER

## Portikus Castle 2007

Flower-wrapping paper, flooring grid, wires  
800x1,100x600 cm

Portikus, Frankfurt am Main  
Installation view

Michael Beutler is regarded as a restless nomad who has succeeded in setting new standards in the field of location-specific art. The architectural characteristics of the exhibition rooms are so vital for his installations and sculptures that these are created in their entirety on site. His installations are, however, very prosaic, as he uses only material attainable in hardware stores, such as foils, cardboard, or adhesive strip.

For his installation »Portikus Castle« in the Portikus art institution in Frankfurt, Beutler made use of the full height of the room, the volume of which is reminiscent of a high and narrow granary. With metal grids usually used for floor substructures, he made scaffolding that he then covered with colorful waterproof paper generally used for wrapping flowers. The light shining in through the roof gave the impression of being surrounded by light, airy church windows. This »Cathedral of Colored Paper« was, however, the result of an unspectacular »handicraft process,« as Beutler explains: »The most important step was that at some point I began treating the mats with my feet. This makes the finish generally more homogeneous, because if something tears during construction, which is very likely to happen with this material, it doesn't matter. Most important though, is that light shines in through the small perforations.«









# MARLOES TEN BHÖMER

→ see materials/technologies #45

## /1 Tyvekboots 2002

Boots

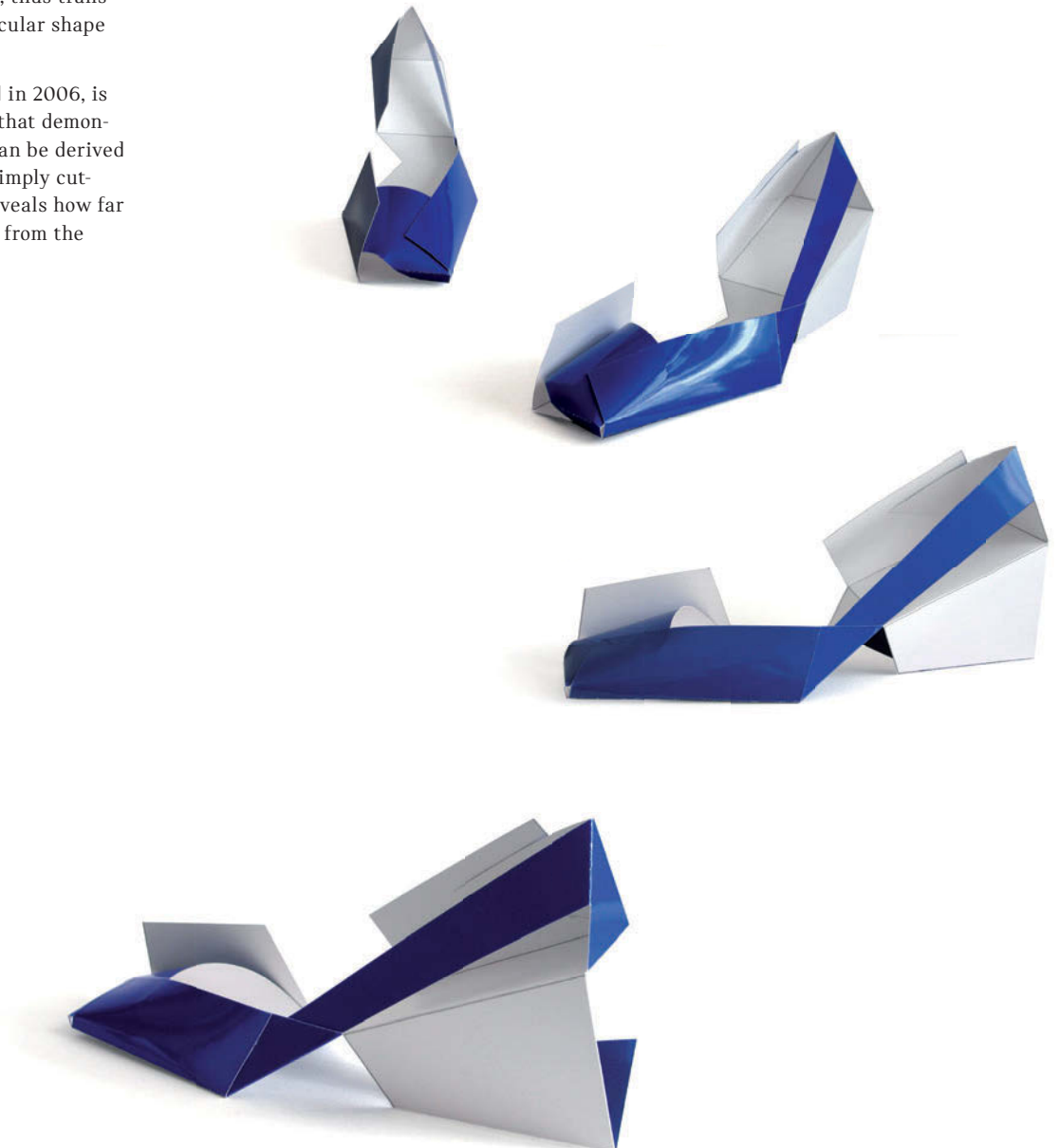
Tyvek, leather and stainless steel

## /2 Paperfoldedshoe 2006

Shoe template made out of one sheet of paper  
Study

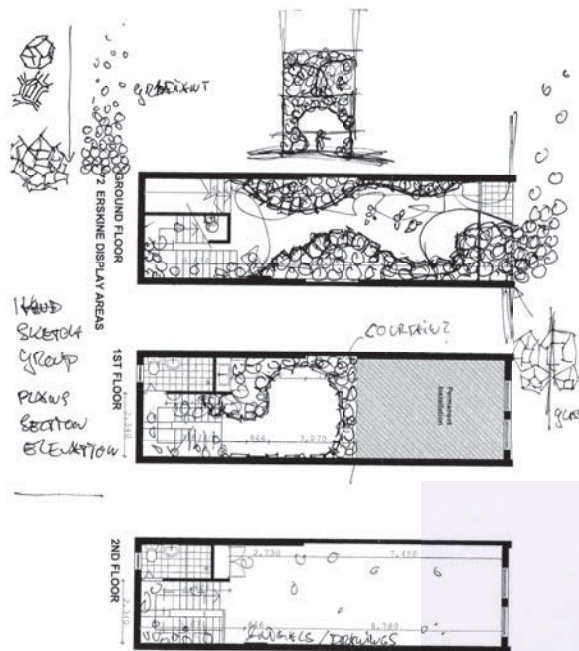
Adapting forms, materials and manufacturing techniques from other fields of design, Marloes ten Bhömer ignores the conventions of traditional shoemaking, thus challenging the familiar image of shoes and fashion accessories. She loves working with unconventional materials. In 2002, she designed a slip-on boot made of Tyvek, a paper-like material. By changing the cut of the boot she made its shaft curve to the front, thus transferring the conventional semicircular shape of the calf to the shin.

The »Paperfoldedshoe«, designed in 2006, is also made of paper. It is a study that demonstrates how shoe-like footwear can be derived from a single sheet of paper by simply cutting and folding it. This study reveals how far ten Bhömer has liberated herself from the conventions of shoemaking.



## Digital Origami 2007

Installation at  
72 Erskine—Events & Exhibition, Sydney  
In collaboration with the master class students  
of the University of Technology, Sydney



For a number of years now Chris Bosse has been addressing organic structures he generates on the computer. In doing so he studies shapes he finds in nature such as spumes and rhizomes, which he then transforms into building structures or facades as he did, for instance, for the Olympic swimming stadium for the Beijing 2008 Olympic Games.

For the work illustrated entitled »Digital Origami,« he had his students at the University of Technology design a small model capable of serving as the load-bearing structure for a complex construction—similar to the microorganisms of a coral reef. In the process the students were expected to make use of digital design techniques and their new possibilities of implementation to conceptualize and build a spatial installation. The final structure comprised 3,500 modules in two different versions, which were laser-cut from cardboard and stacked to create a fantastic set of a grotto. In addition, integrated LEDs enlivened the cardboard elements further.





# ZOE BRADLEY

## /1 The Hanging Gardens of Pulp 2007

Created for the French fashion label  
Marithé + François Girbaud  
Installation at the Soho store, New York

## /2 Pleated Paper Showpiece 2005

Created for Michiko Koshino Advertising Campaign  
Fall-Winter 2005/2006 Collection

Artful worlds of fashion and dramatic silhouettes are Zoe Bradley's trademark. She creates theatrical designs for advertising campaigns, magazines, catwalks, and shop windows. Her oversized jewelry, dresses, and installations can be categorized somewhere between fashion, sculpture and scenic design. They are the result of elaborate handcraft in which she combines traditional tailoring techniques with luxurious paper.

Zoe Bradley's output embraces quite distinct works such as, for example, the striking presentation pieces for Michiko Koshino in 2005, as well as more tranquil installations such as »The Hanging Gardens of Pulp.« For this exhibition Marithé + François Girbaud invited the designer to create a site-specific installation. She created a large-format paper flora and fauna.



/2

# BRUKETA

# &

# ŽINIĆ

## Well Done 2007

Annual report for the food company Podravka  
Book and brochure printed in thermo-reactive ink

If you want to read the 2007 Annual Report of the Podravka food company you have to heat it in the oven first. At least some parts of it. »Well Done« comes in two portions, the actual Annual Report and a small accompanying brochure which conveys the heart of the Podravka brand: homemade recipes. However, being able to cook like Podravka requires a very precise approach, as does understanding their recipes. To this end Bruketa & Žinić printed the brochure in invisible, thermo-reactive ink. For Podravka to reveal its secrets you first need to wrap the brochure in tin foil and bake it for 25 minutes at a temperature of exactly 100° Celsius. With the booklet successfully prepared, the previously empty pages now reveal the recipes and the illustrated plates fill up with food. If you don't follow the instructions carefully, though, the pages can burn, just like a meal.





# DANIELE BUETTI

## Like Tears from a Star 2008

Installation »Maybe You Can Be One of Us«  
Art Museum Mülheim an der Ruhr

Detail

Courtesy Bernhard Knaus Fine Art,  
Frankfurt am Main, © VG Bild-Kunst

Without moralizing or trivializing it, Daniele Buetti analyzes our longing for beauty, standardization, and orientation, which advertising in particular uses so intelligently for its own ends. Buetti lures us with the perfection of fashion and advertising photography while at the same time revealing the abysses of aggressive media machinery and unleashed consumerism by attacking perfect high gloss portraits in fashion magazines with sharp objects such as pencils and needles. In the late 1990s the Swiss artist made a name for himself through advertising portraits, on the back of which he used a ballpoint pen to engrave brand names, which ultimately looked like branding or tattoos and disfigured the models' faces.

With the exhibition »Maybe You Can Be One of Us« he once again addresses the world of advertising. In silent protest, the show assembles demonstration signs pasted over with melancholy models. Countless needle-pricks on the models' faces cause the advertising icons to appear to be weeping »tears of light.« With this artistic reflection on the image, Buetti brings advertising photography closer to the portrayal of saints and religious worship.



# PETER CALLESEN

## /1 Nobody but Flowers 2006

Acid-free paper and glue on stand  
ca. 101.5×34×25 cm

## /2 17.9 cm tall Tower of Babel 2006

Acid-free paper and glue on stand  
ca. 101.5×34×25 cm

## /3 Traces in the Snow 2006

Acid-free paper and glue on stand  
ca. 101.5×34×25 cm

## /4 Burnable Snowman 2006

Acid-free paper and glue on stand  
ca. 101.5×34×25 cm

## /5 In the Shadow of an Orchid II 2006

Acid-free paper and glue on stand  
ca. 101.5×34×25 cm

## /6 White Diary 2008

115 gram acid-free paper, pencil and sketchbook  
244×212×17 cm

Courtesy Helene Nyborg Contemporary



/1



/2



/4



/5

Peter Callesen's finely elaborated paper works reveal tragic, romantic fairy-tale worlds with surprising narrative elements. Callesen transforms two-dimensional paper surfaces into laboriously crafted 3D sculptures. The perishable material and fragile composition stand for the fleeting moment and the vulnerability of the protagonist.

The works featured here (image 1–5) represent 3D still-lives made out of ordinary A4 paper. The frozen snapshots tell short stories from a romantic world portraying fragility, melancholy and the grotesque.

»White Diary« shows a human head formed out of hundreds of paper objects with a book in the center from which an imaginary landscape emerges.



# HUSSEIN CHALAYAN

→ [see materials/technologies #45](#)

## Airmail Dress 1999

Tyvek dress

Hussein Chalayan is regarded as an inventor, philosopher, and architect among fashion designers. He approaches his collections like a conceptual artist, frequently interpreting in his designs socially relevant themes such as cultural identity, tradition and migration. For his widely discussed 1998 design »Between,« he cloaked six female models in Muslim scarves of various lengths. The longest scarf covered the whole body, whereas the smallest one left the whole body, apart from the face, entirely naked. A scandal!

Just like his fashion, his presentations on the catwalk break any given mold and are as full of innuendo and intellectually challenging as theater productions. Alongside his strong concepts, the use of innovative materials and technologies dominates his designs. The 1999 »Airmail Dress« was made of the synthetic paper Tyvek, which is more commonly used for envelopes and protective clothing. What initially looks like an airmail envelope can be unfolded to become a washable, tear-resistant dress with striking red and blue stripes. The paper-like and light dress made of this resilient material could be seen as a postal message from a different, far more innovative world of fashion.





# COTTRELL & VERMEULEN

## The Cardboard Building 2001

Westborough Primary School  
Westcliff-on-Sea, Great Britain



Sustainable methods of construction are the focal point of the work by Cottrell & Vermeulen Architecture. On the basis of intense investigation and material research, they develop flexible and adaptable solutions for ecological construction. For the »Cardboard Building« at Westborough Primary School in Westcliff-on-Sea (Essex), the first of its kind in Europe, the studio developed cardboard structures with load-bearing qualities based on classical origami folding techniques. Ninety percent of this unusual school building is made of reusable or recycled material, the use of which is based on a detailed study of the material. A substantial part of the material used is cardboard. The walls and roof are made of a composite of cardboard and wood, which not only have a load-bearing function, but also boast outstanding insulation qualities. Alongside these, cardboard tubes serve as pillars and palisades. The »Cardboard Building« has a life expectancy of twenty years. Given the low construction costs and its sustainable concept it was awarded not one but two prizes by the Royal Institute of British Architects.

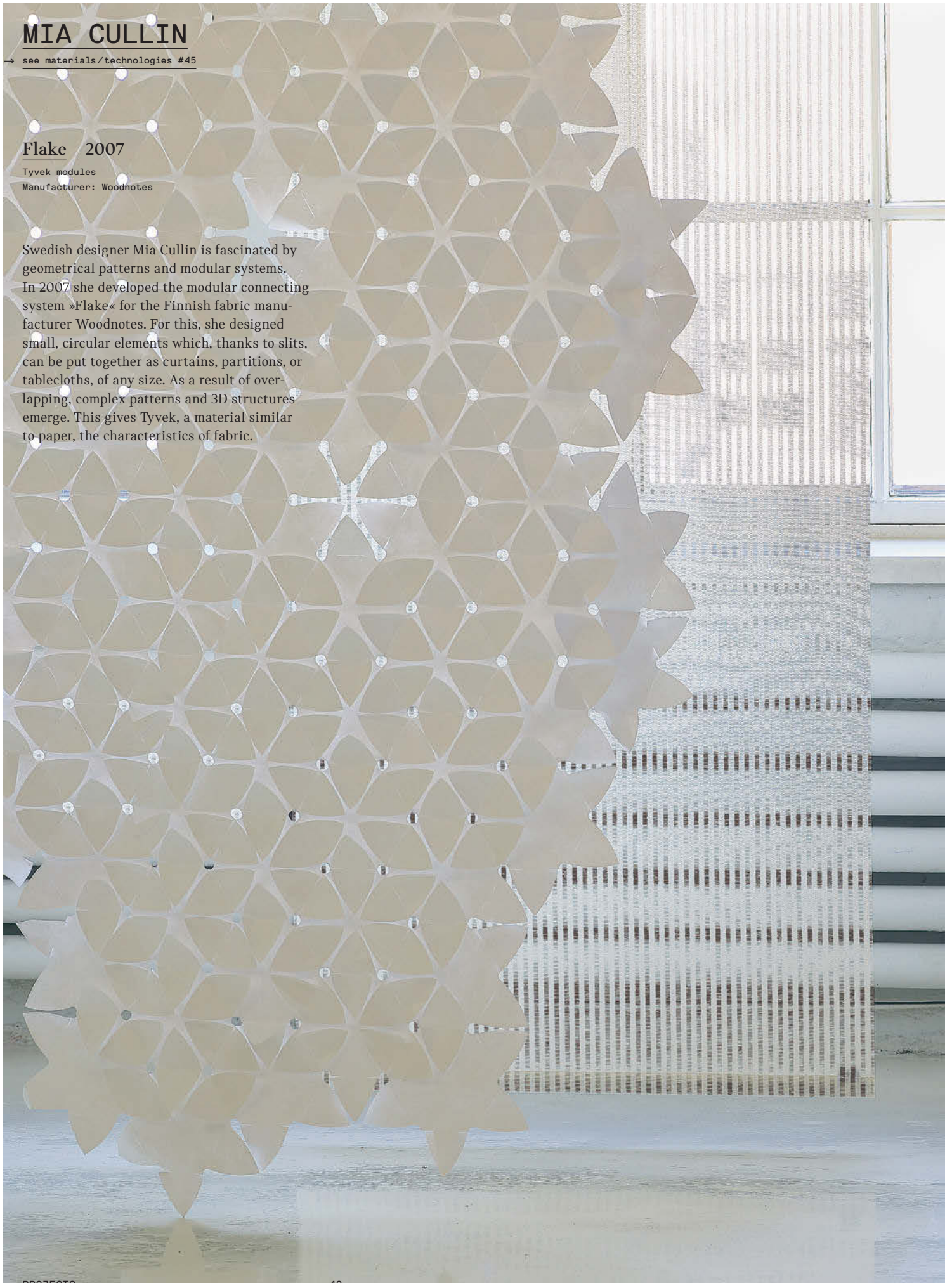
# MIA CULLIN

→ see materials/technologies #45

## Flake 2007

Tyvek modules  
Manufacturer: Woodnotes

Swedish designer Mia Cullin is fascinated by geometrical patterns and modular systems. In 2007 she developed the modular connecting system »Flake« for the Finnish fabric manufacturer Woodnotes. For this, she designed small, circular elements which, thanks to slits, can be put together as curtains, partitions, or tablecloths, of any size. As a result of overlapping, complex patterns and 3D structures emerge. This gives Tyvek, a material similar to paper, the characteristics of fabric.





# DARCH STUDIO

## Papercut 2007

Cardboard covering  
Shop interior for Yiorgos Eleftheriades in Athens

For fashion designer Yiorgos Eleftheriades' boutique in Athens, Elina Drossou designed an interior made entirely of cardboard. By using this particular material, which epitomizes mobility and change, she wanted to reference the different uses of the premises. Eleftheriades' boutique is not only used as working space and salesroom, it is also a venue for exhibitions, small fashion shows, and parties. To guarantee customers as much freedom of movement as possible, she fixed the furniture to the walls. Cardboard strips layered on top of each other cover the walls and form curves that can be used for seating.





# CHARLIE DAVIDSON

## /1 Ruff 2008

Window installation at Selfridges, London  
Paper carton (TetraPak) dyed green on one side, turning construction  
Detail

## /2 Iris & Ruff 2008

Window installation at Selfridges, London  
Iris: card, wire, turning construction  
Ruff: Paper carton dyed green on one side, turning construction

## /3 Black Light 2007

Paper, stainless steel and lighting gels  
ø 85cm



/3

»Black-Light« hovers like a dark cloud beneath the ceiling while individual beams of light set dramatic accents. The atmospheric luminaire, which stands out for its improvisation and variability, was created in a remarkably simple fashion. Charlie Davidson crumpled matt black paper and foil used for lighting into sensational formations.

In an installation he created for a shop window in Selfridges in London, the two luminaires called »Iris« and »Ruff« fan out above the heads of window dummies, causing swirling light effects. »Ruff« is reminiscent of the item of clothing fashionable in the sixteenth century. Davidson attached pieces of TetraPak paper to the circular structure after coloring the paper's uncoated side green. The plastic coated side of the TetraPak paper reflects the light so that when the luminaire begins to swirl, a wild play of light is emitted. »Iris« on the other hand is more a technical experiment than it is a luminaire. It is made out of black cards on a colorful background and circular projection screens arranged around a white source of light. The reflections the light projects onto the screens create thousands of color tones.



# THOMAS DEMAND

## /1 Klausur I 2006

C-Print/Diasec  
275x170 cm

## /2 Klausur III 2006

C-Print/Diasec  
199x258 cm

## /3 Klausur V 2006

C-Print/Diasec  
197x137 cm

## /4 Grotte 2006

C-Print/Diasec  
198x440 cm

© Thomas Demand, VG Bild-Kunst, Bonn

Thomas Demand's meticulous reconstructions initially seem deceptively genuine. Based on press photos of mass media he uses paper and cardboard to recreate locations where for example crime scenes have taken place and subsequently photographs them.

The »Klausur« series deals with a suspicious case of serious child abuse, which caused a legal scandal full of investigational errors, at the end of which all the accused were found not guilty. A mere four months after the investigation had begun, the rooms in which, according to the prosecution, the crimes had taken place were renovated by the owner and rented out anew. However, to reconstruct the case the police rebuilt the rooms, together with the furniture, in their original size. And following the police example, so did Thomas Demand.

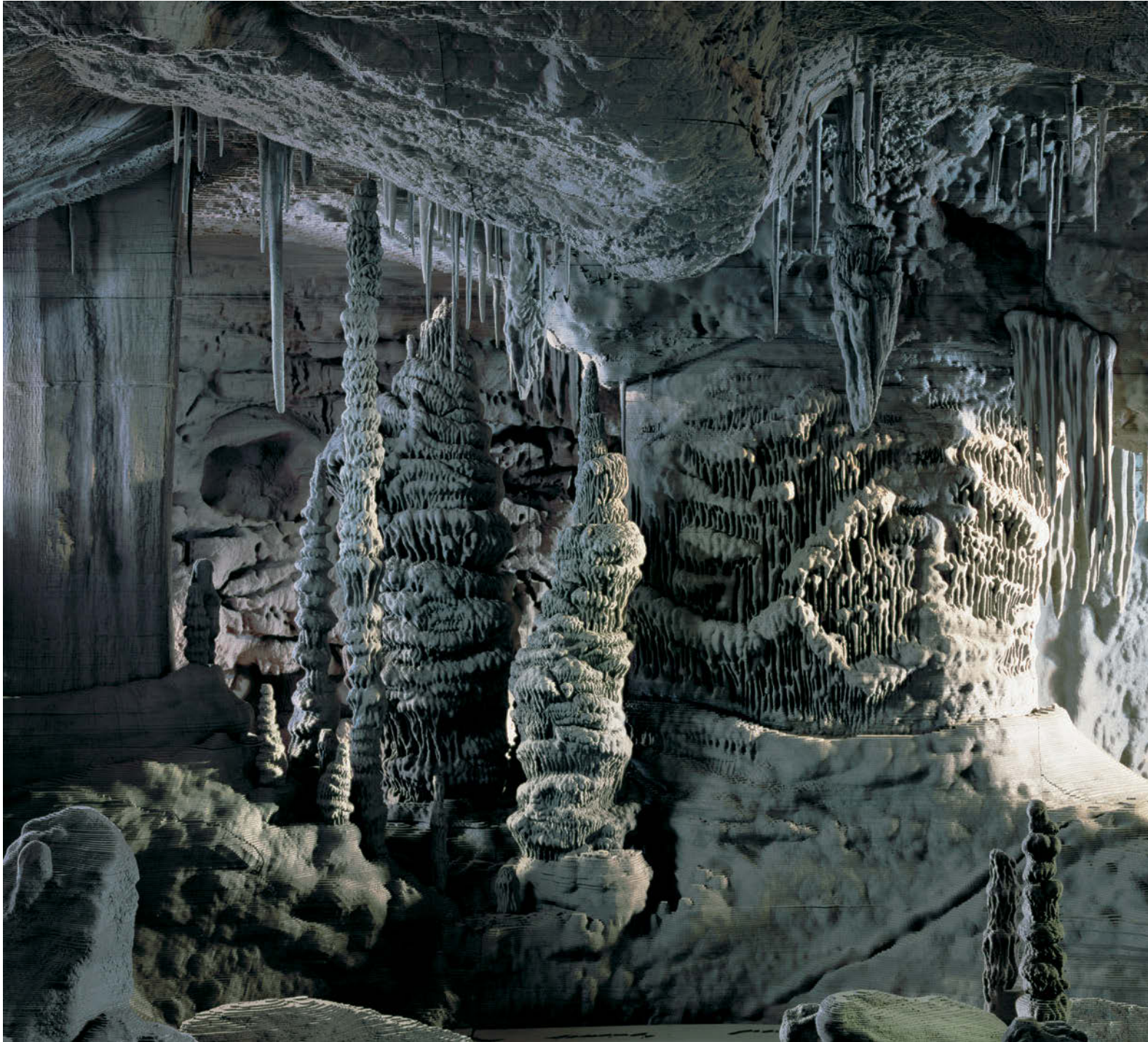
His work entitled »Grotte,« on the other hand, reveals an impressive stalactite cave. A postcard featuring a grotto in Majorca served as the basis for the cardboard model, which weighed over 50 tons. He used a computer to generate the atmosphere of dripstones, but in the construction of the grotto the vast amounts of data overloaded the computer to such an extent that it suddenly started producing shapes of its own Demand had not envisaged. Following the template, the overloaded machine produced the grotto in layers made from 50 tons of light gray cardboard. In terms of perspective the photograph of the model shown in this exhibition draws the viewer into the depth of a nonexistent place. The vanishing point is an illusion, a trick criticizing the media. By using this motif, Demand demonstrates that photography and news coverage are never real; but are part of a construction.

/2

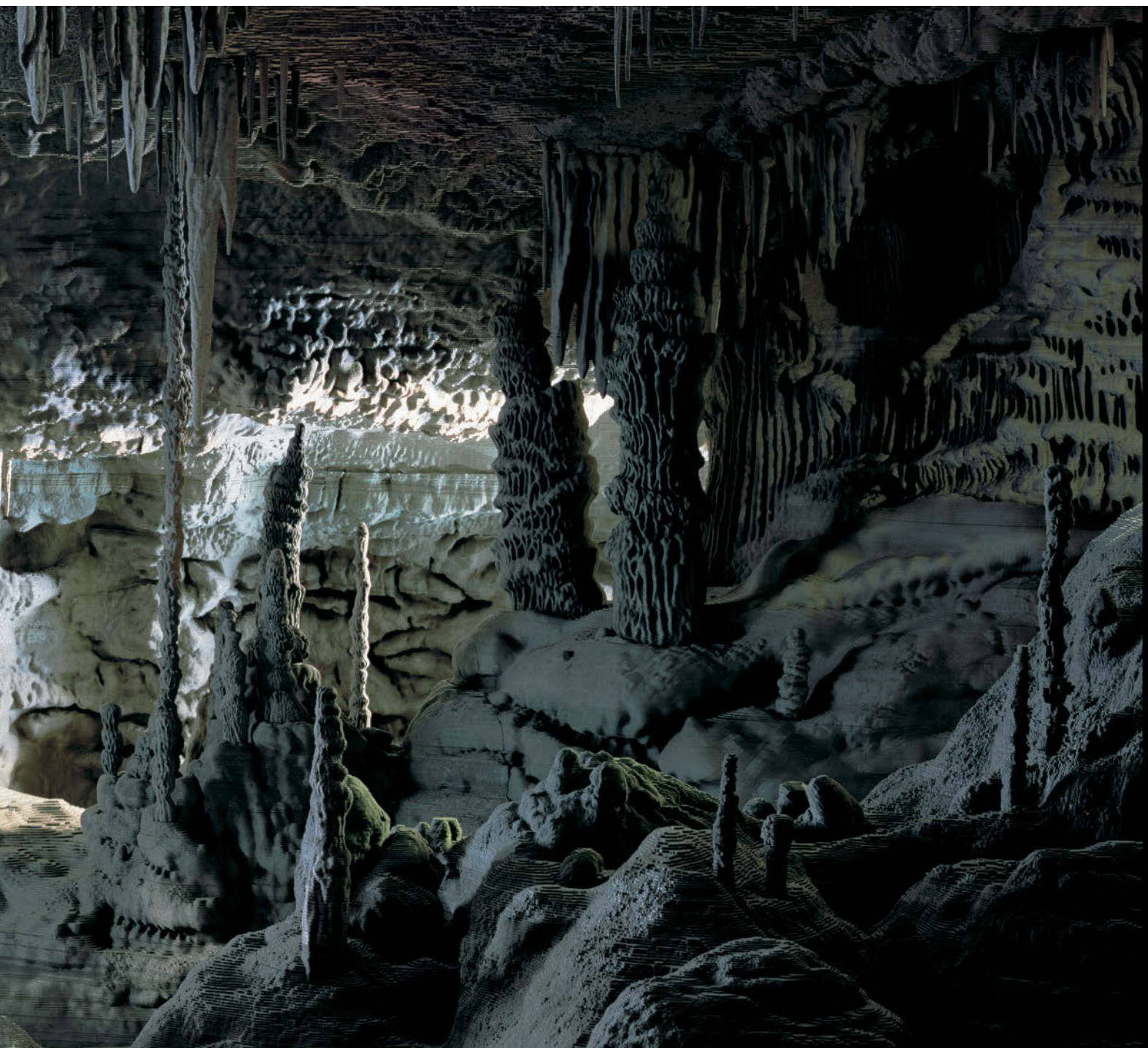














# STEFAN DIEZ

→ see materials/technologies #45

## Papier 2008

Bag series made of Tyvek  
Distribution: [www.shop.saskia-diez.de](http://www.shop.saskia-diez.de)

»Paper« is the simple name Stefan Diez chose for the bag collection he designed with his wife Saskia. However, the extremely light bags are not made out of delicate cellulose at all, but out of Tyvek, a synthetic material similar to paper. The fleece, which is used for envelopes as well as clean room suits, is extremely light and it inspired Hussein Chalayan to come up with his »Airmail Dress«. Now the Diez couple is going much further. The bags, which are sold under the Saskia Diez label, are both unusual accessories and traditional everyday products. For this reason the collection features numerous models ranging from sports bags and handbags to small travel bags. Tyvek is similar to leather not only in its smooth finish, it can also be processed the same way, meaning that typical details used on leather products such as visible seams, perforations, and eyelets, can be used to upgrade the synthetic material.

Even though Tyvek may look very fine and fragile, it is extremely tear-proof and hard-wearing, as well as water- and dirt-repellent. All these features make the bags robust and suitable for daily use. After they have worn out, the bags can be recycled as polyethylene.





# OLAFUR ELIASSON

→ [see materials/technologies #79](#)

## Your House 2006

Laser-cut book

Edition: 225 pieces

Published by the Library Council  
of The MoMA, New York

Reading a book is a purely mental activity. The narrative takes place in our thoughts. Even though the author can describe spaces or images, we do not experience them with our senses but by using our imagination. In his book object »Your House,« Olafur Eliasson breaks with this tradition by turning his own house in Hellerup near Copenhagen into a physical experience. True to scale, he removed the cavities of the building from the body of the book and divided the building into 454 vertical cross sections, according to the pages. Today, each page corresponds to 220 mm of the original. The segments were individually cut from the pages using a CNC laser, leaving only structures such as walls, floors, ceilings, and stairs intact. The result is a true-to-scale model of the house that spans the entire volume of the book and conveys the proportions of the rooms in a quite extraordinary way.

Olafur Eliasson's concept was realized by groenlandberlin. On the basis of CAD files produced by Georg Saguma the book was cut out by means of laser-cut. 225 editions of »Your House« were published by the Library Council of the MoMA in New York.



# LUIS ESLAVA

&

# DIEGO RAMOS

→ see materials/technologies #45

## /1 Geo »Gold Series« 2008

Series of Tyvek vases with gold-plated segments

## /2 Cloud 2008

Stool made of expanded foam and crinkled Tyvek

## /3 Wrinkle's Beauty 2008

Chair made of expanded foam and Tyvek

»We cut it, we fold it, we punch it, we sew it, we glue it, we paint it, and combine it with latex, resins, and foams to create what we call Tyvek World.« This is how the Spanish designers Luis Eslava and Diego Ramos describe their work. Fascinated by the versatile material Tyvek, the two have already created two product ranges with it. The collections made of the paper-like material include asymmetric lamps, a modular carpet, geometric vases, sponge-like chairs, and gold-plated bags. As part of their work, Eslava and Ramos examined the particular qualities of Tyvek and investigated different ways of combining it with other materials and industrial techniques. The chairs, for example, are made of a combination of Tyvek and foam, while the vases are created by using Tyvek segments and bonding them with hot-melt adhesive.



/1



/2



# CHRISTIANE FESER

## Falten # 11 2007

/1 Full-size detail

/2 Complex landscapes of folds, digitally arranged  
230×140 cm

At first glance, the complex paper landscape »Falten« (folds) appears to have been accurately folded by hand. But then we discover that mountains of folds abruptly turn into valleys of folds, that folds and creases proceed in unnatural ways—all of a sudden the image emerges as a digital arrangement.

Christiane Feser crumpled up thousands of sheets of A4 paper by hand before photographing and archiving them. She then carefully composed these different paper folds to form a homogeneous digital landscape of folds. Her artistic photographs are often created by applying documentary techniques: they are questioned, distorted, and exaggerated by digital image processing. Using techniques such as laminating, overlapping, and inversion, Christiane Feser combines what seemingly cannot be combined. This interplay of reproduction and reality reflects the culture of the ubiquitous digital image.









OLIVER FRITZ

&

TOM PAWLOFSKY

Model Making Pavilion 2007

Annexe of the model making studio

Cardboard, PVC membrane

In collaboration with students  
at Hochschule Liechtenstein



As part of a research project carried out at the University of Liechtenstein, assistant professor Oliver Fritz and his research assistant Tom Pawlofsky investigated computer-aided free forms in architecture.

They developed an entirely new formwork system for free forms made of corrugated cardboard which, compared with previous formwork techniques, can be manufactured at a low price. Even though corrugated cardboard is cost-effective, fully recyclable, extremely stable, and easy to process, to date it has rarely been used as a construction material. However, as it is easily processed using CNC-driven cutting and folding plotters, it is ideal for computer-aided production. Following the success of the patent-pending formwork system, in summer the University of Liechtenstein engaged Oliver Fritz and his assistant Pawlofsky to design, in a workshop with students, a 60 square meter exterior studio for model making, using corrugated cardboard as the main construction material. The impressive result is a curved building whose supporting structure is made of corrugated cardboard. Thanks to a superimposed PVC layer it is also weatherproof. The temporary building is not only quick and cost-effective to manufacture, in the future it could also be produced in small series.





# NAOTO FUKASAWA

→ see materials/technologies #50

## SIWA 2008

Products made of tear-resistant washi paper  
Manufacturer: Onao

Onao is a traditional manufacturer of washi paper and has for years has been interested in combining Japanese paper tradition and high tech. The newly developed papers can be used both for traditional Japanese screens and—thanks to the innovative quality of the material—for everyday products as well.

In search of new products to benefit from the tear-proof Naoron washi paper, Onao collaborated with the internationally acclaimed designer Naoto Fukasawa. »Washi often seems to conjure up an image of traditional craft-related products, but I hope to create designs for the everyday that take advantage of its pleasant texture and gentleness of character, and embrace it as a material that is suited to interiors and practical everyday products,« Fukasawa comments his design. He lightly crumpled the paper to emphasize its resilience and its particular grace. Not only does this highlight the texture of the tear-proof material, it also conveys the warm, vivid character of the paper. The »SIWA« product range includes a variety of different rugged covers, from envelopes to spectacle cases, as well as small baskets and bags.









# YING GAO

## /1 Walking City 2 2006

Dress with integrated sound detector

/2 Detail: movement of the collar

## /3 Walking City 3 2006

Dress with integrated motion detector

/4 Detail: unfolded origami

Though the Chinese fashion designer Ying Gao does not construct her sculptural fashion pieces from paper, she does make use of zhezhi, the traditional Chinese art of paper folding related to origami. Experimenting with this folding method enables her to create pieces of clothing that can assume variable shapes. For her »Walking City« collection, she combines the traditional art of folding with electronic components that playfully bring the items of clothing to »life.« By way of example, the sensor in the back of the first dress (not illustrated) responds to touch—the dress is blown up in certain places by integrated pneumatic components. In the second dress, a detector reacts to the sound of the spectator's breath by activating the collar, which slowly unfolds. Finally, the motion sensor in the third dress responds to proximity.

Ying Gao wants »Walking City« to be seen as a homage to the Archigram group of architects, who in the 1960s drew attention to themselves with a number of utopian architecture projects. Under the same name, the group presented a concept design of a mobile town that was to »move through the countryside in a cheerful and relaxed manner.«

/3



/4

# FRANK GEHRY

## /1 Cloud 2005

Lamp made of plug-in shell elements  
Polyester membrane  
Manufacturer: Belux

## /2 Wiggle Side Chair 1972

Chair from the »Easy Edges« series  
Cardboard  
Manufacturer: Vitra

One of the most influential architects of our time, Frank Gehry also frequently turns his hand to designing furniture and other interior fixtures. Still creating conventional cubic buildings in the 1950s, the architect began—inspired by artists such as Claes Oldenburg and Richard Serra—to develop his own style in the 1970s. Working with simple construction materials, Gehry deliberately created the impression of buildings that are left unfinished. His intensive exploration of corrugated cardboard as a working material between 1969 and 1973 inspired him to develop the »Easy Edges« furniture range, and his innovative manufacturing methods of working with the cardboard were patented.

Together with Vitra and Belux, Gehry developed »Cloud,« a range of lamps intended for mass production. The original aim was to make a paper luminaire, though it is now manufactured from polyester fleece. »Cloud« consists of some fifty flexible fleece segments with reinforced edges that can be combined to yield a variety of different volumes. They are supported by an internal wire construction. Thanks to its modular design, there can be no definitive shape for the end product, meaning that each luminaire is individually designed and thus unique.

/1







71

## /1 Chair One 2004

Models made of cardboard and adhesive tape

Manufacturer: Magis

## /2 Chair 2005

Not realized

Models made of cardboard, wire and adhesive tape

Client: Plank

## /3 Kitchen Appliances 2002

Not realized

Models made of cardboard, wire and adhesive tape

Client: Krups

## /4 Tip 2003

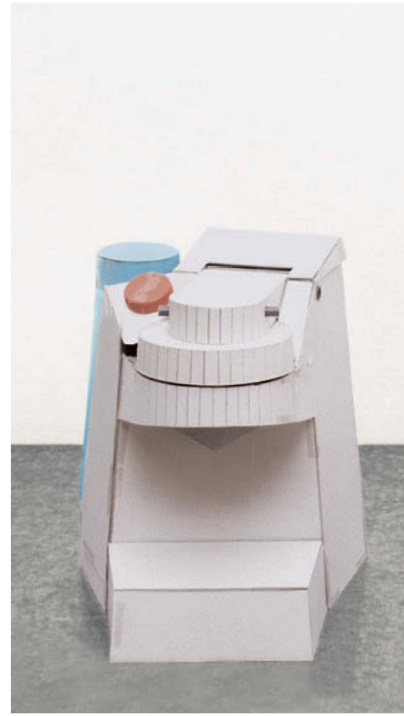
Pedal bins

Models made of cardboard, wire and adhesive tape

Client: Authentics

»I am convinced that model making with paper has been influencing my design vocabulary for years. It is not necessarily a conscious process but when it happens I always accept it. Paper offers me the opportunity to work on a true-to-life scale of 1:1 very quickly. In other words, they are like sketches in space,« Konstantin Grcic says, explaining his preference for models made of paper and cardboard. Materials are very important to him, even though this is not always obvious from the finished objects. However, searching for the perfect materials and manufacturing techniques to suit his design vocabulary has a stronger bearing on the design than the actual model-making material. Nevertheless, materials such as paper, cardboard, and adhesive tape best support him in the early stages of his design work. In his Munich studio, he keeps a large number of cardboard models. »These models retrace the design process in a wonderful way, this is why they are still very dear to me even years later.«

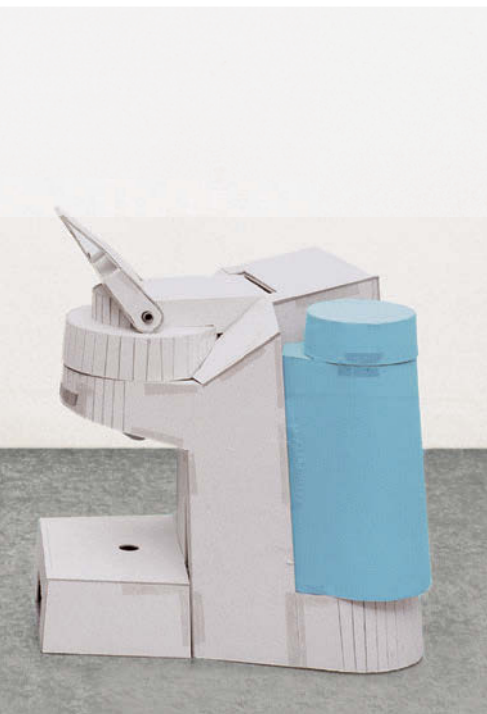




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## /1 Error 2005–2006

Exhibition »A Deodorant Type«  
C-Print, mixed media  
138×118×185 cm

## /2 Nobody 2005–2006

Exhibition »A Deodorant Type«  
C-Print, mixed media  
100×75×226 cm

## /3 Agusta 2008

Exhibition »A Deodorant Type«  
C-Print, mixed media  
188×95×47 cm

## /4 Garden 2007

Exhibition »A Deodorant Type«  
C-Print, mixed media  
176×120×66 cm

## /5 Back Slider proto 2008

Exhibition »A Deodorant Type«  
C-Print, mixed media  
173×100×34 cm

## /6 Map 2008

Exhibition »A Deodorant Type«  
C-Print, mixed media  
185×78×67 cm

Courtesy Osang Gwon and Arario Gallery

The mass media and their manipulative effect on society have always interested the Korean artist Osang Gwon. Even as a student he designed a billboard with the message »Mass media make artists.« Today he photographs people in detail from head to foot producing hundreds of images that he then combines to create life-size shiny sculptures. The images depict the nature of the clothing, skin, and hair and make the figures seem lifelike. But the strangely tortuous poses and distorted proportions confuse the observer, and make the person appear unreal.

In »A Deodorant Type,« Gwon reflects on the interaction of advertising with culture, tradition, and origins. The title plays on the (miserably failed) attempt by some corporations to launch deodorants on the Asian market. The artist imagines that the use of Asian models deprived the product of its »exotic« appeal, and apart from that most Asian people are physically unable to give off body odors, and would consider the ability to do so abnormal. Gwon explains that as such, »the title is a reference to this kind of misunderstanding.«

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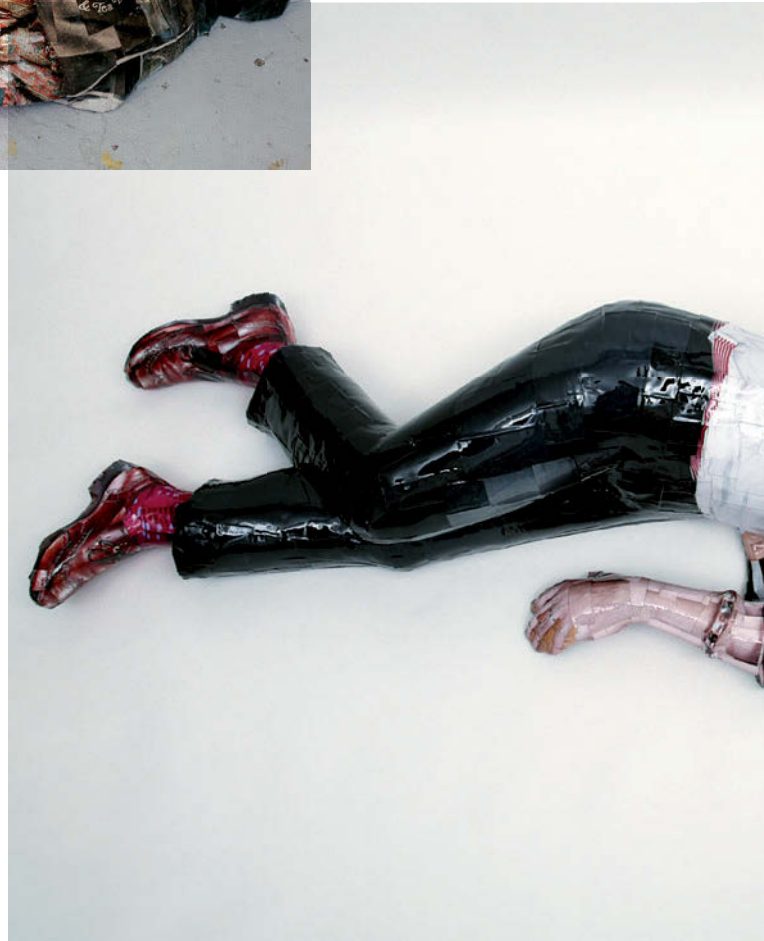








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# HAPTIC—

## AWAKENING THE SENSES

### /1 Cabbage Bowls 2004

Design: Yasuhiro Suzuki  
Paper clay

### /2 Wall Clock 2004

Design: Jasper Morrison  
Clock face in compression molded paper

### /3 Floating Compass 2004

Design: Shunji Yamanaka  
Paper structure with a magnetized rod

### /4 Cast-off Snakeskin Paper Towel 2004

Design: Kengo Kuma  
Embossed paper

### /5 Haptic Cup 2004

→ see materials/technologies #09

Design: Sam Hecht  
Translucent paper

### /6 Paper Wastebasket 2004

→ see materials/technologies #18

Design: Keiko Hirano  
Sheet of vulcanized fiber



/2

The word haptic derives from the Greek and refers to the active touching of an object's surface, texture, and temperature. The exhibition »HAPTIC—Awakening the Senses« took place in 2004 as part of the Takeo Paper Show in Tokyo. Designers from various disciplines were invited to design objects using paper that, rather than captivating people with their visual or formal appearance, would appeal first and foremost to their sense of touch.

The »Haptic Cup« by Sam Hecht, for example, transforms the paper cup, the purely functional disposable article par excellence, into a sensuous and aesthetic product. Made of translucent paper, the cup allows the color of the drink to shimmer through it and thereby sharpens the observer's perception.

Keiko Hirano loves distorting an idea by noisily screwing up a piece of paper with a sketch on it and throwing it in the wastepaper basket. The »Paper Wastebasket« is cut from a sheet of vulcanized paper fibers and is sewn together evenly. When wet the form can be crumpled and, as soon as the fibers dry, the wastepaper basket becomes a rigid structure again.

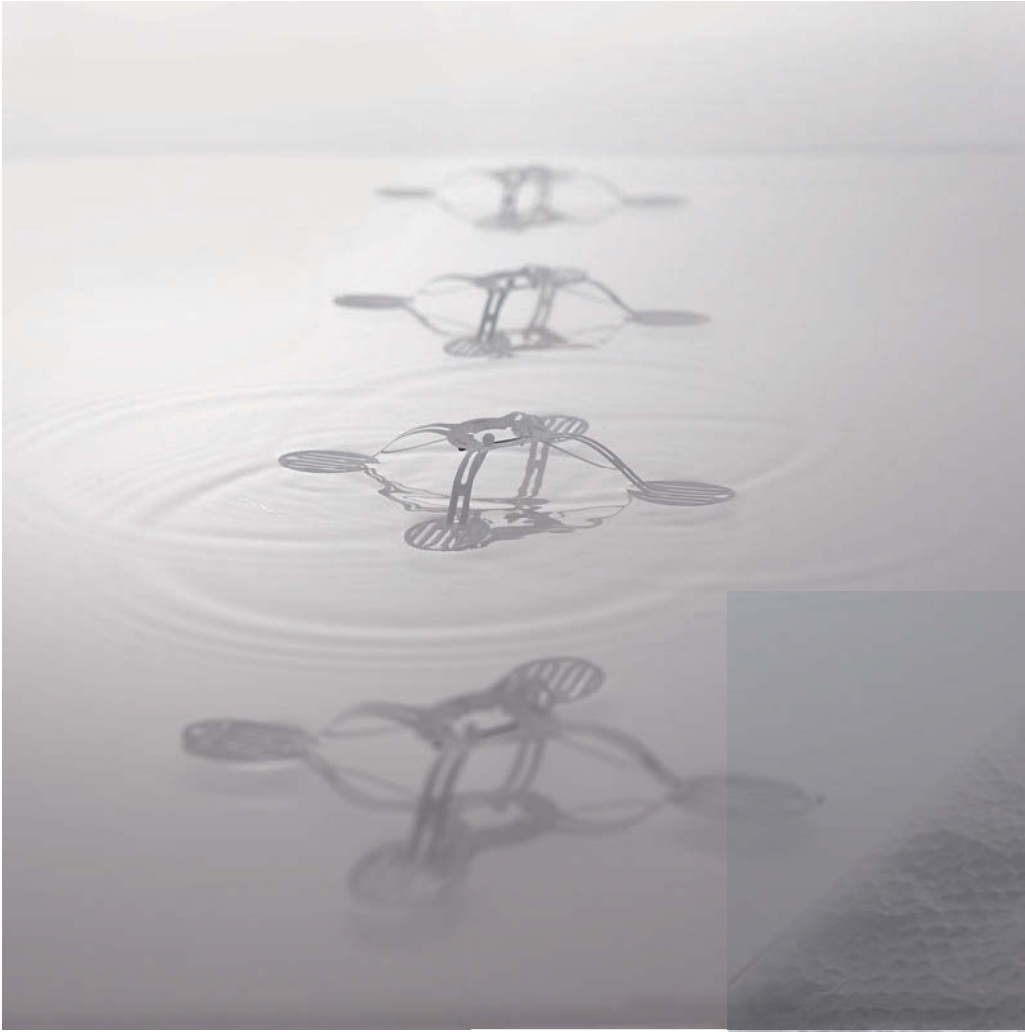
Kengo Kuma's »Cast-Off Snakeskin Paper Towel« is made from extremely thin washi paper. The embossed pattern calls to mind snakeskin not just visually but also when touched.

The ribbed surface of Jasper Morrison's »Wall Clock« likewise invites observers to touch it. The designer worked with a highly elastic paper that can be compression molded without forming folds. He used it to make a wall clock that is more or less invisible on a white wall.

For his »Cabbage Bowls,« Yasuhiro Suzuki heated up a cabbage, peeled off the soft leaves and remolded them in silicone molds. With the help of these negative molds, he formed cabbage leaves using Paperclay, a mixture of paper pulp and clay. The perfectly cast leaves can be used as bowls or combined into cabbage formations.

Shunji Yamanaka designed the »Floating Compass,« a delicate water strider which, thanks to the intelligent structure of its legs, can use the surface tension of the water to glide over it. The compass, made from water-repellent paper, has a small needle and rotates slowly until the needle points north.

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# KIRSTEN HASSENFELD

→ see materials/technologies #08

## /1 Dollar Dreams 2002

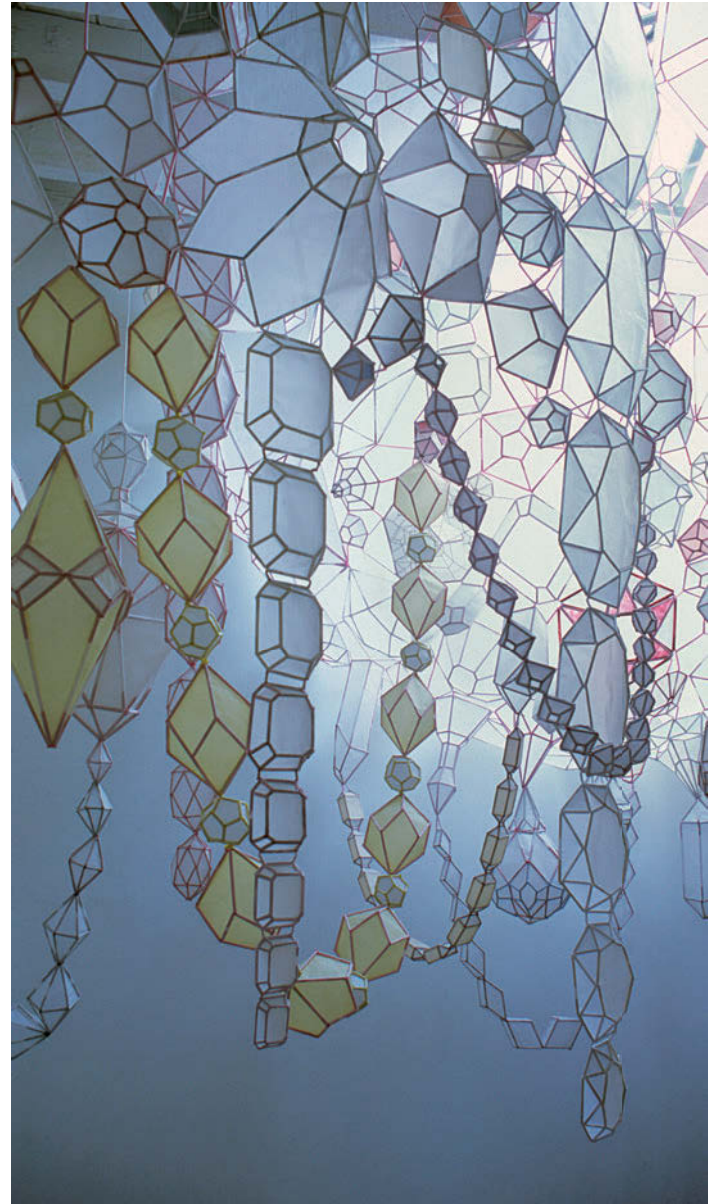
Paper with mixed media

## /2 Horn of Plenty 2004

Paper with mixed media  
ca. 152x60x60 cm

The collection of objects in »Dans la Lune« gives the impression of a fantastic daydream full of ostentation and kitsch. The oversized pieces of jewelry, luxurious chandeliers, and excessively decorated curiosities are for the most part made of paper. Hassenfeld glorifies arts-and-craft techniques and the often derided aesthetics of decoration. Her approach to the various papers is refined; she folds it into clear facets, rolls it into snorkels or cuts delicate silhouettes from it.

Yet Hassenfeld's sculptures do not just tell of opulence and extravagant luxury. By using the fragile and ephemeral material paper, she also questions our wasteful lifestyles. The subtle critique of affluent society is expressed particularly strongly in »Horn of Plenty.« The cornucopia, lit from the inside, is overflowing with paper chains, amulets, crystals, and pearls.



/1





# ANNIKA VON HAUSSWOLFF

## /1 Untitled (horizontal box) 2008

Exhibition: »I Am the Runway of Your Thoughts«  
C-print  
114×140cm  
Edition: 4

## /2 Untitled (red box) 2008

Exhibition: »I Am the Runway of Your Thoughts«  
C-print  
114×140cm  
Edition: 4

## /3 Untitled (vertical box) 2008

Exhibition: »I Am the Runway of Your Thoughts«  
C-print  
172×104cm  
Edition: 4

Courtesy Annika von Hausswolff  
and Casey Kaplan, NY

Annika von Hausswolff's carefully staged photographs arouse feelings of contradiction ranging from unease to curiosity. Naked, unprotected bodies in picturesque landscapes or serious children holding chainsaws suggest macabre stories. The photographer always pushes the boundaries between documentary and staged photography. In recent years, however, her world of images has become more representational, as she is increasingly using props and everyday objects as metaphors.

In the exhibition »I am the Runway of Your Thoughts« at the Casey Kaplan Gallery in New York, three large photographs depict aerial shots of open cardboard boxes that are arranged beside each other in various configurations. In revealing their bare emptiness, the boxes exude the same melancholic indifference as the figures themselves.

»I love photography because it points the finger at things. You can really feel that it has something to do with ›reality-out-there.‹ Photography is very ›realistic‹ and yet at the same time it is also surreal. I love the distance created by it and the feeling of longing evoked by it,« the artist explains.



/1



# JAN VAN HOOF

## Storyboard 2008

Wall built out of cut-up books  
200 x 350 cm

Jan van Hoof aims to give thrown-away books a new lease of life by using them as construction material. For »Storyboard,« he removes the book covers and, by gluing the individual paper blocks together, turns them into brick-like paper modules, 30 centimeters high, which he uses to build a compact partition that runs across the room like a sound-absorbing wall. Originally designed as panelling for a bookstall, he later considered it more appropriate to use the structure as a partition.

In addition to the printed stories, the sheets of paper, which have aged differently, reveal stains and notes in the margins, creating a patina on the material that conveys a strong presence. »Books tell us many different stories—the story in the book, the history of the book itself, as an object belonging to you and, for some reason, also belonging to your own collection. The aim of my work was to try and give those books—using them as construction material—a new life,« van Hoof explains.





# RICHARD HUTTEN

## Book Table 2008

Hardcover books, resin  
»Layers« exhibition, Galleria Facsimile,  
Milan Furniture Fair, 2008

Dutch designer Richard Hutten laments the lack of exploration of the meaning of design content. For this reason, he presented a seven-part collection of handmade, limited edition objects at the 2008 Milan Furniture Fair, whose layered structure was intended to stand for a complex approach. These objects included a chair made of numerous thin slices glued together, modeled on the movement of a person as they sit down. When designing the chair, Hutten, himself a passionate photographer, drew inspiration from the sequence photography of the British photographer Eadweard Muybridge, who became famous in the nineteenth century with his chronographs of human and animal motion sequences. Hutten's collection also featured the »Book Table,« made from piles of books glued together. For, according to the designer, »a book is all about layers, layers of meaning.« With his designs, Richard Hutten hopes to stimulate the debate about objects: »This collection is about objects and what we can read into them. Design is not only about beautiful forms, but also about the stories an object can tell.«



# CHARLES KAISIN

## Hairy Chair 2005

Chair with paper fringes

In his works, Charles Kaisin translates the abstract concept of recycling into real, handcrafted objects by creating unusual and useful products from everyday materials that are in fact trash. By way of example, he uses the window of a washing machine as a bowl or creates an extendable bench using old newspapers. His »Hairy Chair« is an old chair covered in countless fine paper strips from a shredder that look like fur. The hairs of the »Hairy Chair« give the old, disused chair and a pile of wastepaper from the shredder new »life.«



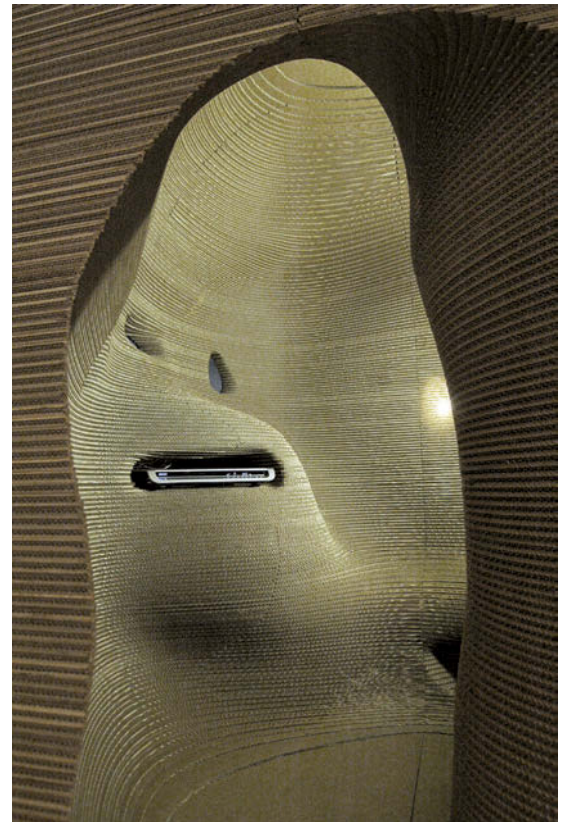
MARTTI KALLIALA

&

ESA RUSKEEPÄÄ

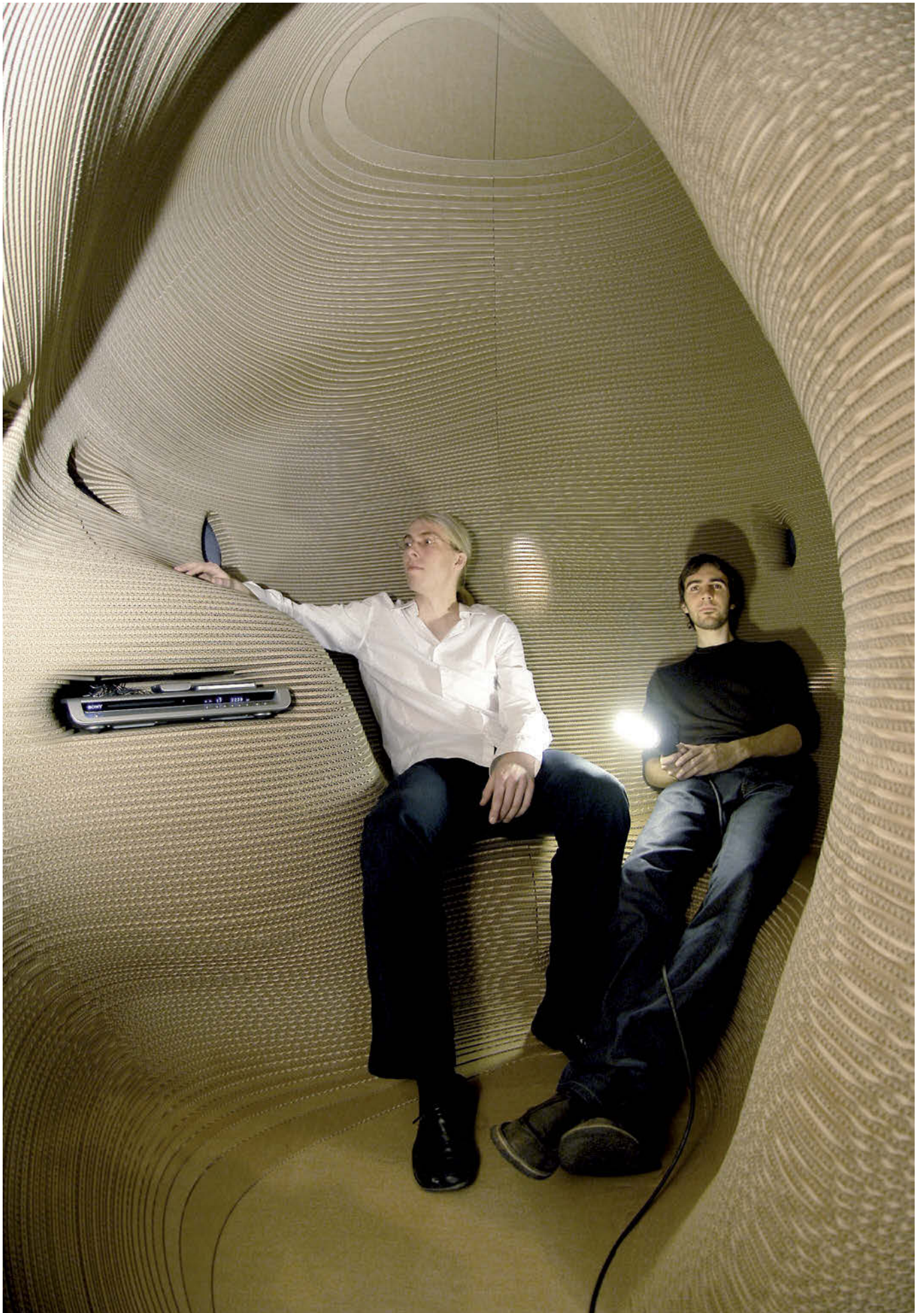
Mafoombey 2005

A space for the experience of music  
Cardboard



In 2005, the University of Art and Design in Helsinki staged a competition for a room in which listening to music becomes a whole new experience. The two architecture students Martti Kalliala and Esa Ruskeepää won with »Mafoombey,« a sound grotto made of corrugated cardboard. The designers cut a freely formed space which they had already developed as a computer model into a cubic volume of 2.5 cubic meters using stacked corrugated cardboard. With a cutting plotter, they removed the hollow spaces from each of the layers of cardboard. The irregular curvatures of the cardboard walls form a bench or openings for the sound system. The corrugated card turned out to be the perfect basic material for this installation. As well as providing a pleasantly warm surface, cardboard also lends the space excellent acoustic properties. The construction is self-supporting; the individual corrugated cardboard layers hold their shape through their own weight alone. This makes »Mafoombey« very easy to assemble and dismantle.





# ANDREAS KOCKS

## /1 Paperwork #701G (in the beginning) 2007

Graphite on watercolor paper  
580×1060×15cm  
Installation at DG Galerie, Munich

## /2 Paperwork #703G (Cannonball) 2007

Graphite on watercolor paper  
330×1670×13cm  
Installation at Jeannie Freilich  
Contemporary, New York

The large wall installation »Cannonball« explodes with full force and leaves huge »splashes« on the walls, composed of black colored paper. Ultimately, a tension-filled interplay unfolds between reality and the paper model. Andreas Kocks' »Paperwork« not only attract attention, they also make the entire room containing the installation a three-dimensional experience.

The integration of visual art into the architecture is a central aspect of his work. As such the creative process begins with a sketch based on the dimensions of the exhibition space. Then he produces a watercolor and continues with a model at a scale of 1:10. Owing to its immense size, the original is assembled from its many individual components only at the exhibition venue. The paper fans out because of the way it is cut, thereby creating a complex interplay of light and shadow. The contradiction between the lightness and fragility of the paper and the intensity of the explosive room installation lends Andreas Kocks' works their power.









## Honeycomb Lamp 2007

Lampshade from red honeycomb paper  
30×30×45 cm

Distribution: [www.charlesandmarie.com](http://www.charlesandmarie.com)



Simple everyday products, precise observations and intelligent interpretations define the work of Japanese designer Kouichi Okamoto. The self-taught former DJ found fame with his radically simple ideas, such as »Balloon Lamp,« where a plain white balloon serves as the lampshade, illuminated by an LED lamp and two button cells. In contrast, »Honeycomb Lamp« derives its appeal from the honeycomb paper it uses. It is made of denguri, a special paper from the Shikoku region in Japan. The two centimeter thick form made of honeycomb paper can be fanned out into a three-dimensional object. The open lamp is fixed in place with small interlocking pieces. The »Honeycomb Lamp« can be easily placed around any lamp socket. The fine structure of the honeycomb paper creates different lighting effects, and the paper lends the light a warm hue.



# ROBERT J. LANG

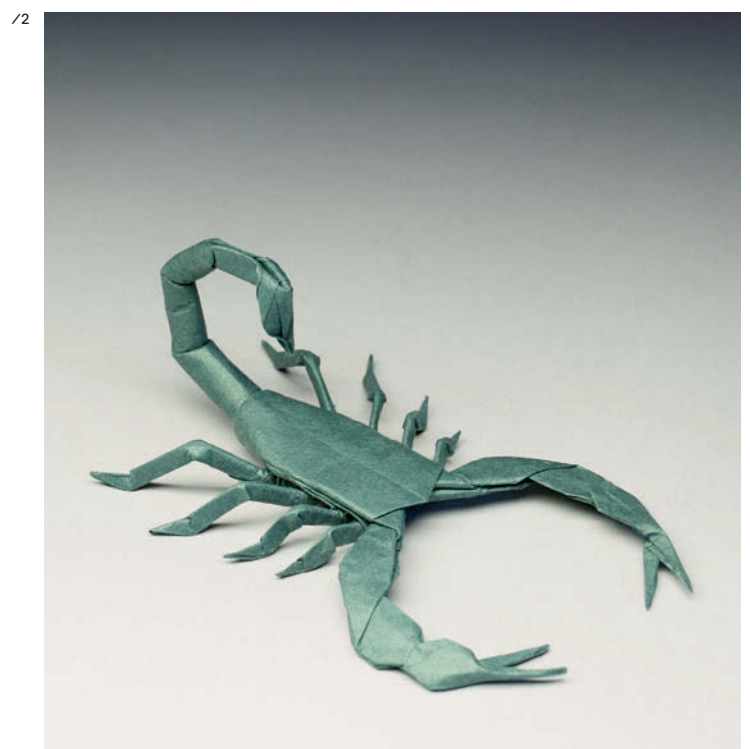
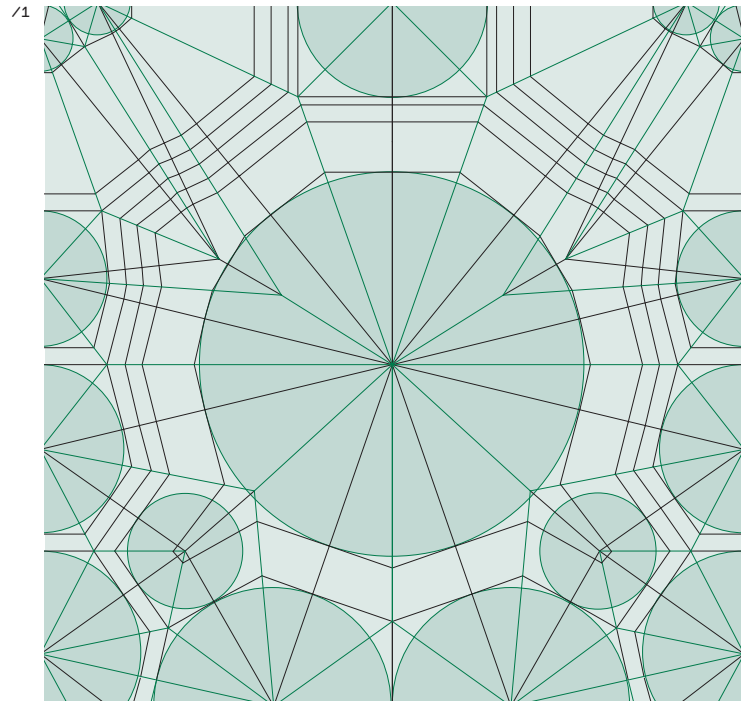
## /1 Scorpion varileg, opus 379 2000

Crease pattern

/2 Scorpion from one uncut square of origami paper

Modern versions of origami bear scarcely any resemblance to the ancient Japanese handi-craft. Whereas traditional origami figures can be created by means of a few folds in a short space of time, modern works require several hours or even days, and can be astonishingly complex. Robert J. Lang has had a considerable influence on the evolution of the handi-craft. Since the 1990s he has been developing folded geometrical and mathematical structures for his art work strictly along the lines of the fu-setsu sei-hokkai ichi-mai ori method (folded from one square without cutting).

Given their slender feet and feelers, insects are considered a particular challenge in origami. In the mid-1990s, however, Lang developed a new geometric folding scheme with circles and corrugations, which enabled him to make a basic structure with any number of extremities. Using this method deer, a traditional origami motif, and in particular their antlers, can be precisely shaped. From this geometric folding concept Lang developed a computer program which he called »Treemaker.« »Scorpion varileg, opus 379« was one of the first origami works to be created with »Treemaker.«







# TOMÁŠ GABZDIL LIBERTINY

## /1 Paper Vases 2007

Turned vases made out of paper blocks  
Series of five vases

/2 Turning of the Paper Vase, 2007  
Woodturner: Joost Kramer

## /3 Writing Table No. 3 2007

Wood, American walnut veneer,  
22,000 strips of paper, steel  
200×80×77 cm

What is nature? Taking this question as a starting point, Libertiny reversed the production process of paper from wood in the »Paper Vases« project. The designer glued together seven hundred sheets of paper, all printed with a tree motif, to form a compact wood-like block. Then, with the help of the traditional wood-turning technique he shaped it into a vase. As the material was stripped down the tree motif reappeared, hinting at the natural origins of paper.

Studio Libertiny also designed »Writing Table No. 3« from paper. The table top is composed of 22,000 paper strips which have been finely ground down, producing a soft finish. The pliable paper tabletop is reminiscent of the leather surface of old desks, making it a pleasure to write on. The sensitive material quickly gains its own patina as traces of use accumulate.



/2



/3



## Seasons Through the Looking Glass 2007

Tunnel entrance installation  
The Victoria & Albert Museum, London  
Honeycomb sandwich panels, recycled garments

»A large rose tree stood near the entrance of the garden; the roses growing on it were white, but there were three gardeners at it, busily painting them red. Suddenly their eyes chanced to fall upon Alice, as she stood watching them,« it reads in »Alice in Wonderland«. The installation in the South Kensington station (London Underground), »Seasons Through the Looking Glass,« was inspired by the section where Alice falls down a long winding tunnel into a subterranean garden. CJ Lim therefore planted an abstract rose-filled garden in the tunnel, which cast its shadow on the arched ceiling. It is a strange construction, however, with stem and branches made of honeycomb panel material and flowers fashioned from recycled textiles. A large mirror at the entrance to the underground tunnel reflects the installation, making it appear as if the garden stretches into an infinite fictive space. The installation was set to the music of Vivaldi's »Four Seasons.«



# MAISON MARTIN MARGIELA

## COLLECTION ARTISANAL

### Fox Stole in Party Paper Balls 2008

Stole made from 2,500 paper balls in different shades of gray



In the past, a fox stole was the symbol of ostentatious and overstated luxury. This model from the Collection Artisanal by Maison Martin Margiela plays with its significance as an expensive object of desire. The stole is made of small paper balls dyed in different shades of gray using Chinese ink, these are subsequently joined together using a weaving technique. It is made, and this is the real luxury about it, by hand, taking approximately fifty-five hours.

The forceful, handcrafted character is the trademark of the Collection Artisanal, which Maison Martin Margiela sees as its answer to luxurious haute couture gowns. The fashion house has been transforming fabrics, accessories, and existing items of clothing into new, handmade creations since 1989. To this end Margiela uses objects from flea markets and private garage sales, and makes them part of original items of clothing. Handcrafted details such as threads hanging out underline the uniqueness of the objects.

# MARCH STUDIO

## /1 Pen Plan China 2007

Full-scale cardboard model of a traditional Chinese courtyard house

Awesome Arts Festival, Perth, Australia

/2 Painted by children at the Festival

## /3 Aesop Flinders Lane 2008

Shop interior for natural cosmetics brand Aesop

Aesop Flinders Lane, Melbourne, Australia

© Aesop

What does the world look like on the other side? How do people live in China? In 2007, children at the Australian Awesome Arts Festival in Perth addressed such questions. A full-size traditional Chinese house made of brown cardboard was specially designed by March Studio as a projection and drawing surface. The children were allowed to draw and paint their own pictures of Chinese life on it. The »Pen Plan China« buildings, the second installation in the Pen Plan series, were made completely of cardboard components for the festival. The first cardboard house »Pen Plan Paris,« focusing on life in Europe, was built in 2006.

A shop interior for the Australian cosmetic label Aesop was also made from cardboard. In just five days, designers had a service counter built from Aesop's transport boxes, as well as display shelves and the eastern wall of the salesroom. On the back of the positive response it received and its conformity with the brand values of Aesop, the interior, originally intended as a temporary solution, became a permanent feature.



/1



/2



# MIEKE MEIJER

## Newspaper Wood 2008

Woodlike material

Newspaper, water-soluble glue

We all know that paper is made from wood. But Dutch-born Mieke Meijer reverses the production process. For her project »Newspaper Wood« she rolled paper and old newspapers tightly together and glued them with water-soluble adhesive so that they ended up looking like tree trunks. When you cut the paper blocks, the printed layers become visible, like age rings in a tree, making the material seem all the more like wood. The »Newspaper Wood« can be processed using standard methods such as sawing, milling, planing, and sanding. Mieke Meijer invented the process in 2003 while studying at the Design Academy in Eindhoven and is still advancing it today. She presented the project in its current state at the 2008 Dutch Design Week in Eindhoven.









# MIYAKE DESIGN STUDIO

→ [see materials/technologies #70](#)

## Pleats Paper Dresses 2008

Work-in-progress pieces made out of paper for »XXIst Century Man« exhibition 21\_21 Design Sight, Tokyo

It was with finite resources and increasing environmental pollution in mind that Issey Miyake conceived his exhibition »XXIst Century Man« at Museum 21\_21 Design Sight in Tokyo, which addressed mankind and its future production methods. It provided a look into the future and questioned life in the 21st century.

Issey Miyake, who is also the Director of the Museum, not only curated the exhibition, he also designed objects for it. With regard to textiles he worked on the premise that in some fifty years, paper will be the only fiber still available. So Miyake and his team spent months exploring various paper and processing techniques. The exhibition portrays a large snake and eight girls borrowed from a Japanese legend, all made of paper. The clothes illustrated here are the results of tests carried out during the design process, they are made from industrial packaging paper. Like the textiles in the »Pleats Please« collection, the paper was pleated and handcrafted.





# MIYAKE DESIGN STUDIO

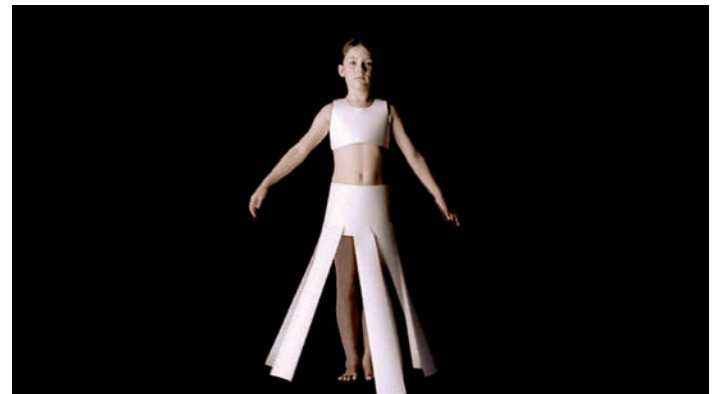
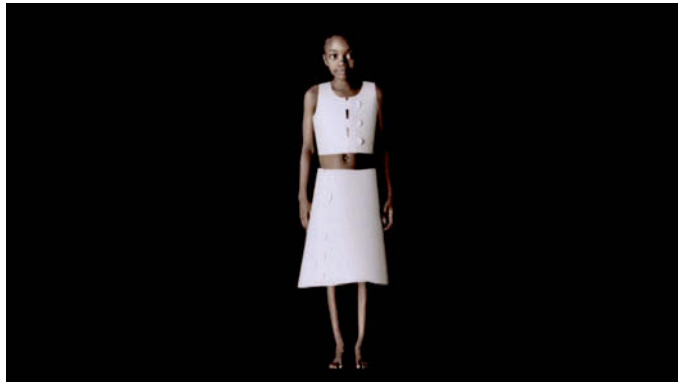
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# MARCUS TOMLINSON

## Pen to Paper 2008

Video stills from the film »Pen to Paper«  
For Issey Miyake Fête

The theory of film often compares the film experience to a dream. Marcus Tomlinson also likes to play with dreamlike sequences. His work is constantly developing, from his first atmospheric shots for fashion magazines, progressing to films and installations. He has a predilection for visual and filmic tricks when staging his dream worlds, as illustrated in his film »Pen to Paper« which he produced for Miyake Design Studio. The film shows children in simple paper clothes that transform themselves in a playful way. The impossible suddenly becomes possible. A cape, for example, grows into a giant blossom over one child's head, surreal structures mushroom as origami figures over another child's hair. A dress suddenly bursts into flames but of course the child wearing it is unharmed. The static poses stand in sharp contrast to the children's romantic look. This makes the film sequence seem like a surreal dream, opening up a completely new perspective on fashion.



## paper softwall 2003

Room partition out of honeycomb paper  
30×183× max. 500 cm

Paper glued into honeycomb structures is surprisingly strong and resistant. Stephanie Forsythe and Todd MacAllen have taken advantage of this in their seating series »softseating« and designed elements which can be fanned open into stools, benches, and loungers. The product line includes »paper softwall,« a free-standing partition which can be made smaller, larger, or turned into a different shape altogether. Folded up, it is a mere five centimeters thick and can be extended to a length of five meters. »paper softwall« is made from fine honeycomb paper and reinforced at the ends with woolen felt. »soft« products are not intended to be disposable objects. The honeycomb material changes its properties with time and becomes softer at the edges and corners, with traces of usage creating a natural patina. Thanks to the honeycomb structure the objects remain stable over time.



KOSTAS MURKUDIS

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CARSTEN NICOLAI

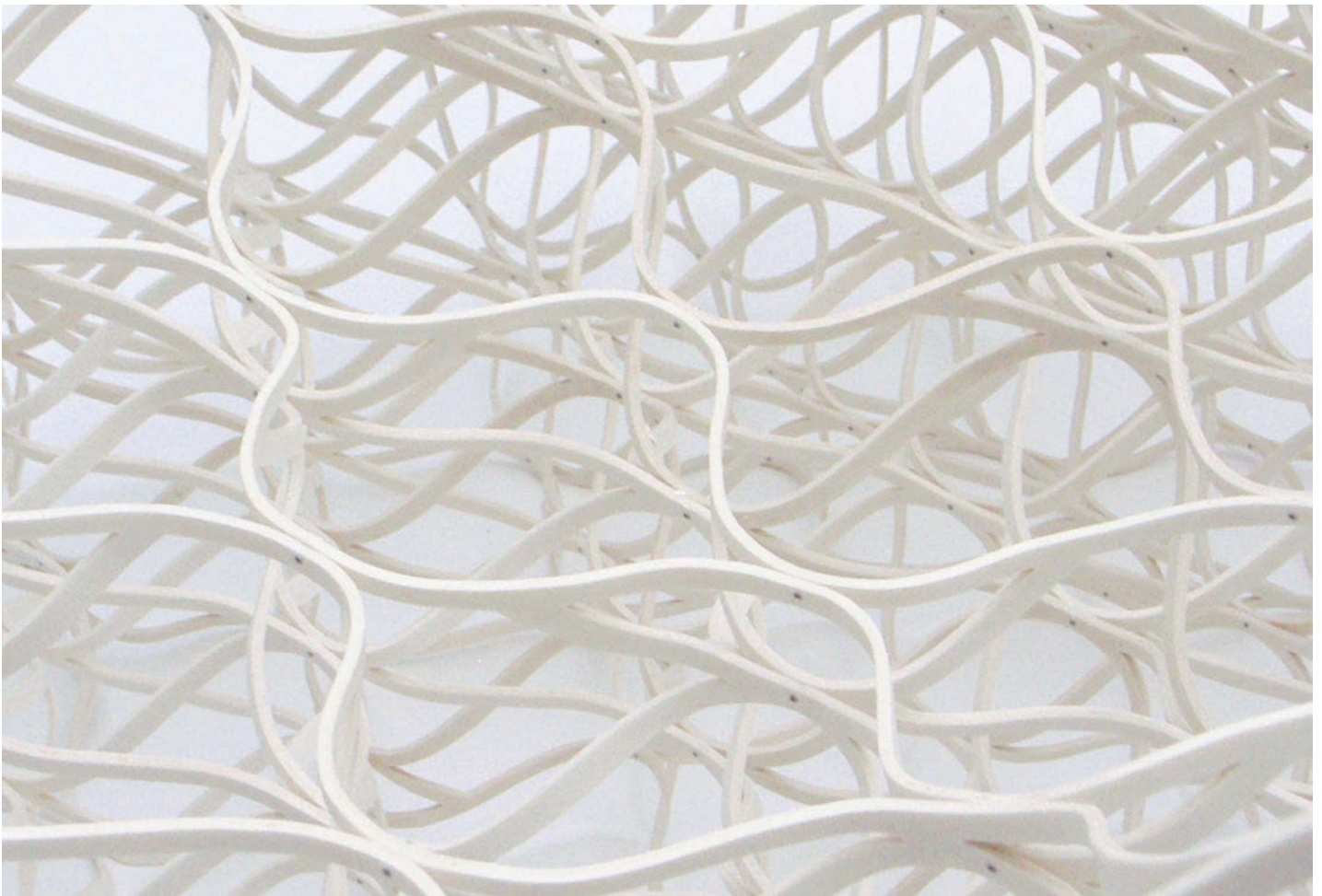
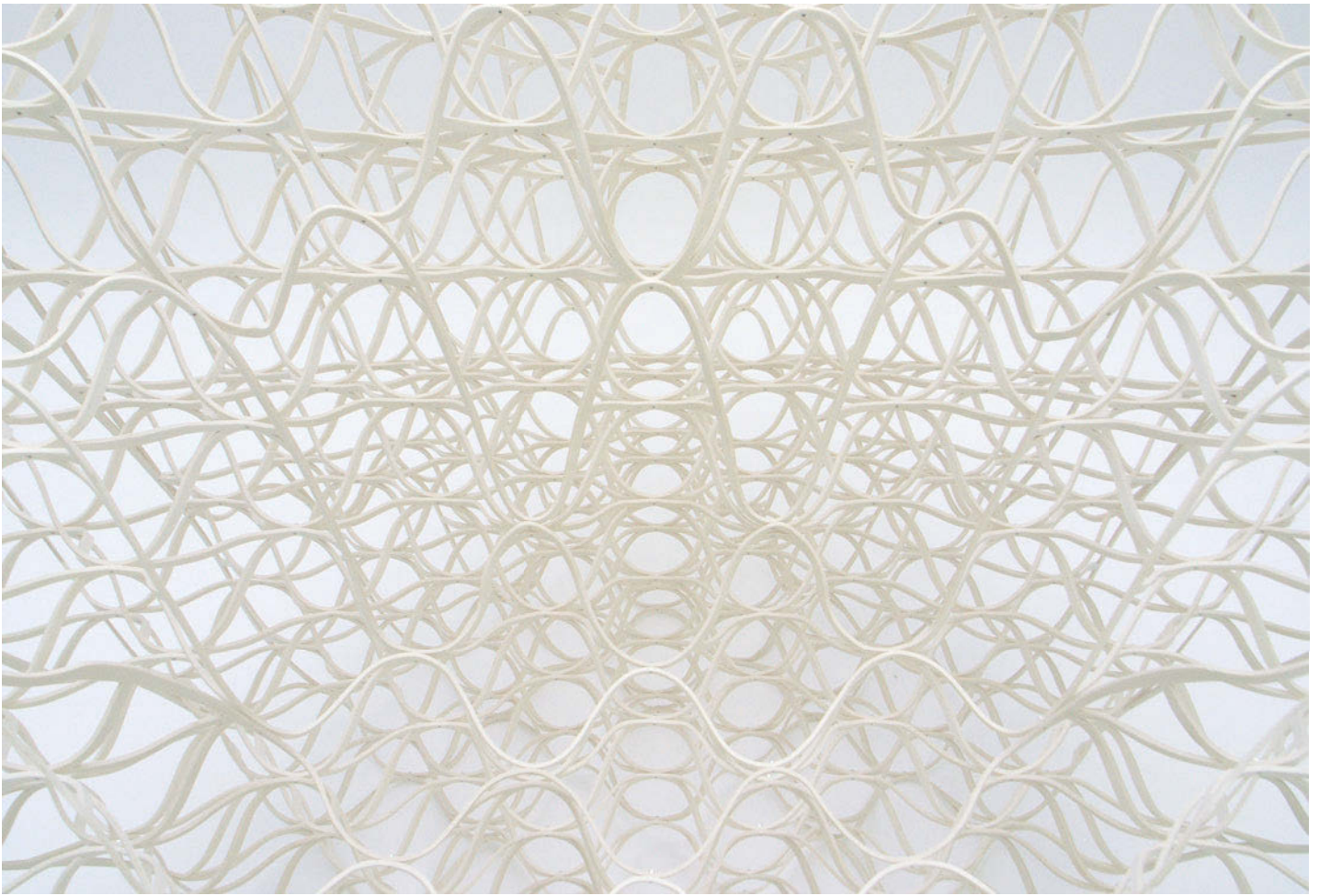
→ see materials/technologies #45

Dipron 2003

Study on rapid prototyping in fashion design  
Four prototypes of paper dresses



Rapid prototyping, in which models are produced by machine using construction data, is a widely used technique in industrial design. With their project »Dipron,« the designer Kostas Murkudis and the artist Carsten Nicolai explored the possibilities of rapid prototyping in fashion. Aided by software they produced a modular grid which made it possible to produce one-off designs from a choice of desired materials. As such, consumers assumed the role of producers in that the modular system enabled them to choose a combination of style, material, and pattern themselves. The chosen elements were processed by a cutting plotter and glued together. Murkudis and Nicolai chose the light synthetic paper Tyvek as their material, it is as easy to use as paper and ideal for cut-plotting and gluing.



# RYUJI NAKAMURA

→ see materials/technologies #18

## Hechima 4 2008

Chair made of vulcanized paper fibers (2.4mm)  
ca. 90x90x75 cm

For years Ryuji Nakamura has devoted himself to »Hechima,« a delicate armchair with a web-like structure. He presented the first version of the chair in November 2005, though back then he was still using plywood. For »Hechima 2,« however, Nakamura worked with vulcanized paper, a material with a long tradition in Japan. This is produced by hardening cellulose fibers in an acid bath. Even in thin sections the material is extremely robust, which is how Nakamura was able to produce an especially light and transparent net structure. While it is still soft the material is cut to form a web structure, shaped layer by layer and hardened in an acid bath. This manufacturing process can be used to produce any conceivable shape. The armchair shown here is made of vulcanized paper fibers just 2.4 millimeters thick and demonstrates just what paper can achieve. It represents the latest stage in Hechima's ongoing development process.



## A Costura do Invisível 2004

Fashion collection made of paper



»I dived ... totally unfettered by limits, rules and conventions. There I found a simple metaphor: a collection in paper. Paper, the realm of the sketch, of notes and a part of the creative process, a fragile, fleeting material, sensitive to the action of time. A white, unfinished, empty work capable of becoming laden with meanings, with poetry and with lightness.«

This is how Jum Nakao describes the idea of »A Costura do Invisível,« which means something like »sewing the invisible.« Though the collection recalls the extravagant, voluminous and richly patterned fashions of the late nineteenth century, it was made entirely of paper. The designer used embossing to lend the material relief-like patterns or laser-cutting to create delicate lacy cut-outs. As is still customary for exclusive fashion, this collection required extensive work by hand. And while the fashion show at the São Paulo Fashion Week 2004 began in customary style, it finished with a sensation when the models ripped off their paper dresses. In a very short space of time seven hundred hours of work lay in shreds on the floor and the »sewn invisible« was a thing of the past.











## Cabbage Chair 2008

Chair made of pleated paper  
»XXIst Century Man« exhibition  
21\_21 Design Sight, Tokyo

None other than Issey Miyake, grand master of the pleat and inventor of the fashion line »Pleats please,« inspired the young designer Nendo. Miyake, who is arguably Japan's most famous designer, wanted to produce new products from the paper placed on fabrics in pleat work to prevent the shiny lines produced by ironing. Previously this paper had simply been discarded as waste, but Nendo used a roll of resin-impregnated pleat paper to create the »Cabbage Chair« by simply fanning out the individual layers. Resin is added to the paper during the production process, making it sturdy and able to retain its shape. Thanks to the resin, the »Cabbage Chair« is also comfortable to sit on.

And it could be mailed as a compact roll and then fanned out by its new owner. The »Cabbage Chair« was produced for the show initiated by Issey Miyake in Tokyo: »XXIst Century Man.« »This primitive design responds gently to fabrication and distribution costs and environmental concerns, the kinds of issues that face our 21st century selves,« Nendo said of his design.



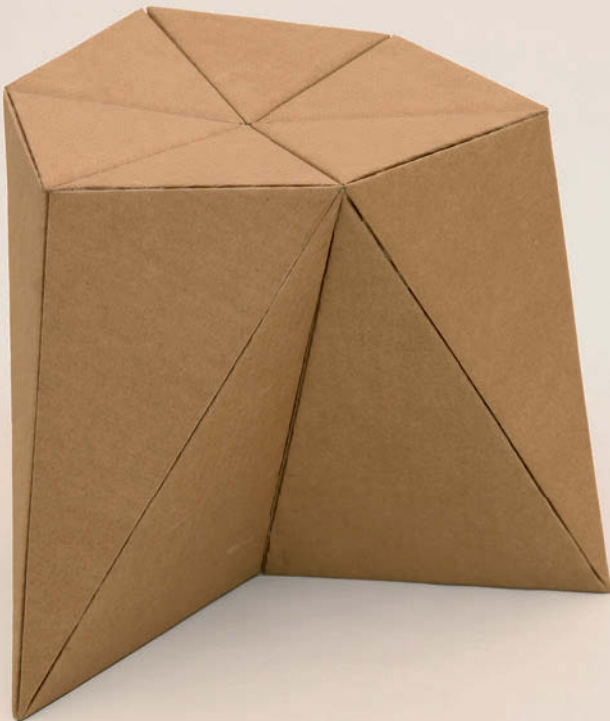


# NICOLA FROM BERN

## Foldschool 2007

Do-it-yourself cardboard furniture for children

Intermediary trade and the elaborate production methods used in the furniture industry make designer furniture expensive. The Swiss architect and designer Nicola Enrico Stäubli believes that this makes no sense for children's furniture with a short life span. As a result he designed the »foldschool« range of cardboard furniture for children. Anyone interested can download the pattern and the assembly instructions from the Internet free of charge. With simple tools such as a cutter, ruler, spray adhesive, glue, cardboard, and adhesive strip, you can assemble the furniture yourself. As a material, corrugated cardboard is ideally suited for children's furniture, not just for cost reasons, but also because it is soft and light, and can be painted on. In addition, when the furniture has served its purpose it can simply be recycled.



# JENS PRAET

## One Day Paper Waste 2007

Table from shredded documents and resin  
70×85×40 cm

Jens Praet was horrified by the huge amounts of wastepaper produced in offices and endeavored to find another use for it. In his project »One Day Paper Waste,« he transformed useless documents into valuable and useful objects. To this end he mixed the confetti from shredded documents with resin, pressed the mixture into a mold and let it harden to become rigid objects. The paper-resin composite boasts a firmness similar to wood and has a unique appearance. Thanks to Praet's recycling project, office waste returns to the office as usable furniture, bringing to mind just what little thought we give to the general use paper.

In 2007, Jens Praet presented »One Day Paper Waste« in the guise of a chest of drawers. After this he was commissioned to design a small table from the material at EatDrinkDesign during Dutch Design Week in Eindhoven in 2007. In 2008, Droog Design included the table in its collection and presented it at the »A Touch of Green« show at the Milan Furniture Fair.





# PRIESTMAN GOODE

## Post A Phone 2007

Concept for a disposable phone  
A5 paper format, h: 4mm

»Post A Phone« is a new concept for a simple, inexpensive landline phone that can be sent by post like a music postcard. The product by the London design agency Priestman Goode is based on the observation that telephones are increasingly seen as fashionable throwaway items. Why then waste valuable resources for such a short-lived object? The inexpensive »Post A Phone« would consist of recyclable cardboard and come with only the bare bones of technology. The planned features include particularly thin components such as a foil keypad, a divisible plug, and a specially adapted cable, which enable a total height of a mere four millimeters. The simple landline phone can be mailed in an A5 envelope, then simply pressed straight out of the envelope and connected to the power supply system. Sadly, the »Post A Phone« is only a concept and a long way from being reality.



# HEATHER RASMUSSEN

## /1 Untitled 2008

(M/V Ital Florida, Italy, July 2007)  
C-Print  
76.2×101.6cm

## /2 Untitled 2008

(M/V Excelsior, Cologne, Germany, March 2007)  
C-Print  
76.2×101.6cm

## /3 Pier J Los Angeles, California 2007

(Google Satellite Photograph, 3/39/2004, 1«=1'-0'») /1  
Card stock on paper  
304.8×762×15.2cm  
Installation view



/1

»For years I have been taking photographs of the Port of Los Angeles. I am fascinated with the volume of shipping containers that occupy space in the port, how they are stacked and arranged, and how their colors and shapes formally relate to children's toy blocks,« says Heather Rasmussen, explaining her work »TransportTransform.« For her research, Rasmussen studies satellite images of the port, makes scale paper models of the containers, and draws diagrams to help structure the photos. She positions the paper containers according to the satellite image and then takes her pictures. The series »DestructConstruct« takes this idea of image choreography further. It is based on photos of accidents and mishaps during container transport, for example, stacked containers that have collapsed. Here the photos work like instructions for action, according to which the destroyed containers are positioned. The lack of context, white background, and confusing proportions mean that the observer no longer perceives the paper objects as containers, but as abstract shapes.

/2





# RAW-EDGES

## /1 Volume 2008

Pattern-cut chairs  
Paper, PU Foam

## /2 Form studies

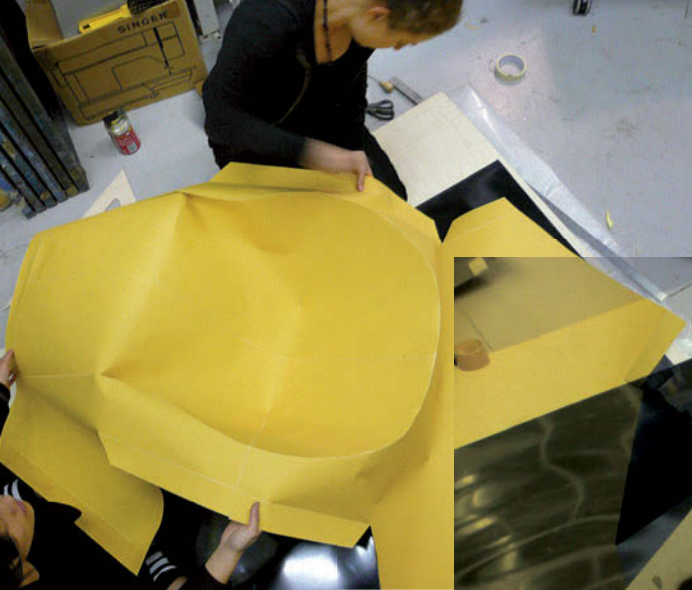
Scoring of the lines  
Folding of the form  
Pouring of the polyurethane mixture  
into the empty paper structure

Yael Mer and Shay Alkalay from Raw-Edges have created truly »custom-made furniture.« Similarly to items of clothing, they make their armchair and sofa series »Volume« using paper patterns. And almost as with a bespoke tailor, even the volume of the handmade armchair can be adjusted to suit the customer's needs.

To begin with, the designers transfer the selected pattern onto paper and cut it out. After folding along the lines, they fold the paper into a three-dimensional form and glue it together. Later they blend two-component polyurethane foam that is poured into the form through a hole in the base. The hollow space slowly fills with the polyurethane foam. After ten minutes the foam has fully expanded and hardened. The armchair is now ready for use.

/1





/2



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# TOBIAS REHBERGER

## /1 Kaputte Zwergenmutter 13 2004

Paper, foam, wire, wood  
87×35×28 cm

Courtesy neugerriemschneider, Berlin

## /2 Kaputte Zwergenmutter 7 2004

Paper, foam, wire, wood  
99×58×63 cm

Courtesy neugerriemschneider, Berlin

## /3 Mother Dying V 2004

Wood, wire, tape, paper  
Dimensions variable

Courtesy Galerie Bärbel Grässlin,  
Frankfurt am Main

## /4 Kaputte Zwergenmutter 17 + 16 2004

Paper, foam, wire, wood  
No. 17: ca. 117×27.5×27 cm  
No. 16: ca. 96×31×27 cm

Courtesy Galerie Bärbel Grässlin,  
Frankfurt am Main

German sculptor Tobias Rehberger was one of the first artists to introduce to art typical design-related issues such as, for example, functionality and emotionality. It was a gamble. After all, in the art business, so-called applied art was regarded as mere decoration and insubstantial, and contingent on market requirements. Rehberger defies these prejudices. His installations and designs adopt but also question the current zeitgeist at one and the same time. In his view, this uncertainty is the »best kick there is for art.«

The point of departure for the »Kaputte Zwergenmutter« group of sculptures was an invitation to a group exhibition entitled »Suburban House Kit.« Rehberger created this series of different-sized origami flowers for the 2004 exhibition at Deitch Projects in New York. The cheerful, brightly-colored plants are reminiscent of suburban gardens, yet on closer inspection you discover bent sheets and burn marks, which give the flowers a slightly morbid character.

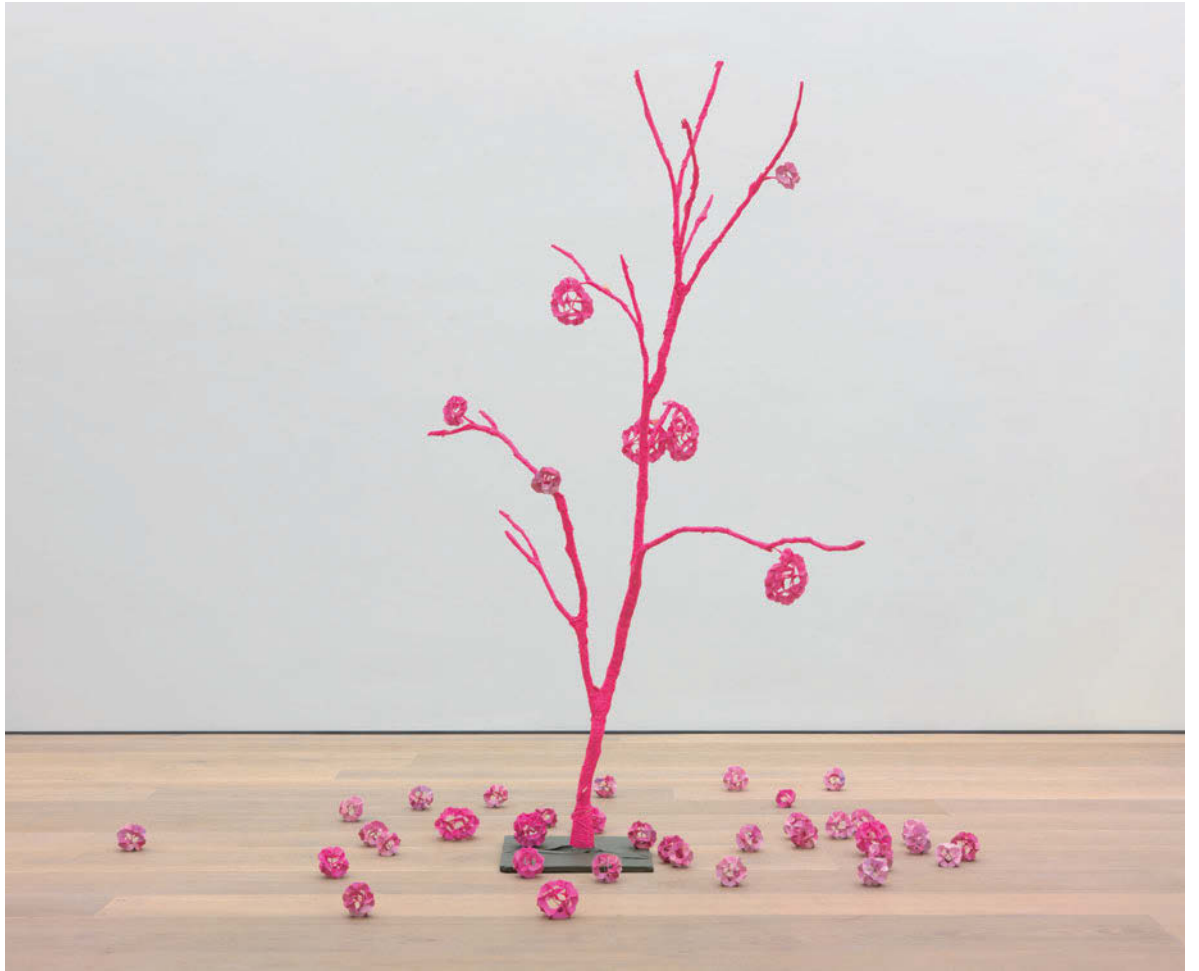


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73



74



# RON RESCH

→ see materials/technologies #75

## /1 Acoustical Panel 1979

Prototype out of cardboard  
Acoustical panel for the Showscan Film Corporation  
United States Patent, 1983

## /2 Basic Triangle Fold 1967

Installation  
»Made With Paper Show.«  
Museum of Contemporary Craft, New York  
Courtesy of the American Craft Council Library

## /3 Ron Dancing with Paper Fold 1959–1961

A single sheet folded with periodic triangle pattern  
Courtesy of the American Craft Council Library

## /4 Folded Square Module 1959–1961

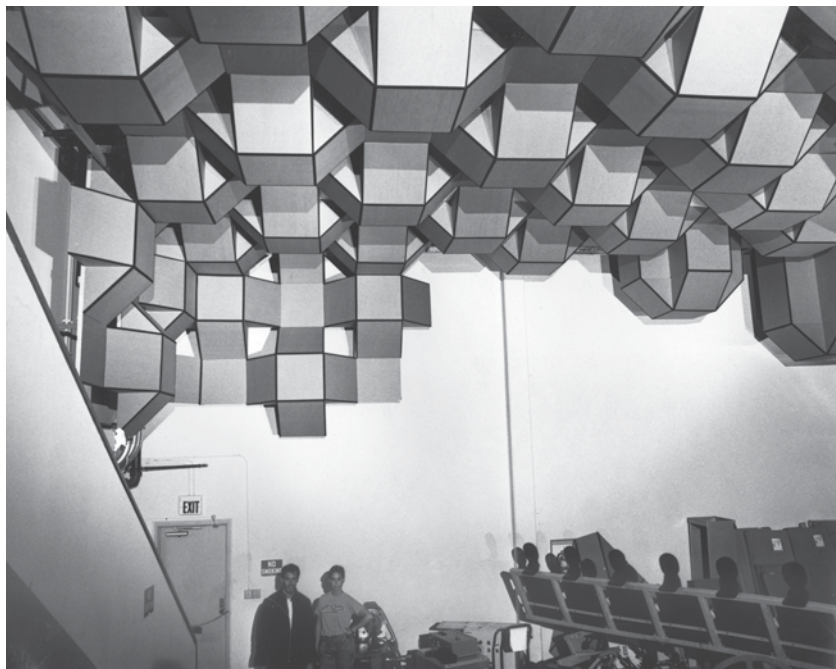
Modules from folded squares

## /5 Tetra Ball ca. 1970

Folded, curved score line unit

When Ron Resch started experimenting with folding paper, he was initially looking for particularly stable and aesthetically challenging solutions. Then, in 1961, he created modular models, which he called »folded mosaic patterns,« now known as origami tessellations. The modular patterns can be joined together and repeated as often as desired within a sheet of paper. These folds can create countless shapes, such as dome geometries. Whereas this discovery could be demonstrated using paper models soon afterwards, a precise calculation of the complex three-dimensional structures was not possible until 1971. That was when Resch developed a computer program at the University of Utah that enabled him to convert any space curve into a folding edge. The novel program allowed both the translation of two-dimensional curves into round three-dimensional folds as well as the visualization of the three-dimensional form.

Ron Resch's innovative folds are suitable for use in various fields. He has created both transport pallets with enormous load capacities from cardboard, as well as acoustic wall panels. However, his architectural structures are among his most important achievements.



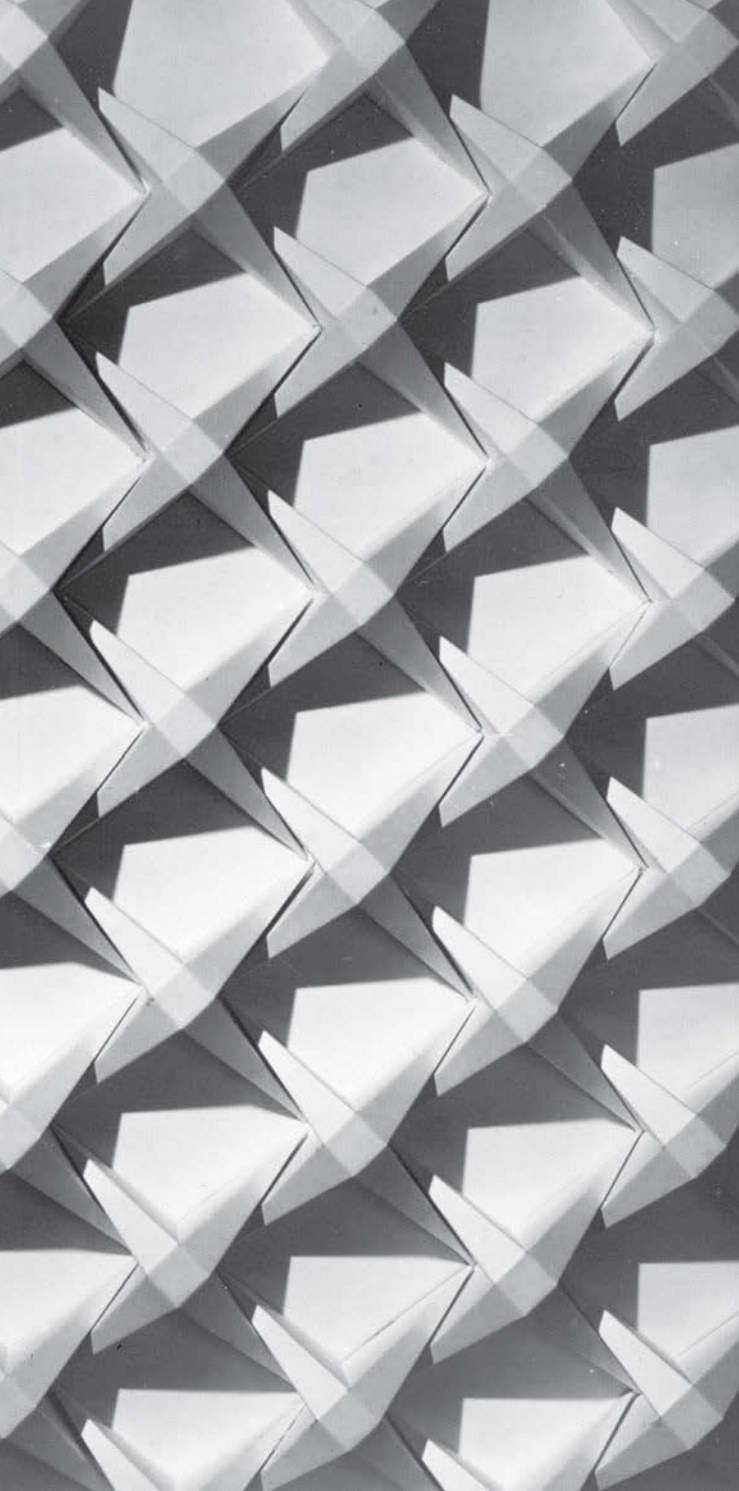
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## A Cardboard Suit for Scherpontwerp 2007

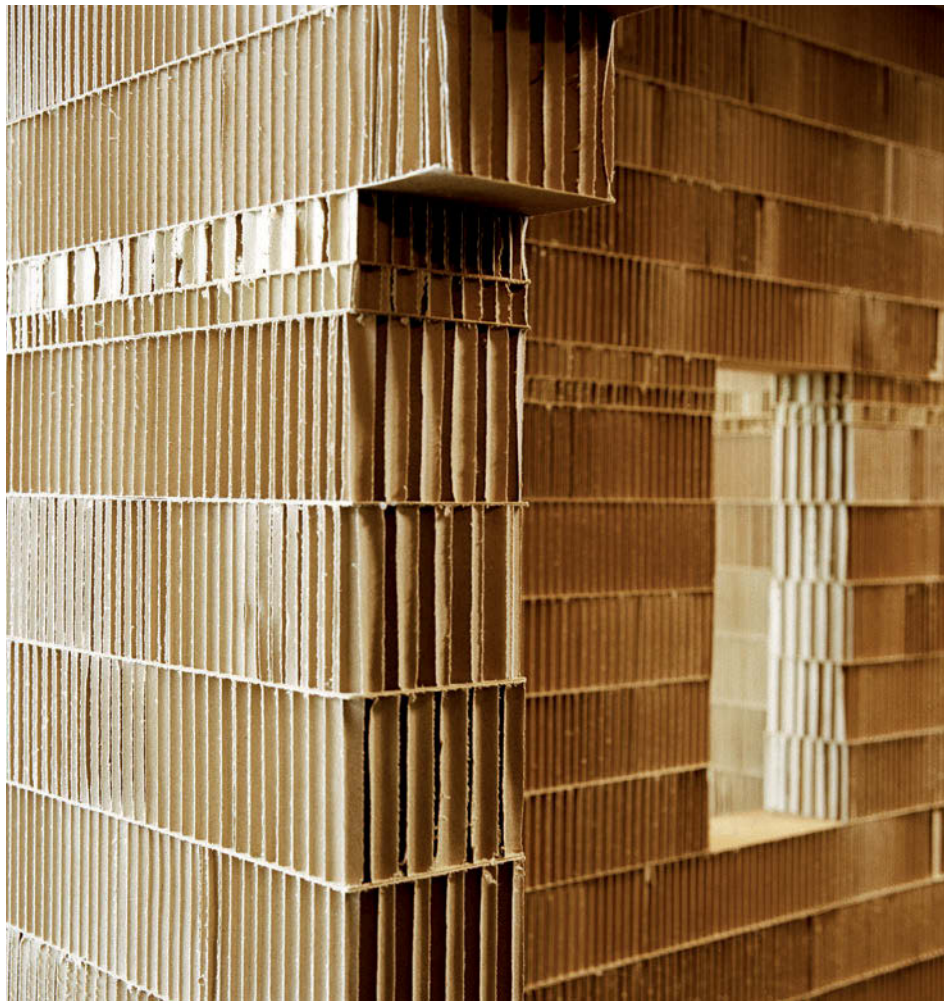
Cardboard office interior  
Shared office of Scherpontwerp and  
De Boekenmakers Publishers in Eindhoven



When, in 2005, the graphic design studio Scherpontwerp and the publishing house De Boekenmakers rented a new office in the center of Eindhoven on a five year lease, they asked RO&AD Architecten to come up with an interior design. The budget was tight due to the short rental term, and Ad Kil and Ro Koster faced the challenge of designing some 200 square meters of space with little money.

The designers, who base their approach on sustainability, decided that owing to the short lease, it would be sensible to use recyclable honeycomb cardboard panels. This stable and relatively economical material can be easily assembled and dismantled. Painting it with transparent acrylic paint protects the elements from damage, and a fire-retardant coating provides the necessary protection from fire. Moreover, the material's honeycomb structure is sound absorbent.

RO&AD made it their aim to give the office a clear structure. They would keep the open space and intersect it with just a long table. Today, work cubicles made from honeycomb sheets, and smaller meeting rooms, book-cases, and walk-in cupboards surround the generously sized conference room.



# MARINE ROUIT

## Oto 2008

Wall radio

Molded cellulose surface, audio vibrator,  
FM receiver, antenna

New technologies, especially electronic devices, dominate our daily lives. Yet how can we lend these cold, abstract technologies a more lively and sensitive character? In the thesis she wrote while studying at the ENSCI in Paris, Marine Rouit attempted to give electronic and technical products softer quality using paper. She created three objects from compression-molded cellulose, namely, the back-lit paper wall »Akari,« the digital notebook »Kuro,« and the wall radio »Oto« shown here. The molded part not only serves as a cover for the electronics, but also as a sound resonator. There is a radio receiver, audio vibrator, a battery, and an antenna integrated into the device. The surface of »Oto« is sensitive to touch, enabling the user to regulate the volume simply by touching the Braille-like structure on the surface.



# ADRIENNE SACK

## Hyperbolic Heptagonal Structure 2007

Origami studies for the visualization  
of mathematical functions

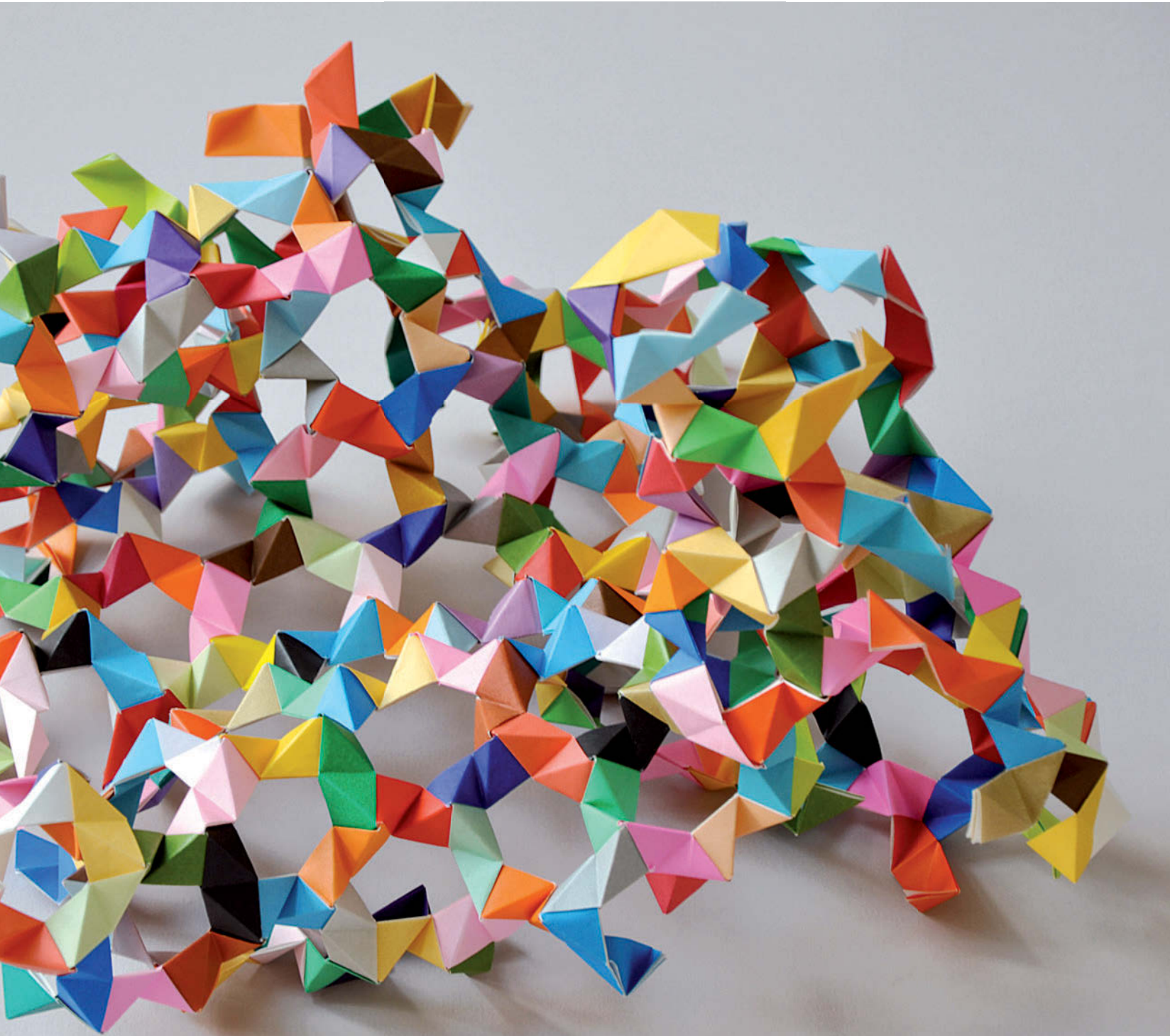
Paper, tape



The origami artist Adrienne Sack wanted to find out whether her lifelong obsession with origami could also teach her something about mathematics. She tried to gain a better understanding of the hyperbolic function with the help of an origami model.

Following a mathematician's instructions, she managed to visualize the function by joining seven equilateral triangles at their corners. Then she followed another expert's suggestion and joined several hexagons with an equilateral triangle to create a flexible structure. On the basis of these experiments, Sack started to understand how geometric shapes can be made from triangles. Step by step she translated this knowledge into origami figures. Finally she folded the hyperbolic surface from a structure of triangles she developed herself. Departing from the basic rules of origami, Sack made her model from several pieces of paper. Despite the fact that she broke a rule, the endless structure, which gives visual form to the mathematical theory, is an impressive origami work.





# INGA SEMPÉ

→ see materials/technologies #45

## /1 Lampe Extensible 2001

Prototype for a lamp

Light intensity grows with the height of the lamp

Tear-proof paper, metallic structure  
40 to 180cm

## /2 Double Stray 2008

Collapsible lampshade

Tyvek, metal  
33×29×29cm

Manufacturer: Artecnic

Inga Sempé loves folds. Her luminaires made from pleated fabrics for Cappellini have brought her international renown. When making her first prototypes, Sempé likes to use card, as it is easy to fold, extremely economical, and easy to get hold of. »Double Stray« is her first product of which the final version is also made of paper, or rather Tyvek. The flexible, white ceiling luminaire, based on the Chinese lantern, can be flat-packed and unfolded like an accordion. Moreover, the light shining through the fine Tyvek strips creates a varied moiré pattern.

»Lampe Extensible« also works on the basis of the tried-and-tested accordion principle. Thanks to a flexible metal structure inside the luminaire, it can be extended from 40 to 180 centimeters. And it is not just the size of the luminaire that increases, but also the intensity of the light it produces. For the time being, the innovative lamp is only a prototype made of tear-resistant paper.



/1









# CYGALLE SHAPIRO

## NurtuRing 2008

Mold for paper plates

»NurtuRing« consists of a bronze bowl and a negative mold of a corresponding stone basin. Together, they function as a press mold for paper bowls. Wet paper, thin cardboard, or plant leaves can be placed in the mold and pressed and dried to form bowls and plates. The bronze bowl is a structure made of three plate shapes flowing into each other, thereby enabling casts of different sizes. Thus she can make matching pressed salad bowls, soup bowls, and wide plates. In addition, the bronze bowl can also be used as a serving plate.

»NurtuRing« is Cygalle Shapiro's final project for her degree at the Design Academy in Eindhoven. The product is inspired by the industrial processes of compression molding and adapts them to the simple production of paper plates at home. In this way she can make interesting forms of environmentally friendly disposable dishware using a non-industrial method.



# SOUNDS OF SILENCE

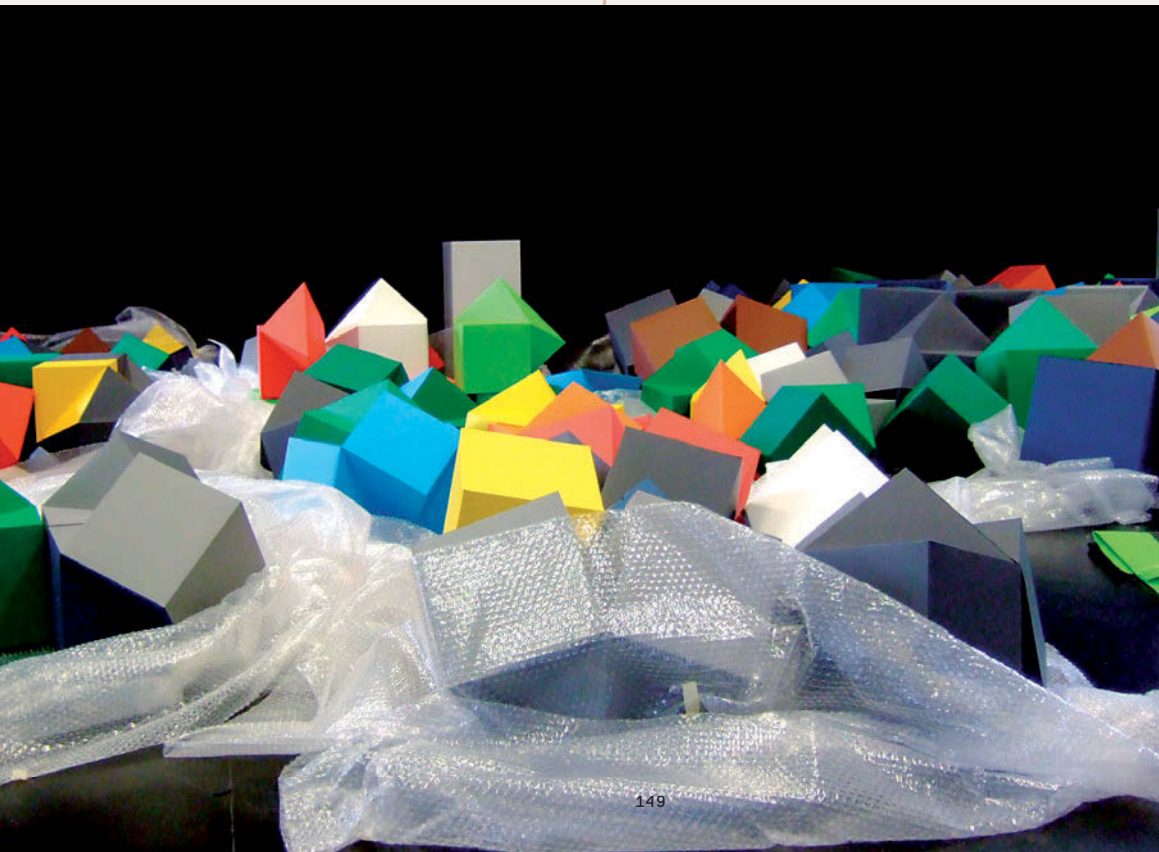
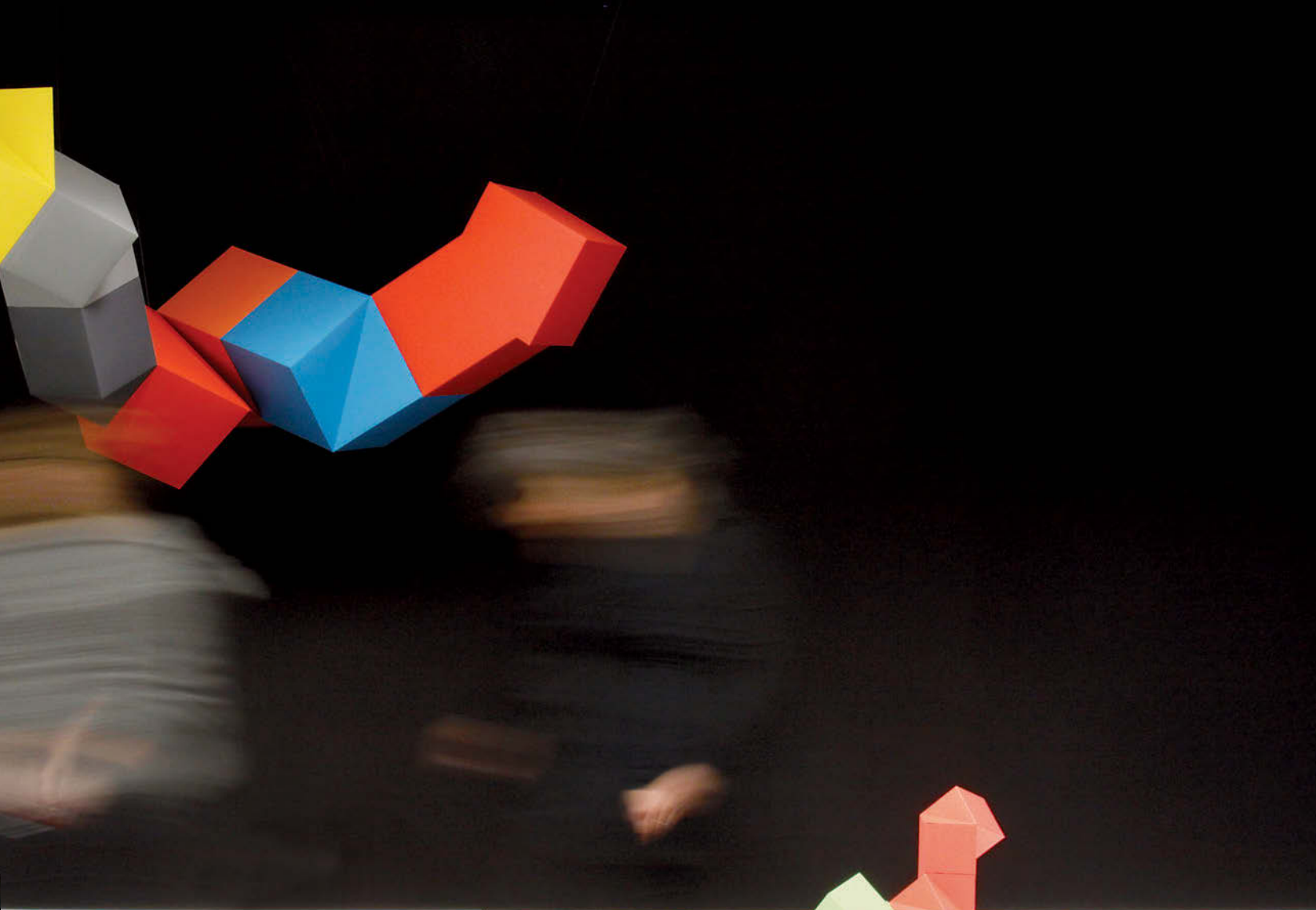
## Whim! 2009

Installation of 600 cardboard cubes in 11 colors  
Cardboard, adhesive tape  
saasfee\* pavilion, Frankfurt am Main

Sounds of Silence, the design duo Petra Eichler and Susanne Kessler's label, was previously known for its serene poetic installations. In 2006 their first work, made of eleven giant handmade silhouettes, represented a forest clearing. The spatial installation shown in an old Frankfurt movie theater was conceived as an invitation to visitors to relax away from the backdrop of urban noise.

In 2009 they returned to downtown Frankfurt with a strictly cubic installation displaying no sense of calm. In the Saasfee\* Pavillon, a temporary gallery, the two designers exhibited a work of colorful and wildly overlapping cardboard cubes entitled »Whim!.« The constellations of irregular cubes entwined in one another proliferated over walls and ceiling. There are of course no machines to create an individual work such as this. Each of the 600 A1 sheets of photo cardboard and the 1,500 meters of adhesive tape were transformed into the bold spatial installation by being folded by hand over the course of twenty days.





# MARIO STADELMANN

→ see materials/technologies #64

## Paperchair 2008

Chairs with compression molded seats  
Recycled newspapers



Before creating his »Paperchair,« Mario Stadelmann wanted to design a particularly light piece of furniture with a relatively short lifespan from recycled newspapers. In the course of extensive materials research, he developed a low-energy production process that benefits from the natural cohesion of cellulose. The seat of the »Paperchair« is compression molded from a mixture of recycled newspapers and water, binding agent, and pigments.

The Swiss designer does not, however, see materials just as passive means, but accords them a central role in the design process. The material blend, for example, absorbs and stores heat and, in contrast to its lightness, exhibits the aesthetics of heavy concrete. Compared with plastic seat shells, the material is certainly not as long lasting and is also sensitive to damp if not sealed. Nonetheless, its rawness lends the product a temporary character, which suggests that after a certain period of use, the »Paperchair« can once again be recycled.

# DIANE STEVERLYNCK

## Cardboard Covering 2001–2007

Blanket  
Used cardboard, linen  
Variable sizes

Belgian designer Diane Steverlynck's »Cardboard Coverings« are proof that the theme of recycling can also be realized in a poetic way. It is no coincidence that the color and surface of these blankets are reminiscent of brown cardboard boxes, they are made from reused corrugated cardboard. Diane Steverlynck has transformed this material, which is actually very rigid and »awkward,« into an incredibly soft and pliable fabric. The graphics on the former packaging are still visible and remind us that the blanket was once packaging material. Now the blanket has assumed the typical functions of a cardboard box, albeit in a different context: it insulates, protects, and is easy to transport.







# TOMMY STØCKEL

## /1 (Broken) Tree 2000–2006

Paper, wood, acrylic, foam, beams  
75×80×160 cm

## /2 Ist das Leben nicht schön? 2006

Honeycomb cardboard, paper  
240×360×100 cm  
Detail

## /3 From Here to Then and Back Again 2008

Paper, polystyrene, styrofoam, self-adhesive film  
80×90×2,000 cm

Courtesy Tommy Støckel  
and Helene Nyborg Contemporary



/2



/3

»Isn't life wonderful?« asks Tommy Støckel in an exhibition at Frankfurter Kunstverein. In the immense installation, Støckel blends strict modernist forms with the simplified images of computer-generated realities, thereby creating a minimalist futurism.

Sometimes this new futurism comes across a less perfect future and ends in decay. However, this does not devalue the work, but rather adds a surprisingly romantic dimension to the installation, whereby exciting arrangements of apparent trash appear, and suddenly even plant-like shapes flourish over the supposed garbage.

Nonetheless, the work would have a strictly instructive undertone were it not for the incredible precision that lends the handmade cardboard objects a certain irony.

# SHINJI SUZUKI

&

# TAKUO TODA

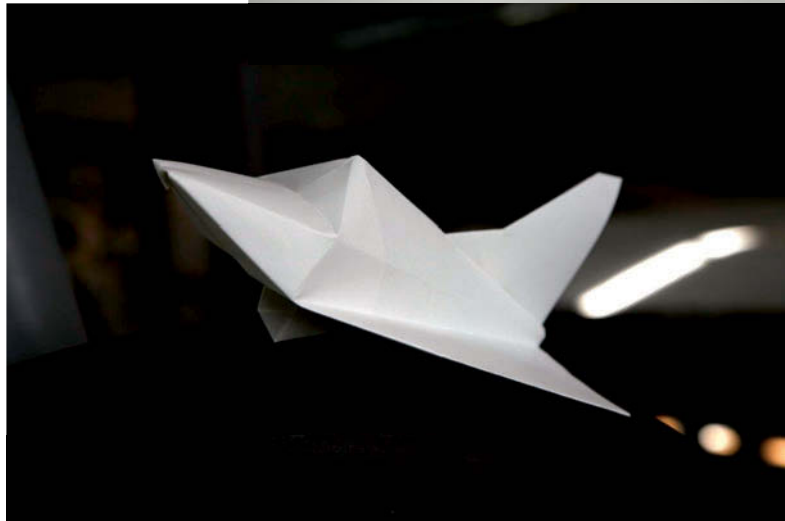
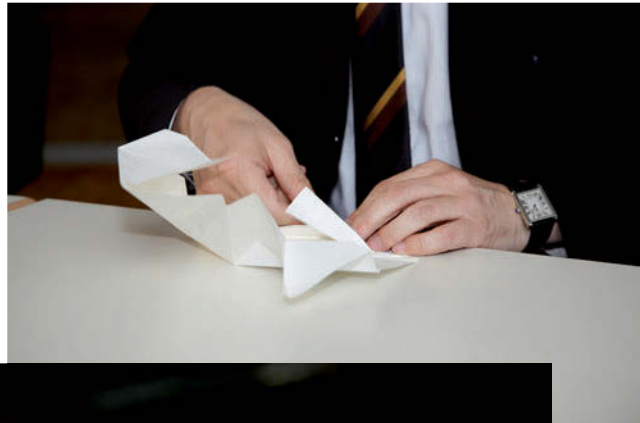
## /1 Orispace 2008

Paper planes for outer space  
Ongoing project at Tokyo University,  
Department of Aeronautics

## /2 Takuo Toda, 2008 The origami master and his work »Orispace«

»Paper airplanes thrown from space.« It sounds like a small boy's dream, and yet it could soon become reality. The Japanese scientist Shinji Suzuki and his team at the University of Tokyo are currently conducting research on »Orispace.« Together with the President of the Japanese Origami Airplane Association, Takuo Toda, the engineers are about to develop a paper craft that can return to Earth from space. But how is a paper plane supposed to endure reentry into the Earth's atmosphere without burning up?

Speed is the all-important factor. Thanks to the low fall velocity of »Orispace,« the extreme frictional heat during the descent through the dense layers of the atmosphere can be reduced. The glider is made of special paper composed of particularly long sugarcane fibers. These fibers are coated with silicone molecules that make the paper heavy, rigid, and hard, and at about 220° Celsius even lend it additional stability. For the sake of stability, Toda is even breaking the strict rules of origami by integrating several adhesive strips into the plane. Initial tests in the wind tunnel are said to have been successful.



/1



# RICHARD SWEENEY

→ see materials/technologies #17

## /1 Beauty 2007

Paper object  
Photographic commission  
for the Strategic Hotel annual report

## /2 Luxury 2007

Paper object  
Photographic commission  
for the Strategic Hotel annual report

## /3 Lazerian 2008

Paper dog  
Plotted 3D model, Carton  
90 cm tall

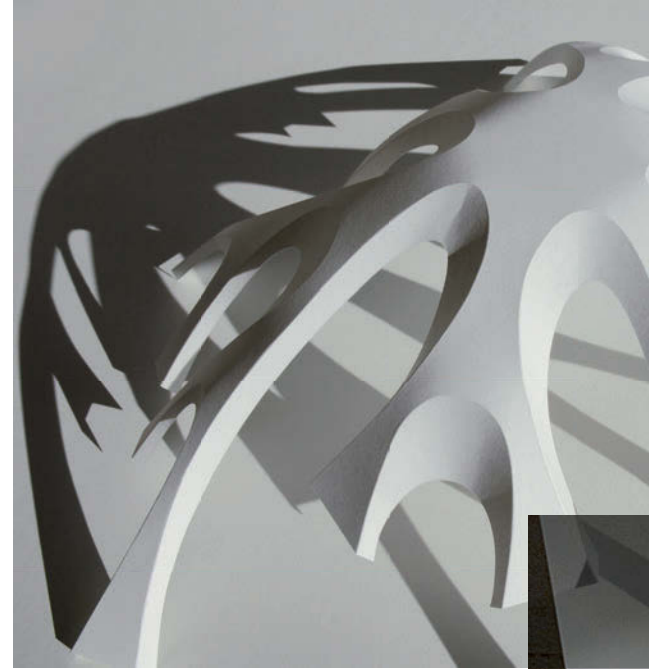
## Surface 2007

- /4 Under construction in the ex-tobacco factory, Lucca
- /5 Installation at the Piazza Cittadella, Lucca  
Cardboard, waterproofed with PVA  
400x200x200cm  
Festival of Arts »Cartasia« in Lucca, Italia

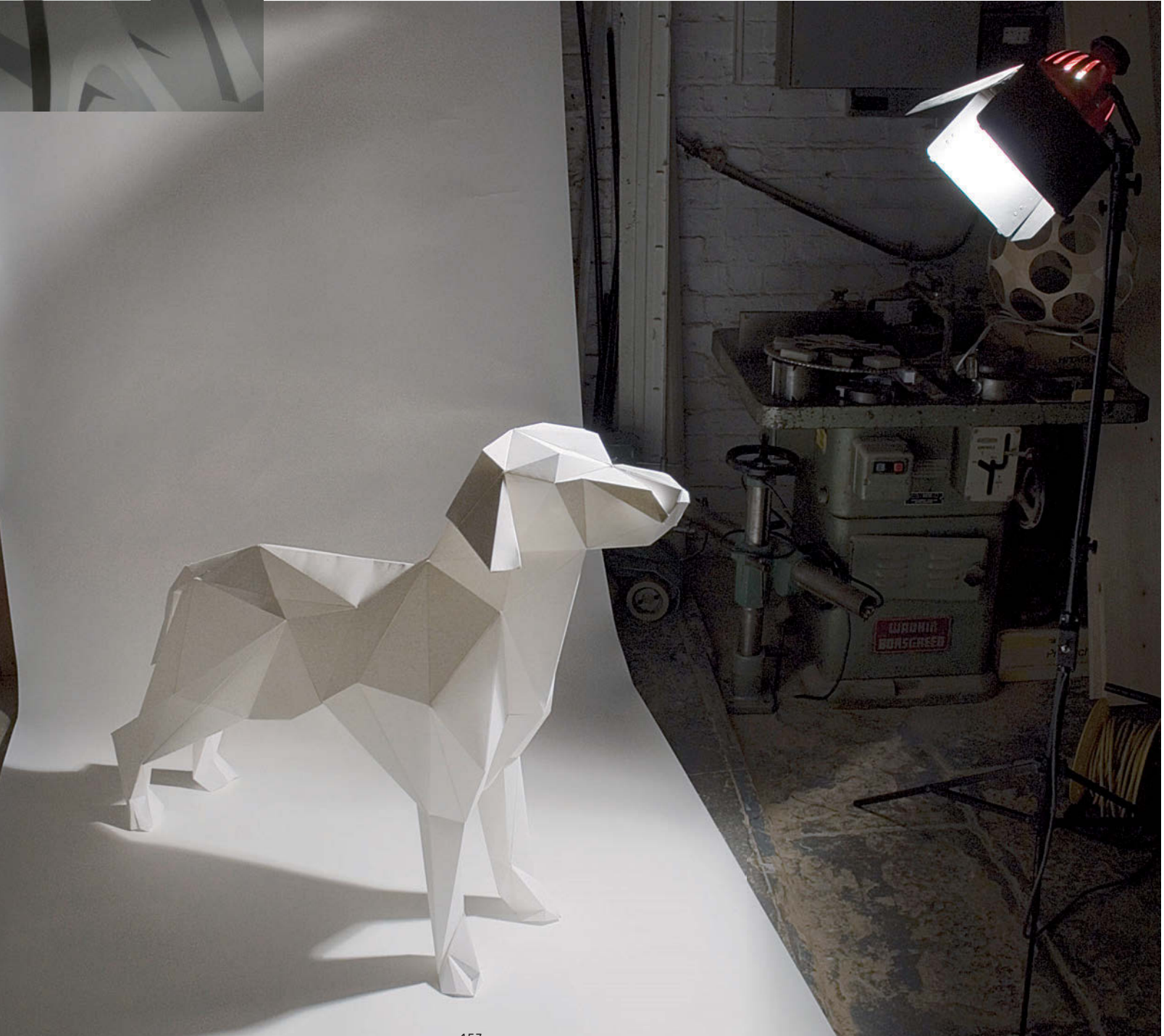
Richard Sweeney discovered his interest in paper folding when experimenting with materials. He combines repetitive geometric shapes and folding modules with computer-aided design and production techniques.

»Surface« is a temporary cardboard sculpture that Richard Sweeney designed in 2007 for the Cartasia art festival in Lucca, Italy. He combined corrugated cardboard, an underestimated material in his eyes, with a form developed through computer modelling that consists of an arrangement of intersecting slices. Sealed edges and a PVA coating made the components watertight.

Richard Sweeney also collaborates with Liam Hopkins. Their »paper dog,« for example, simply is a test object made of cardboard for a new cutting plotter. At the same time it was to be the mascot for Hopkins' label »Lazerian.« However, because the machine to be tested was too weak to cut the thick paper, they used the plotter to transfer the CAD data onto the paper, but then cut out the forms by hand. Sweeney folded the strongly beveled individual sections and then joined them with hot-melt adhesive. The triangular joints lend the sculpture additional stability. The 90 centimeter dog has yet to be named.



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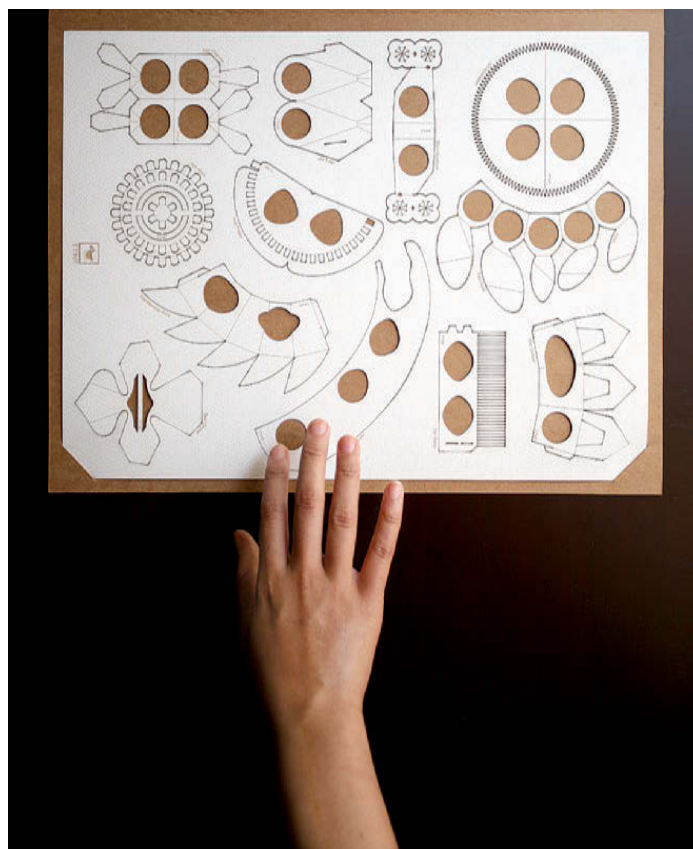
## All Year Rings 2008

Foldable paper jewelry

Laser-cut and engraved on textured white paper

Let flowers speak! TT:NT, the two London-based Thai women Tithi Kutchamuch and Nutre Arayavanish, explored the special symbolism of particular flowers and produced a collection of twelve foldable rings made of paper. The floral motifs of the rings were derived from the twelve flowers associated with the twelve months of the year, a tradition, they believe, that dates back as far as early Roman times. The chrysanthemum, for example, represents the month of November, while in December you should adorn yourself with orchids.

The »All Year Rings« were cut into cardboard sheets (200 g/m<sup>2</sup>) by laser. Buying the rings as a sheet of paper, customers can then separate and fold the appropriate flower ring each month themselves. Birthday cards containing a single ring with the corresponding flower of the month are also available.



# ROB VOERMAN

## Real Estate 2006

Installation at 2YK-Gallery Berlin  
Cardboard, Plexiglas, and other materials  
210×500×500cm  
Courtesy Upstream Gallery



With his improvised huts made of waste cardboard and wood, Dutch artist Rob Voerman creates a world that is far removed from any norms. His »Real Estate« installation, for example, consists almost entirely of used cardboard boxes, which given their improvised construction are reminiscent of primitive shelters for the homeless. However, once you enter the cave-like interior, a very different impression emerges: What seems to be the haphazard design of a hut turns out to be a sophisticated structure including a creative working area and an inviting bar. This retreat seems to be more of a deliberate counterdesign rather than an expression of poverty, it is reminiscent of the improvised fantasy buildings of the hippies who likewise sought to turn their backs on the highly technical Western world. From inside the hut, visitors can see into the exhibition hall through a large window, and vice versa. This interplay of private and public space emphasises the fact that Rob Voerman's sculptures often contain a socio-critical element. In a society in which terrorism and fear of the unknown are part of everyday life, we increasingly feel the need to be protected and a desire for intimacy.



## Public Farm One 2008

Installation at the PS1, New York

PS1 is an exhibition space for experimental interventions and an affiliate of the MoMA in New York. Every summer the institution invites artists and architects to design interventions in its courtyard. Here, architects provide elements of shade, seating, and water, thereby creating a sort of urban beach as a popular dream of fun and freedom. Yet WORK AC considered this dream image to be outdated, which is why they chose the motif of the garden as a visionary scenario for a better, more ecological world.

»Public Farm One« represents a blend of a rural way of life and urban space. It is made of recyclable cardboard tubes, the requisite electricity being generated with the help of solar panels, and rainwater for irrigation collected in cisterns. The cardboard tubes serve primarily as beds in which herbs, fruit, and vegetables can be cultivated. A unit consists of seven tube segments, with individual tubes reaching as low as the ground, thereby acting as columns to support the floating structure. The tubes, configured like cells, form a honeycomb pattern, with a central conduit left empty to allow gardeners access to their work.



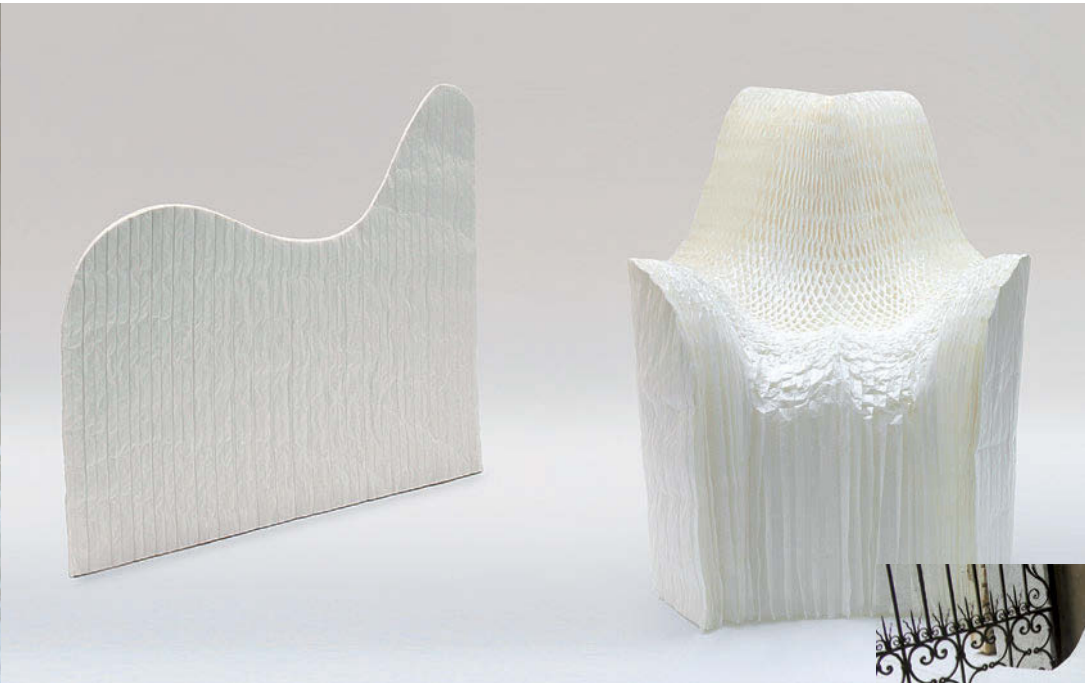


## Honey-Pop Chair 2001

Chair made of honeycomb paper  
79×81×81cm

Even though you cannot always tell from his designs, Tokujin Yoshioka is fascinated by nature. For Yoshioka, the light but nevertheless extremely stable honeycomb of a beehive represents the ultimate form of architecture. Inspired by the bee as a master builder, he used honeycomb paper for his »Honey-Pop Chair.« Not only is honeycomb paper very strong, it also integrates its users in the production process because it has to be fanned out from a two-dimensional shape into a three-dimensional seating sculpture. For his basic material, the designer processed a stack of 120 sheets of parchment paper to form a honeycomb structure which he then cuts in form. Once fanned out, the staple of honeycomb paper transforms into an armchair. However, as the material adapts to the person who is sitting on it, the ultimate shape of the seat shell will only emerge when it is used.

Tokujin Yoshioka likes to compare the discipline of design to poetry. This is why in the case of a chair, for example, his main interest is in what it feels like to sit on it rather than its construction or function. Comfort when sitting down—or even more so the feeling of floating in the air beyond gravity—is what he seeks to achieve in this work.



# MICHAEL YOUNG

→ see materials/technologies #73

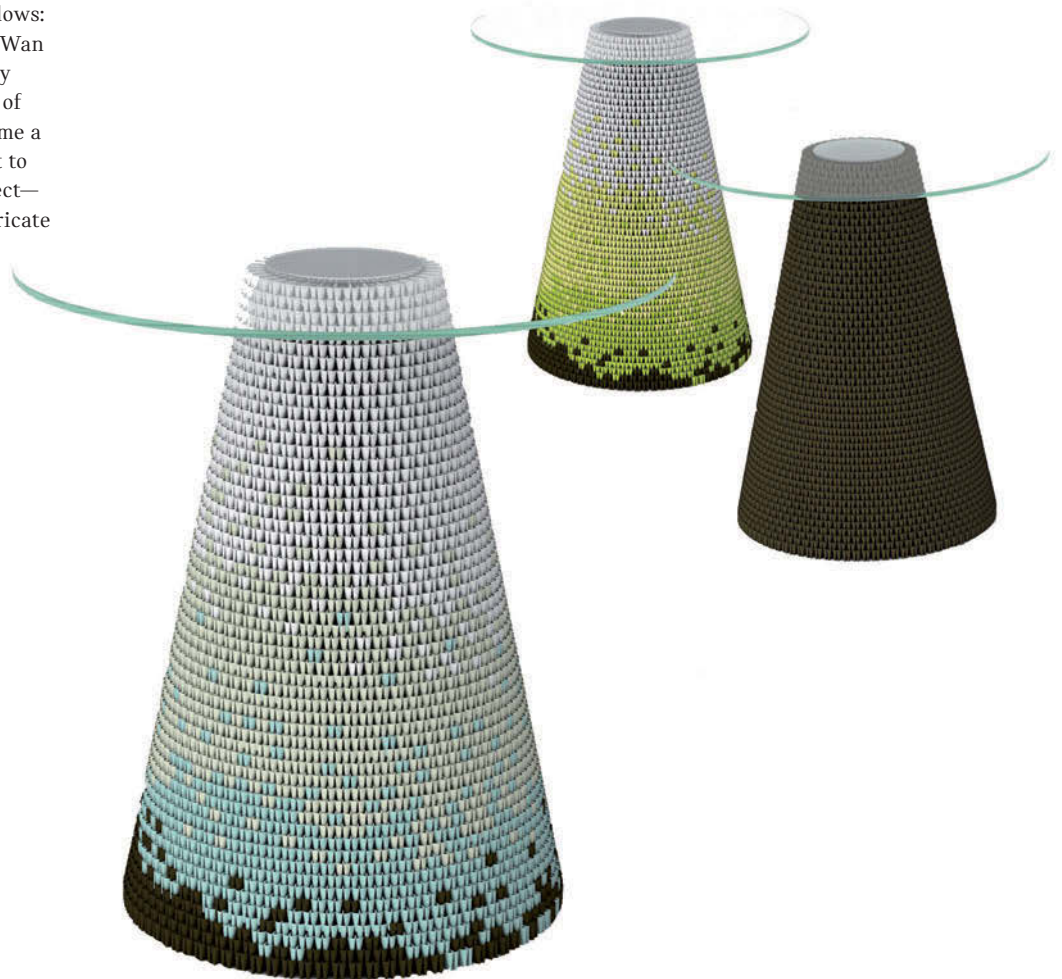
## Zipzi 2007

Tables

Paper elements, glass  
35 cm x ø 90 cm, 50 cm x ø 50 cm, 74 cm x ø 90 cm  
Manufacturer: Established & Sons

The British designer Michael Young has moved his studio from London to Hong Kong to benefit from the direct access to Chinese factories. The »Zipzi« table clearly demonstrates how he processes inspirations, as the basic material of the sculpture-like table—with a glass top—is astonishingly paper. For his design, Young has applied the technique of modular Chinese paper folding, also referred to as »golden venture folding.« Not only does the complexity of the interlocking folds create a fascinating texture, it also gives the table the necessary stability.

Today, the »Zipzi« table is part of the collection of the British furniture manufacturer Established & Sons, whose elaborately crafted individual designs gained them an international reputation. A folded paper ball, found in the streets of an industrial estate in Hong Kong, provided the starting point for Michael Young. He explains his experience as follows: »Walking through the streets of Sheung Wan in Hong Kong I was charmed to see a tiny little folded paper ball. My head was full of cold factories and machines which gave me a determination to work on what I thought to be this most regressive progressive project—an old Chinese technique of creating intricate objects by assembling folded paper—and thus the idea was born.«









**MATERIALS  
AND  
TECHNOLOGIES**



**INNOVATIVE PAPER AND MANUFACTURING  
PROCESSES FOR INTELLIGENT LIGHTWEIGHT  
CONSTRUCTION**  
Nicola Stattmann and Mareike Gast

Light, thin, recyclable, flexible, solid, rigid, and made from regenerative raw materials: these are the properties that distinguish sustainable materials used in lightweight construction. In addition to low density and volume, these materials should also be able to integrate functions that would otherwise have to be added using extra components. Furthermore they should be produced, processed, and recycled using energy-saving processes, with few tools and a minimum of logistics. The same topics can be found in current research in the paper industry and material science. These are jointly pursuing the goal of establishing paper as an ecological lightweight construction material. For some years now, engineers and scientists have been working on so-called »technical« paper. This is paper, the composition or processing of which has been modified so as to improve, for example, its stability and resistance to weather and water.

However, new, or at least modified manufacturing processes are required for this. Paper is made from pulp. As a rule this consists of water in which, alongside the usually wood-based cellulose, the filler material is also dissolved. The quality of the paper can be altered by changing the composition, by using alternative fibers, or by adding filler material with specific characteristics. In itself, this is not new. The same technique is used to modify printing paper or to make it more resistant. What is new, however, is the fact that it is possible to change the characteristics of paper in such a way that it can be used as a »building material« for three-dimensional objects.

We could only begin to fathom this when, in spring 2006, Frankfurt-based design consultancy Stylepark, whose subsidiary Stylepark Materials specializes in communications in the field of materials, asked us to develop a concept for an exhibition on a specific material. We chose paper because we wanted to show that even a »run-of-the-mill« material can possess high-tech functions. After all, everybody is familiar with paper and it is in everyday use, moreover, it is available in large quantities throughout the world at a relatively low price. This means that for the manufacturing of products from paper large investments and expensive tools are not necessarily required. And since lightweight construction, minimizing the use of materials, sustainability, and the reduction of components play a major role in all of our projects—both in the office and in teaching—we wanted

to find out whether paper used as a lightweight construction material would be suitable for constructing and producing complex and long-lasting products and buildings.

We defined the following parameters for global research into technical paper for 3D applications: the material has to be manufactured in a similar way to paper or consist of similar raw materials. It needs to be processed and shaped using the same technologies or processes as conventional paper or to possess qualities similar to paper, such as its feel, weight, and format. The results of this research amazed us. We discovered paper with undreamed-of qualities, offering possibilities we had never expected. For the subsequent section of the book we reappraised our 2006 research, complementing it with new developments. The chapter now comprises a compilation of particularly innovative paper types either already in use for manufacturing long-lasting products or at least suitable for the purpose. In our texts, we point out the untapped potential of a material or a process, so that in future designers and industry can realize these new possibilities of a particular paper.

Fibers, filler material, binding agents, and coating materials can be considered the parameters for certain material characteristics that can be varied according to requirements. For example, the length, grain size, structure, and direction of the fiber are the main criteria that determine the strength of a paper. And entirely new possibilities are opened up if the fibers are not, as was originally the case, made of wood-based pulp but of raw materials such as carbon, plastic, bamboo, or glass. They provide the material with completely new qualities, qualities untypical of paper. Unusual material characteristics can also be achieved by substituting common filler materials such as chalk and titanium oxide. If these are complemented or completely replaced by ceramic particles, metal oxides, silver ions, or pigments, the resultant paper boasts integrated functions and unusual material properties. Coatings can also lend paper new qualities. Such layers can be sprayed or laminated on as a film. Films made of silicone or other plastics can, for example, make paper waterproof or particularly tear resistant. Adding innovative components in modified manufacturing processes results in long-lasting and resistant paper. Today, paper can be water- and weatherproof, tear-proof, UV- and chemicalfast. It is a little-known fact that

in architecture steel girders are protected from heat by fire-proof paper foam cladding. By modifying the components, we can produce papers that conduct electricity and heat, or are antibacterial. They can also be carrier materials for electronic components, and switching circuits can be applied directly with the aid of »functional ink,« using ink-jet printers. Based on these innovations, in future, paper could be marketed and produced as a customized lightweight construction material. Developing and using this functional, sustainable paper requires creativity and an open-minded approach from research, industry, and marketing. Functional and hardwearing papers are no longer just for printing or packaging, but are used more and more for technical components or three-dimensional products. Cutting and folding these papers to industrial standards requires new technologies. CAD/CAM-assisted cutting plotters, folding and pleating machines, for example, can be employed in processing large quantities of paper. With these machines it is possible to produce stable constructions whose lines and folds that are also aesthetically satisfying.

Familiar or even very traditional techniques such as origami and origami tessellations as featured in this book can serve as examples for architectural supporting structures. These demonstrate on a small scale the variety of designs, the structural characteristics required, and the possibilities of producing large structures from small individual components. They can convey a notion of the kind of architecture projects possible in future and are also easy to produce using CAD/CAM. Today it is also possible to use technical production processes for plastics to make paper three-dimensional, alongside traditional hand papermaking or folding techniques. For example, extrusion processes can be used to produce weatherproof profiles from waste labels, and using foam molding technology products can be manufactured from foamed paper.

As all these examples demonstrate, paper is well suited to manufacturing complex products using one-shot industrial processes. The evolution of technical paper can well be compared to the development of technical textiles. When, a few years ago, it no longer seemed cost-efficient to manufacture »simple« textiles in Europe, both material scientists and engineers started working on high-performance textiles. The resulting fabrics displayed outstanding mechanical and

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/2



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/4



/1-4 PAPERLAB 2007

Exhibition at the design annual  
Commissioned by Stylepark and Messe Frankfurt

functional qualities. Since the mid-1990s, the integration of functional fibers into textiles subsequently known as smart textiles has been studied intensively. Today, we are familiar with these fabrics, with their outstanding mechanical and functional qualities, in a number of contexts including breathable sportswear textiles, wearable electronics, and innovative building facades. By integrating high-tech functions into textiles, the textile industry of the time succeeded in developing materials that were so innovative that they changed the entire sector. In our opinion, paper is going the same way. Papiertechnische Stiftung (PTS), the Technical Paper Foundation in Munich, is a research organization funded by the paper industry where new kinds of technical paper are developed. Solar paper and ceramic paper, which is fired into pure ceramics after being folded and shaped, are examples that demonstrate the enormous potential of paper as a raw material.

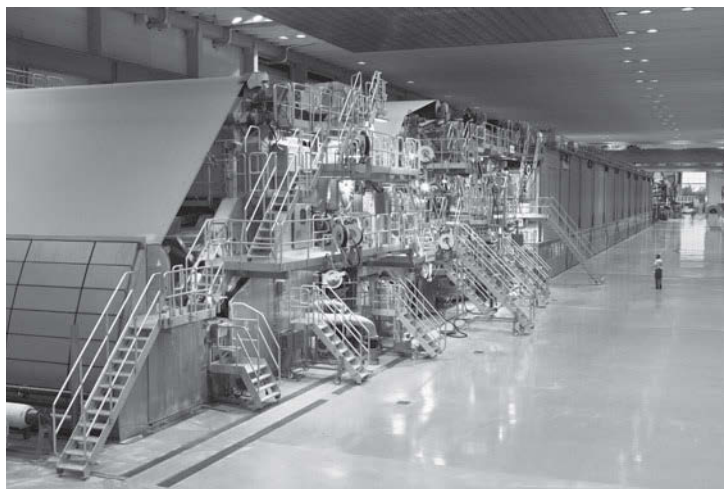
Lightweight construction using sustainable materials is one of the particularly important issues in product design. To develop sustainable products, however, more than just these two parameters have to be taken into account. As tests have overwhelmingly shown, the concepts for the use of a product must be developed and formulated very precisely. In future, the actual life span of a product or building and the mechanical strain to which it is subjected will need to play a more important part in the choice of materials and recycling concepts. We cannot justify or afford to manufacture products and construct buildings with a short life span from materials that are overqualified for the purpose. We consider the field of technical paper, alongside that of technical textiles and biotechnology, to be one of the most innovative areas in raw materials. Due to its high energy and water consumption, paper is not yet sustainable in the full sense. However, for some time now, enzymes have been able to considerably improve the process of pulp manufacture since they can replace a number of chemicals. As an alternative to pulp derived from wood, bacteria that produce cellulose are currently being studied. This opens up entirely new possibilities because it eliminates the complicated operation of processing wood pulp. For all this we are convinced that in future light, innovative, and well-designed products and buildings made of paper will become reality.





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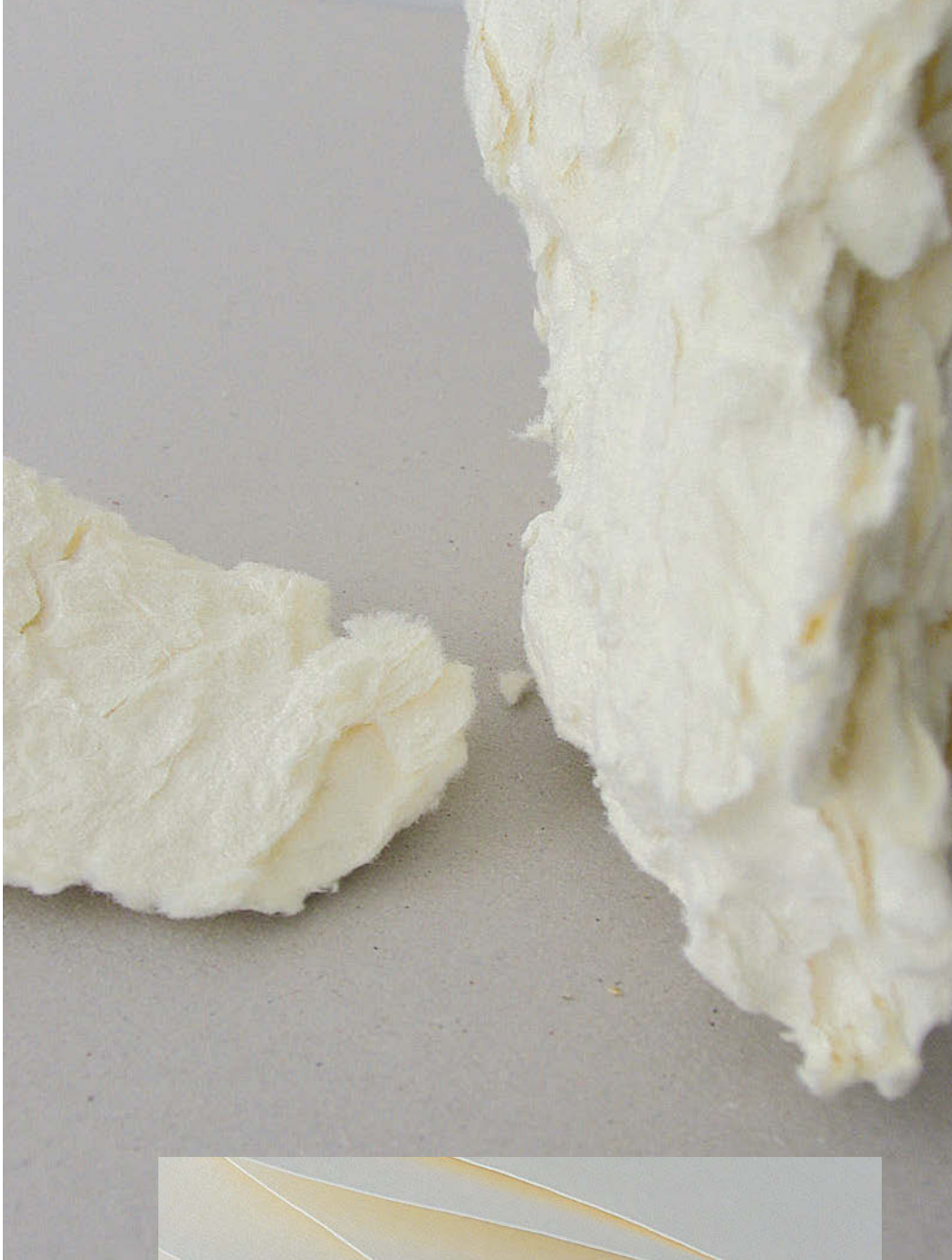
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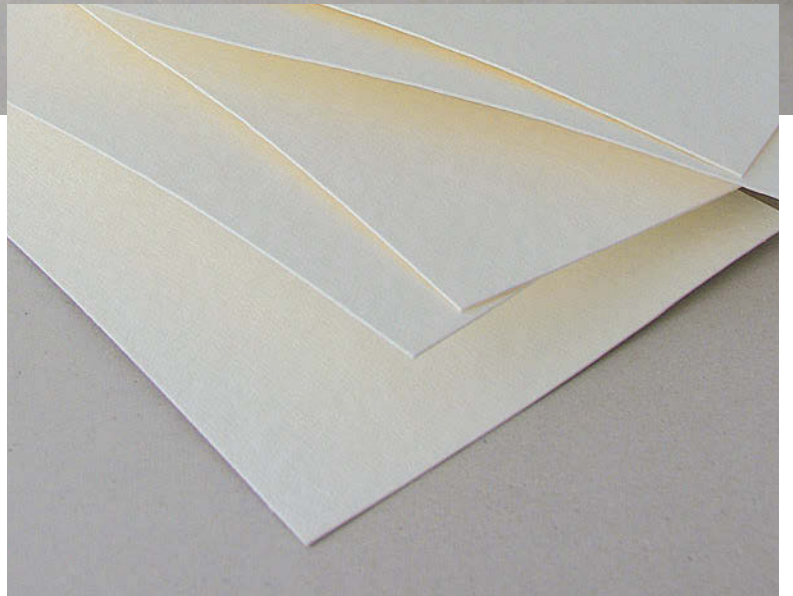
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PRODUCTION

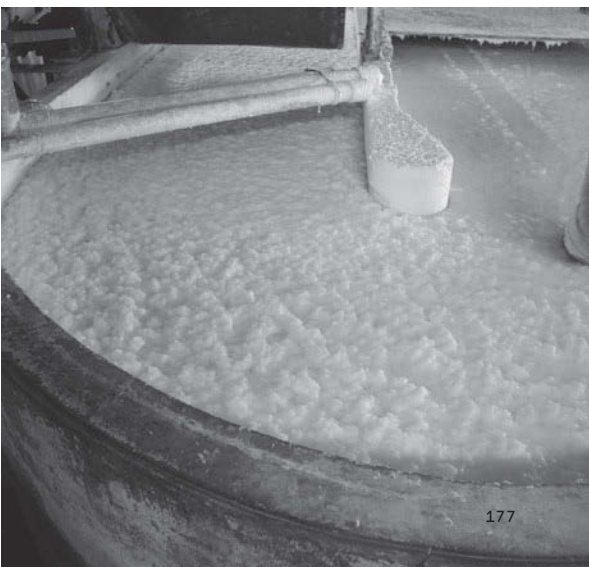


02 /1



02 /2

04



# 01

260×200×180mm

WASPS' NEST A wasps' nest is built in several stages. First, using their mandibles the wasps scrape off wood fibers in backward movements. They then roll the fibers into a small ball and transport this to the nest where the queen wasp chews it. Mixing it with saliva, she produces a paper fiber mixture from which she builds the nest.

The nests always open downward and initially have five to ten cells, for the most part in a slightly curved honeycomb shape. Depending on the size of the wasp population »extensions« are gradually added. In Central Europe, »German wasps« and »common wasps« can reach populations of up to 7,000, with nests of up to 40cm in diameter.

All real wasps build paper nests from wood fibers. Hornets and common wasps use decayed wood from rotting tree trunks and branches; their nests are light beige. All other species use superficially weathered wood such as deadwood from trees, posts and fences and their nests are grey. It is no coincidence that wasp paper is very similar to our paper: in Europe, at least, paper manufacturing derives from the observation of wasps. The model for many lightweight construction paper structures is also based on the honeycomb structure of their nests.

# 02

/1: 260×170×80mm

/2: 210×297mm

mass-produced

SCA Zellstoff GmbH

[www.sca.com/pulp](http://www.sca.com/pulp)

CELLULOSE AND PULP Cellulose is probably the most common organic compound found in nature. Together with lignin and pectin, it forms the structure of plant cell walls. Coniferous wood is the main raw material used for paper, as its long fibers ensure a high degree of rigidity. However, pulp and therefore paper can also be made from the cellulose of fast-growing plants such as cereal. There are two processes for the production of cellulose: the groundwood technique rarely used today, in which cellulose fibers are mechanically extracted from wood chips by milling, and the sulphate or sulphite method. In this process the cellulose is separated from the other wood components by cooking the wood chips in an alkaline sulphur solution. This produces brown cellulose which is suitable for making paper. To remove the brown coloration caused by the remaining lignin, subsequent bleaching is required. Only the cellulose remains. It is the basis of wood-free and thus nonyellowing paper. The mechanical process requires a large amount of energy, while the chemical process in common use today releases poisonous gases and pollutes large quantities of water. For this reason more environmentally sound processes are being developed.

In the Allcell or the Organocell processes, the accompanying wood pulp is extracted from the cellulose with the help of organic solvents using high temperatures and pressure and is thus sulfur-free. In the Biopulping method, enzymes that decompose carbohydrates are used to make the fibers more accessible. Enzyme mixtures are also used to pretreat the woodchips. This makes the wood structure more flexible, requiring less energy for milling in the mechanical defibrillation. The development and use of these technologies significantly reduces environmental pollution.

## 03

technology

Stora Enso  
Kvarnsveden Mill

www.storaenso.com

**PAPER PRODUCTION** Modern paper machines such as Stora Enso's Kvarnsveden Mill shown here produce 1,750 meters of newsprint paper with a width of more than 10 meters every minute. This equates to almost 300,000 A4 pages a minute. The machine conveys the pulp, consisting of cellulose, filler materials and water, with a scoop-wheel onto a screen and removes the water by vacuum. The paper is then pressed through calenders and dried on heated cylinders. It can then be finished with an adhesive coating if required. This creates an excellent printable surface on one or both sides.

## 04

mass-produced

Onao Co., Ltd.

www.onao.co.jp

Eriko Horiki & ASSOCIATES

www.eriko-horiki.com

**WASHI** Traditional Japanese paper is referred to as washi. It is notable for its special visual and tactile qualities, as well as its high tear resistance and rigidity. Washi is made from the bark of small shrubs such as Gampi, Mitsumata and Kozo, the properties of which vary depending on the plant used. Gampi paper made from the Gampi bush, which is difficult to cultivate, has a shiny surface and is almost transparent. The fibers of the Mitsumata bush are very fine, while Kozo (mulberry paper) is the most commonly used paper and is noted for its particular resilience. The production process plays an important role in the quality of washi: the bark is not cut but beaten and crushed so the long fibers remain intact. After the fibers have been cleaned, beaten, and bleached, water and Neri, a slimy substance made from roots which prevents the fibers from clumping, are added. With the help of special screens with removable bamboo mounts, the paper is scooped into layers and the number of these determines the thickness of the paper. Fibers can also be set between the layers. Moreover, the various layers can be produced in different colors. This is possible when pulp is poured over the screen instead of being scooped. Finally it is pressed and dried. Watermarks can be added as perforation by masking the screen.

Washi is predominantly used for Shoji walls. The designer Eriko Horiki makes use of the distinctive properties of washi and produces lengths of paper up to 20 meters long, which are stabilized and decorated by fiber lines shaped by hand. This paper is then used for stage backdrops and light installations.

## 05

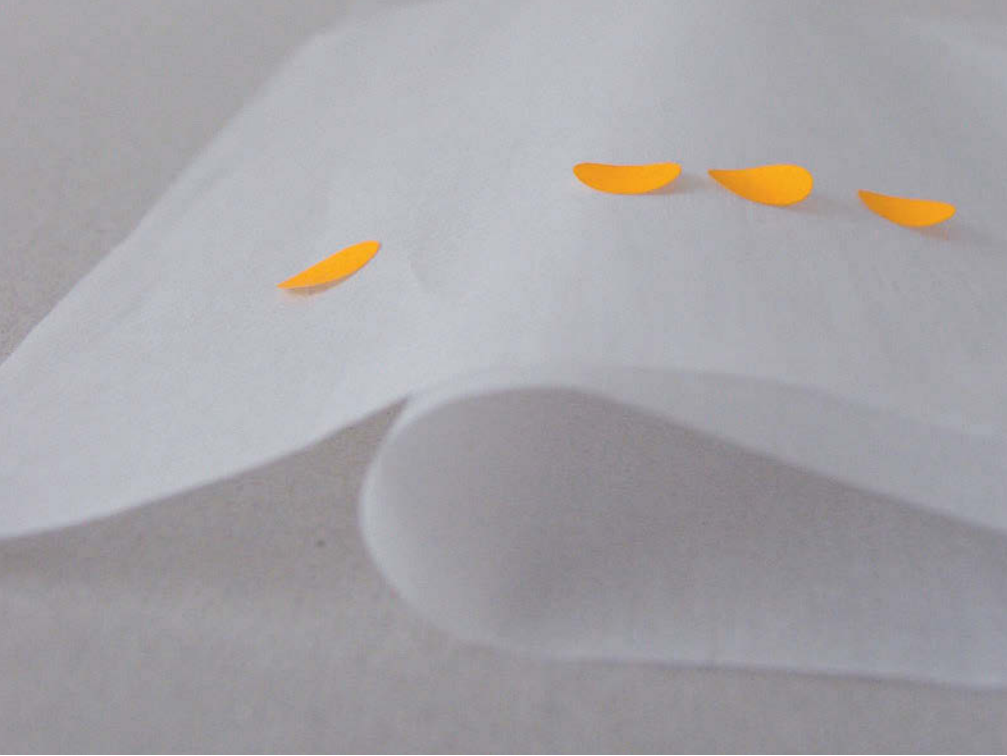
70×70×0.5mm

scientific research

KTH, Royal Institute  
of Technology

www.kth.se

**NANOPAPER** Nanopaper consists of the same components as conventional paper—only the cellulose molecules in the pulp, the so-called fibrils, are reduced to nanometer size. In an environmentally sound process, the cell walls are dissolved and refined either mechanically or by adding enzymes. The smaller fibers display better adhesive properties and create an overall more homogeneous paper with fewer large or irregular cavities, so greatly increasing resilience. The tear resistance in particular is extremely high. It is fascinating that these outstanding properties can be achieved through the size of the fibrils alone, without the need for any additives. At present, experiments are being conducted with potato starch as a filler material in order to intensify the properties of the Nanopaper still further. It is a high-tech material made from 100 percent renewable materials.

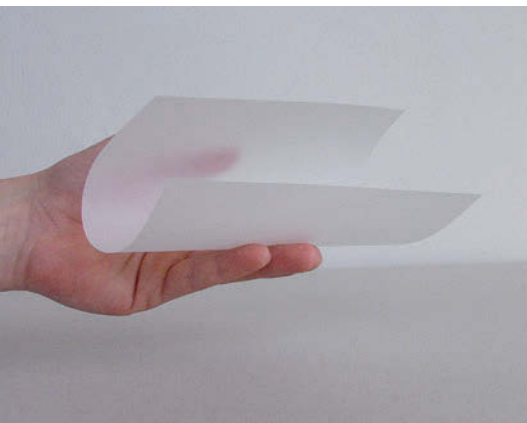


06

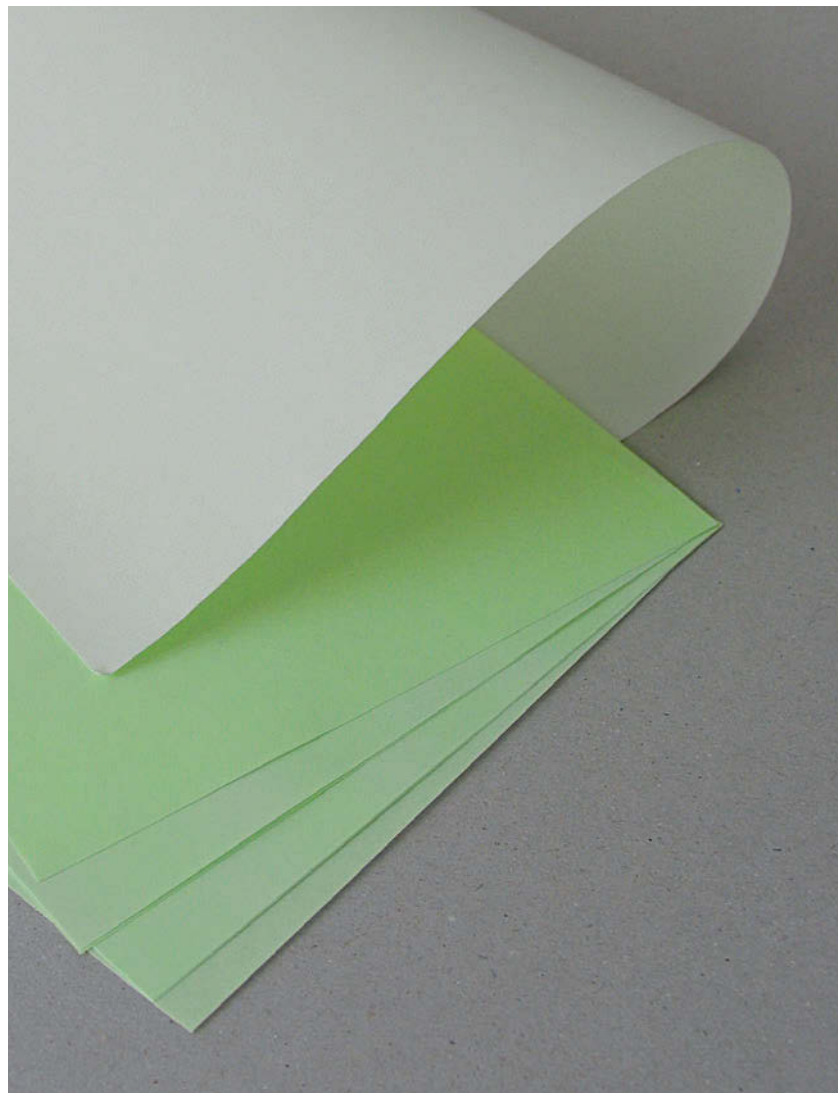


09

07 /1 /2



08



## 06

210×297mm

mass-produced

Huchtemeier Papier GmbH

[www.huchtemeier.com](http://www.huchtemeier.com)

**SILICONIZED KRAFT PAPER** Coating this kraft paper with silicone on one or both sides ensures that it is nonstick. This makes it ideal, for example, as a base for adhesive labels. The use of silicone means the kraft paper can resist temperatures of up to 300° Celsius and is also waterproof. Moreover, the paper has a distinct soft and smooth feel to it. These characteristics could have interesting applications in product design.

## 07

/1: 150×150mm

/2: 210×297mm

mass-produced/scientific research

Brightech, Inc.

[www.brightec.com](http://www.brightec.com)

INP Grenoble—PAGORA

[pagora.grenoble-inp.fr](http://pagora.grenoble-inp.fr)

**GLOW-IN-THE-DARK PAPER** This paper contains photoluminescent particles which make it glow a pale green in the dark after a certain amount of exposure to daylight or artificial light. This effect has been used for postage stamps for years, enabling automatic franking machines to recognize invalid stamps and to sort out letters for which postage has not been paid. The glow-in-the-dark particles are either contained in the pulp or are applied by a binding agent or foil. Researchers at the Institut National Polytechnique de Grenoble/Pagora have succeeded in chemically modifying the cellulose fibers so that they absorb large quantities of phosphorescent particles or so-called colloids and thus become phosphorescent themselves. This significantly increases luminescence without affecting rigidity. In conjunction with other coatings the »luminous craft paper« could also be applied to outdoor or safety products.

## 08 →

see projects B88

190×190mm

mass-produced

M-Real Zanders GmbH

[www.zanders.de](http://www.zanders.de)  
[www.m-real.com](http://www.m-real.com)

**TRANSPARENT PAPER** The properties of paper are largely dependent on the type of milling or fiber-grinding used. Transparent paper uses a »slushy milling,« in which widely spaced blades or a basalt stone blade produce slow, protracted milling. The fibers are not cut but compressed, so producing a swelling, slushy fiber slime which dehydrates slowly in the subsequent manufacturing process. This makes the paper transparent, particularly strong and largely tear-proof. Given these special properties it could have significant applications in product design. Through folding stable, semitransparent lightweight constructions could evolve. »Zanders Spectral,« which is produced by M-real Zanders, is a transparent paper which is also excellent for inkjet printing, has a special weight of 200g/m<sup>2</sup>, and is available in a variety of colors.

## 09 →

see projects B84

130×80mm

prototype

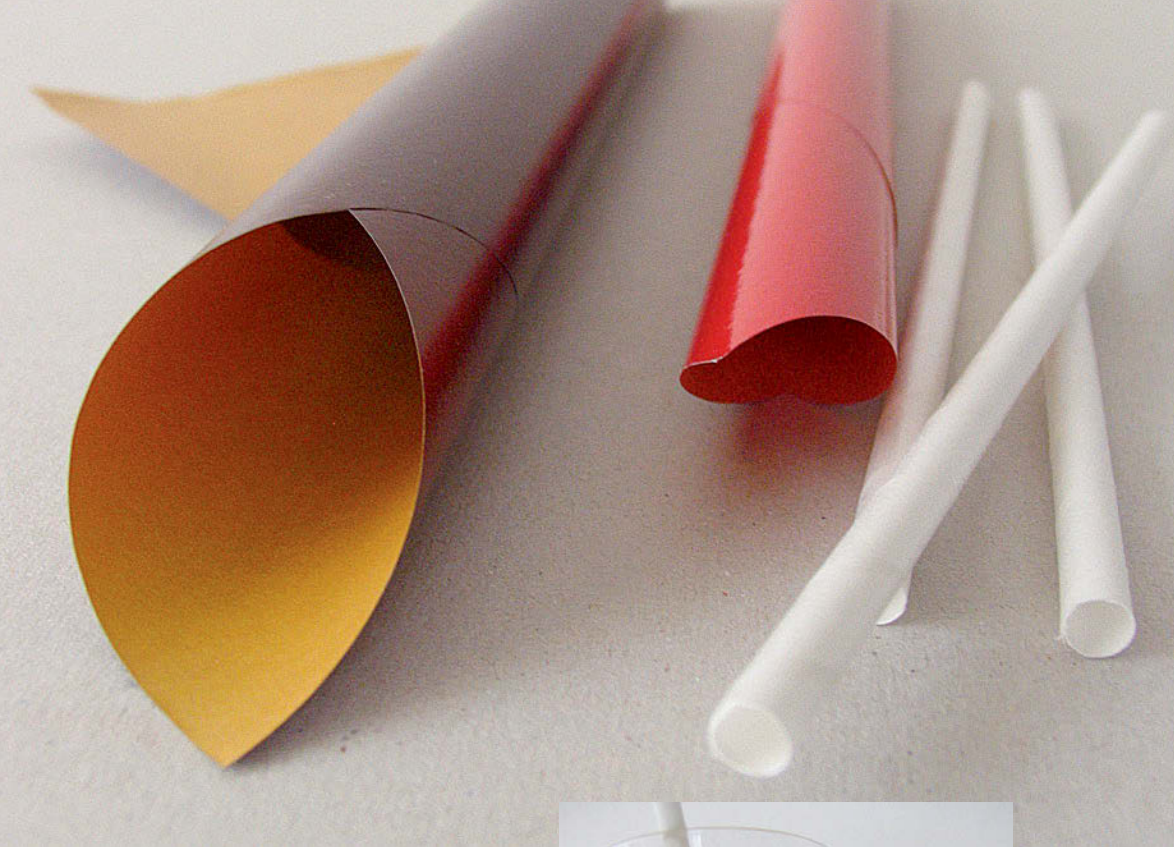
Industrial Facility  
Sam Hecht

[www.industrialfacility.co.uk](http://www.industrialfacility.co.uk)

Takeo Co.,Ltd.

[www.takeo.co.jp](http://www.takeo.co.jp)

**HAPTIC PAPER CUP** This is the design for a translucent paper cup submitted by British designer Sam Hecht for the »Haptic« exhibition at the Japanese Takeo Paper Show. In this project, Hecht has designed a high-quality transparent cup, in contrast to standard paper or plastic cups: »Using transparent instead of conventional paper to make a cup might seem very simple to many. However, the »Haptic Cup« is more than a cheap mass product, drinking from it is a sensual and aesthetic experience. The material is restrained in appearance, unlike glass and plastic, and is far more honest—like paper, which is very closely related to the natural material wood.«  
Sam Hecht's vision of a transparent paper cup can be achieved with today's technology. It does not compromise the taste of drinks and furthermore would replace disposable plastic cups, thus contributing to environmental protection.



13 /1 /2



14



11





12



10

## 10

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210×297mm  
mass-produced

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Neenah Lahnstein GmbH  
www.neenah-lahnstein.de

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WATERPROOF PAPER »Neobond« paper is a particularly durable and hard-wearing material consisting of a cellulose and synthetic fiber blend which is also waterproofed. It is notable for being highly tear-proof and for its folding strength, light- and colorfastness, not to mention its considerable dimensional stability when both wet and dry. Moreover, the paper, as well as being waterproof, is resistant to organic solvents and to temperatures of up to 180° Celsius. Given these properties the paper is a popular material for drivers' licenses, entrance tickets, index sheets and suitcase labels. As the paper resembles plastic in many of its properties, such as durability and water resistance, it has potential for applications in outdoor products and in mobile architecture.

## 11

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50×50×40mm  
mass-produced

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Genpak  
www.genpak.com

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FOLDED PAPER CUPS The paper cup is a typically American invention which was introduced in the early 20th century and was intended to increase the hygiene of public water dispensers. The folded cups shown here are still a standard item in American fast-food restaurants today. They are made of coated translucent paper and come in various sizes. In the production process, round cut-out sheets are folded into cylindrical forms and then the edges are rolled very firmly outwards. The concave bottom, the vertical folds and the stable rolled edge lend the paper cup its immense stability. This example shows that even complex folding processes are suitable for mass production.

## 12

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195×130mm  
mass-produced

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Melitta  
Unternehmensgruppe Bentz KG  
www.melitta.de

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BAMBOO PAPER For ecological reasons Melitta's filter paper is no longer made solely from chemical wood pulp but is composed of 60 percent bamboo. With its wide propagation and rapid growth, this agricultural plant helps to conserve trees. The proportion of bamboo used in this particular product is limited, however, as the ecological material is less stable and tear resistant, and the embossed seams on the side of the filter require a certain amount of strength. Other rapidly renewable raw materials are eucalyptus, grasses and straw. These are suitable for paper production but not for coffee filters, as they would affect the flavor.



# 13

.....  
 /1: 210×297mm  
 .....  
 /2: 205×7mm  
 .....  
 mass-produced  
 .....  
 STEPAh NV  
 .....  
 stepah@introweb.nl

**BIOPOLYMERS AND PAPER** The purpose of packaging paper is to keep food fresh and protected. As such it needs to be airtight, steam-proof, fat-resistant and waterproof, as well as impermeable to odors and substances. This is usually achieved by laminating various foils made of aluminum or the plastics PS (polystyrole) and PE (polyethylene), which due to their sandwich construction, however, are very difficult to recycle. Now, for the first time, STEPAh has succeeded in producing barrier layers with a coating of biodegradable plastics. Two bioplastics called »SoluSol« and »Eco-Bar« made of whey and lactic acid form the basis of various packaging papers. When coated with these materials, paper and cardboard gain excellent barriers against aromas, moisture and fat. »Eco-Bar« is one of the few monolayer packaging materials suitable for the food industry which can replace the above-mentioned packaging foils. If the plastic »SoluSol« is added, the material can even be used to make containers for acidic fruit juices. This packaging biodegrades extremely well. In compost, microbes decompose it completely in 30 to 50 days.

# 14

.....  
 /1: 149×210mm  
 .....  
 /2: 600×600mm  
 .....  
 mass-produced  
 .....  
 Sihl GmbH  
 .....  
 www.sihlgroup.com

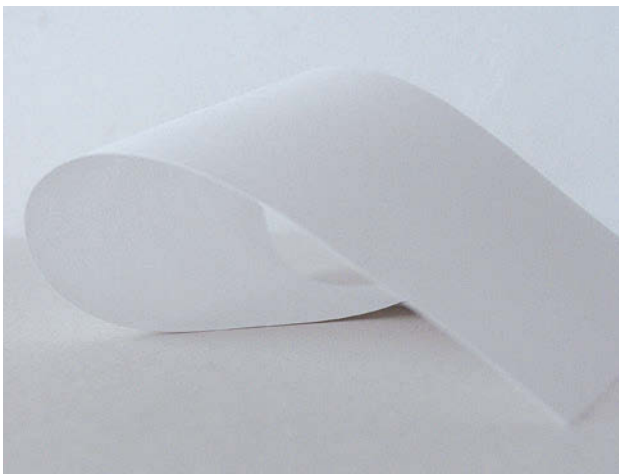
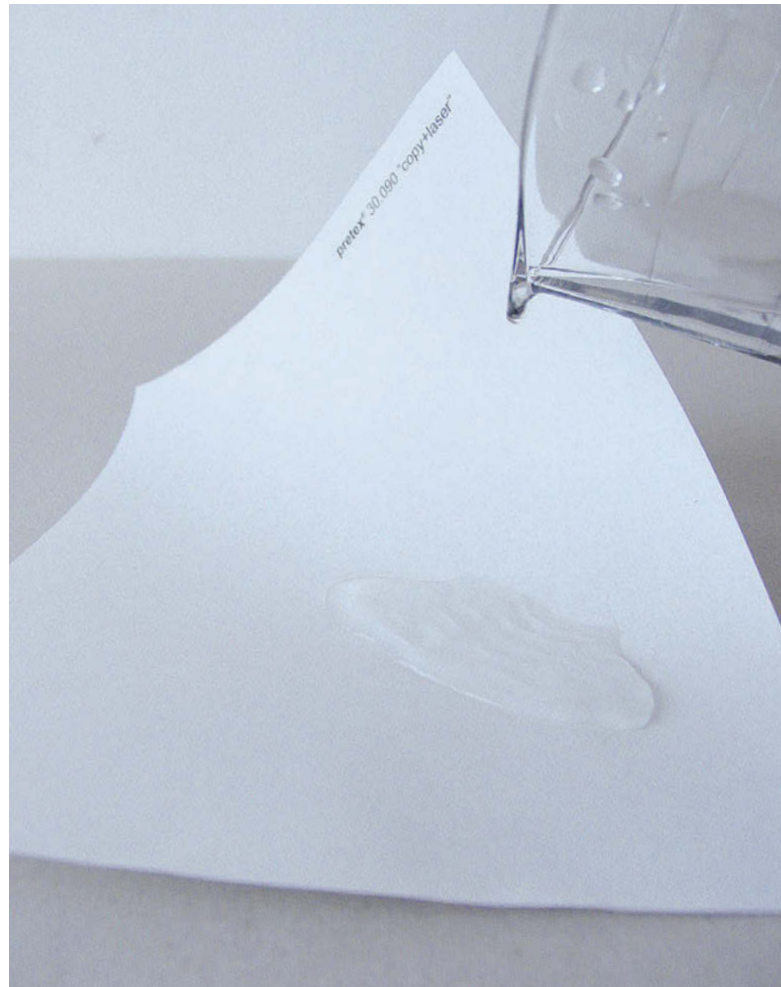
**TEAR-PROOF PAPER** EnDURO is a composite material made of paper and film (OPP or PET). The paper forms the outer layers while the foil serves as a sturdy intermediate layer. In this way EnDURO combines the properties of both materials: it is tear-resistant and water-impermeable like plastic, but its surface feels exactly like paper, and is ideal for folding and printing. It comes in additional versions such as EnDURO Effect, characterized by a gentle silver or gold shine. EnDURO Ice is a tear-resistant transparent paper which is printable like normal paper and does not turn white along the fold lines, as would normally be the case. EnDURO can be used e.g. for envelopes, folded cards, bags, and book covers.

17 /1



17 /2

16



15

# OUTDOOR PAPER

## 15

210×297mm  
mass-produced

Awa Paper Mfg. Co., Ltd.  
www.awapaper.co.jp

**BREATHABLE PAPER** Polyethylene and polyolefin fiber are the basic ingredients of this material from Japan. The manufacturing process, however, is comparable with that of paper and even the material's surface properties, diameter and flexibility are very similar to thin paper. Unlike most types of paper, however, it is waterproof, permeable to steam and air, and resistant to most acids and bases. What is remarkable is that on the one hand this breathable material has the qualities of paper and on the other it operates like a functional membrane. The paper introduces new material properties and structural possibilities which could prove to be interesting for the production of clothing and outdoor products.

## 16

210×297mm  
mass-produced

Neenah Lahnstein GmbH  
www.neenah-lahnstein.de

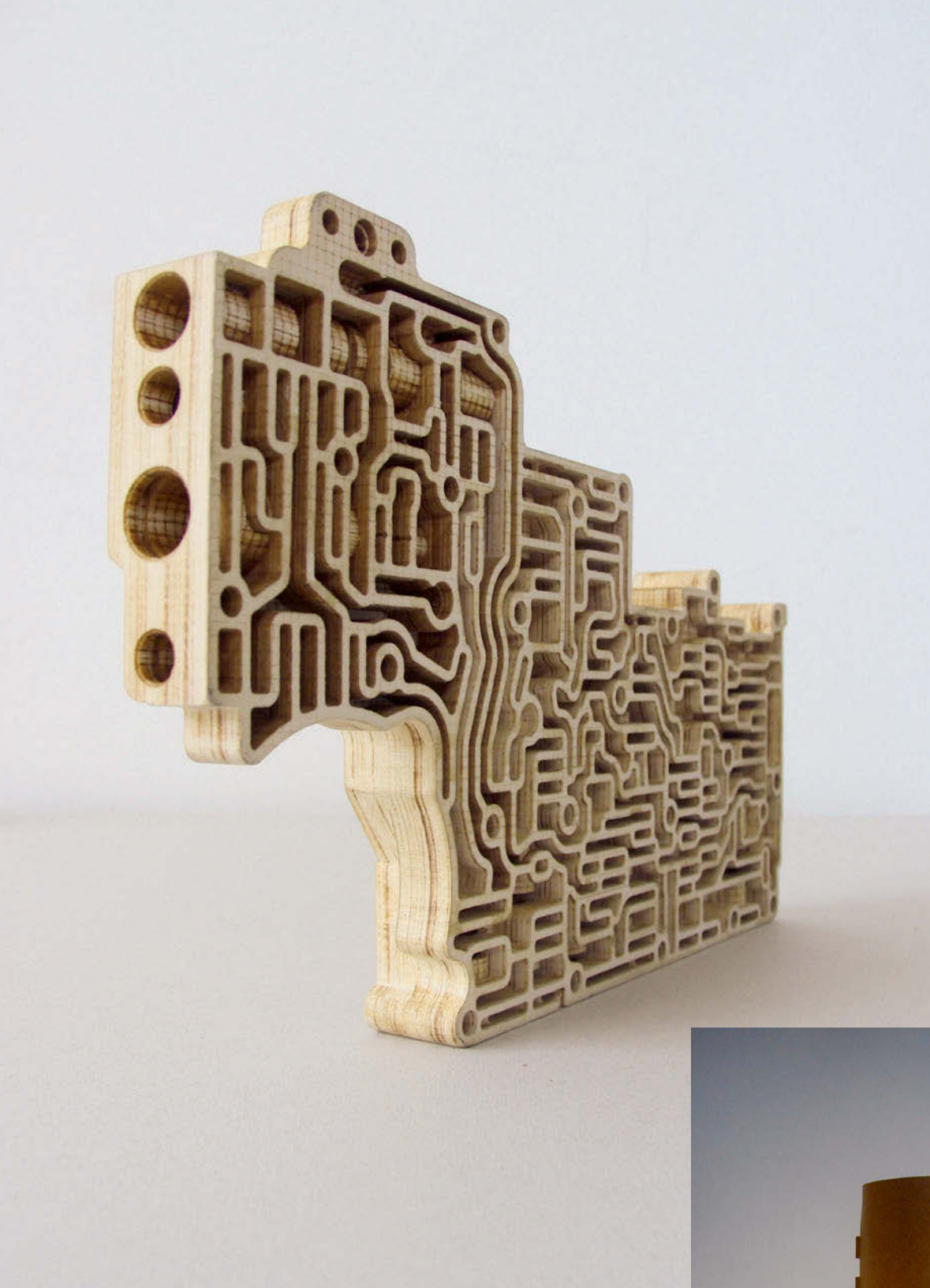
**WEATHERPROOF PAPER** In the manufacture of the impregnated paper »Pretex,« Neenah Lahnstein uses pulp and synthetic fibers made of polyamide and polyester to initially create raw paper. In two further stages it is impregnated using binding agents (such as acrylates and ethylene vinyl acetates) and given a pigment coating of clay mineral or chalk. This results in paper that is very light- and colorfast, robust, and heat resistant up to 180° Celsius. Furthermore, it is waterproof and copes with heavy mechanical loads when wet and dry, not to mention its resistance to organic solvents. To date the paper, which can be printed on using all standard processes, has been used for technical documentation, teaching and display boards, plans for outdoors, land maps, and nautical charts. However, given its resilience it has potential for outdoor use.

## 17 →

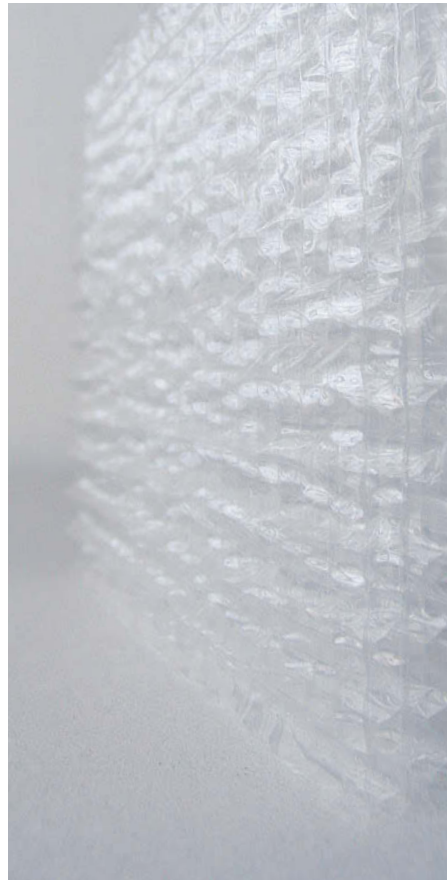
see projects B156  
/1: 400×400×500mm  
/2: 400×400×400mm  
one-off

Richard Sweeney  
www.richardsweeney.co.uk

**FOLDED CONSTRUCTIONS** Richard Sweeney's filigree objects demonstrate the tremendous stability paper can achieve through folds alone. Through the use of curved fold lines in particular he demonstrates the potential of the material. Even though the young Briton studied design in Manchester, his works are not models in the traditional sense. He does not give his structures specific functions, but rather brings the material's appearance and characteristics to the fore. It is easy to imagine them on a grander scale as roof constructions which certainly seem capable of being made from water- and weatherproof kraft paper. Many of Richard Sweeney's sculptures appear highly complex, even though the artist basically works with repeating folds and composite modules.



19

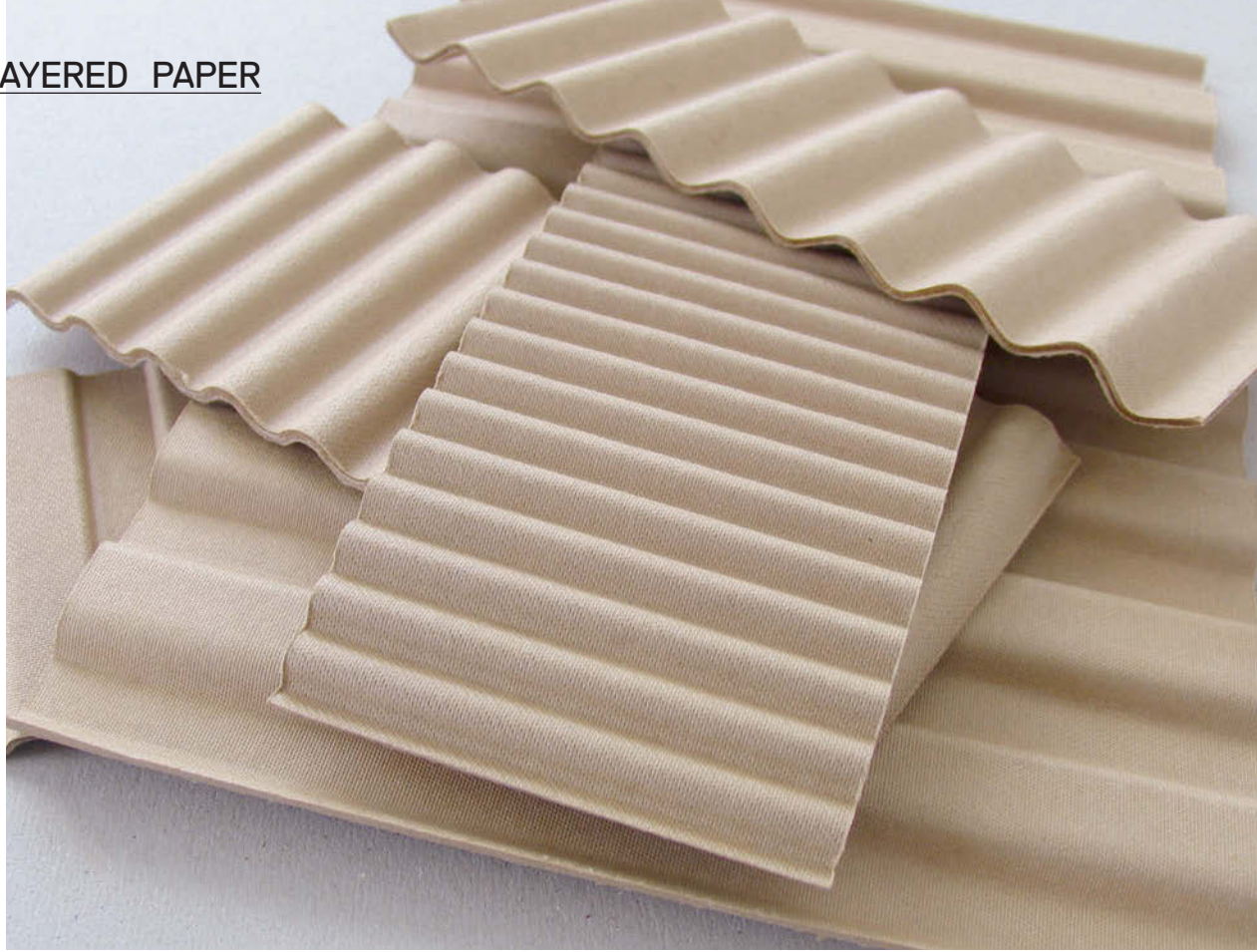


20

22



LAYERED PAPER



21



18 /1



18 /2

see projects B84/B118

179×35×4mm

mass-produced

Adachi Shiki Kogyo  
Co. Ltd.

[www.adachishiki.co.jp](http://www.adachishiki.co.jp)

Niigata Industrial  
Creation Organization

[www.nico.or.jp/hyaku/english](http://www.nico.or.jp/hyaku/english)

**VULCANIZED PAPER** The immense strength and durability of vulcanized paper in no way corresponds to the material properties of traditional paper. In a special manufacturing process, the sheets of paper are first bathed in zinc chloride (acid), causing the surface of the paper fibers to turn rubbery and sticky. In this state, the paper sheets are pressed together such that the sticky and rubbery fibers bond extremely well. Next, the zinc chloride is thoroughly washed out with water and the paper subsequently dried. It now has the desired stability and can be cut to size. Depending on the number of paper sheets pressed together, different thicknesses are produced for rolled goods, sheets of paper, and panels. Rods and tubes are subjected to the same production process, though using different tools and machines. Like traditional paper, vulcanized paper consists almost solely of cellulose and achieves its rigidity without added glue, binding agents or resin. Vulcanized paper is notable for its electrical isolating properties and furthermore is extremely water-resistant and cannot be easily broken, cut or torn. By using different kinds of paper, further characteristics can be created. Even waste paper has recently started to be vulcanized.

In Japan, production of this material is a long-standing tradition. Originally it was used to make suits of armor for swordsmen. Given its strength and low degree of thickness, today it can be used as an ecological material for lightweight construction in the form of sheets, or as molded parts made of vulcanized paper sheets pressed together. Suitcases, helmets and casing components, for example, can also be made with vulcanized paper. The Japanese designer Ryuji Nakamura used this material in 2006 for his extraordinary »Hechima 2« chair. He impressively demonstrates the material's resilience: a delicate structure made of vulcanized paper can even bear the weight of a person.

500×300×50mm

technology

RTC Rapid Technologies  
GmbH

[www.rtc-germany.com](http://www.rtc-germany.com)

**PAPER-BASED LAMINATED OBJECT MANUFACTURING (LOM)** The LOM process is a rapid prototyping technology in which computer-generated data can be turned layer by layer into three-dimensional paper models with the aid of a laser. In this way, complex objects with undercuts can be made without the need for tools. The process steps are the following: hot-melt adhesive is applied to the underside of the paper. At a temperature of around 320° Celsius this is then glued and pressed onto the layer beneath with a laminating cylinder. After each laminating procedure a laser cuts out the appropriate contour before the paper for the next layer is fed in. In principle, LOM is nothing more than numerous layers of paper glued together to form a three-dimensional model. Components produced in this way are heat-resistant up to 110° Celsius and, given their wood-like texture, are easy to process. They are ideal for the numerous steps of the product design process, such as construction discussions, viewing of three-dimensional designs, testing components, and making tools and forms. If the LOM model is later permeated by resin it becomes particularly rigid, heat resistant and, first and foremost, moisture resistant. Compared with other rapid prototyping processes LOM is relatively inexpensive, ecological and allows for very large prototypes.

## 20

each 250×170×25mm  
mass-produced

Isoflex AB  
www.isoflex.se

TRANSPARENT CONSTRUCTION PANELS FROM CELLULOSE The basic material used in these lightweight construction panels is cellulose acetate. Production of this thermoplastic biosynthetic involves dissolving pulp in caustic soda and carbon disulfide. This produces pure, transparent cellulose, to which glycerin is then added. The finished cellulose acetate can be processed into a transparent foil, which can be printed, glued and welded. It is not particularly easy to shape and can only be elongated to a limited extent. It does, however, have many applications, for example as textile fiber, shoelace casing, cigarette packaging, and optical layers in displays. The material is processed by Isoflex into honeycomb-shaped, lightweight construction panels under the name »Moniflex,« which are notable for their light weight and for the fact that they are stable and air-permeable despite the honeycomb structure. The light construction panels are also long-lasting, robust, and highly biodegradable. They come in varying thicknesses ranging from 420 to 1,260 millimeters with maximum dimensions of 635×3,000 millimeters. Given the high fire- and flame-resistant qualities and heat resistance of up to 220° Celsius, the material is used as insulation for roofs of industrial buildings, in the shipbuilding industry and in transport.

## 21

from 90×200mm  
to 200×290mm  
mass-produced

well ausstellungssystem  
GmbH  
www.well.de

PRESSED CELLULOSE PANELS Cellulose panels are formed when sheets of paper are pressed together at high heat and under great pressure. Under these conditions, cellulose coalesces into a rigid substance, providing a high degree of stability even for thin materials. Water or adhesives are unnecessary in the production process. Corrugated cellulose panels are also available: under high pressure (200t), heat and steam, a roller presses the flat basic panel into a waveform. In the process the surface is given a fine and linen-like texture. Perpendicular to the direction of the corrugations, the panel material is afforded a high degree of stability. In the direction of the corrugations it remains very flexible with thin walls, making it ideal for construction of curved elements. Moreover, the panels can be further processed and even lacquered using standard wood finishing machines. The material consists wholly of renewable and recyclable cellulose and, given the diverse processing possibilities, can be used to replace many other panel materials.

## 22

120×120×360mm  
mass-produced  
lamp: prototype

well ausstellungssystem  
GmbH  
www.well.de  
designer:  
Stephanie Knust  
www.stephanieknust.net

PAPER FIBER PANEL Like paper, the panel material »Kraftplex« by Well consists entirely of pure cellulose, but has material and shaping properties similar to those of sheet metal and plastics. Moreover, it is high-density yet pliable. It is produced from cellulose fibers of renewable softwoods in a process using only water, pressure and heat, with no chemical additives, bleach or adhesive agents. The panels are available with either a flat or textured finish. They can also be treated with lacquers, varnishes, oils and waxes and, like conventional panel materials, cut, drilled, embossed, milled and stamped. The panels come in varying thicknesses ranging from 0.8 to 1.6 millimeters and can be permanently compression molded or deep-drawn into shape. This allows complex, three-dimensionally formed components to be produced in just one process.

24 /1 /2



26



23



25



23

210×297mm

mass-produced

Strategic Communications  
Consulting, SCC

www.vitan-papier.de

PHOTO-CATALYST, AIR-PURIFYING PAPER This photo-catalyst paper is composed of 60 percent cellulose, 30 percent polyester and 10 percent titan dioxide. The latter is a nonpoisonous, white pigment, which is found in many toothpastes. Given its crystal structure, when subjected to UV radiation specially modified titan dioxide is able to form free radicals which, when oxidized, can destroy E. coli bacteria and other germs in a room within 24 hours. Toxins and bacteria are eliminated from the room's air when they come into contact with the surface of the photo-catalyst paper. The titan dioxide in the paper also breaks down formaldehyde or soot from exhaust fumes, thus eradicating odors. In Japan, for example, photo-catalyst paper is used in traditional sliding doors and lamps, and as wallpaper or curtains it purifies the air in rooms that contain toxic substances. Facemasks made of this material provide excellent protection in contagious areas.

24

/1: 210×297mm

/2: 95×178mm

mass-produced

Awa Paper Mfg. Co., Ltd.

www.awapaper.co.jp

ANTIBACTERIAL PAPER Antibacterial paper is marketed in Japan under the name »Izi«. The paper has an integrated function, as the pulp is enriched with acrylic fibers containing silver ions. It is shaped and processed in different production processes. The integrated silver ions have a sterilizing effect and can be relied on to destroy bacteria, fungi, salmonella and other microbes. Paper masks made of this paper are commonly sold in Japan. As only contact with the paper is required to destroy germs and not, as with photo-catalytic paper, UV radiation, it could also potentially be used in other areas of hygiene such as disposable containers.

25

210×297mm

no longer mass-produced

Arjo Wiggins  
Feinpapier GmbH

www.arjowiggins.com

PAPER WITH THERMOCHROMIC FIBERS The main component of this paper is cellulose fibers with thermochromic pigments which respond to temperature changes by changing color. Material development is now so advanced that color combinations can be set to previously defined temperatures. With this particular paper, the colored fiber specks become paler when they reach 23° and disappear completely at 31° Celsius—for example, when the paper is held in the hand for a while. The color returns once the paper has cooled down again. So the thermochromic pigments can be used to give a decorative effect to paper. However, in the foreseeable future it will be withdrawn from the market. It is significant, nonetheless, that these pigments were able to be integrated directly into the paper production process. It is also possible to produce paper in which all the fibers have thermochromic pigments. In the future, paper that changes color in this way could be used to make products that tell the temperature.

26

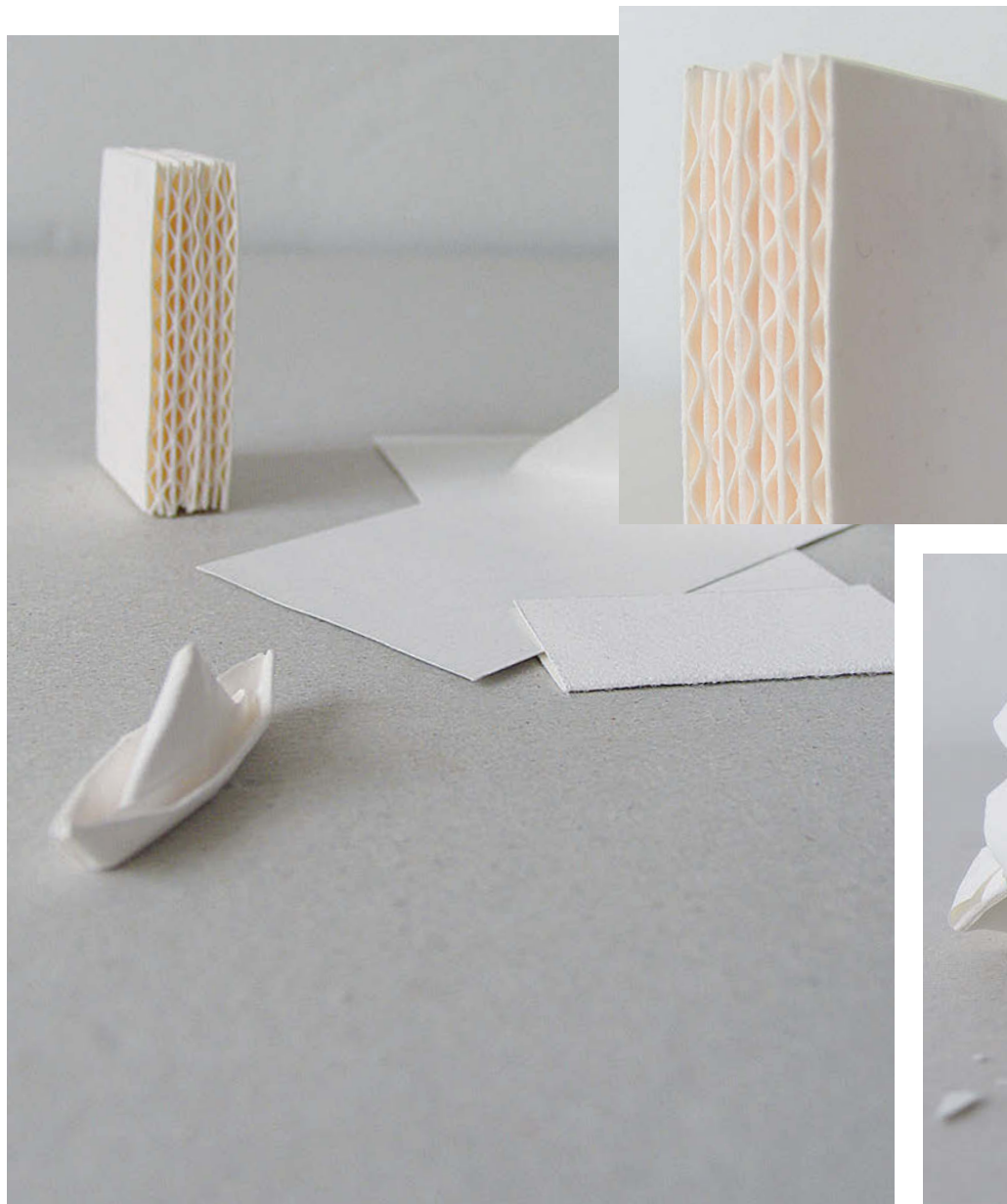
respectively 74×10mm

mass-produced

Munktell Filter AB

www.munktell.se

INDICATOR PAPER High-quality cotton paper is the basic material for these test strips which are saturated in indicator color blends. When treated this way, the paper changes color on contact with a certain pH value or chemicals, indicating a particular state or value. The dye litmus is one of the oldest and best known indicators. Apart from that Congo red and phenolphthalein are used in papers to test for acid or base reactions.



27 /2

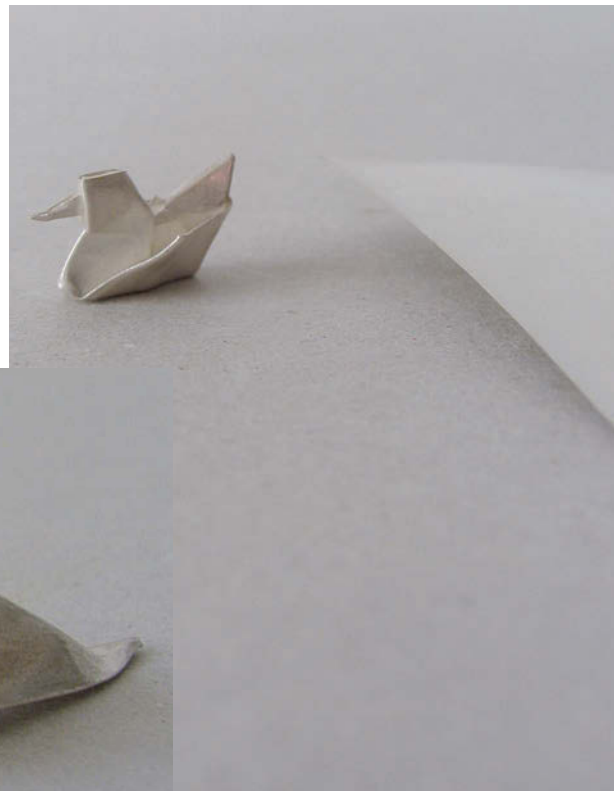
27 /1 /2 /3



28 /1



29



## 27

/1: 20×6×12mm

/2: 20×9×35mm

/3: 55×210mm

scientific research

Papiertechnische  
Stiftung (PTS)

[www.ptspaper.de](http://www.ptspaper.de)

**CERAMIC PAPER** The Papiertechnische Stiftung (PTS, a research organisation to the paper industry) in Munich has developed a ceramic paper where preceramic additives such as aluminum and silicon powder, as well as latex, are added to the standard components water, paper fibers, and fillers. Like traditional paper it can be folded, bent, rolled and can even be shaped three-dimensionally in industrial production methods such as the manufacture of corrugated board, folding and honeycomb structures. The advantages of this combination of paper and ceramics come into their own when the ceramic paper is sintered at 1,600° Celsius. The paper ingredients burn away and the ceramic components become concentrated and solid, shrinking by 15 to 17 percent. As these are thin-walled parts made of a new material, the temperature curves and the entire burning procedure need to be precisely planned and programmed. This all takes place at the Friedrich Alexander University in Erlangen-Nürnberg. After sintering, a part results that is manufactured like paper and possesses the material properties of ceramics, as well as a very good resistance to pressure and scratching, to chemicals and high temperatures, and a translucent white as its aesthetic characteristic. In the future, combining shaping and production processes from paper making with ceramic material qualities could introduce new possibilities for the production of lightweight construction materials and ceramic products.

## 28

/1: 25×60×40mm

/2: 95×95×30mm

experiments

Papiertechnische  
Stiftung (PTS)

[www.ptspaper.de](http://www.ptspaper.de)

Rauschert GmbH

[www.rauschert.de](http://www.rauschert.de)

/1: Heinz Strobl

[www.knotologie.eu](http://www.knotologie.eu)

/2: Christiane Bettens

<http://origami-art.org>

**CERAMIC PAPER EXPERIMENTS** For the »Paperlab« exhibition at the 2007 trade fair Design Annual, the Munich-based Papiertechnische Stiftung (PTS) made available some of the very first ceramic paper. At the time there was hardly any experience of the extent to which this paper could be shaped and its rigidity after firing. Up until then, the PTS had manufactured only a small number of three-dimensional samples. To get an idea of the possible mechanical properties and constructions that could be achieved with ceramic paper, a unique research project was undertaken. Origami artists worldwide were invited to put the ceramic paper to the test. They were highly enthusiastic and duly returned the paper elaborately folded. As the firing process with its temperatures and firing times is very complicated and normally needs to be adapted to the specific geometries in a series of tests, many of the ceramic pieces broke. Nevertheless, the results concerning the pliability of the paper were extremely important. They demonstrated that ceramic could now be folded and processed just like paper.

29

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13x13x2mm  
scientific research

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Papiertechnische  
Stiftung (PTS)  
.....  
www.ptspaper.de  
.....  
Friedrich Alexander  
University  
Erlangen-Nürnberg  
.....  
www.uni-erlangen.de

LAMINATED OBJECT MANUFACTURING (LOM) FOR CERAMIC PROTOTYPES Laminated Object Manufacturing is a rapid prototyping procedure for paper. The use of ceramic paper in the LOM process means that for the first time ceramic prototypes can be put into production. The Chair of Glass and Ceramics at the Friedrich Alexander University in Erlangen-Nürnberg has spearheaded this technological development. To conduct the new procedure the scientists modified a LOM machine so that it could cut, glue and adjust the ceramic paper. For this they used CO<sub>2</sub> lasers or steel blades for cutting and to add an adhesive for fixing purposes. The objects made in this process are subsequently heated or sintered to create solid components. The first small turbine wheels have been produced already.

30

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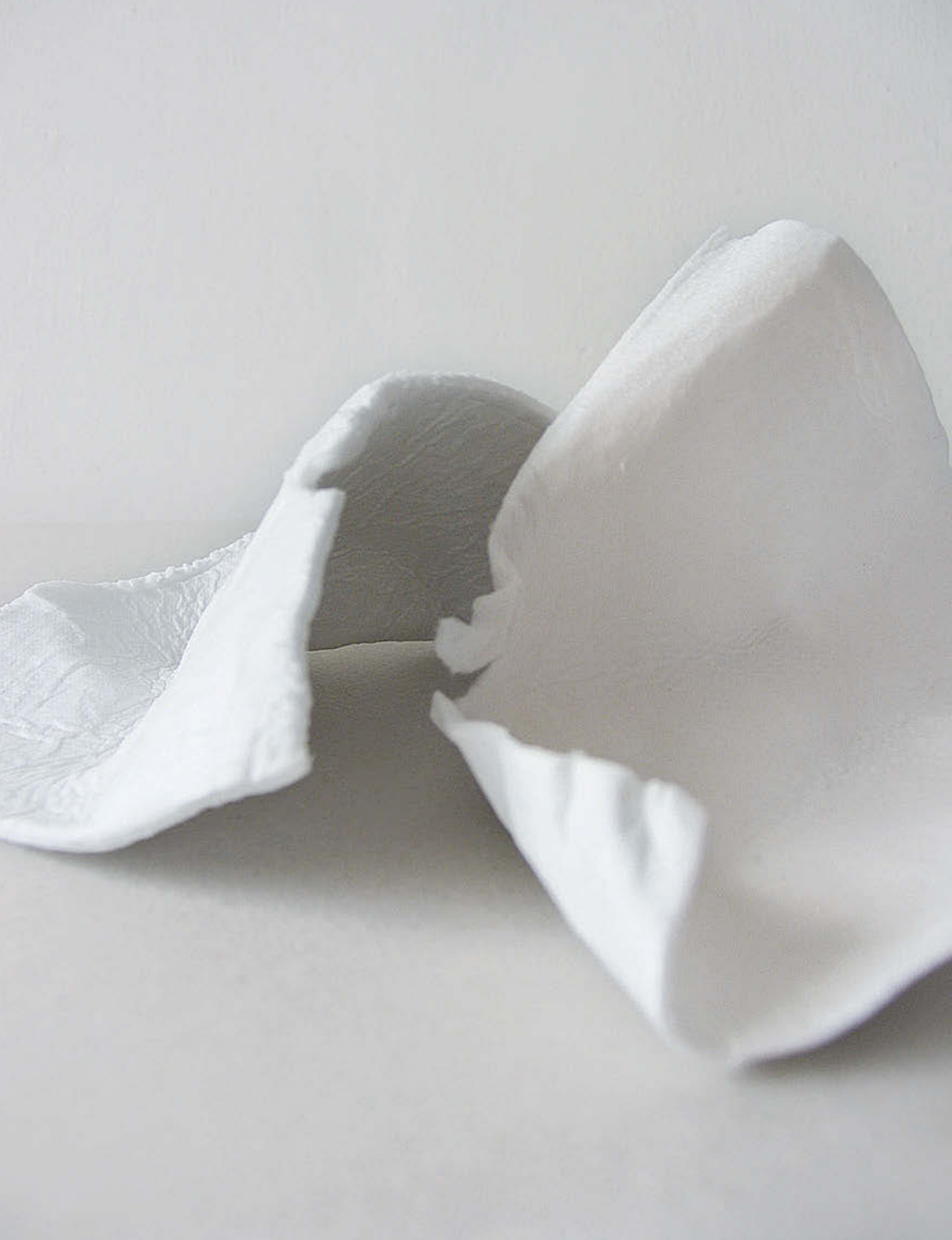
30x8x20mm  
one-off

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Dr. Ulrike Krallmann-Wenzel  
.....  
hike00@gmx.de

SILVER ORIGAMI The origami figures displayed here are made of silver. To make these precisely folded figures, the origami artist Ulrike Krallmann-Wenzel uses a foil that consists of fine silver powder and an organic binder. She then sinters the figures at 80° Celsius, when the organic binder dissolves leaving the pure silver. In this way silver can be treated using a completely new shaping method.

32



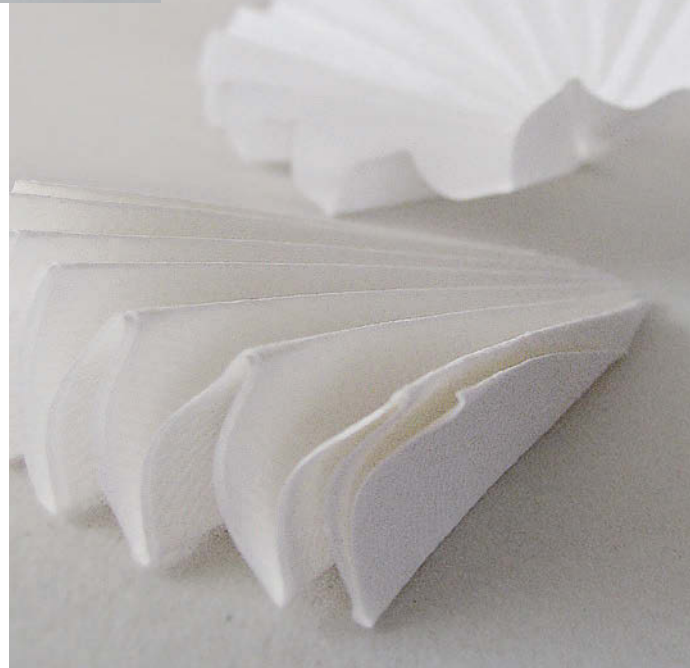
33



34



31



# FIRE-RESISTANT AND CLEANING

## 31

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200×250mm  
mass-produced

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Thermal Ceramics UK Ltd.  
[www.thermalceramics.com](http://www.thermalceramics.com)

**GLASS FIBER PAPER** Glass fiber paper was developed as an insulating material for temperatures of up to 500° Celsius. To guarantee that it is even in terms of thickness and density, it is made of high-purity, regular borosilicate glass fiber. The glass fiber paper is produced in different dimensions and with varying degrees of thickness and rigidity, from »paper-like« to »felt-like«. Furthermore, it stands out for its low heat conducting qualities and is extremely tear resistant. It has various applications, for instance for insulation in industrial plants and for fire prevention in trade fair construction.

## 32

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200×250mm  
mass-produced

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Thermal Ceramics UK Ltd.  
[www.thermalceramics.com](http://www.thermalceramics.com)

**FIRE-RESISTANT CERAMIC FIBER PAPER** Because ceramic paper is flexible, resistant to temperature and does not tear easily it is used primarily as sealing material at high temperature. Aluminum oxide fibers processed in the material are extremely resistant to heat and can withstand temperatures of up to 1,600° Celsius. Together with an organic binder, the high-purity ceramic fibers are processed in a specially adapted paper manufacturing process. When subsequently heated to approximately 300° Celsius the small binder elements dissolve, such that no ingredients other than ceramic are left. The flexibility typical of paper, however, remains. The paper serves as a dividing layer in the manufacture of hot component parts in glass and metal production, as a heat shield in automobile construction, and as insulation in the aerospace industry. Ceramic fibers can be processed into paper and felt of varying thickness and size. The thin papers can be pressed, sewn and folded, while the solid or cotton wool-like felts up to 50 millimeters thick can be used as an insulation layer. In the future this high temperature-resistant fire protection could well be used in lightweight construction.

## 33

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400×400×3mm  
prototype

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Hara Design Institute,  
Nippon Design Center, Inc.  
[www.ndc.co.jp/hara/home\\_e/index.html](http://www.ndc.co.jp/hara/home_e/index.html)

**HAPTIC HUMIDIFIER** For the »Haptic Humidifier« Japanese designer Kenya Hara made use of the phenomenon of the hydrophobic surface. Though not actually watertight, water still pearls off it. Plants achieve this, in what is known as the lotus effect, thanks to many small elevations (papillae) on the surface of their leaves. The paper used for the »Haptic Humidifier« was artificially equipped with the lotus effect by being sprayed with a hydrophobic aerosol, creating a papilla-like microstructure on its surface. If water is used to wet the humidifier it is not absorbed and water drops form. These drops get caught in the graphic, textured cavities, creating an entirely new functionality and product language. The evaporation becomes visible.

## 34

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diameter: 355mm  
mass-produced

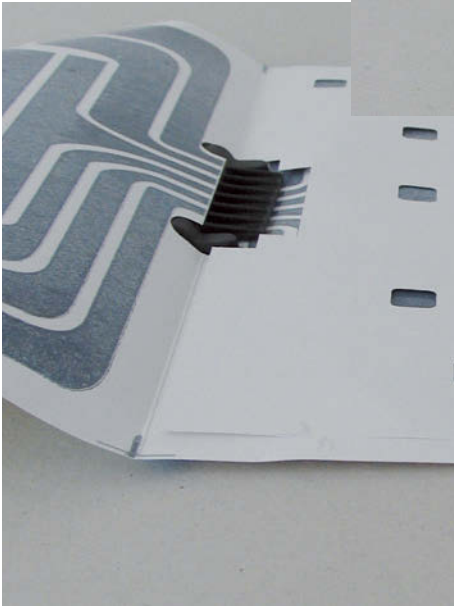
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Munktell Filter AB  
[www.munktell.se](http://www.munktell.se)

**TECHNICAL FILTER PAPER** Blotting and filter paper is nonlaminated and barely pressed paper, which, given its loose structure, forms fine capillaries that allow liquids to permeate it, or alternatively be absorbed swiftly. Additionally, the size of the pores can be adjusted to suit the size of the particles to be filtered. Filter papers are made of pure cellulose in various textures, sizes and formats. As a rule they are available as rolls that can be creped or embossed if required. This form of processing reduces the filtration time, as the surface area and flow rate increase. Filter papers are very soft and voluminous.



36

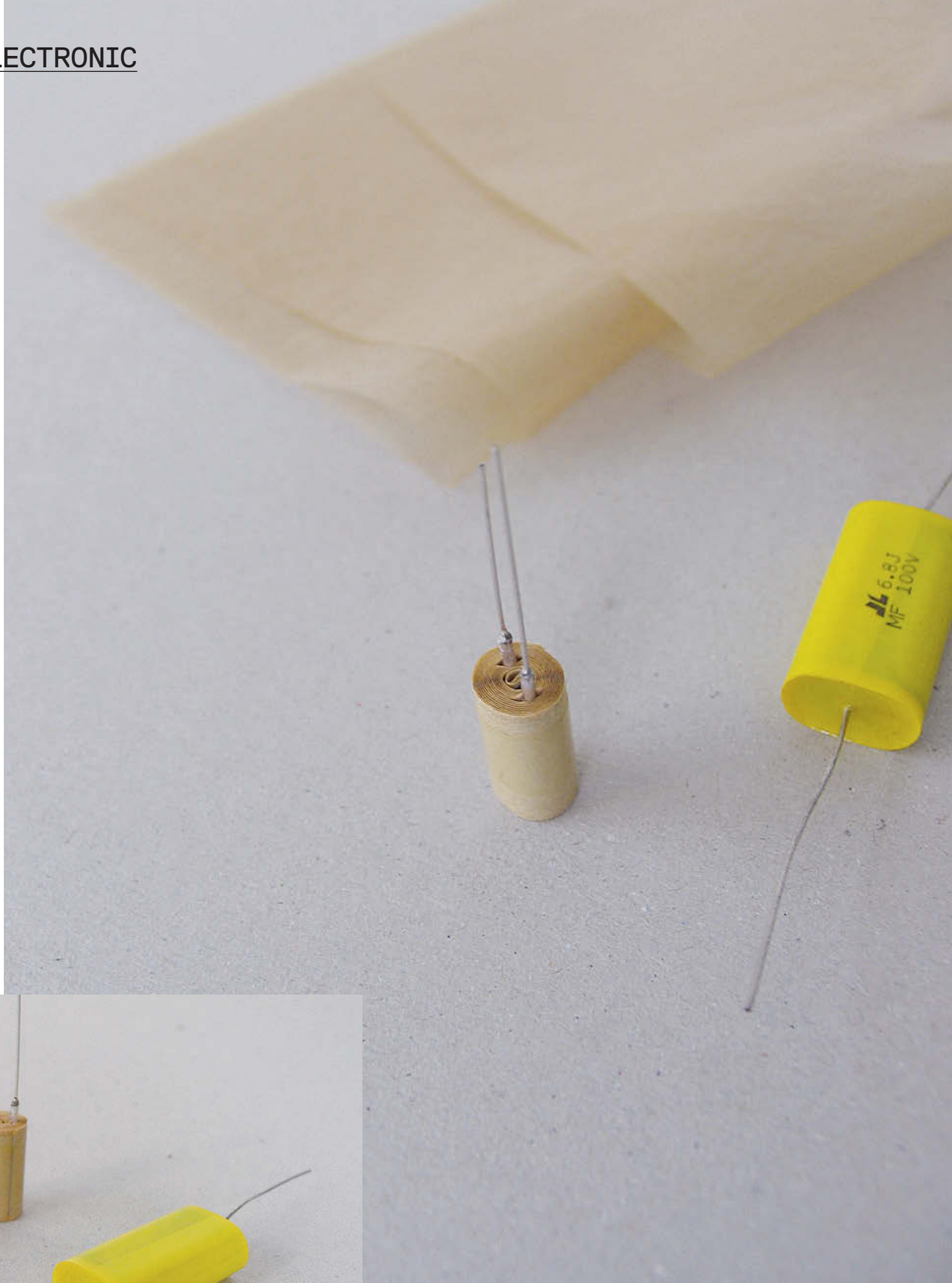


35

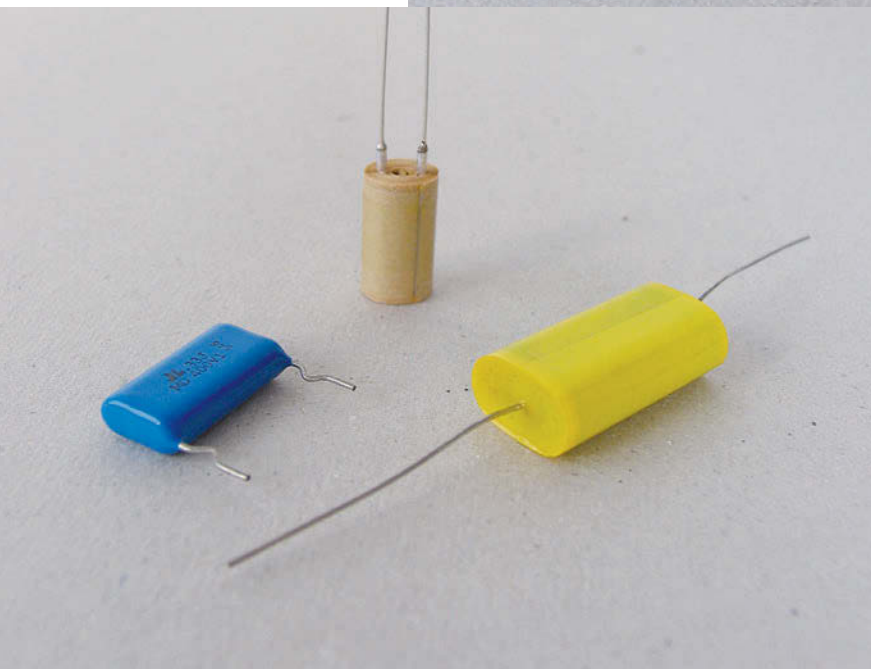




ELECTRONIC



37 /2



37 /1 /2

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210×297 cm

mass-produced

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Technical Fibre Products Ltd.

www.techfibres.com

CARBON FIBER PAPER Carbon is very light and boasts excellent conductive qualities. It is popular in the manufacture of high-end sports equipment that needs to be robust, can withstand bending and torsion, and is of course light. Carbon, however, can also be processed into a form of »synthetic paper,« as just like cellulose, in liquid carbon fiber can be blended into pulp, to which 5 to 10 percent of organic adhesives are then added to bind the fiber. A sieve conveyor belt that functions as a filter drains the liquid from the sludge. Finally, the ready »endless-carbon-fiber-paper« is rolled up just like normal paper. The carbon fibers used can be between 3 and 25 millimeters long and, depending on their use, are mixed with ceramic, glass or aramid fiber. Pure carbon fiber paper is made in weights of up to 800 g/m<sup>2</sup>. The paper-like fiber structure makes the material easy to cut, emboss, bend, and jet-cut. Given the excellent electrical and thermal conducting qualities and the high resistance to heat, carbon fiber paper can be used as shielding material against electromagnetic radiation, and as protection against fire and lightning. For this reason it is used increasingly as an ultrathin yet highly efficient conducting layer, for example for seat heating, battery electrodes, and fuel cells. In the future carbon fiber paper has potential for use in the construction of lightweight components where the insulation thickness needs to be thinner than standard carbon fiber. Blending carbon and cellulose fiber to create paper is also conceivable. This has not yet been put into practice but could be valuable for the production of electrically conductive paper.

## 36

210×297mm

technology

printed systems GmbH

www.printed-systems.de

**POLYTRONICS** Developing electrically conductive, luminescent, magnetic, or optical functional polymers opens up new opportunities in the manufacture of electronic switching circuits, as the integration of metal components becomes redundant. Apart from integrated circuits, displays, electronic semiconductors, LEDs, batteries, sensors, and polymer solar cells can already be manufactured either in laboratories or in some cases even as mass-produced articles. A promising development based on the creation of liquid functional polymers goes by the name of polytronics (polymer electronics). Like ink or paint, the liquid functional polymers are applied to foils and paper in a variety of printing methods. This means that the circuits can be printed on sheets, rolled materials and other fitted formats quickly, cost-effectively, and using a minimum amount of material in a continuous roll-to-roll process. Nowadays only simple circuits and aeriels are produced in this way. Various research facilities are, however, already conducting intensive work on how to make complex, durable and sophisticated systems suitable for mass production. This would offer entirely new potential for the development of electronic and microcomponents, as well as new possibilities for integration in the field of electronics. In this way, the chip itself would become the housing, and could be imprinted on thin paper that can be folded.

## 37

/1: 210×297mm

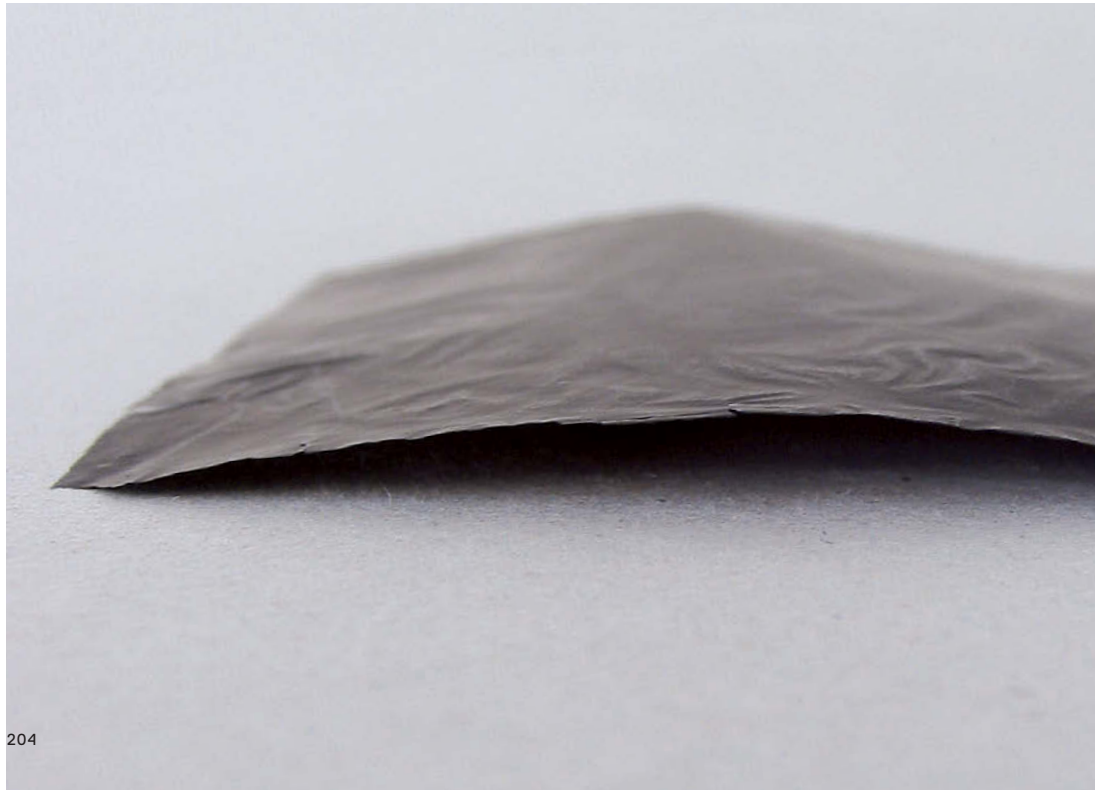
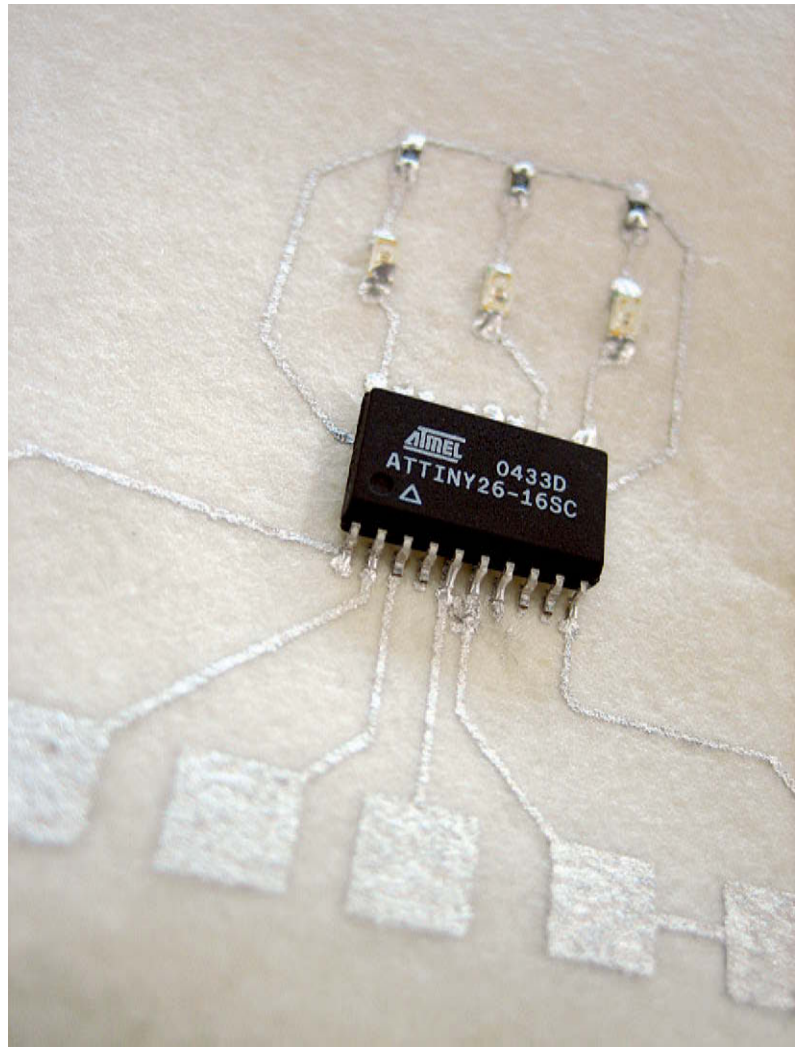
/2: from 11×11×19mm  
to 17×10×30mm

mass-produced

Spezialpapierfabrik  
Oberschmitten GmbH

www.spo-gmbh.de

**INSULATING PAPER** The Spezialpapierfabrik Oberschmitten GmbH uses high-purity specialized cellulose and deionized water to produce absolutely nonconducting electrotechnical paper. It acquires this characteristic through fine grinding, purification of the pulp and the very high condensation of the paper under heat and pressure. This specialized rolling process also makes the paper shiny, smooth, and transparent. To date the extremely thin paper layers have been used as insulating intermediate layers in condensers or as cable sheathing. However, these insulating features could also be of interest in widespread use in the field of polytronics (for instance organic LEDs), as the insulating paper would also serve as the medium for circuits and isolators. Folded or sandwiched it could be used for manufacturing structural components as well.



## 38

210×297mm

scientific research

Marcelo Coelho, Research  
supported by MIT Media Lab  
and XS Labs

www.cmarcelo.com

**PULP-BASED COMPUTING** In an astonishing research project dedicated to the »paper computer,« scientists at MIT have combined traditional craftsmanship and computer technology. To incorporate different fibers, colors and textures, paper is scooped in many layers in Japan. Through pressing and drying, the fibers of the layers form a very strong compound when scooped one after another. The scientists use the scooping technique in order to embed electric ink, conductive threads, LEDs and other electronic material in the paper. With this classical method of paper scooping, scientists have combined sensors, actuators, and circuits with the characteristics of paper, so producing seamless paper composites offering new methods of construction for electronic components. The aesthetic and tactile qualities are particularly fascinating.

## 39

/1: 90×125×0.02mm

scientific research

/1: Florida  
State University

www.fsu.edu

Fraunhofer Institute for  
Interfacial Engineering  
and Biotechnology IGB

www.igb.fraunhofer.de

Rensselaer Polytechnic  
Institute (RPI)

www.rpi.edu

**BUCKY PAPER** »Bucky Paper« is made not of cellulose fiber but of carbon nanotubes. These are extremely light tubes with a diameter fifty thousand times smaller than human hair. They are composed of carbon-60 molecules, so-called »bucky balls,« whose special configuration, similar to Fuller's geodesic domes, provides enormous stability. Hence they are very light and about twice as hard as diamonds. »Bucky Paper« is manufactured in a process similar to that for paper: the carbon nanotubes float in a tenside solution and are then dried on filters. The combination of enormous stability, minimum weight and excellent conducting qualities produces a paper with fascinating properties. »Bucky Paper« can, for example, be used as an ultrathin, ultra-light conducting layer for very even display lighting or as an efficient heat conductor in electronic devices. Its flexibility and pliability enable miniaturization and lightweight construction. Put in an electrolyte solution and under a low voltage of 1-3 volts, carbon nanotubes expand. Given this feature, »Bucky Paper« could be used as an actuator, as an artificial muscle to create, for example, tiny valves for use in medical engineering. Scientists at the Rensselaer Polytechnic Institute are going down a more advanced path. Through »infusing« they create normal paper with 10 percent of carbon nanotubes. This creates thin black paper with excellent electric storage capacity. By adding dry ion fluid as an electrolyte, a powerful battery or a high performance capacitor is formed, usable in temperatures of between 150° and -40° Celsius. In the future, a printing process suitable for mass production will replace the »infusing« process. Carbon nanotubes are regarded as one of the most promising technologies and are already being produced in high quantities, which could herald the development and production of very light, thin, foldable, rollable, stackable, efficient, and inexpensive batteries.

40



41



42



43



## 40

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width: 115cm  
mass-produced

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NUNO Corporation  
www.nuno.com  
designer: Reiko Sudo

SILK PAPER FABRIC The »Slipstream Fabric No. 9-188« is made of pure silk and Japanese mino paper. This paper is handmade from the fibers of the mulberry tree (Japanese: kozo) using a traditional method and is characterized by its particular stability. Its strength makes it particularly suitable for use in producing paper fabrics (Japanese: shifu). To make »Slipstream« you lay thin strips of mino paper loosely between two strips of silk organdy and weave them together. The combination of these two materials produces a fabric that is both hardwearing and as fine as thin silk. In their fabrics, NUNO and in particular the designer Reiko Sudo combine traditional Japanese weaving and batik techniques with new materials and technologies.

## 41

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220×295mm  
fringe length: 110mm  
one-off / mass-produced

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Annemette Beck  
www.annemette-beck.dk

PAPER WALL HANGING Annemette Beck is a textile designer who, in her studio, experiments a great deal with different yarn materials which she weaves into innovative fabrics. She makes rugs and furniture covers in a variety of colors. The beautiful structures are particularly visible in backlit curtains. The pieces shown here are made of paper yarn, which due to the raw material's properties is relatively stiff and inflexible. These qualities lend the fabrics special textures, as in the work »Chanel,« whose fringes are enchanting.



## 42

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140×120×30mm  
mass-produced

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Danskina  
www.danskina.com

**PAPER RUG** Ulf Moritz designed this slightly »tousled-looking« rug called »Papyra« for the Dutch company Danskina. Its unruly paper fibers lend the rug an unusual tactile quality and a lovely rustling sound when you walk on it. The paper strands, which are not twisted nor compacted, are coated with wax, making them resistant to water and dirt, such that they are suitable as rug material. »Papyra« consists of 45 percent paper and 55 percent natural wool. The paper and wool threads are hand-tufted into a 40 millimeter thick rug, the combination of which materials enables it to keep its shape and puff up again every time it is vacuum cleaned. Incredibly, the rug is so resistant that it is also suitable for public interiors.

## 43

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thread size: 2mm  
experiment

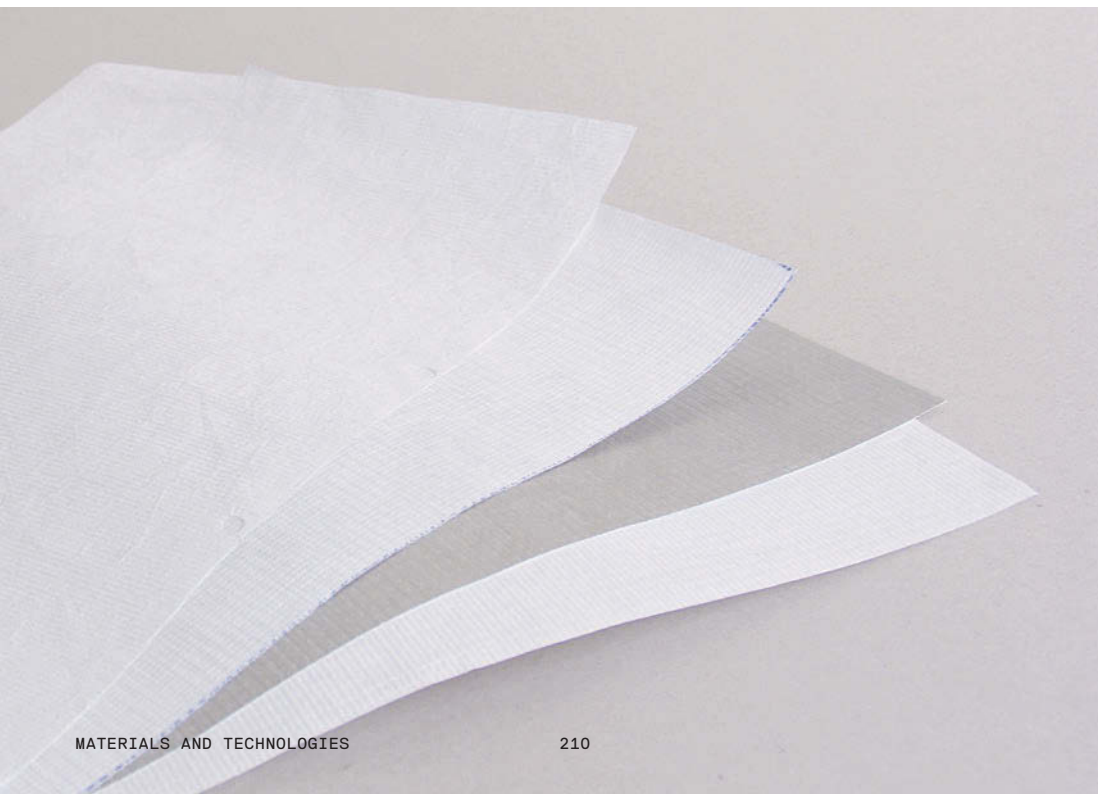
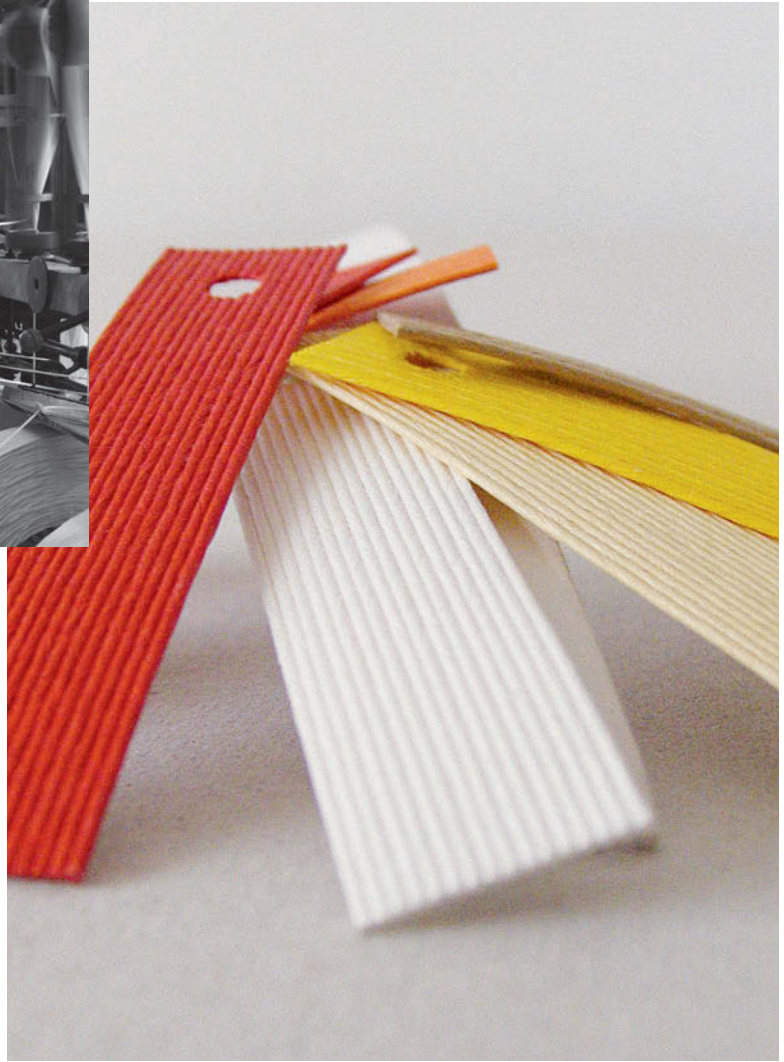
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Greetje van Tiem  
www.greetjevantiem.nl

**YARN FROM WASTE PAPER** After just one day, newspapers are old and worthless. Greetje van Tiem from the Netherlands has found a good way to lengthen the life cycle of waste paper. In her graduation project »Recycling Daily News« at the Design Academy in Eindhoven in 2007, she spun old newspapers into yarn. One newspaper page, says Greetje van Tiem, can make at least 20 meters of yarn. The tough and robust thread can be woven, knitted, crocheted, and knotted. The colors result from the newspaper ink and are an expression of the incorporated memories, facts, information, and images. Apart from the woven rug shown here, she has also produced curtains and seating elements—the colorfastness of which, however, cannot be guaranteed.



44 /1



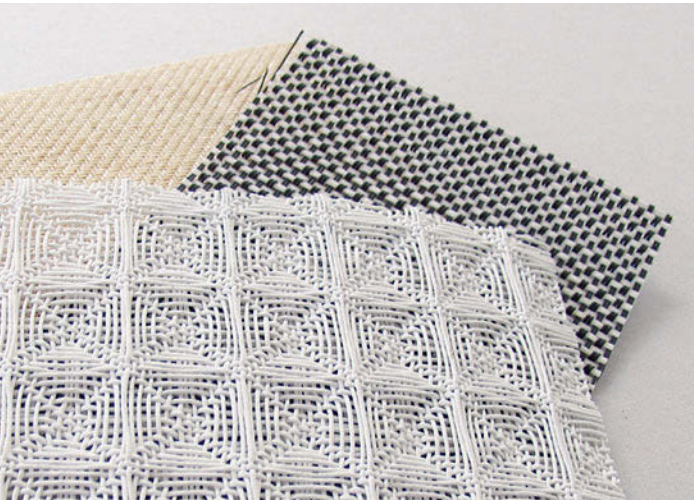
TEXTILES



47



46



211

17×85mm

mass-produced

Kamihimo, Ueda  
Industrial Co., Ltd.

www.kamihimo.jp

**WATER-RESISTANT PAPER STRINGS** Japanese washi paper is characterized by its extraordinary stability and enormous strength. It is the primary material used to make the paper strings presented here. Kamihimo, which is Japanese for paper string, refers to long cords which are glued together to form strips. These strips are waterproof, very robust and strong and are produced in single-color and multicolored versions. In the production process, paper is first cut on wide rolls into, for example, 20 to 100 millimeter wide strips, depending on its weight, and then twisted into a string in special machines. Subsequently, the reels of paper yarn are pulled through an adhesive solution in a continual process and then aligned to be glued together and pressed into flat strips. The strings come in a variety of colors depending on the original color of the paper, and a single strip can also consist of differently colored strings. The production of these paper strips also forms the basis of an old Japanese craft, the plaiting of paper strips into decorative figures, baskets, bags, mats, sandals, boxes, and other containers. Owing to the material's tremendous strength it can also be used for woven seats. In the German soccer premier league some of the goal nets are made of Kamihimo, which should be sufficient proof for the material's resistance to weather and tearing. If the nets do tear at some point, you can simply throw them on the compost heap as they are biodegradable.

see projects B34/B44/  
B48/B58/B62/B117/B144

210×297mm

mass-produced

DuPont de Nemours  
(Luxembourg) S.à r.l.,  
Tyvek®

www.dupont.com

**PAPER FLEECE-LIKE FIBER FUNCTIONAL TEXTILE (TYVEK)** Tyvek is a paper fleece-like functional textile that combines the physical properties of paper, foil, and fabrics. The so-called »flash spinning process« first produces HDPE plastic fibers. The plastic is emulsified in a water and solvent mixture under pressure and heat. When the emulsion is injected through a fine nozzle in a vacuum the solvent evaporates, the temperature falls, and the plastic forms fibers by way of crystallization.

The resulting »threads« are then laid as a web and bonded together by heat and pressure—without the use of any binders or fillers. Different structures and surfaces can be produced by changing the lay-down speed and pressing parameters. The material is 100 percent recyclable.

Tyvek behaves similarly to soft paper in terms of its malleability. It creases, can be sewn, glued, and heat-sealed. It is watertight, resistant to chemicals, and above all extremely strong and hard-wearing. Tyvek is produced in a number of different versions, with varying thickness, weight, and surface structure, and it can be given an antistatic coating. It is used in the packaging industry as a durable »synthetic paper« in industries ranging from medicine to automotive. Overalls made of Tyvek satisfy clean room requirements, as the material does not release fluff or particles on the outside, does not allow any skin or clothing particles to permeate from the inside to the outside, while being breathable. They are used, for example, as protective clothing in painting plants, operating theaters and in crime scene investigations. In architecture, the »synthetic paper« is used as a breathable barrier layer in insulation work.

## 46

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148x210mm

mass-produced

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Somic p.l.c

www.somic.co.uk

WOVEN PAPER FABRIC The base material for these woven paper fabrics is a raw paper made from wood from ecologically grown farmed forests in Scandinavia. In the production process for this paper, special attention is paid to ensuring a sufficient length of the fibers, as this lends the finished paper yarn its special strength. Strips of between 7 and 45 millimeters are cut from the paper rolls and then twisted into threads.

The paper yarn is produced in a variety of colors and strengths and then made into rolls of fabric of various patterns, strengths and color combinations with a width of up to 180 centimeters. The fabrics can be recycled and are made exclusively from environmentally friendly or renewable raw materials.

Paper yarns have been used for the production of Lloyd Loom furniture since the 1930s. Other applications include: lampshades, wall coverings, partitions, furniture covers, shoes, bags, and filtration facilities.

## 47

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800x500mm

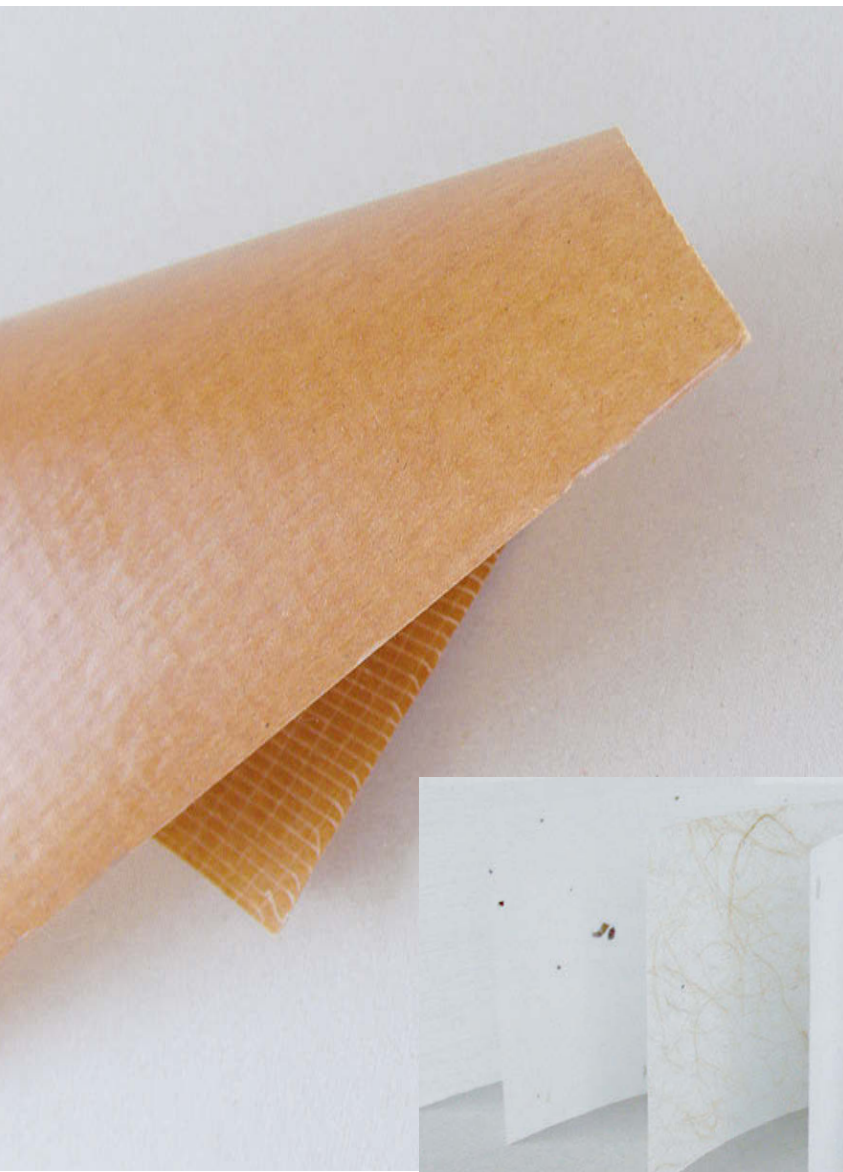
one-off

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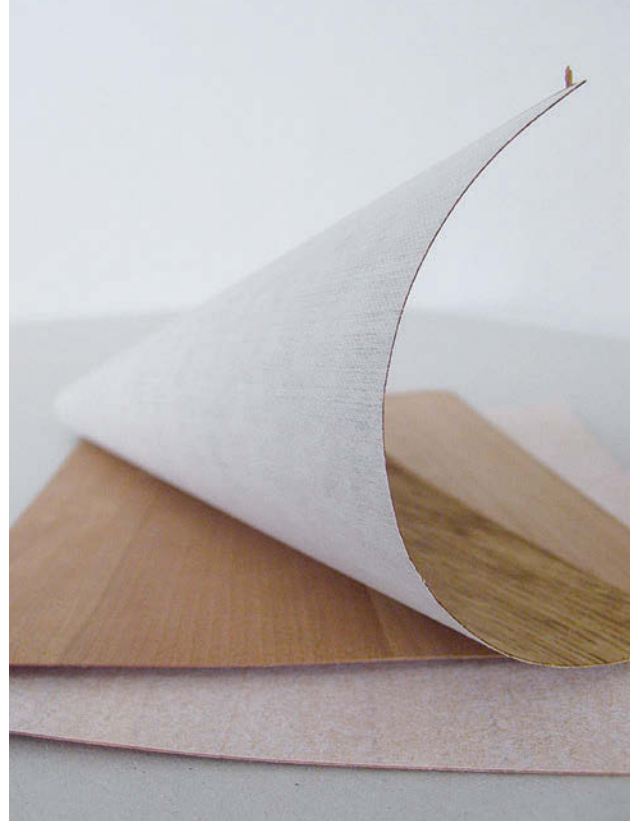
Marian de Graaff

mariannegraaff@hotmail.com

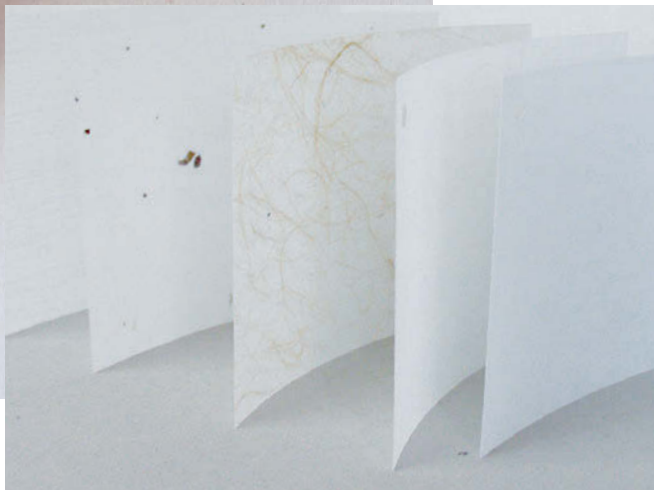
CROCHETED PAPER TEXTILES While on a scholarship program, in 2000 Marian de Graaff investigated the textile processing possibilities of paper. De Graaff created fabrics both by hand and using traditional looms. Her hand-crocheted textiles took on completely different structures depending on the thickness and finishing method of the paper yarn as well as the size of the needle and the type of stitch. Some of the yarns used were very fine and all consisted exclusively of paper. Moreover, Marian de Graaff experimented with blended fabrics, which can be produced on looms. The paper-cotton fabric, for example, is characterized by its particular strength and can be washed in the washing machine at 60° Celsius, even though it is partly made of paper.



49



48



50

51



## 48

210x297mm  
mass-produced

Schorn & Groh GmbH  
www.sg-veneers.com

**WOOD VENEER FLEECE** The extremely thin and flexible »fleece'n'flex« consists of a genuine wood veneer and a layer of cellulose fleece, which are glued together under high pressure. Depending on the subsequent finishing or use, different adhesives can be used that impact the stability, rigidity, and resistance to moisture, as well as heat and fire. The cellulose fleece can be glued to various bases, including honeycomb panels and three-dimensional plastic component parts.

The wood veneer fleece is notable for its elasticity, making it ideal for use in multidimensional shapes, and is primarily used in the construction of automobile cockpits and in aircraft and ship building. The wood veneer papers come in a number of standard sizes. Special formats can be manufactured from a range of 140 types of wood.

## 49

210x297mm  
mass-produced

Hermann Nawrot AG  
www.nawrot.de

**OIL KRAFT PAPER** Kraft paper is extremely tear-resistant. To achieve this high level of resilience, the wood of slow-growing coniferous trees is used in its production. Their long, tear-proof fibers ensure the requisite stability. Kraft paper is brown and is largely used as packaging material, but for other products as well.

Kraft paper which, when impregnated with paraffin, becomes water-repellent is referred to as oil paper. Oil paper is neither oily nor greasy, it protects packaged metal products from moisture and thus from corrosion. Furthermore, automotive parts suppliers, for example, use it to pack greased parts to guarantee that the oil is neither soaked up by the paper, nor seeps through. Oil paper also serves to make products »seaworthy,« so that they can be shipped. The material comes in various weights, both single-layered and laminated, as well as with additional wide-meshed gauze fabric reinforcement.

## 50 →

see projects b70  
105x148mm  
mass-produced

Bernd Kuhn &  
Yasuko Tamaru GbR  
www.takumi.de

**TEAR-RESISTANT AND LAMINATED WASHI PAPER** Hand-scooped washi is translucent but nontransparent and in former times was used primarily for Shoji sliding doors in Japanese houses and for lampshades. Making washi is a special craft, of which there are several versions. There would appear to be no limit to the combinations of different fibers and colors, the integration of vegetable parts, and the arrangement of the long fibers in layers scooped on top of each other. Different laminates have been developed so that washi paper can be used in public areas as well. Tear-resistant washi paper consists of three layers, the middle layer being a transparent plastic foil (PET). Another version comprises a middle layer of washi paper and two outer layers of plastic. This laminate is waterproof and in addition barely flammable, and is used, for example, in bath houses.

## 51

diameter: 400mm  
wall thickness: 1.5mm  
one-off

Marian de Graaff  
mariandegraaff@hotmail.com

**ALGAE BOWL** The bowl displayed here consists of sheets of algae and paper and was shaped by hand. It is around 40 centimeters in diameter and its sides are about 1.5 millimeters thick, becoming very thin towards the edges. The algae paper is extremely tough, relatively tear-resistant, and gives the large bowl great rigidity. This handcrafted one-off is of interest to the field of technical papers in that it explores the possibilities of an alternative raw material. Algae can grow very quickly and are a resource that to date has hardly been used at all. As this project demonstrates, in the future they could even be used in the manufacture of paper, thereby conserving valuable forest resources.





## 52

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210×297mm  
technology

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Dr. Mirtsch GmbH  
www.woelbstruktur.de

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**VAULT-STRUCTURED PAPER** Wölbstrukturierung™ (Vault Structuring) refers to a structuring process in bionics that lends thin materials additional stiffness and rigidity. Vault-structured paper, cardboard, and sheet metal are excellent building materials for lightweight construction, as they offer maximum rigidity at minimum weight and thickness. Vault structuring requires no tools, presses, or punching, and is based on a fascinating process of self-organization. First, the paper is placed in a defined cylindrical curvature and from inside supported only by overlaid rings. It is then subjected to relatively light external pressure, which the paper can only withstand to a certain point before reaching an instable intermediate state. At precisely this point the material stabilizes through a spontaneous process of self-organization by forming regular, three-dimensional honeycomb structures from the convex curved surface. If the pressure is not increased the vault structure remains and the paper does not tear but receives a higher bending stiffness and rigidity. The process described above was developed, advanced and adapted for technological production by Dr. Mirtsch GmbH. Cups and packaging can be made from vault-structured paper, but the material with its high bending stiffness and perfect finish could also be used for more challenging tasks. Dr. Mirtsch GmbH is currently structuring sheet metal and foils by means of this process. These are used, among other things, for washing machine drums, car seat backs, and low-glare, extremely light lamp reflectors.

## 53

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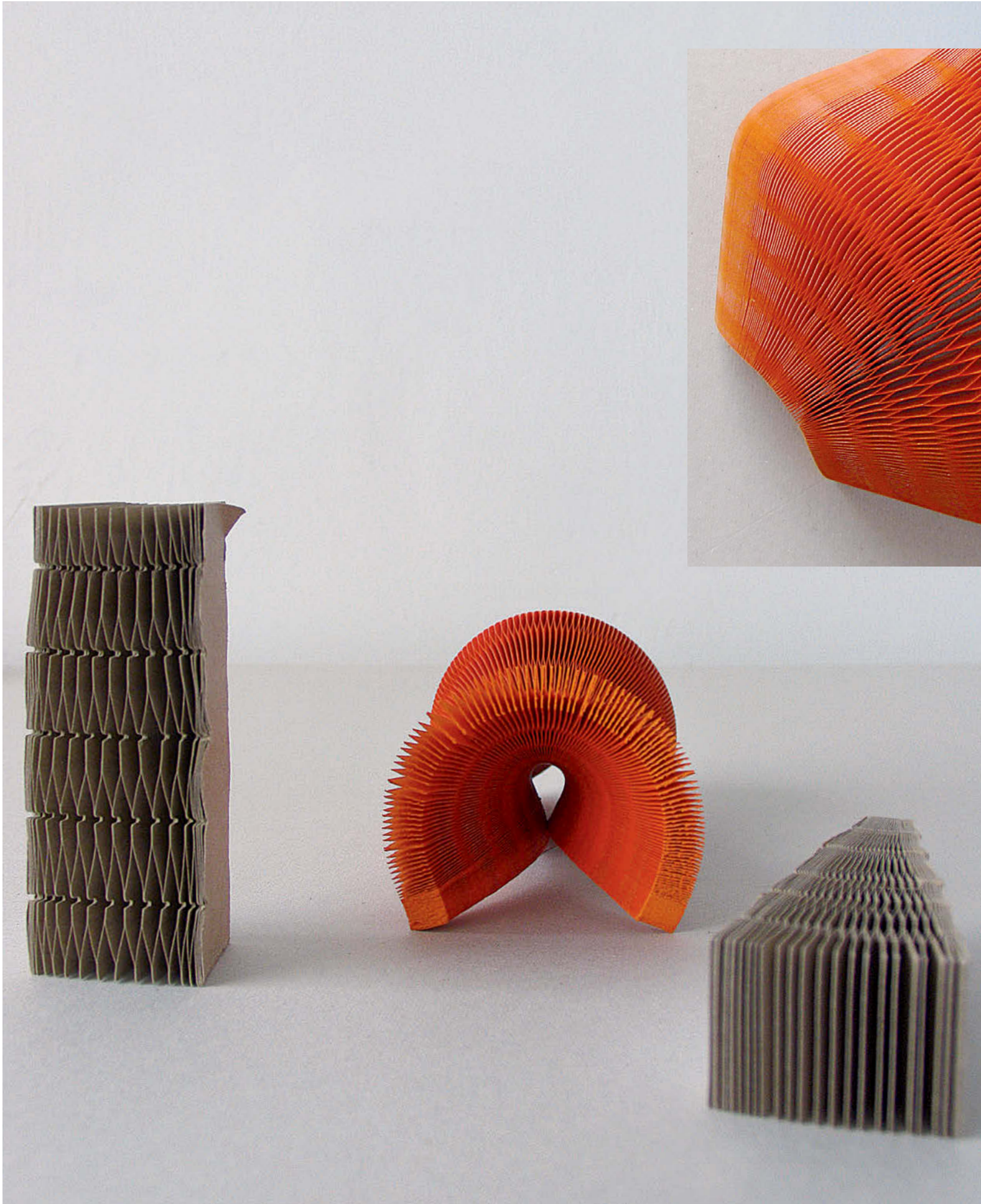
from 11×6mm to 110×20mm  
technology

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Manz Automation  
Tübingen GmbH  
www.manz-automation.com

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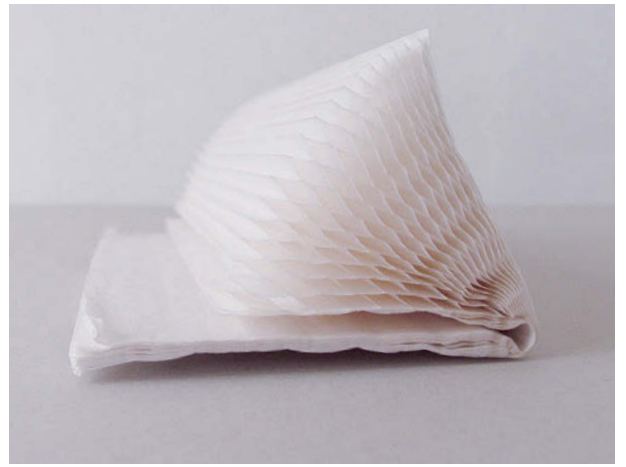
**DEEP-DRAWN PAPER** Like foil or sheet metal, paper can also be deep-drawn. The process is used, for example, in the production of cheese packaging. Pieces of cardboard cut to the appropriate size are stacked in a machine. One by one the sheets are fed into the tool, where between the two halves they are drawn over a slightly cone-shaped punching tool. The pressure is so high that the folds concentrate into a smooth, very sturdy edge, which the same tool also cuts. Another machine calibrates the edges so that the carton lid fits the box base perfectly. Cartons made of deep-drawn paper can be manufactured in various sizes, with the heights of the sides ranging from 6 to 65 millimeters. As a rule, duplex board weighing 450g/m<sup>2</sup> is used. It goes without saying that it is not limited to cheese packaging. Any geometric shape that is releasable from the mold in one direction is suitable for deep-drawing, and that at a rate of up to 100 pieces per minute.



# HONEYCOMB STRUCTURES



55 /2



54

56



219

## 54 →

see projects B102/B166

148×210mm

mass-produced

Fest-Dekor GmbH

www.fest-dekor.at

**HONEYCOMB PAPER** Honeycomb paper consists of glassine paper. To make it, large sheets of paper are given extremely thin, straight adhesive seams, which run parallel across the entire sheet. As a rule the distances between them are equal. Layer by layer the adhesive seams alternate with each other: where there was previously a gap there is an adhesive on the next strip, and so forth. In this way honeycombs emerge, which become visible when fanned out. Honeycomb paper is used primarily as packaging and modeling paper. Architects and designers frequently use the paper, fascinated by the astonishingly rigid three-dimensional volumes emerging when the flat paper is stretched. To increase the durability of products, weatherproof, tear-proof or laminated papers can be processed into honeycomb paper. The mechanical properties such as stability and pressure resistance can be considerably increased through the use of robust, thick paper.

## 55

/1: 125×40mm  
(width variable)

/2: 80×150mm

mass-produced/experiment

Honice1 Worldwide B.V.

www.honice1.com

**HONEYCOMB PANELS AND 3D HONEYCOMB STRUCTURES** Honeycomb panels consist of honeycomb paper that is cut into thin strips and then glued fanned out between two surface layers. By using various qualities of paper and honeycomb sizes, different compression strengths can be achieved. The honeycomb paper is cut to size using a veneer cutting machine. This way, 100 millimeter thick blocks can be cut into thin strips of around 5 millimeters. The fanned-out honeycomb strips are shapeable and can also be glued onto three-dimensional surfaces. The orange honeycomb shape shown here is an anomaly: in this case the honeycomb paper is cut along nonlinear contours, such that when it is fanned out a three-dimensional structure emerges. Though this is not a standard application, mass production is certainly conceivable. Honice1 also manufactures honeycomb structures made of paper impregnated with phenol.

**56** →

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see projects B116

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500×300mm

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mass-produced

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molo design, ltd.

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[www.molodesign.com](http://www.molodesign.com)

PRODUCTS MADE OF HONEYCOMB PAPER Canadian company molo design came up with an entire range of furniture made of honeycomb paper. The »softseating« stools are made of thick kraft paper, which can withstand very heavy loads. Depending on the number of layers, the honeycomb paper can be used to create stools and benches of differing sizes. Folded up, the furniture can be stored like large books. In addition to these »honeycomb seats« molo design have also come up with honeycomb paper luminaires and flexible partitions. Apart from the magnetic panels for fastening, the furniture is made exclusively of totally recyclable paper.

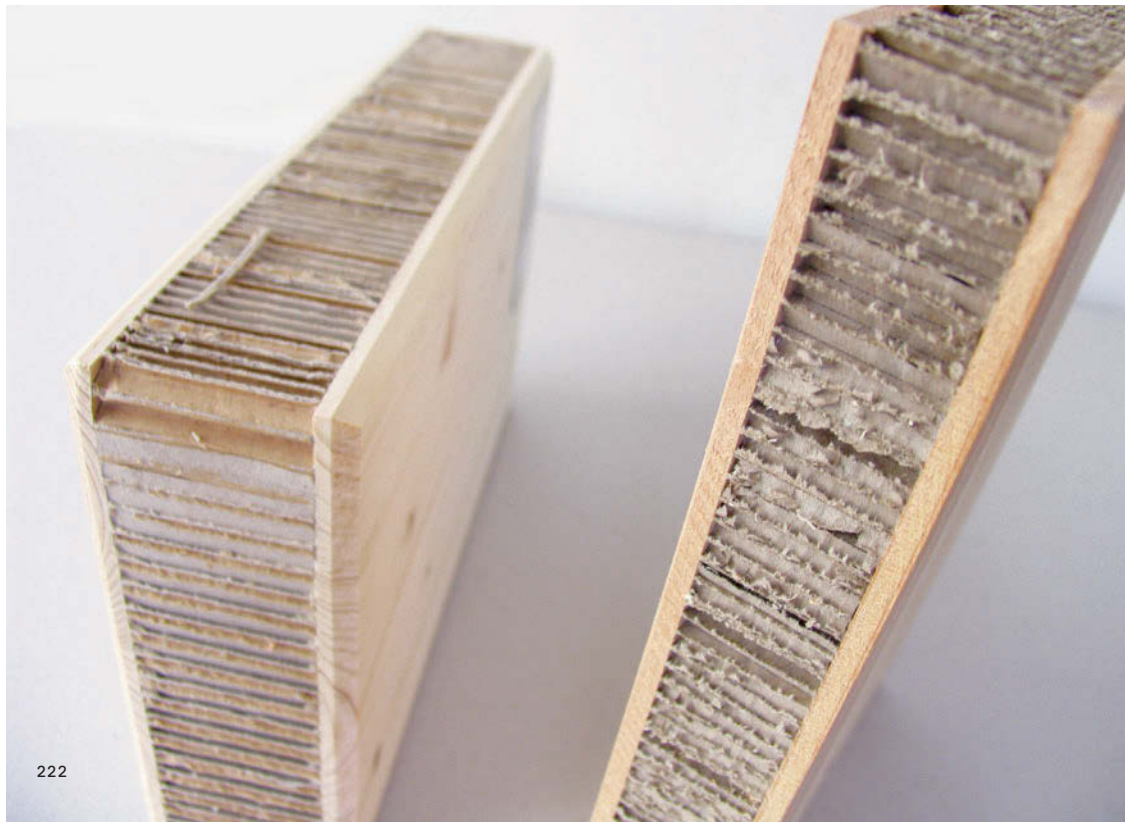


59



58

57 /1 /2



## 57

/1: 210×297×70mm

/2: 210×297×40mm

mass-produced

Lud. Kuntz GmbH,  
Elka Holzwerke  
www.elka-holzwerke.de

**SOLID HONEYCOMB PANEL** The combination of this panel material consisting of two solid wood surface layers with a paper honeycomb core represents a new development both in the field of panel materials and in solid wood construction. It outlines two major areas of work in current material development: lightweight construction and the treatment of renewable raw materials. This semifinished product also upholds ecological criteria such as, for example, the absence of toxic solvents, the use of materials that save resources, and recyclability. Combining honeycomb core and solid wood surface layers gives the panel a high degree of bending and transverse tensile strength. The surface layers are made of approximately 8 millimeter thick, glued planks of solid spruce or Douglas fir, while the honeycomb core can vary in height. The panels are 30, 40 or 70 millimeters thick and come in a standard size of 5.20 by 2.5 meters. Their specific weight of between 110 and 170 kg/m<sup>2</sup> is only around a quarter of that of traditional chipboards. What is remarkable about this combination of materials is the fact that paper honeycombs can lend stability to a solid wood product. The contrast between the two materials, both of which are sourced from tree trunks, is equally unusual.

## 58

honeycomb core 16mm  
material thickness: 21mm

mass-produced

SWAP (Sachsen) GmbH  
www.swap-sachsen.de

Wayand AG  
www.wayand.de

**CURVED HONEYCOMB PANELS FOR MOLDED PARTS** Curved lamellas and corrugated lamellas give the panel material particular stability, even though the curved honeycomb panel is almost as light as polystyrene and the resistance to pressure compares with that of wood. The following techniques can be used to process it into furniture and trade fair stands: cutting, perforating, sawing, milling, drilling, doweling, plotting up to 18 millimeters thick, gluing, screwing, scoring, bending, printing, and laminating. Furthermore, fixing systems and hinges can be inserted in the panels. As curved honeycomb panels are made exclusively of paper and environmentally friendly adhesives, they can be recycled.

Wayand manufactures lightweight composite parts with reinforcing honeycomb cores. These composite parts consist of a honeycomb core coated with glass or natural fibers. The fleece is sprayed with a PUR matrix (Baypreg®), which unlike traditional epoxy systems is free of solvents and styrene. It is then put around the honeycomb core and pressed in the heated tool. This produces large, lightweight parts which are distinctive for their enormous rigidity and crash behavior.

## 59

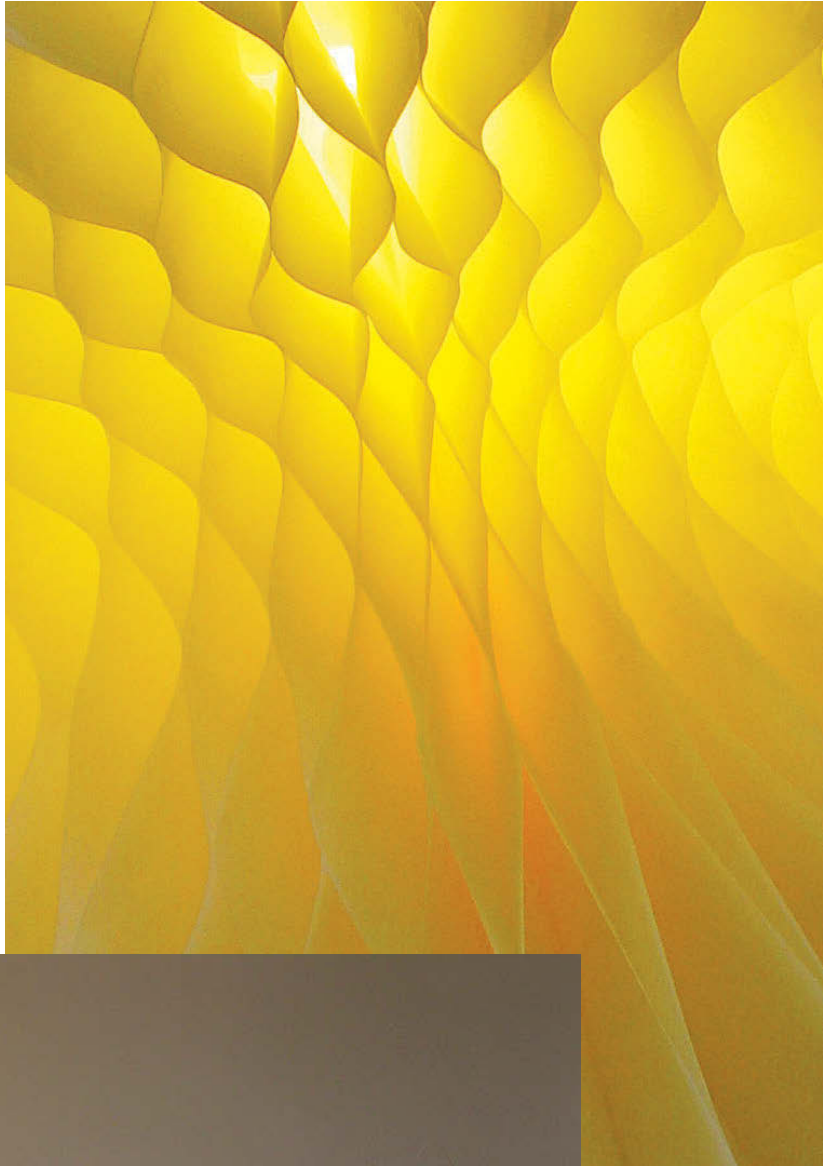
210×297×10-30mm

mass-produced

WF Wabenfabrik GmbH  
www.wabenfabrik.de

**CORRUGATED HONEYCOMB PANEL WITH CHANGING CORRUGATION SIZES** Compared with honeycomb panels, corrugated honeycomb panels are extremely robust even without being laminated, as they are made of stacked, glued, corrugated cardboard. The configurations, vertical to the corrugated strips, ensure the requisite rigidity. In the production process corrugated board is glued together to form large blocks, which are then sawn into slender strips of up to two millimeters using a long band saw, and if required, laminated. Gluing together corrugated board with corrugations of various sizes to form a block can lead to variations in the bending and pressure resistance within the panel. Using various paper types and grammages can also change the panel's properties. The fact that in different sections of a paper honeycomb sandwich different degrees of rigidity, colors, and densities can be achieved offers totally new possibilities for lightweight construction. The blue panel consists of fire-resistant paper and is classified as barely flammable (building material class B1). A »moisture-resistant« honeycomb, which will not only withstand moisture but also mold and fungi, is currently being developed.

60 /2



60 /1



60 /3



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700×500×400mm

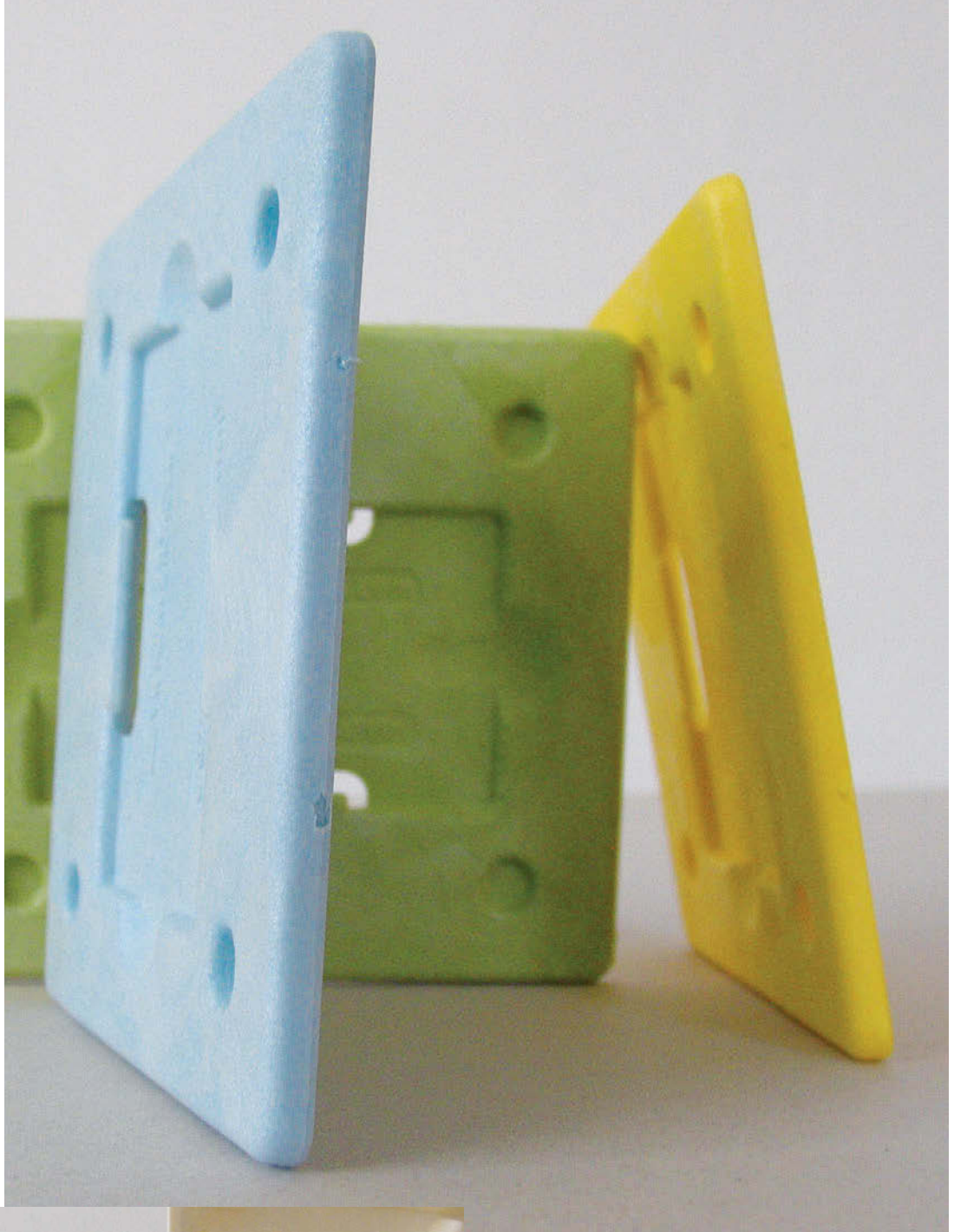
prototype

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Tom Pawlofsky, Michael  
Haas, Jennie Hardenbicker

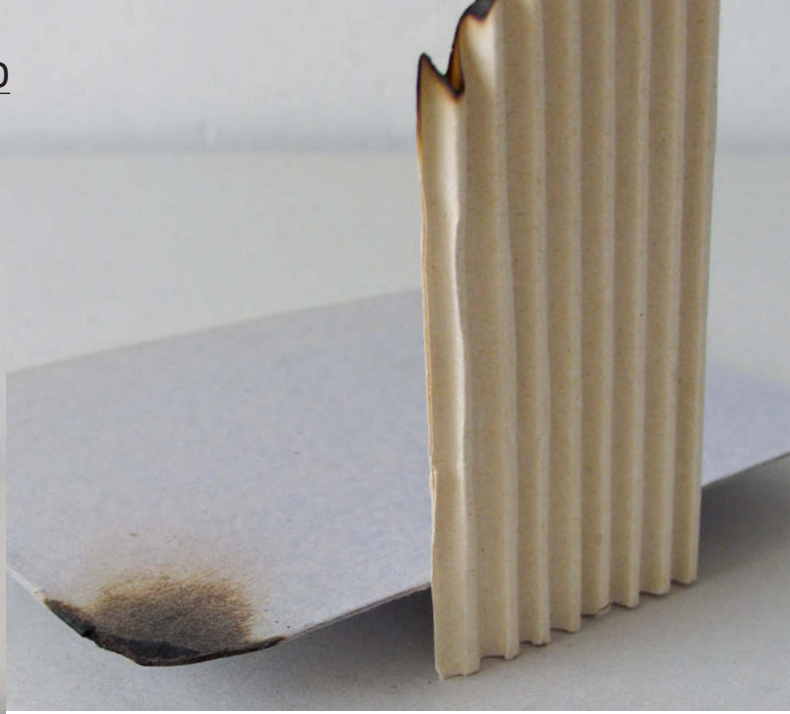
www.shadyshade.com

CNC HONEYCOMB LAMP The design and manufacture of the ShadyShade lamp are based on a process that is controlled entirely by a computer program and a CNC machine. The program is written so that it independently generates and computes asymmetrical shapes as well as their production on a CNC-controlled machine. The lamp is produced similarly to honeycomb paper. Lines of adhesive stick the layers together. However, on account of asymmetrical shapes, each layer of paper has a contour of its own, each of which is cut out individually on a converted cutting plotter. Next, the adhesive jet mounted on the plotter applies the adhesive seams, not in the usual strips but in a variable pattern adapted to the contour of the respective piece of paper. Each individually cut sheet of paper, adhesive seams duly applied, is individually placed on the precut paper sheets and pressed. The CNC-controlled system allows the size of the honeycombs, and thus also the level of translucency, to be regulated. The light source is a round fluorescent tube placed in a transparent acrylic tube (PMMA), which gives the lamp stability and also protects the paper from heat. ShadyShade can be produced in various shapes and sizes ranging from 30 centimeters to 3 meters. The strong transparent paper gives the lamp a warm yellowy color.



FOAM MOLDED

63 /1



63 /2 /3

62 /1 /2



227

62 /3



62 /4 /5

## 61

/1: 125×138×6mm

/2: 180×125×16mm

technology

PaperFoam BV.

www.paperfoam.com

**PAPER FOAM** Paper foam is produced on the basis of a viscous suspension of starch, cellulose fibers, and water. This suspension is injected into a mold (tool) using a die-casting procedure. In an aluminum tool heated up to 200° Celsius, the starch particles thicken and the water evaporates. At this stage the matter foams up, filling the entire mold, with the water working as a foaming agent. After approximately 40 seconds all the water has evaporated, leaving the finished product hardened and ready to remove. Depending on the thickness and size of the paper foam product, the process takes between five seconds and two minutes. Paper foam has a very pleasant, soft finish. It is antistatic and, given its foam structure, very light and insulating. Similar to plastic injection molding, the material, which is very easy to dye, can be made into complex geometrical shapes more than a millimeter thick. Even if there are considerable variations in the thickness, the material does not collapse but maintains its finish and shape. Given these features, paper foam is suitable as a replacement for other petrochemical foam materials, since it is, in contrast, completely recyclable and biodegradable.

## 62

/1: 75×48×74mm

/2: 57×70×150mm

/3: 30×10mm

/4: 165×110×12mm

/5: 148×234×29mm

technology

Hellbut & CO GmbH

www.hellbut.com

**PAPER FOAM MADE OF WASTE PAPER** Waste paper can be used to produce paper foam that goes a long way to saving natural resources. Medium-quality paper—such as newspaper or paperboard containers—is used as the raw material. Once the waste paper has been shredded and defibrated it is blended with pure food-grade native wheat starch. Next, a 100 percent biodegradable alcohol-based binder is added. Finally, the mixture is pressed into pellets, which are later foamed up in either an extruder or a tool. This takes place exclusively by thermal and mechanical energy input by means of steam, without the use of chemical agents and softeners. Different degrees of rigidity for the foam can be achieved depending on moisture, ingredients, temperature, screw configuration, pressure, and amount of water added in the foaming process. Paper foam products boast a high-quality, homogeneous finish and can be molded with relatively complex geometrical forms. They are disposed environmentally friendly in the compost or organic waste bin. It has emerged that paper foam has a positive effect on the composting process, which takes just two to three months.

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/1: 46×10 mm  
.....  
/2: 148×210 mm  
.....  
/3: 75×135×5 mm  
.....  
technology

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AddiTherm Group VBM  
.....  
[www.additherm.com](http://www.additherm.com)

FIRE-RESISTANT PAPER AND CARDBOARD BY MEANS OF CRYSTAL TECHNOLOGY The manufacture of nonflammable paper using crystal lattice technology comes about by adding seed crystals to the pulp. In the drying process, a chemical bond develops between the crystal matrix and cellulose fiber matrix, which makes the paper nonflammable in line with the German B1 fire rating. The following fire-resistant types of paper have already been developed: laminated cardboard, coarse cardboard, paper foam, recycled paper insulating boards, and the »AddiTherm Top Steel Coating« material. The latter is a cellulose-based injection material that was developed as fire-prevention coating for steel beams. This leads to the paradoxical situation in which a paper foam proves to be more fire resistant than steel. The dark colored paper shown at the top of the previous page was subjected to heat of approximately 1,700° Celsius. Even wallpaper that has already been hung can be sprayed with AddiTherm to make it more fire resistant. The crystal lattice forms in the paper matrix at room temperature.



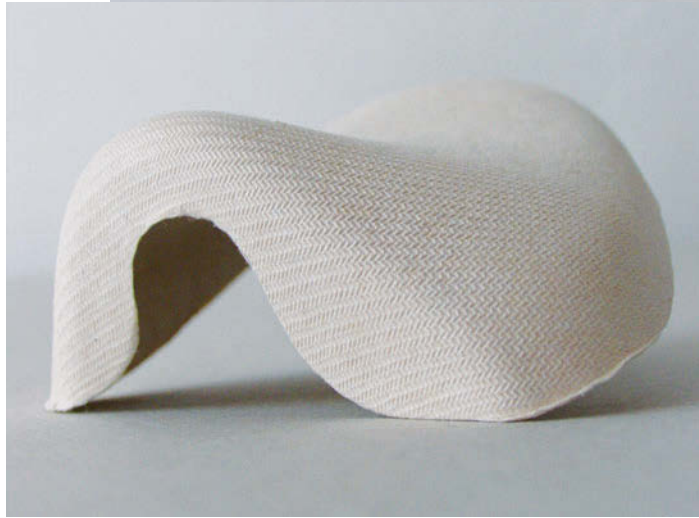
65 /1



65 /2



MOLDED PULP



64 /1



66



64 /2

64 /3

## 64 →

see projects B150

/1: 520×255×90mm

/2: 125×100×45mm

/3: 330×406×60mm

technology

Buhl PaperForm,  
Heinrich Buhl GmbH

[www.buhl-paperform.de](http://www.buhl-paperform.de)

/3: Communion W Ltd.

[www.communio-n-w.com](http://www.communio-n-w.com)

**MOLDED PULP** These three-dimensional products are made entirely of waste paper with no added adhesives or other chemicals in a molding-scooping process. Egg cartons are the simplest form of molded pulp. In the area of packaging trays this material is a very good alternative to polystyrene and corrugated cardboard.

The so-called »NormPac« molded pulp products are notable for their high level of rigidity and stability when put to the test. The molded pulp products referred to as »PressPac« differ from »NormPac« through their very smooth finish, the result of an additional pressing process. Molded pulp products are dimensionally stable, possessing an astonishing precision and aesthetic appeal. By default molded pulp products are produced in pure white or unbleached. However, without any great effort they can be dyed and impregnated against moisture and grease. The most recent developments include extremely absorbent products suitable for the safe transport of dangerous fluids, as well as fire-resistant variants.

## 65

/1: diameter: 80-120mm

/2: height: 150-300mm  
diameter: 100-180mm

experiments

Luzia Kälin and  
Nicole Lehner

[www.designasy1.swissblog.ch](http://www.designasy1.swissblog.ch)

**SUGAR PAPER** Paper pulp consists of various fibers and fillers mixed together. Fascinated by this diversity, the product designers Nicole Lehner and Luzia Kälin have experimented with pulp mixtures and produced several promising results. In material studies they tested various fiber and filler combinations for their rigidity, finish, elasticity, durability, touch, and aesthetic appeal. The mixture of water and sugar turned out to be particularly robust, and even proved suitable for making three-dimensional objects. For the objects shown here, the designers enriched the pulp with sugar and applied it on the inside of sewn fabric shapes. The fabric quickly absorbed the pulp's moisture, giving it an initial rigidity. The application of heat produced the hardening effect. While drying, the structure of the textile shapes began to appear on the object's surface. Extremely robust and astonishingly shock-proof vessels were produced which could certainly be manufactured on an industrial scale and which raise the question of whether this biodegradable paper mixture could replace plastic in many fields.



66

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210×297mm

mass-produced

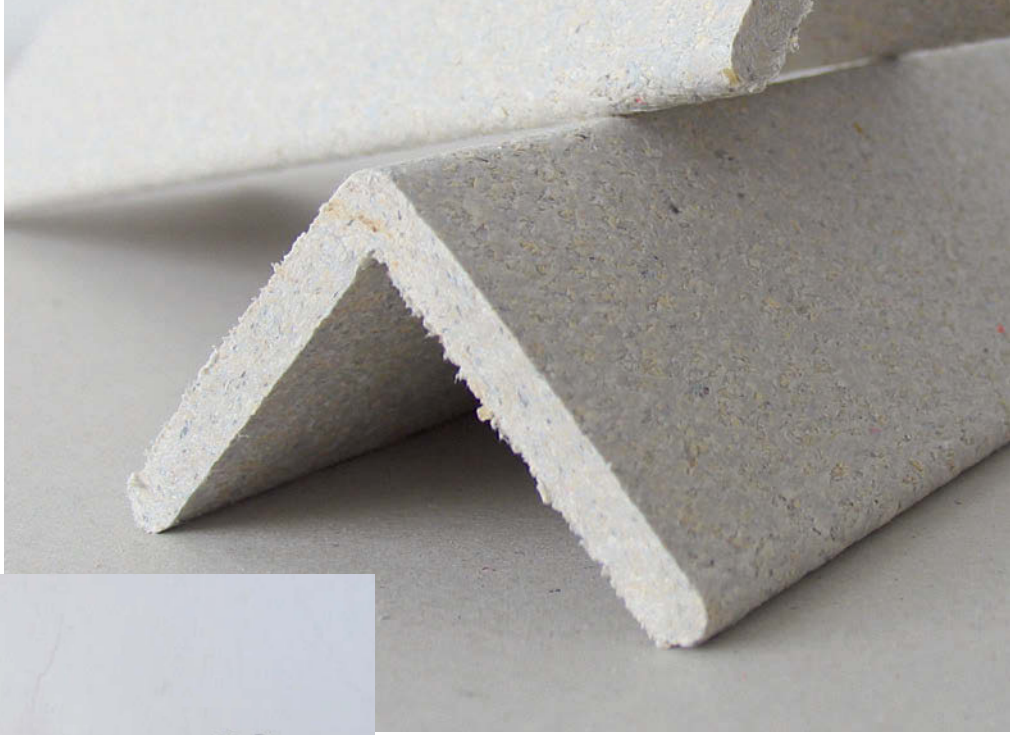
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Flexipack  
International Wunderlich  
GmbH + Co. KG  
.....  
[www.flexipack.de](http://www.flexipack.de)

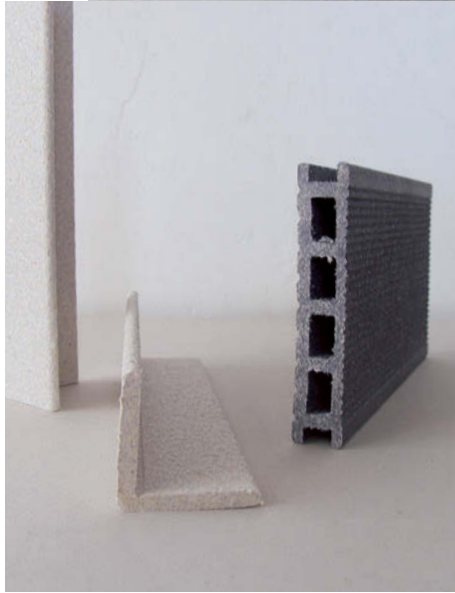
CORRUGATED CARDBOARD WITH MOLDED CORRUGATIONS This rib-shaped padding material is made out of cast waste paper fiber. A rotary infinite casting and pressing process turns the paper pulp into a filled corrugation. This particularly compact, highly concentrated rib profile can withstand pressures of up to 2,000kg/m<sup>2</sup>. Lamination with various surface papers or soft foam can add further characteristics such as higher impact absorbency and antislip finishes for transport packaging. The cast corrugated cardboard is produced in various versions and also processed into finished component parts.



68 /1 /2 /3



67 /1



67 /1 /2

69 /1



69 /2

67 →

see projects b30

/1: 60×60×270mm

/2: 150×274×25mm

technology/mass-produced

Artek oy ab

www.artek.fi

UPM Group

www.upm-kymmene.com

**STRUCTURAL PROFILE MADE OF WASTE LABELS** Architect Shigeru Ban, in collaboration with the forest industry group UPM-Kymmene, developed a new paper-based material for the construction of an exhibition pavilion for Finnish furniture manufacturer Artek. For the pavilion, waste produce from the manufacture of adhesive paper labels—which UPM-Kymmene usually recycles—was chaffed and extruded into angle profiles. Following intensive research, a »paper-fiber-reinforced-plastic-profile« made entirely of waste adhesive labels was produced that had no added plastics or adhesives and boasts a high degree of bend, UV, and weather resistance. Based on this project UPM-Kymmene now manufactures »UPM ProFi Deck« outdoor flooring in a variety of colors. It can be recycled to produce more »UPM ProFi Deck.«

68

/1: 102×102×250mm

/2: 93×18×250mm

/3: 50×46×220mm

mass-produced

Paul & Co GmbH & Co KG

www.kunertgruppe.com

**CARDBOARD PROFILES** These angle and U-profiles consist of several layers of paper pressed into shape and with a laminated surface layer, which can also be colored, high gloss, or printed. The sides can be between 35 and 100 millimeters wide and the walls 2 to 8 millimeters thick depending on requirements. The cross sections of the profiles vary in their geometry and wall thickness. This is done by partially reducing the paper layers, or by using compression tools. The profiles are produced in lengths of 50 millimeters to 6 meters by using a tool to extrude them to infinite profiles. To date the angle profiles have been used primarily to protect the edges of goods being transported. Their bend- and torsion resistance is outstanding. For this reason more sophisticated areas of use such as children's furniture and temporary lightweight constructions are conceivable, with an outer layer of waterproof paper recommended for outdoor use.

69 →

see projects b26

length: ca. 1.5m  
diameter: 200mm

mass-produced

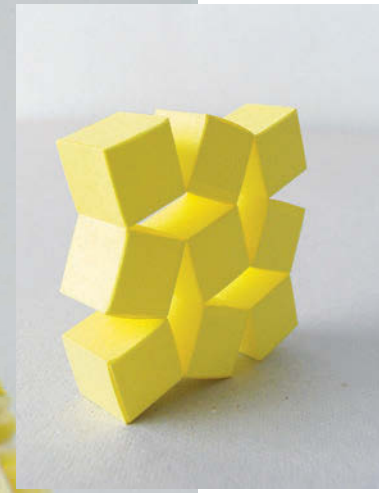
Octatube Space  
Structures BV  
Mick Eekhout

www.octatube.nl

Shigeru Ban Architects

www.shigerubanarchitects.com

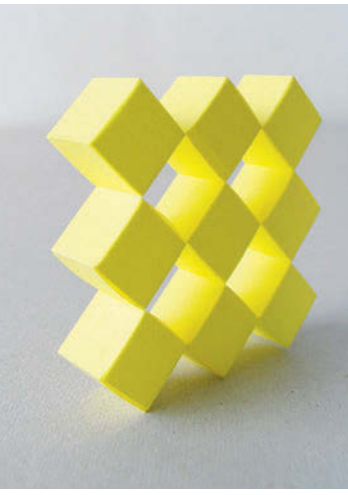
**STRUCTURAL ELEMENT FOR THE CARDBOARD DOME** Shigeru Ban's impressive cardboard construction »Theatre Dome« in Leidschenrijn, the Netherlands, is 10 meters high and 25 meters in diameter. The lightweight construction consists of 700 cardboard pipes covered by white fabric. The structural element, which was carefully thought through by the Dutchman Mick Eekhout, is manufactured as a modular mass product and can be adapted to fit buildings of various sizes and uses. It demonstrates that structures of the highest standard can be made using the simplest of materials. Initially designed for temporary use, the question arises as to whether the technical paper could be used for more permanent structures.



72 /2

72 /1

ORIGAMI IN PRODUCTION



71 /1 /2



71 /3

70

73 /1



73 /2



## 70 →

see projects B112/B124

400×200mm

technology

Lassner GmbH

[www.lassner-plisse.de](http://www.lassner-plisse.de)

**PLEATED PAPER** To pleat means to fold in layers. Pleating machines work on the principle that two cutters on moveable metal runners grasp the rolls of material along their entire width and make folds, which are then set between two heated rollers or guide plates. Having grabbed the material, the cutters can make a sideways movement which creates diagonal folds. If wave-shaped or diamond-shaped cutters are used, the folds can also be made in a cross direction. Moreover, computer-controlled distorting machines are able to control the movement of the cutters and rollers such that the folds vary in depth and distortion (irregularities in the pattern). To protect the material, so-called accompanying paper is used in pleating. This pleated crepe paper is very thin, yet heat resistant and strong. Following the production process the material is generally discarded. The designer Nendo has used it to design a chair and thus recycled pleated crepe paper in an innovative way.

Today, textiles are pleated less for the fashion industry and more for technical applications, such as airbags, window blinds, covers for robot joints and industrial filters; and lampshades, for example, are folded from high-quality papers. However, leather, sheet metal, and wire mesh can also be pleated. Moreover, two or more layers of different or the same material can be processed together in a sandwich with a width of 1.5 meters.

## 71

/1: 120×120×70mm

/2: 120×120×25mm

/3: 400×400×4mm

one-off

Christiane Bettens

<http://origami-art.org>

**ORIGAMI TESSELLATIONS** »Origami tessellations« are folds that are based on geometric lines and bodies, which can be repeated on a plain any number of times. Even using very thin paper, the resulting three-dimensional structures are surprisingly stable. There is an immense variety of these filigree patterns and shapes, which are reminiscent of load-bearing structures and roof constructions.

Back-lit tessellations have a particularly strong aesthetic effect due to the geometric overlays of layers of paper. As tessellation folds can be computed mathematically, software such as »Tess« by Alex Bateman enables the development of one's own folds or folding templates.

## 72

/1: 120×120×300mm  
 /2: 55×55×17mm (variable)  
 one-off

Heinz Strobl  
 www.knotologie.eu

KNOTOLOGY AND SNAPOLOGY These two terms refer to folding techniques and paper constructions developed by the physicist and software developer Heinz Strobl. They involve short strips of paper folded into triangular, quadrangular or pentagonal modules and joined using the »knotology« technique without adhesives. Slight changes to the angle of the fold line produce different versions of the module, from which an infinite number of geometries and constructions can be composed. Structures made of triangular modules are particularly stable, as is the case with the exhibits »Bambussturm« (bamboo storm) and »Double« illustrated here. »Snapology« is an advance on »knotology,« and is a sort of clicking mechanism, folded from short strips of paper, which joins the »knotology« elements together. More complex structures can very easily be made from these modules.

## 73 →

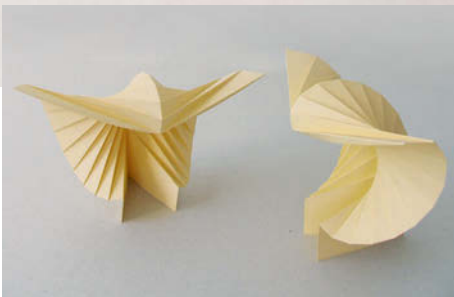
see projects B168  
 diameter: 100mm  
 one-off

Rona Gurkewitz,  
 Bennett Arnstein  
 gurkewitzr@wcsu.edu

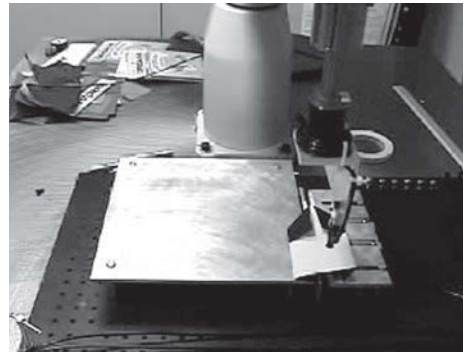
MODULAR ORIGAMI Modular origami consists of several paper modules folded in the same way. These retain their shape and stability without the use of adhesive and are joined exclusively through folds. The scientists Rona Gurkewitz and Bennett Arnstein have produced objects from modules with »identical folds,« »similar folds,« and »systematically changed angles.« A further parameter is the varying number of modules. This sounds more complicated than it actually is—or so the two maintain, and they try to demonstrate how with few changes so wide a variety of »identically folded« modules can emerge. The icosahedron (twenty-face) shown in cross section is a model from the »Bucky Balls« series and consists exclusively of sixty identical units. The »dimpled« dodecahedron (twelve faces) consists of ninety modules, each of which consists of five parts joined together. All the structures are notable for their astonishing stability, which is produced by the folds and connections.



75 /1



75 /2



74



76



## 74

scientific research

Dartmouth Computer Science  
Department

[www.cs.dartmouth.edu/  
~robotics/origami.html](http://www.cs.dartmouth.edu/~robotics/origami.html)

**ORIGAMI ROBOTS** Scientists at the Dartmouth Computer Science Department have designed the first origami-folding robot. As early as 2007 it was able to fold objects such as hats, airplanes and paper cups. To do so the robot sucks up the paper by vacuum in order to position it on the »folding table.« There the paper is folded into a cavity and turned over and then repositioned by the robot. Researchers are currently experimenting with far more complex fold structures. The aim is to use origami robots for the mass production of lightweight constructions, as machine-processing of paper into complex architecture offers numerous advantages: the flat sheets of paper need little storage space and can be folded and put together without complicated assembly and dismantling work. Should the development work be a success, in future it will be possible to realize totally new constructions in architecture and product design, which through the use of technical papers in particular provide new functions.

## 75 →

see projects D136

/1: 240×240×120mm

/2: 140×180×100mm

one-off/scientific research

Ron Resch

[www.ronresch.com](http://www.ronresch.com)

**CURVED CAD/CAM FOLDS** Ron Resch was writing computer programs back in the 1960s to visualize structures folded three-dimensionally, which he then transferred to folding patterns. What was special about his work was that even then he was able to compute curved fold lines and realize them in 3D. He built a simple computer-controlled plotter, which transferred the curved fold lines to paper or thin plastic panels and grooved them in. These could then be produced in large numbers in a computer-controlled process, and only needed to be folded three-dimensionally. The so-called »birds,« among other things, were created at the time. These circular-fold, 3D objects were presumably the first of their type to be created using a CAD/CAM process. A pioneer in this field, Ron Resch worked with the architects Frei Otto and Buckminster Fuller; furthermore he designed some of the sets for the first Star Trek movie in 1979.

## 76

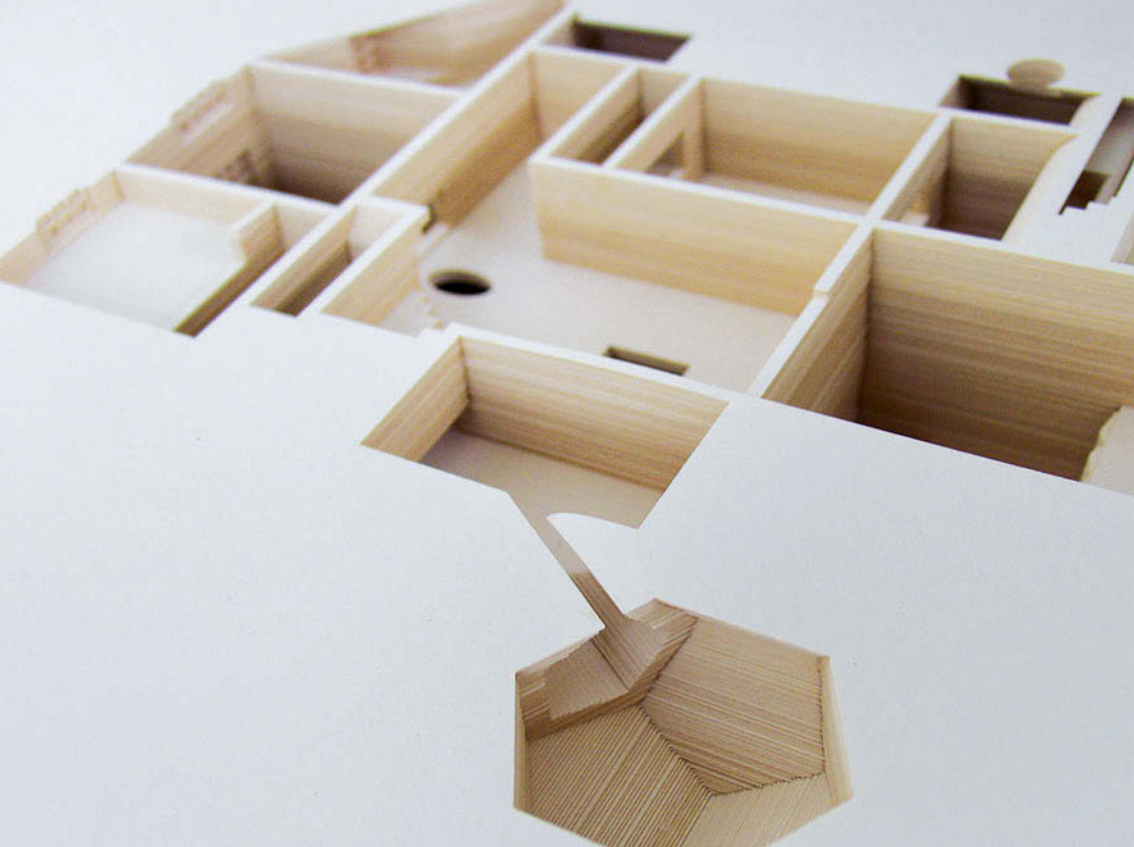
210×330×178mm

one-off/scientific research

Erik Demaine und  
Martin Demaine

[www.erikdemaine.org](http://www.erikdemaine.org)

**COMPUTATIONAL ORIGAMI** »Computational Origami« is the title of a series of works that consist of round strips of paper folded in pleats and joined together. The scientists Erik and Martin Demaine first make two to three circular surfaces between 720° and 1080°, which, having been cut open and turned several times, are put together to create a large, topological circle. This approach gives them access to a wide variety of shapes for self-stabilizing circular segments. Furthermore, the structures illustrated here are self-unfolding and can—for example for transportation purposes—be collapsed to take up very little space. For a research project (2004–06) with MIT student Jenna Fizel they developed a software that exactly simulates the physical laws of pleated circular segments. Nowadays this software can be used to generate and simulate shapes and volumes and turn them into three-dimensional models. The two brothers are currently working on building bigger volumes.

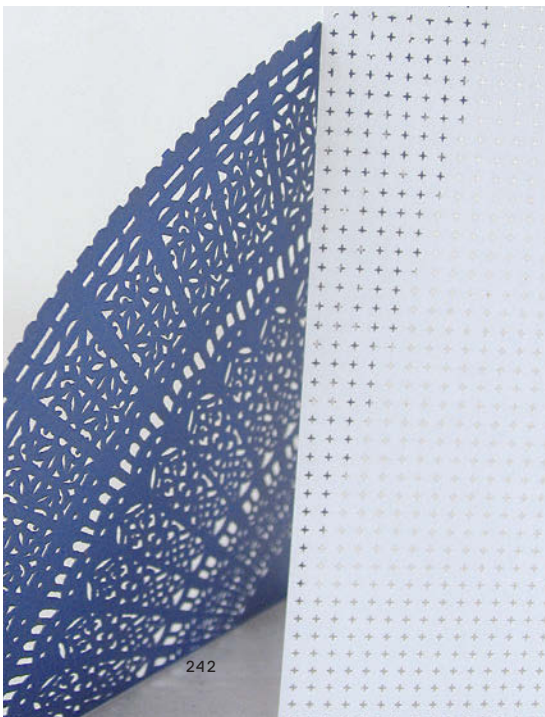


79

78



77 /1 /2



## 77

/1: 157×157mm

/2: 210×103mm

technology

Druckerei Schroeder  
GmbH & Co. KG

[www.filigran-laser.de](http://www.filigran-laser.de)

**LASER-CUTTING WITH COPPER TEMPLATE** This laser cutting process enables perforations to be made that would not have been possible with traditional punching tools. Extremely fine and closely spaced lines and dots in widths of up to 0.3 millimeters can be cut out. Even large patterns and graphics, which are only supported by very thin bars, are possible with this technology. Laser-cutting with copper templates functions as follows: the desired motif is etched out of a thin copper sheet to get a precise template. Beneath the template the paper is then guided through a »laser curtain.« Wherever the laser can penetrate the template the paper burns away completely, while beneath the copper it is preserved. Just how fine the motif is also depends on the choice of material: the thicker and coarser the paper, the less fine the motif will be. This process uses paper measuring from 180 by 180 millimeters to a maximum of 1,000 millimeters by 720 millimeters, and weighing 80–500g/m<sup>2</sup>. The advantage of laser-cutting using a copper template is that with the two-dimensional laser, large areas and quantities can be produced in little time.

## 78 →

see projects b120/b160

210×297mm

technology

Kremo Laser-  
Papierfeinstanzungen

[www.kremo.de](http://www.kremo.de)

**CNC-CONTROLLED LASER-CUTTING OF PAPER** The CNC-controlled CO<sub>2</sub> laser is ideal for making filigree, elaborate perforations in paper and cardboard. In this process, based on the computer data a laser head burns graphics or letters in line widths or dot diameters of up to a tenth of a millimeter in paper. Paper and cardboard weighing up to 40g/m<sup>2</sup> and up to three millimeters thick are suitable for laser cutting. As the laser's intensity can be varied, engravings are also possible. Colored paper, cardboard, and printed materials are usually labeled in this way. As with all CNC technologies, laser-cutting opens up possibilities which previously required elaborate craftsmanship, for example, silhouettes. As no expensive tools are needed, individual items can be produced cost-effectively, allowing entire graphics, patterns, and ornaments without repeater patterns. Laser-cut paper can frequently be recognized by traces of soot on the edge of the cut and on the rear.

## 79 →

see projects b60

273×430×107mm

one-off

Kremo Laser-  
Papierfeinstanzungen

[www.kremo.de](http://www.kremo.de)

Olafur Eliasson

[www.olafureliasson.net](http://www.olafureliasson.net)

**YOUR HOUSE** »Your House,« a work by Icelandic artist Olafur Eliasson, was also made by laser-cutting. Each of the 454 hand-bound pages was lasered out. As a model the artist used his own house in Copenhagen, the dimensions of which he determined by means of a 3D scan before converting them into 454 vertical sections on a scale of 85:1. Each page of the book corresponds exactly to 2.2 centimeters of the real building. The data for the vertical sections are also the data for the laser, which in accordance with the outer contours cut out the rooms, cellar, windows, doors, and the mantelpiece. This very first »negative-space-architecture-model« has inspired several architecture studios to present their designs in this way, so impressive are the spatial impact and the precision of the details.



## BRIEF DESCRIPTIONS



## BIOGRAPHIES

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### NORIKO AMBE

WWW.NORIKOAMBE.COM

Noriko Ambe was born in 1967 in Saitama, Japan, and studied Painting at the Musashino Art University in Tokyo. Since 1999, sculptures cut from paper have been the focal point of her work. In 2006 her »Flat Globe, Above NY« became part of the permanent collection in the Whitney Museum of American Art. Recently her work »A Piece of Flat Globe« was showcased in the »Second Nature« exhibition curated by Tokujin Yoshioka in the 21\_21 Design Sight museum in Tokyo. Ambe lives and works in New York.

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### ATELIER OÏ

WWW.ATELIER-OI.CH

Swiss design studio Atelier Oï was founded in 1991 by Aurel Aebi (born 1966), Armand Louis (born 1966), and Patrick Raymond (born 1962) in La Neuveville, and is still located there today. The interdisciplinary work by the three designers, who operate in the fields of architecture, design, and interior design, is characterized by a detailed study of different materials. Among their clients are Ikea, Wogg, Röthlisberger, Swatch, B&B Italia, Foscarini, Desalto, Louis Vuitton, and Bulgari. Patrick Raymond is also a professor at ECAL, Lausanne.

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### ATOPOS

WWW.ATOPOS.GR

Atopos is an international, Athens-based cultural organization founded in 2003 by Stamos J. Fafalios, Dimitris Papanikolaou and Vassilis Zidianakis. The aim of the organization is to support and implement innovative projects that combine new technologies with design, fashion, and contemporary art. In 2007, Atopos staged the exhibition »RRRIPP!! Paper Fashion« at the Benaki Museum in Athens. The paper clothing collection then went on show in Mudam in Luxembourg as well as in the Modemuseum in Antwerp and, as of October 2009, will be on display in the Design Museum in London.

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### SANDRA BACKLUND

WWW.SANDRABACKLUND.COM

The fashion designer Sandra Backlund (born 1975) studied at Beckmans College of Design in Stockholm. She still lives in Stockholm where, in 2004, she launched her own label. In order to give her clothing unusual shapes and volume she experiments with origami, folding techniques, and knitwear. Sandra Backlund won the 2007 Grand Prix Award at the International Fashion and Photography Festival in Hyères, and in 2008, she was awarded the New Generation Award of the British Fashion Council in London.

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### BALL-NOGUES STUDIO

WWW.BALL-NOGUES.COM

In 2004 the set designer Benjamin Ball (born 1968) and the product designer Gaston Nogues (born 1967) set up the Ball-Nogues Studio in Los Angeles. In their experimental built environments, which always lie somewhere between design, art, and architecture, the focus is on spatial experience.

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### SHIGERU BAN

WWW.SHIGERUBANARCHITECTS.COM

Japanese architect Shigeru Ban (born 1957) studied at the Southern California Institute of Architecture and at the Cooper Union School of Architecture. In 1985 he founded Shigeru Ban Architects in Tokyo, which today has branches in New York and Paris. From 1995 until 1999 he was a consultant to the United Nations High Commissioner for Refugees (UNHCR). Ban is regarded as a pioneer of sustainable architecture.

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### MICHAEL BEUTLER

German artist Michael Beutler (born 1976) studied at the Städelschule in Frankfurt from 1997 until 2003, and staged his first solo exhibition in 2001 at the Viennese Secession. Today he lives and works in Berlin. His installations, interventions, and sculptures address architectural space playfully and by association.

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### MARLOES TEN BHÖMER

WWW.MARLOESTENBHOMER.COM

Born in the Netherlands in 1979, Marloes ten Bhömer studied Product Design at Arnhem Academy of Art before taking a Master's degree at the Royal College of Art in London. In addition, she also completed courses in shoe design at the London College of Fashion and in commerce in the Nesta Creative Pioneer Programme. She lives and works in London. Her shoe designs are provocative and experimental and have been exhibited in museums and galleries worldwide, including the Crafts Council in London, the »Folding« exhibition at Platform21 in Amsterdam, and Galerie Lucy Mackintosh in Lausanne.

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### CHRIS BOSSE

WWW.CHRISBOSSE.DE

Chris Bosse was born in Stuttgart in 1971 and worked in various European architecture studios before moving to Sydney in 2003. Today he runs his own architecture practice there and is a professor at the University of Technology. The young German's most famous work is undoubtedly the swimming stadium for the 2008 Olympic Games in Beijing.

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### ZOE BRADLEY

WWW.ZOEBRADLEY.COM

After completing her studies in fashion design at Middlesex University in London, Zoe Bradley (born 1973) worked for Alexander McQueen, for whom in 1999 she created spectacular clothing made of wood. Her vividly staged works combine sculpture, fashion, and theatre. Today she runs her own studio in London.

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### BRUKETA & ŽINIĆ

WWW.BRUKETA-ZINIC.COM

Croatian communications design agency Bruketa & Žinić was founded in Zagreb in 1995 and is internationally known for its unorthodox advertising concepts.

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### DANIELE BUETTI

Swiss artist Daniele Buetti (born 1955) lives and works in Zurich. He became well known for his ballpoint pen scarifications on advertising images, in which he reflected on the aggressive machinery of media and the pressure to consume. Since 2004 he has held a professorship at the Art Academy in Münster.

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**PETER CALLESEN**  
WWW.PETERCALLESEN.COM

Danish artist Peter Callesen (born 1967) primarily works with paper, which he turns into filigree silhouettes, thereby creating new stories and worlds. He lives and works in Copenhagen.

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**HUSSEIN CHALAYAN**  
WWW.HUSSEINCHALAYAN.COM

Renowned fashion designer Hussein Chalayan (born 1970) is of Turkish Cypriot origin. Since 1982 he has been living in London, where he studied at Central St. Martins College of Art and Design. With his conceptual designs he explores the intersection of art and fashion. In both 1999 and 2000 he was voted Designer of the Year at the British Fashion Awards. Chalayan's work has been exhibited at the Kyoto Costume Institute, Musée de la Mode in Paris, Tate Modern in London, Mode-museum Antwerp and MUDAC in Lausanne. In early 2009, the Design Museum in London staged a retrospective in his honor.

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**COTTRELL & VERMEULEN**  
WWW.COTTRELLANDVERMEULEN.CO.UK

The two architects Brian Vermeulen (born 1957) and Richard Cottrell (born 1964) met at the restoration of Le Corbusier's Unité d'Habitation. In 1992, they founded Cottrell & Vermeulen Architecture in London. Their architectural practice focuses on sustainability. Their projects include several public buildings and they have been awarded many prizes, including several from the Royal Institute of British Architects (RIBA).

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**MIA CULLIN**  
WWW.MIACULLIN.COM

Mia Cullin (born 1970) is a Swedish designer who lives and works in Stockholm. Having studied at various faculties in Sweden, Italy, and Denmark, she graduated from Konstfack in Stockholm with a degree in Interior Design and Furniture Design. Today Mia Cullin designs for renowned companies such as Woodnotes, Nola, Habitat, and Ikea.

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**DARCH STUDIO**  
WWW.DARCHSTUDIO.COM

In 2006, architect Elina Drossou (born 1978) founded dARCHstudio in Athens. The practice works on various projects in the fields of architecture, interior design, as well as furniture and graphic design.

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**CHARLIE DAVIDSON**  
WWW.CHARLIE-DAVIDSON.COM

In 1993 the product designer Charlie Davidson (born 1970) set up his own design studio in London. Today he lives and works in Gothenburg in Sweden. His field of work is highly diverse: he has designed furniture and luminaires, developed design concepts for well-known companies such as Lego and Sony, and created experimental spatial concepts.

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**THOMAS DEMAND**  
WWW.THOMASDEMAND.DE

The German artist Thomas Demand (born 1964) studied at the Akademie der Bildenden Künste (Academy of Fine Arts) in Munich, the Staatliche Kunstakademie (State Art Academy) in Düsseldorf and Goldsmiths College in London. Demand documented the sculptures he made as a student by taking photographs of them. Today he is known for his media-critical exploration of photography. In his studio he recreates out of paper and cardboard real scenes and spaces, such as, for instance, the Oval Office or a TV studio, and then destroys them. Only the photos remain, referencing their origin: sensationalist and trivial press and TV coverage.

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**STEFAN DIEZ**  
WWW.STEFAN-DIEZ.COM  
WWW.SHOP.SASKIA-DIEZ.DE

The German designer Stefan Diez (born 1971) completed an apprenticeship as a carpenter before studying Industrial Design at the Academy of Fine Arts in Stuttgart. He worked as assistant to Richard Sapper and later for Konstantin Grcic in Munich. In 2003 he set up his own design studio in Munich.

Diez has now made a name for himself with the design of furniture, tableware, bags, and exhibitions. He designs for renowned clients such as Authentics, Nymphenburger Porzellanmanufaktur, Moroso, Rosenthal, Thonet, Wilkhahn, and WMF.

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**OLAFUR ELIASSON**  
WWW.OLAFURELIASSON.NET

Olafur Eliasson was born in 1967 in Copenhagen but spent his childhood in Iceland. He studied at the Royal Danish Academy of Fine Arts in Copenhagen. Today Eliasson lives in Berlin and Copenhagen where he works as an artist.

The central themes of his work include physical natural phenomena such as water, light, temperature, movement, and reflection. His works feature in a large number of public and private collections such as the Guggenheim Museum in New York, the Museum of Contemporary Art in Los Angeles, and the Tate Modern in London.

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**LUIS ESLAVA & DIEGO RAMOS**  
WWW.LUISESLAVA.COM  
WWW.DIEGORAMOS.ES

Luis Eslava (born 1976) studied Graphic and Product Design at ESDI-CEU in Valencia. He worked for the shoe manufacturer Camper before completing his Master's degree at the Royal College of Art in London. Today he runs a design studio in Valencia.

Diego Ramos (born 1978) studied Industrial Design at EINA Escola de Disseny i Art in Barcelona and also attended the Master's programme at the Royal College of Art in London. Since 2006 he has been working independently, switching between Barcelona, Madrid, and London. At the 2007 ARCO art fair in Madrid, Luis Eslava and Diego Ramos presented their joint collection »Tyvek World,« followed by »Tyvek World 2« in 2008.

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**CHRISTIANE FESER**  
WWW.CHRISTIANEFESER.DE

Artist Christiane Feser was born in 1977 in Würzburg and studied Visual Communication at the University of Art and Design in Offenbach. From 2000 to 2003 she was a curator at the »Digitalcraft« research project hosted by the Museum of Applied Art in Frankfurt am Main. The main focus of her work is digital photo collages.

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**OLIVER FRITZ & TOM PAWLOFSKY**  
WWW.HOCHSCHULE.LI  
WWW.PAWLOFSKY.DE  
WWW.ADAPTIVEARCHITEKTUR.COM

Oliver Fritz (born 1967) studied Architecture at the University of Kaiserslautern. As a research assistant at the university, he worked on a project on media-experimental design in architecture and urban planning. He was also an assistant to the Chair of CAAD at ETH Zurich. Since 2004, he has held an assistant professorship in architecture and digital media at the University of Liechtenstein.

Tom Pawlofsky (born 1976) trained as a carpenter and studied Product Design at the University of Design (HfG) in Karlsruhe. Since 2002, he has taught in the department of CAAD at ETH Zurich, as well as at HfG Karlsruhe. Next to that he is a research assistant at the University of Liechtenstein.

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**NAOTO FUKASAWA**  
WWW.NAOTOFUKASAWA.COM

Japanese industrial designer Naoto Fukasawa (born 1956) studied at Tama Art University and ran the IDEO studio in Tokyo before setting up his own studio in 2003. Fukasawa is a professor at Musashino University and a visiting professor at Tama Art University. The CD player for Muji, which was included in the permanent collection at MoMA, and the household devices for ±0 feature among his world-famous products. Today, his designs are manufactured by such renowned companies as Danese, and Boffi. He also works as an art director for the Japanese product manufacturer and retail company Muji.

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**YING GAO**  
WWW.EXERCICESDESTYLE.COM

Peking-born Ying Gao (born 1973) studied Fashion Design in Geneva and Quebec. She regards clothing as an interface between the human body and its physical and social environment. Striving to break with the stereotypes and uniform shapes so common in modern fashion, she experiments with new materials and technologies. She works as a professor at the Université de Québec in Montreal, Canada.

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**FRANK GEHRY**  
WWW.FOGA.COM

Born in Canada as Ephraim Owen Goldberg in 1929, Frank Gehry studied Architecture at the University of Southern California as well as Urban Planning at the Graduate School of Design in Harvard. As early as 1962 he established his own architecture practice in Los Angeles. In 1989, he was awarded the renowned Pritzker Architecture Prize for his unique building constructions. The California Aerospace Museum in Los Angeles, the Vitra Design Museum in Weil am Rhein, the Guggenheim Museum in Bilbao, as well as his own house in Santa Monica are among his most famous architecture projects.

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**KONSTANTIN GRČIĆ**  
WWW.KONSTANTIN-GRČIĆ.COM

Konstantin Grčić, an internationally acclaimed designer, was born in 1965 in Munich, where in 1991 he established his own design studio. He trained and studied in Great Britain, first as a student at the Royal College of Art in London and later working for a year as an assistant to the world famous British designer Jasper Morrison. His two chairs, »Chair One« (2004) and »Myto« (2008), as well as his »Mayday« lamp (1999), represent important milestones in his work.

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**OSANG GWON**  
WWW.OSANG.NET

Korean artist Osang Gwon was born in 1974 in Seoul, where he still lives today. He studied Sculpture at Hongik University in the capital. Gwon is a major contemporary Korean artist. The Arario Gallery in Cheonan, Korea, the Andrew Shire Gallery in Los Angeles, the Union Gallery in London, the Arario Gallery in Beijing, and the Manchester Art Gallery have all devoted exhibitions to his work. In addition, it has been on show in the Seoul Arts Center in Korea, in the Photography Museum Amsterdam, and at Art Cologne.

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**HAPTIC—  
AWAKENING THE SENSES**  
WWW.TAKEO.CO.JP  
WWW.NDC.CO.JP/HARA/

The exhibition »HAPTIC« was held in 2004 as part of the Takeo Paper Show in Tokyo. It was organized by the Japanese graphic designer Kenya Hara (born 1958) in collaboration with the Takeo Paper Company. The exhibition, subtitled »Awakening the Senses,« showcased practical everyday objects made of paper, which first and foremost appeal to our sense of touch. By renowned designers from a number of different disciplines, the surprisingly multifaceted exhibits highlight the enormous potential of paper as a material.

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**SAM HECHT**  
WWW.INDUSTRIALFACILITY.CO.UK

Sam Hecht, who was born in London in 1969, studied Industrial Design at the Royal College of Art in London. He then worked in various design studios in Japan and the USA before IDEO brought him back to London as head of the industrial design department. In 2002 he founded Industrial Facility with Kim Colin. His studio's clients include Whirlpool, Magis, Epson, Muji, Lexon, Established & Sons, and Droog Design. The two designers' works are part of the permanent collection of the MoMA in New York, and the Centre Pompidou in Paris.

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**KEIKO HIRANO**  
WWW.CDLAB.JP

Japanese designer Keiko Hirano (born 1959) founded the communication design studio Hirano Studio Inc. in Tokyo in 1977. Together with Aoshi Kudo she has run the Communication Design Laboratory, or CDL, since 2005. Her award-winning works include the visual corporate identity of the National Museum of Art in Tokyo and the brand appearance of »qiora« for Shiseido. Keiko Hirano has received numerous awards, including the Mainich Design Award, the iF Design Award, the Tokyo ADC Award, and the New York ADC Gold Prize.

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**KENGO KUMA**  
WWW.KKAA.CO.JP

Architect Kengo Kuma, who was born in Yokohama in 1954, studied at the University of Tokyo and then at Columbia University in New York. He has been running his own architecture studio in Tokyo since 1999. Alongside his practical work, he has also held a professorship at the Keio University of Tokyo since 2001. Kengo Kuma has received important awards including the Prize of the Architectural Institute of Japan (AIJ), the DuPont Benedictus Award, and the Spirit of Nature Wood Architecture Award.

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**JASPER MORRISON**  
WWW.JASPERMORRISON.COM

Jasper Morrison (born 1959) studied Design at Kingston Polytechnic Design School, the Royal College of Art in London, and the Hochschule der Künste in Berlin. He opened his design studio in London in 1986 and expanded in 2000 with a second branch in Paris. Jasper Morrison Ltd. makes products for renowned companies such as Alias, Canon, Cappellini, Flos, Magis, Muji, Rosenthal, Rowenta, Samsung, Sony, and Vitra.

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**YASUHIRO SUZUKI**  
WWW.MABATAKI.COM

Yasuhiro Suzuki was born in Shizuoka, Japan in 1979 and studied Design at the Tokyo Zokei University. He has been working at the University of Tokyo's Center for Research and Technology Development since 2002. His works, somewhere between art and design, have been awarded numerous prizes, including the Digista Award, Philip Morris Art Award, and the Grand Prix of Tokyo Designer's Week.

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**SHUNJI YAMANAKA**  
WWW.LLEEDD.COM

Shunji Yamanaka (born 1957) studied Mechanical Engineering at the University of Tokyo and then worked as a designer for Nissan. In 1987 he started working as a freelance industrial designer and in 1994 founded Leading Edge Design. He has taught at the Technical Faculty of the University of Tokyo and has also been a professor at Tokyo's Keio University since 2008. Yamanaka designs a huge variety of products for renowned companies such as Nissan, Panasonic, Olympus, and Issey Miyake, from vehicles, cameras, watches, and electronic devices to humanoid robots.

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**KIRSTEN HASSENFELD**

Kirsten Hassenfeld, who was born in Arizona in 1971, studied Visual Art at the Rhode Island School of Design and at Skowhegan School of Painting and Sculpture in Maine. She completed her education with a Master's degree at the University of Arizona in Tucson. Today she lives and works in Brooklyn, New York. The Hudson D. Walker Gallery in Provincetown, Bellwether Gallery in New York, Rice Gallery in Texas, and Smack Mellon Gallery in Brooklyn, have all held solo shows of Kirsten Hassenfeld's work.

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## ANNIKA VON HAUSSWOLFF

Born in Gothenburg in 1967, the artist Annika von Hausswollf lives and works in Stockholm. She studied at the Sven Winquist School of Photography in Gothenburg, the Konstfack in Stockholm, as well as the Royal Academy of Art, also in Stockholm. Her photographic works have been exhibited in various venues including the House of Photography in Gothenburg, the Guggenheim Museum in New York, the Fotomuseum in Winterthur, Bonniers Konsthall in Stockholm, the Nordic Pavilion of the Venice Biennale, and the Casey Kaplan Gallery in New York.

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## JAN VAN HOOF

WWW.JVANHOOF.COM

Tilburg-born Jan van Hoof (1981) studied Industrial Design at Delft University of Technology before embarking on a Master's degree in »Man and Living« and »Man and Public Space« at the Design Academy in Eindhoven which he completed in 2008. Van Hoof is currently completing a Master's programme at Rotterdam Academy of Architecture and Urban Design.

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## RICHARD HUTTEN

WWW.RICHARDHUTTEN.COM

Richard Hutten, who was born in the Netherlands in 1967, studied Industrial Design at the Design Academy Eindhoven. After completing his studies in 1991, he founded his own design studio in Eindhoven, which he later relocated to Rotterdam. Richard Hutten, a member of the first generation of the successful Dutch design collective Droog Design, teaches at various design schools, including the Design Academy Eindhoven, ECAL Lausanne, University of Helsinki, University of Reykjavik and the Royal College of Art in London. His clients in the field of industrial and furniture design include Lensvelt Office Furniture, Unilever, Royal VKB, TNT Royal Dutch Post, KPN Royal Dutch Telecom, Moooi, Muji, Christoffe, and Karl Lagerfeld.

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## CHARLES KAISIN

WWW.CHARLESKAISIN.COM

Charles Kaisin was born in Belgium in 1972. He studied at the Royal College of Art in London and worked for the internationally renowned designer Ron Arad. Today he has his own studio in Brussels where he also teaches at the École Supérieure des Arts Saint-Luc. Central themes in his work are recycling and the re-use of everyday materials.

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## MARTTI KALLIALA & ESA RUSKEEPÄÄ

WWW.ESARUSKEEPAA.COM

Finnish architect Martti Kalliala (born 1980) has worked in Rem Koolhaas' Office for Metropolitan Architecture in Rotterdam and has been working for Now Office in Helsinki since 2006. Kalliala has won numerous architecture competitions and was nominated, with Esa Ruskeepää, for the Swedish Forum Prize in 2005. Esa Ruskeepää (born 1980) studied Architecture at the Technical University in Helsinki. He has worked at the Office for Metropolitan Architecture in the USA and with Peter Zumthor in Switzerland. Today he is a freelance architect in Finland and teaches at the Technical University in Helsinki. He has received a scholarship from the Finnish Art Commission for 2009.

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## ANDREAS KOCKS

WWW.ANDREASKOCKS.COM

German artist Andreas Kocks (born 1960) studied both at the University and at the Art Academy in Düsseldorf. Today he lives in Munich and New York. In 2006 he received a scholarship from the Pollock-Krasner Foundation in New York. His works have been exhibited at Haus der Kunst in Munich, the gallery Jeannie Freilich Contemporary in New York, and the Museum of Art and Design in New York, among other venues.

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## KYOEI DESIGN

WWW.KYOEI-LTD.CO.JP

Japanese designer Kouichi Okamoto (born 1970) founded Kyoei Design in Shizuoka in 2006. In 2007 he participated in the exhibition »handle with care« by Designboom and Designersblock and in the Gwangju Design Biennale in Korea, and has taken part in Designboom Mart in Tokyo and Stockholm. In 2008, the Museum of Art in the Shizuoka Prefecture held a solo show of Kouichi Okamoto's work.

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## ROBERT J. LANG

WWW.LANGORIGAMI.COM

American origami master Robert J. Lang was born in 1961 in Ohio and has been applying himself to the art of Japanese paper folding for 30 years. The successful physician and engineer has been involved with 80 technical publications and 40 patents for semiconductor lasers, applied optics and integrated optical electronics. Today, Lang operates primarily as an origami artist. His complex folded structures are also used for technical solutions—from airbags to collapsible telescope lenses. His works have been exhibited in the Louvre in Paris, the MoMA in New York and the Nippon Museum of Origami in Kaga.

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## TOMÁŠ GABZDIL LIBERTINY

WWW.STUDIOLIBERTINY.COM

Tomáš Gabzdil Libertiny was born in Slovakia in 1979 and received a Bachelor's degree in Product Design at the Academy of Art and Design in Bratislava and a Master's at the Design Academy in Eindhoven. He worked for Maarten Baas, Demakersvan and Joris Laarman before setting up Studio Libertiny in 2007. Libertiny's works have been exhibited worldwide including at Design Miami Basel, Designhuis Eindhoven, the exhibition »Design and The Elastic Mind« at the MoMA, New York, and at the Victoria & Albert Museum in London.

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## CJ LIM / STUDIO 8 ARCHITECTS

WWW.CJLIM-STUDIO8.COM

CJ Lim (born 1957) set up Studio 8 Architects in London in 1994. The interdisciplinary architecture studio's work lies somewhere between architecture, landscape architecture and urban planning. Lim also designs spectacular collages, which he calls »built cultural assemblages.« The best-known of these is »Virtually Venice« which was on show in the British pavilion at the 2004 Venice Architecture Biennale. Lim is also a professor of architecture and cultural design at The Bartlett, University College London. In 2006 he won the Grand Architecture Prize of the Royal Academy of Arts in London.

The Studio 8 Architects client base includes the Victoria & Albert Museum London, the British Council, the Arts Council England, the RIBA Trust, the Aga Khan Foundation, the city planning offices of Shanxi, Shenzhen, Sichuan and Tangshan in China, as well as the Korea Land Corporation.

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## MAISON MARTIN MARGIELA

WWW.MAISONMARTINMARGIELA.COM

The Belgian fashion designer Martin Margiela (born in 1957) studied fashion design at the Royal Academy of Fine Arts in Antwerp before going on to work as Jean Paul Gaultier's assistant. In 1988 he founded Maison Martin Margiela in Paris together with Jenny Meirens. Maison Martin Margiela work features in the permanent collections of numerous renowned museums, such as the Musée de la Mode et du Textile in Paris, the Metropolitan Museum of Art in New York, the Victoria & Albert Museum in London, Museum Boijmans van Beuningen in Rotterdam, Flanders Fashion Institute in Antwerp, and Kyoto Costume Institute in Japan. In early 2009 Haus der Kunst in Munich paid tribute to the fashion label with a retrospective on its twenty-year history.



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**MARCH STUDIO**  
WWW.MARCHSTUDIO.COM.AU

The Australian architecture and design office March Studio was established in Melbourne by Anne-Laure Cavigneaux, who was born in 1980 in France, and the Australian Rodney Eggleston, who was born in 1981.

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**MIEKE MEIJER**  
WWW.MIEKEDINGEN.NL

Mieke Meijer was born in 1982, and studied at the Design Academy in Eindhoven. Since 2006 she has worked both individually under the design label »Mieke Dingen« and as part of the design group Vij5 together with Anieke Branderhorst and Arjan van Raadshooven. Her work was exhibited at the Woonbeurs in Amsterdam in 2004, the Dutch Design Week in Eindhoven in both 2007 and 2008, and at Designhuis in Eindhoven in 2008, among other venues.

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**MIYAKE DESIGN STUDIO**  
WWW.ISSEYMIYAKE.CO.JP

Fashion designer Issey Miyake was born in 1938 in Hiroshima and originally studied graphic design before leaving Japan in 1964 to work in Paris and New York. In 1970, he founded the Miyake Design Studio, presenting his first collection in Paris in 1973. Issey Miyake, who has now withdrawn from the fashion business, is one of the world's most renowned fashion designers. In 2007, Dai Fujiwara took over as creative director for the Issey Miyake label.

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**MIYAKE DESIGN STUDIO & MARCUS TOMLINSON**  
WWW.MARCUSTOMLINSON.CO.UK

British photographer Marcus Tomlinson (born 1961) made a name for himself in the mid-1990s with shots for fashion magazines such as »i-D,« »Arena,« »The Face« and »Vogue.« He also designed multimedia presentations for Hussein Chalayan's collections »Echoform« and »Afterwords,« presentations that created a stir worldwide and were shown in internationally renowned museums such as London's Tate Modern and the Museum of Contemporary Art in Los Angeles.

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**MOLO DESIGN**  
WWW.MOLODESIGN.COM

In 2003, together with manager Robert Pasut, the architect duo Stephanie Forsythe (born 1970) and Todd MacAllen (born 1966) established the label molo design, which not only designs products but also manufactures and markets them. Their »paper softwall« partition and »softseating« are included in the permanent collection of the MoMA in New York.

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**KOSTAS MURKUDIS & CARSTEN NICOLAI**  
WWW.KOSTASMURKUDIS.NET  
WWW.CARSTENNICOLAI.COM

Kostas Murkudis, who is of Greek origin, was born in 1959 in Dresden and studied Chemistry for two years at Berlin University before switching to the fashion department of the Berufsfachschule für Design of the Lette-Verein foundation. After graduating he worked for Wolfgang Joop. In 1994 he received the Philip Morris Design Award and established his own label. Today he lives and works in Berlin. In addition to his own collection he also works for well-known companies such as Nokia and Adidas. The artist Carsten Nicolai was born in 1965 in Karl-Marx-Stadt (now Chemnitz) and initially worked as a gardener before embarking on a landscape architecture course in Dresden in 1985. Today he lives and works in Berlin. He belongs to a generation of artists who intensely explore the overlap between art and science. In 2005 Nicolai's works were showcased in a solo exhibition at the Schirn Kunsthalle in Frankfurt and the Neue Nationalgalerie in Berlin.

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**RYUJI NAKAMURA**  
WWW.RYUJINAKAMURA.COM

Born in 1972 in Nagano, Ryuji Nakamura studied Architecture at Tokyo Art School and from 2000 to 2003 worked at Jun Aoki & Associates before setting up his own studio in 2004: Ryuji Nakamura Architects. He has received various prizes including the 2006 Good Design Award, the 2007 Great Indoors Award, and the 2007 Tokyo Designer's Week Design Premio.

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**JUM NAKAO**  
WWW.JUMNAKAO.COM.BR

Brazilian fashion designer Jum Nakao (born 1966) studied Visual Arts and History of Fashion and Costumes in São Paulo. Today he runs his own studio in São Paulo, and is Creative Director of the Brazilian Art and Fashion Institute. In 2004, he created a collection for Nike inspired by the parties in Copacabana Palace in Rio. His works have featured in fashion shows in Galeries Lafayette, in the Musée de la Mode in Paris, and in the Oscar Niemeyer Museum among other places.

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**NENDO**  
WWW.NENDO.JP

Born in Canada in 1977, Oki Sato (also known as Nendo) studied Architecture at Waseda University in Tokyo. In 2002, he founded his interdisciplinary studio for architecture, interior design, furniture, industrial, and graphic design. Three years later he set up a second office in Milan. European furniture makers such as Cappellini, DePadova, Swedese and Oluce all produce objects by Nendo. The »Cabbage Chair« is in permanent collections of MoMA New York, the Paris Musée des Arts Décoratifs and the Museum of Art and Design in New York.

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**NICOLA FROM BERN**  
WWW.NICOLAFROMBERN.COM

Nicola Enrico Stäubli (born 1978) studied Architecture at ETH in Zurich. Since 2005 he has been working as a self-employed architect and designer under the name nicolafrombern. He was also a cofounder of Milieu Galerie in Bern.

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**JENS PRAET**  
WWW.JENSPPRAET.COM

Born in Belgium in 1984, Jens Praet studied Architecture and Foreign Languages before completing studies in Industrial Design and Communications Design at ISIA in Florence. After this he graduated from Eindhoven Design Academy with a Master's degree. Today he has his own design studio in Florence.

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**PRIESTMAN GOODE**  
WWW.PRIESTMANGOODE.COM

Priestman Goode, a London-based design agency, was set up in 1986 by Paul Priestman as Priestman Associates. Nigel Goode joined the agency in 1989 as Paul Priestman's partner. Today, Priestman Goode is one of England's largest design agencies. Clients include Airbus, Coca-Cola, Disney, Fisher Price, Lufthansa, Marks & Spencer, Orange and Procter & Gamble.

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**HEATHER RASMUSSEN**  
WWW.HEATHERRASMUSSEN.COM

Heather Rasmussen (born 1982) studied at the University of California in Irvine. She was involved with dance and painting before turning to photography. In 2007 she graduated from the California Institute of the Arts in Valencia (Los Angeles County) with a Master's in Photography and Media Studies. Rasmussen lives and works in Los Angeles. Her works have been on display in various galleries, such as Gallery 825 in Los Angeles, Lime Gallery in Valencia, D300 Gallery in Valencia, and at 915 Mateo in Los Angeles.

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**RAW-EDGES**  
WWW.RAW-EDGES.COM

The two designers Yael Mer and Shay Alkalay, who were both born in 1976 in Tel Aviv, now live in London, where they run the Raw-Edges Design Studio. Yael Mer studied at the Stuttgart Academy of Art and Design and the Bezalel Academy of Art and Design in Jerusalem. Shay Alkalay studied at the Politecnico in Milan and also at the Bezalel Academy of Art and Design in Jerusalem. In 2006 they both graduated with Master's degrees from the Royal College of Art, where they studied under Ron Arad. Their works have been displayed at Johnson Trading in New York, the FAT Galerie in Paris, and the Aram Gallery in London. Some of their works are included in the Design Museum London's collection and are produced by Established & Sons and Arco.

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## TOBIAS REHBERGER

German artist Tobias Rehberger (born 1966) studied under Martin Kippenberger at the Städelschule in Frankfurt am Main. The exploration of functionality and design processes we are familiar with in design, architecture, and the media characterize the oeuvre of the internationally renowned sculptor. Among other places, Rehberger's works have been showcased at the Berlin Biennial, Schirn Kunsthalle in Frankfurt am Main, Palais de Tokyo in Paris, Galerie neugerrischneider in Berlin, The Whitechapel Gallery in London, as well as Stedelijk Museum in Amsterdam, and Museum Ludwig in Cologne.

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## RON RESCH

WWW.RONRESCH.COM

American artist Ronald Resch (born 1939) studied at the University of Iowa. A pioneer in the field of computer art, he has been assistant professor of architecture and computer sciences at the University of Illinois, a lecturer in IT research at the University of Utah, and director of the Computer Graphics Center at Boston University, as well as giving lectures at numerous other universities. In 1979 Paramount Pictures hired him to create movable folding modules for »Star Trek: The Motion Picture.« Resch has also worked as a consultant for many companies, including Evans & Sutherland and Meta Software. Today he lives in New York.

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## RO&AD ARCHITECTEN

WWW.RO-AD.ORG

Ro Koster (born 1963) trained as a carpenter and draftsman before graduating in Architecture from the Utrecht School of the Arts. Ad Kil (born 1965) first studied Tool-Construction and then transferred to Architecture at the University in Delft. The pair started collaborating in 2002 and three years later they founded RO&AD Architecten. Today they design offices, residential buildings, and restaurants as interior designers.

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## MARINE ROUIT

Marine Rouit was born in Paris in 1982 and studied Product Design there at Les Ateliers-ENSCI. As a student she spent five months in Tokyo. In 2008 Rouit graduated with a thesis on »Sensitive Paper,« which shortly afterwards earned her a nomination for the 2008 Audi Talents Awards. Today she works for 3M in the research and development laboratory.

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## ADRIENNE SACK

Origami artist Adrienne Sack (born 1983) found an origami book in her mother's bookcase when she was seven years old and has been taken with the Japanese art of folding paper ever since. After completing her undergraduated education in Psychology and Latin at the University of Texas, she is now studying Fashion Design in Houston with the aim of combining her passion for origami, geometry, and fashion.

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## INGA SEMPÉ

WWW.INGASEMPE.FR

Inga Sempé, who was born in Paris in 1968, graduated in Product Design from Les Ateliers-ENSCI in Paris in 1993. She worked in several design studios before turning to freelance work in 2000. Today she lives and works in Paris. Sempé designs for renowned companies such as Luceplan, Ligne Roset, Cappellini, Edra, Artecnic, Domestic, David Design, Almedahl, and Baccarat.

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## CYGALLE SHAPIRO

WWW.CYGALLE.COM

Product designer Cygalle Shapiro (born 1976) first graduated with a Bachelor's degree in Sociology and Anthropology before studying Design at the Design Academy in Eindhoven. Her conceptual works are inspired by production techniques, materials, and the social context of products.

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## SOUNDS OF SILENCE

WWW.SOUNDSOFSILENCE.DE

In 2005, architect Petra Eichler and artist Susanne Kessler founded Sounds of Silence in Frankfurt. Petra Eichler (born 1971) studied Architecture at the University of Kassel. Susanne Kessler (born 1973) studied Performing Arts and Literature in Frankfurt and Paris and completed her studies with a diploma in experimental art at the University of Art and Design in Offenbach. Sounds of Silence create installations and objects to be experienced. The duo first attracted attention with large scale paper silhouettes for Droog Design and Van Cleef & Arpels. In 2007 they won the iF Communication Design Award.

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## MARIO STADELMANN

WWW.SANKTADELMANN.CH

Mario Stadelmann was born in Biel in 1981. In 2008 he graduated with a Master's in Design from the Royal College of Art in London. Prior to that he studied Business Administration at the University of St. Gallen and completed internships at Hans-Jörg Ruch Architekten in St. Moritz and the advertising agency Jung von Matt in Zurich.

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## DIANE STEVERLYNCK

WWW.DIANESTEVEYLYNCK.BE

Diane Steverlyncck was born in 1976 in Belgium. She initially studied Visual Art and subsequently Textile Design at La Cambre, the National College of Visual Arts in Brussels. In 2003 she opened her own studio in Brussels. Diane Steverlyncck's objects and fabrics are often based on detailed material research.

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## TOMMY STØCKEL

WWW.TOMMYSTOCKEL.NET

Danish artist Tommy Støckel (born 1972) studied at the Royal Danish Academy of Fine Arts in Copenhagen. Today he lives and works in Berlin. His works have been exhibited at venues including Frankfurter Kunstverein, Helene Nyborg Contemporary in Copenhagen, Heidelberger Kunstverein, the Nordic Embassies in Berlin, Arnolfini in Bristol, and the Rena Bransten Gallery in San Francisco.

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## SHINJI SUZUKI & TAKUO TODA

WWW.ORIPLANE.COM

At the University of Tokyo, a team of aerospace experts headed by Professor Shinji Suzuki is working on a spacecraft made of paper. To this end, they are cooperating with an unusual project partner, namely the Japan Origami Airplane Association and its President Takuo Toda (born 1956). Toda's primary occupation is Director of a tool machine company, though his great passion is for origami paper airplanes.

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## RICHARD SWEENEY

WWW.RICHARDSWEENEY.CO.UK

Richard Sweeney was born in Great Britain in 1984. He attended the foundation course at Batley School of Art and Design and studied Three-dimensional Design at Manchester Metropolitan University. His paper objects lie somewhere on the border between craftwork, design, and sculpture. They have already been exhibited at The Old Truman Brewery in London, the Saint-Étienne Design Biennale, and the Design Museum in London.

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## TT:NT

WWW.TITHI.INFO

WWW.NUTREJEWELLER.COM

The label TT:NT represents two Thai women: Tithi Kutchamuch (born 1981) and Nutre Arayavanish (born 1981). Tithi Kutchamuch studied Architecture and Industrial Design at King Mongkut's Institute of Technology in Bangkok before taking a Master's degree in Product Design at the Royal College of Art in London. Nutre Arayavanish studied Jewelry Design at Silpakorn University in Bangkok before she completed her education with a Master's in Jewelry Design, likewise at the Royal College of Art in London.

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## ROB VOERMAN

WWW.ROBVOERMAN.NL

Dutch artist Rob Voerman (born 1966) initially studied Landscape and Garden Architecture at Wageningen University before continuing his education at the Constan-tijn Huygens Academy in Kampen. The UCLA Hammer Museum in Los Angeles, the Rhodes + Mann Gallery in London, the Upstream Gallery in Amsterdam, and the MoMA in New York have all exhibited works of art by Rob Voerman. At Art Brussels 2008 his works were displayed in a solo exhibition.

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## WORK AC

WWW.WORK.AC

WORK Architecture Company, or WORK AC for short, was founded in 2002 in New York by Amale Andraos and Dan Wood. It has already completed more than a hundred projects, from apartments in Panama to urban planning in Las Vegas. Parallel to this, Andraos and Wood teach at Princeton University.

WORK AC has received numerous prizes, has twice been awarded the Design Prize of the American Institute of Architects, was nominated for the Architectural League's »Emerging Voices,« and at the Architecture Biennale in Rotterdam presented the urban planning project for downtown Beirut.

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## TOKUJIN YOSHIOKA

WWW.TOKUJIN.COM

Japanese designer Tokujin Yoshioka (born 1967) worked with both Shiro Kuramata and Issey Miyake before setting up his own studio in 2000. He has worked as a designer for prestigious companies such as Hermès, Swarovski and Moroso. In 2007, Tokujin Yoshioka received the »Designer of Year« award from Design Miami and, according to Japanese »Newsweek,« he is among the »100 Japanese respected by the world«. His art works are in the permanent collections of major museums, including the MoMA in New York, the Centre Georges Pompidou in Paris, the Victoria & Albert Museum in London, and the Vitra Design Museum in Weil am Rhein.

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## MICHAEL YOUNG

WWW.MICHAEL-YOUNG.COM

Michael Young (born 1966) studied Industrial Design at Kingston Polytechnic in London. The Centre Pompidou in Paris acquired his early designs as far back as 1992. In 1995 he set up his own design studio—MY-022 Ltd.—in London, where he created designs for Cappellini, Magis, Galerie Kreo, Danese, Artemide, Rosenthal, and Swedese. Young now works in Hong Kong, which gives him greater access to Chinese factories.

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## ABOUT THE AUTHORS

PETRA SCHMIDT is a freelance author and consultant in Frankfurt am Main. She teaches theory of design at the Hochschule für Gestaltung (Academy of Design) in Karlsruhe and writes for art and design magazines such as »art« and »Frame.« After completing her degree in theater, film, and media studies in Frankfurt, she worked for various design firms and was editor in chief of the design journal »form« from 1999 to 2007. She is co-editor of the books »Patterns« and »Patterns 2« published by Birkhäuser Verlag in 2005 and 2008 respectively.

[WWW.SCHMIDT-FOGELBERG.COM](http://WWW.SCHMIDT-FOGELBERG.COM)

NICOLA STATTMANN has worked as a freelance designer in Frankfurt since 2002. Her studio specializes in developing products that focus on the use of new materials and technologies. She has written for numerous design and architectural trade journals and is also the author of the publications »Handbuch Material Technologie« (av Verlag, 2000) and »Ultra Light–Super Strong« (Birkhäuser Verlag, 2003). Since 2001, she has taught at various universities at home and abroad as a visiting professor; she currently teaches in the Department of Industrial Design at the Fachhochschule Nordwestschweiz (University of Applied Sciences, Northwestern Switzerland).

[WWW.NICOLASTATTMANN.COM](http://WWW.NICOLASTATTMANN.COM)

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