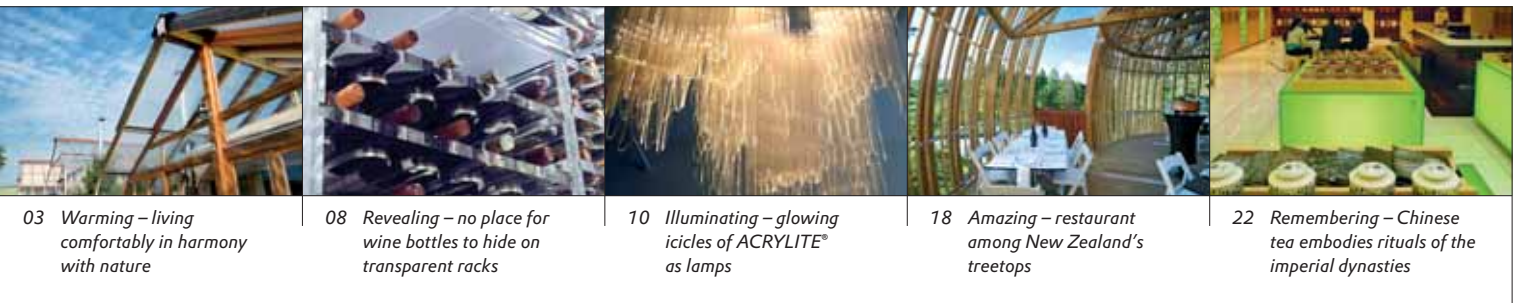


Design in Acrylics

The ACRYLITE® Magazine

2010 N° 7



03 *Warming – living comfortably in harmony with nature*

08 *Revealing – no place for wine bottles to hide on transparent racks*

10 *Illuminating – glowing icicles of ACRYLITE® as lamps*

18 *Amazing – restaurant among New Zealand's treetops*

22 *Remembering – Chinese tea embodies rituals of the imperial dynasties*

Going down

Tourists have close encounters with the underwater world in a miniature submersible. This is enabled by specially formed transparent ACRYLITE® windows for the ultimate fun diving experience. More on page 12.





Michael Traxler,
Senior Vice President
Acrylic Polymers

Dear Readers:

One of the challenges in our society is to reconcile man with nature. Giving people access to the beauties of nature and helping to protect the environment at the same time is a responsible task, and one where ACRYLITE® can provide assistance.

The Tree House in New Zealand is a unique combination of an exclusive restaurant and an experience of nature. Protected by a barely visible ACRYLITE® roof, people enjoy their meal among swaying branches. The 33 foot difference in height up to the Tree House is spanned by a 197-foot wooden bridge that is softly lit at night by lamps with ACRYLITE® P95 covers.

ACRYLITE® offers quite a different experience of nature in our own hemisphere. People board the Nemo submersible in the East German Helenesee (Lake Helen) to explore the underwater world. Thin but stable domes give a clear view of underwater life and give passengers close encounters with local plants and animals.

The bio-solar house unites environmental protection in the classical sense with comfort. ACRYLITE® DEGLAS ALLTOP SDP multi-skin sheets in a delicate construction help to achieve these aims by means of their transparency, letting warming sunlight into the house. This façade makes it possible to cut the heating energy requirement by up to 90 kWh per square meter a year.

I wish you an enjoyable read of these futuristic stories.

Michael Traxler



A Moment in Time

An impressive stream of light shines through a transparent shell. A glowing fluid swirls inside and lights up all that surrounds it. The glowing fastening element shows how luminous this liquid is. But it is not captive fire that is being directed – the force that lights up the darkness is the world's largest chemiluminescent lightstick with an imposing size, an outside diameter of eight inches and a height of ten feet. Twenty-six gallons of different fluids are stored in a fragile core made of single glass. When hit at a predefined spot of the brittle interior, the chemicals react with each other. The giant lightstick presents its fascinating play of light in a shell made of precisely dimensioned, impact-resistant ACRYLITE®.



Onion shape or gable roof – the bio-solar house functions almost entirely without technology, and saves energy too.

Nature Triumphs Over Technology

More energy-efficient than passive houses and even healthier: the bio-solar house

▶ When an engineer designs a house, one would presume it includes a lot of technology. But quite the opposite is true of the bio-solar house. Mechanical engineer Klaus Becher consciously designed a house that works with a minimum of technology and even saves energy in the bargain. This is made possible by the judicious use of physical laws such as the greenhouse effect that is good for climate protection in this context. In the bio-solar house, the greenhouse effect is created by the transparent roof and façade elements made of ACRYLITE® DEGLAS ALLTOP SDP multi-skin sheet. These conduct a lot of warming sunlight into the house. As a side-effect, the room climate in the bio-solar house is also particularly healthy.

No such thing as impossible

As the technical manager of industrial plants, Klaus Becher had spent his entire professional life with machines that didn't work. In his retirement, he therefore wanted a house that functioned almost without technology, was energy-saving and healthy to boot. "No such house existed in the early 1990s, so I designed one myself," says 74-year-old Becher, as if that were the most natural thing in the world, and adds: "I bore in mind the knowledge of house construction gathered in past centuries and the laws of nature."

The principle of a house within a house

This led to the construction in 1994 of the first of more than 250 bio-solar houses built according to Becher's patented construction principle, in St.

Alban in the German federal state of Rhineland-Palatinate. The core of the building is a well-insulated interior house that is enclosed in an outer weather-protection shell. Between the two parts of the house is an air layer that is heated by the transparent ACRYLITE® surfaces in the façade and by sunlight in the conservatory. This greenhouse effect protects the rooms inside from heat loss and avoids the formation of condensate. To do this, it is important for the sheets to be highly transparent and to let in plenty of daylight. "That is why we use ACRYLITE®, which is also resistant to UV light and weather, and does not turn yellow after a while like other plastics," says Becher. He can be sure of that, because Evonik gives a 10-year guarantee of protection against yellowing.

Saving instead of freezing

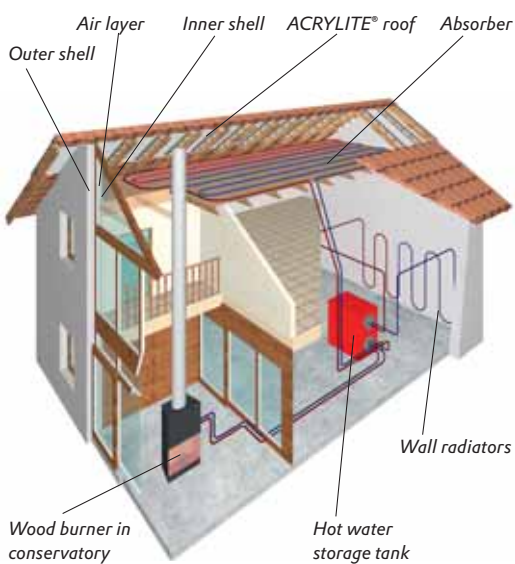
The bio-solar house system is as easy as it is effective. According to Becher, it has a heating energy requirement of 10 to 25 kWh per year per square metre of usable floor space. The primary energy requirement is less than 10 kWh per square metre. "That is less than a passive house and corresponds to annual heating costs of US-\$ 210 to 500," Becher says. In comparison, a newly built house for several families has a heating energy requirement of around 100 kWh per year and square metre of usable floor space. The bio-solar house is preferentially heated using a wood burning stove that creates a cozy atmosphere in the conservatory and is very cost-effective. The Jacobi family, who have been living in their bio-solar house since December



Transparent multi-skin sheets provide the positive greenhouse effect.



The conservatory, a vital component of the energy concept.



House within a house: the inner and outer shell, the air layer in between and further elements make the bio-solar house an energy-saving and healthy way to live.

2005, is very appreciative of that fact. "We heat the house from November to March. At temperatures of about 40°F, it is quite sufficient to light the burner for two hours every two days. At sub-zero temperatures, we heat for two hours every day. Last year, we used four cubic metres of wood for that, which I was able to buy cheaply at US-\$ 70," says Darko Jacobi, who estimates having had to pay another US-\$ 880 for electricity for the family's 3,700 kWh power consumption in 2008. The wood burner also heats the water for the wall radiators and hot water. In summer, the water used by the family is heated to the desired temperature by solar power via water pipes under the skylight. "Even between seasons, i.e. in late spring from April on and in autumn up to October, sunlight alone is usually enough to heat the water," Darko Jacobi reports.

Airy in summer

Whereas the sun heats the house in winter and the greenhouse effect heats it in summer, cooling is achieved in summer merely by opening windows. For this, air flaps have been built into the roof. When these and the outer doors of the conservatory are opened, the warm

air between the inner and outer shell of the building escapes by the so-called chimney effect. This prevents heat build-up indoors and at night, cool air can be let in. "Due to the chimney effect, the interior remains pleasantly cool in the hot season, without sophisticated cooling technology," Becher explains.

Gore-Tex vs. plastic raincoat

There is another reason why a bio-solar house does not require a technical ventilation system. Thanks to the natural, untreated building materials, the indoor walls are open to diffusion. That means the water vapor that is produced in every house, as well as other gases, can escape through the walls. This prevents humidity, which is dangerous for buildings and can lead to harmful mold formation. Architect Udo Guenther-Dreisbusch from the Energieberatung-24.de company sees this as a crucial advantage over conventional passive houses: "Passive houses have to be absolutely airtight. That means they have a vapor barrier in the walls and require expensive ventilation technology in order to function properly. As a building consultant, I see a lot of incompetent building every day. When I remove in-



Air flaps in the roof let hot air escape in summer and keep the inner house nice and cool.



Green oasis for plants and people.



The natural ventilation has a positive effect on the health of the people who live in the bio-solar house.

sulation sheets, the whole wall behind is often covered in mold." Guenther-Dreisbusch gives two examples of how well the natural ventilation works in the bio-solar house: "A baby's used diaper does not smell indoors, and the mirror doesn't frost up when someone takes a shower. You can compare a bio-solar house to a breathable Gore-Tex jacket. A passive house, on the other hand, is like a plastic raincoat that soon makes you sweat."

The tolerant type

Architect Guenther-Dreisbusch is so confident in the bio-solar house that he has already designed four of them for his clients. To him, the construction principle is of prime importance, which allows for much greater leeway during construction because it dispenses with sensitive technology that is prone to break down. "A passive house, on the other hand, is a bit like the Mercedes A class that can only pass the famous elk test of crosswind stability by incorporating a great deal of technology. Other cars are built to offer crosswind stability due to their very design, just as the bio-solar house works merely due to the laws of nature." Freedom to choose

the building materials is just as important to Guenther-Dreisbusch: "Take ACRYLITE® as an example. It can be simply cold-curved, is hail-resistant and can also withstand stress without being damaged. That is inconceivable with glass." The weight also plays an important role in architecture: "ACRYLITE® is much lighter than glass and enables more delicate conservatory designs. In addition, the double-skin sheets show good heat insulation and can be installed without frames, unlike glass. This prevents energy losses through unnecessary thermal bridging."

Healthy climate

To allow enough sunlight to enter to heat up the air cushion between the outer and inner shell of the building, the conservatory is a firm component of every bio-solar house. "It makes our house nice and bright and keeps us cheerful even in winter," says Jacobi. He also thinks the special room climate makes for well-being: "Wall radiators don't stir up dust like other kinds of heating do. That is very pleasant and is always commented on by visitors." The inventor Klaus Becher has received confirmation from many people who live in his bio-

solar houses that the room climate is beneficial to health: "People who suffer from asthma, allergies, rheumatism or neurodermitis find their symptoms improve or even disappear completely." This is because the natural ventilation and air drying in the bio-solar house prevent the factors that cause these conditions. Mold, dust, viruses, bacteria and allergens can multiply rapidly in airtight passive houses with ventilation systems and conventional heating. In the bio-solar house, though, they are excluded right from the start by the construction principle. That is why the bio-solar house received an award in 1997 from the German Confederation of Skilled Crafts as Germany's healthiest house.

Solar park rather than retirement home

Becher's original idea was to build himself a home for his retirement. But nothing came of that. A small settlement with eight more houses of the same type has meanwhile been built around his first bio-solar house, named Sonnenpark St. Alban – the research and development center of the specially founded company Bio-Solar-Haus GmbH. The



Klaus Becher (left), mechanical engineer and the man who developed the bio-solar house, and his nephew Hubert Becher, have proved that building can be environmentally friendly, stylish and healthy all in one.

“You can compare a bio-solar house to a breathable Gore-Tex jacket. A passive house, on the other hand, is like a plastic raincoat that soon makes you sweat.”

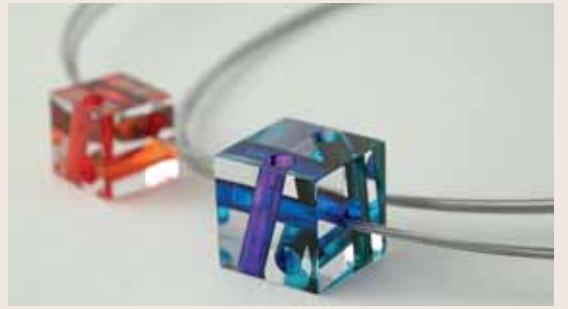
firm with its 12 employees is managed by Becher’s 40-year-old nephew Hubert. People intending to build this type of house can test-live in one of the houses at the solar park before making their decision. Meanwhile, the range of buildings includes schools and offices as well as residential housing, also in latitudes that pose greater problems, like the extremely windy Shetland Islands. “With regard to heat balance, the bio-solar houses function up to the North Pole and down to the South Pole. And

heat is no problem even in the Mediterranean region,” Hubert Becher says. That makes the bio-solar house a future-ready construction concept that has already passed its practice test. This is reflected in the numerous awards it has received, such as the German Solar Prize 2003 and the Environment Award of the Federal State of Rhineland-Palatinate. hf

www.Bio-Solar-Haus.com



A good combination: solar modules and bio-solar houses stand for environmentally-friendly living.



Double the Lightness for Stylish Ladies

Work at Ute Piwowarsky's studio involves routing, drilling, sawing and coloring. The objects she works on are mostly transparent.

► Various colors add bright touches, create enfolded blossoms or underline the geometric shapes. "I am fascinated by the material's light effects, such as the colors of the rainbow that arise when I use prismatic forms, i.e. certain cutting angles. But I also have numerous options for other shapes, and I've also developed some unconventional machining techniques," says Ute Piwowarsky, who has been designing chains, earrings and bangles made of ACRYLITE® for 20 years. She usually gets her new ideas when working on an item. Sometimes, chance plays a crucial role: "I have a certain idea, try something out and often end up with something quite different, but very beautiful," the artist explains. For some items, she puts the material under a level of stress it does not usually have to bear. Her aim is to make creative use of changes that would be considered defects on a larger scale. There are a number of machines at Piwowarsky's studio in Aachen, some of them specially converted to her needs. To prevent the ACRYLITE® from getting too hot, she mounted an infusion hose for cooling on her frontal grinder. "I have gained a lot of experience of work-

ing with ACRYLITE® in past years and tried out more and more new techniques," Piwowarsky says. The pieces of jewelry created in this way find favor with her customers especially because of their lightness, in two senses of the word: Because ACRYLITE® weighs so little, even larger creations are not too heavy for fashionistas to wear. And their transparency makes for optical lightness too.

The little works of art can be bought via the Internet and at selected galleries and artists' markets. "My jewelry appeals especially to women over 30 who have found their individual style," says the artist, who likes wearing her own designs. "I made my favorite earrings over 10 years ago. They are timelessly beautiful." They consist of large transparent prisms that refract light on their inner and outer surfaces, creating a series of new effects that are enduringly attractive. ck

www.piwowarsky.com

Room size: 8' x 17' x 10'

Weight of ACRYLITE®: 9,020 lbs

Number of bottles: 2,800



Fort Knox for Fine Wines

Californian wine cellar with a transparent design

▶ A glass of wine may glow in shades of red, rosé or gold. Wine connoisseurs worth their salt store these precious beverages in their own wine cellar, where they are protected against environmental influences like fluctuating temperatures and sunlight. At the same time, the bottles are impressively presented.

A dark brick vault is lit by candlelight. Heavy oak barrels stand against one of the walls. Opposite these, solid wooden shelves reach up to the ceiling. A thick layer of dust covers the dark-green and brown bottles on the shelves. In the center of the room is a heavy wooden table. Every classical wine cellar, the eldorado of the wine lover, looks very much like this. The only problem is that neither the owners nor visitors can see at a glance which rare vintages are concealed on the shelves. The only way to do that is by taking a closer look at the label on each bottle, after removing it from the shelf.

This dilemma gave a Californian connoisseur a bright idea. He was looking for clear wine racks that would present his collection in the best light rather than concealing it. Although wood comes in many colors, clear is not one of them. So a material had to be found with the same structural integrity as wood, while still being transparent. The answer was ACRYLITE®.

The mountain comes to the prophet

It was not just the shelves that posed a challenge for the builders, but the cellar itself. "The room was meant to resemble

a bank vault in several ways: the walls, doors and countertops are all stainless steel," explains Pierre Miremont, owner of Architectural Plastics.

So the room has a similarity with Fort Knox. Everything looked quite simple on the drawing board, but when it was time to begin fabrication and installation, the complications began. The builders had assumed the room was perfectly square. "Since there wasn't supposed to be any space between the racks and because they completely encompass the room, mathematically, it had to be as close to square as possible. Unfortunately, that wasn't the case," Miremont says.

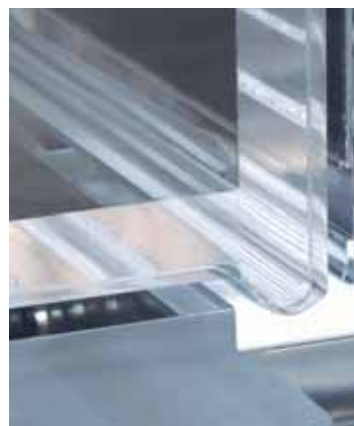
One common way to fix the problem would have been shimming, or using small fillers of similar material to fill gaps between larger sections. However, using crystal clear acrylic made this impossible as the fillers would be easily seen by anyone who walked into the vault. Since the designers couldn't adapt the rack to the room, they adapted the room to the rack. "The construction crew had to rebuild the room three times to get it as close to square as possible," Miremont tells us.

A transparent titan

The wine rack had to fill a room 8' x 17' x 10' high and be able to house approximately 2,800 bottles. Most plastics cannot support this weight, and glass is not impact-resistant enough for such quantities. "We knew what we were looking for and decided on ACRYLITE® because of its strength, clarity and longevity for joint gluing. We have worked with Evonik Cyro for over 30 years and con-



ACRYLITE® as far as the eye can see: the transparent wine rack leaves no room for error.



The edges of the racks reflect incident light.





tinue to use them because of the quality of their products," Miremont says. More than four tons of ACRYLITE® were used for the wine vault.

Contained within the stainless steel vault, wine racks rise up to the ceiling above the countertop than run around the whole room at hip height. Overhead, three bridges run left to right and hang 3' from the ceiling. The larger bridges, when full of wine bottles, weigh close to 1,400 pounds – about as much as a full-grown bison. They would have been heavier still if made of glass. The hanging giants are supported by stainless steel brackets at the ceiling and the ends of the bridges rest on wine racks at each wall. Below the countertop are various bins and drawers, all of which are also designed in transparent ACRYLITE®. The only non-clear plastic parts in the room are the slides on which the drawers move in and out. "People would come to watch us install the cellar over a period of a month just to see the progress," Miremont continues. "Although the owner's house was impressive in and of itself, no one had ever seen anything like the ACRYLITE® wine rack."

Transparency is merciless

Crystal-clear material also has its drawbacks: Nothing can be hidden behind it. "In order to make sure there were no visible flaws, we had to accommodate field realities," continues Miremont. "Because everything was clear, there was no margin for error and every flaw was visible." One eyesore was the exposed elec-

trical equipment that ran from floor to ceiling, in the empty spaces in the corners between the wall racks. In order to remedy the situation, Architectural Plastics used sand-blasted ACRYLITE® to construct L-shaped partitions to obstruct the wiring from view.

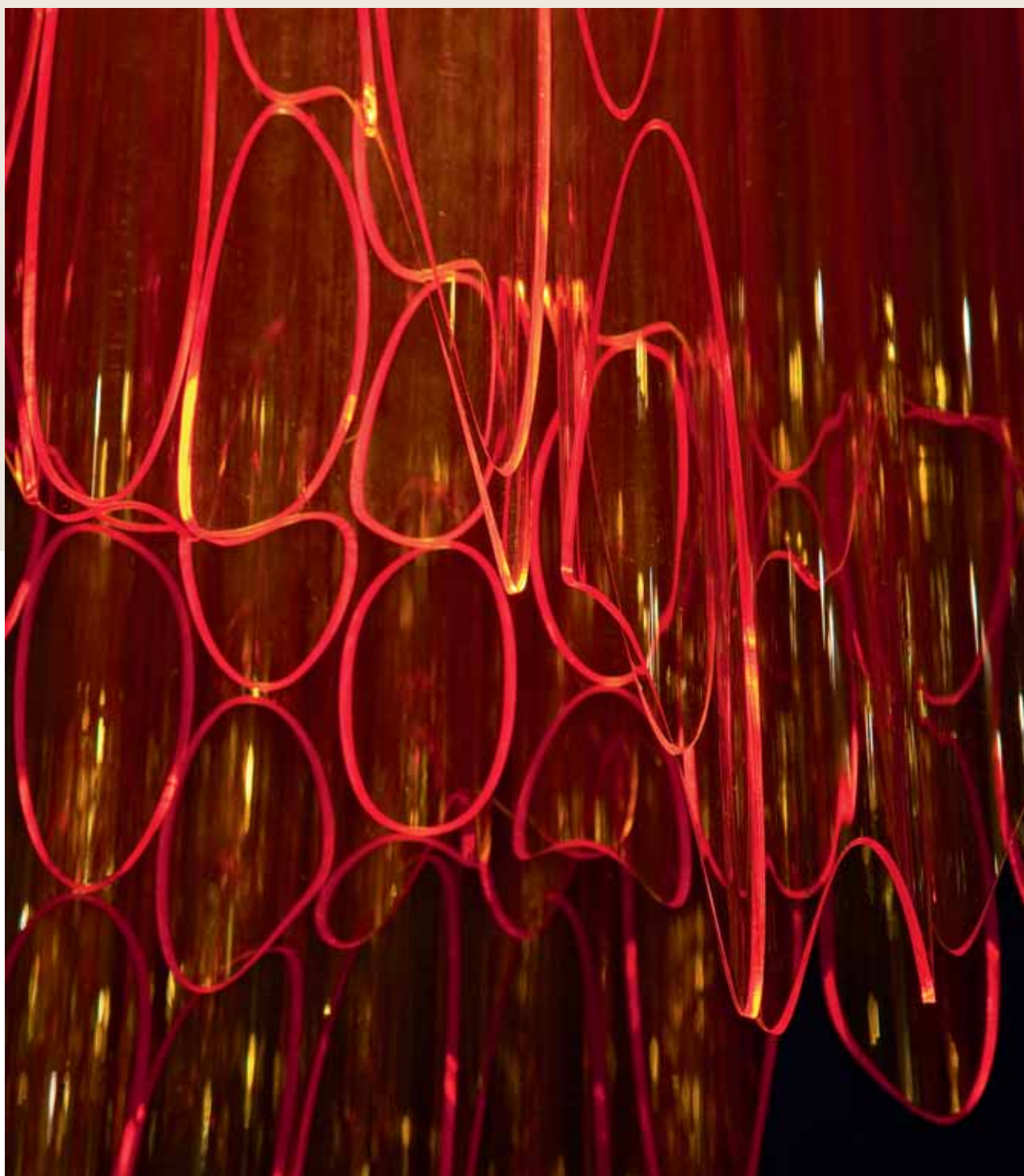
Finding innovative solutions took added time and effort, but the results showed that all the hard work had been worthwhile. "The owner and everyone involved with the project were delighted with the finished wine cellar. Aesthetically, it is amazing to stand in the room with the interplay of light and transparent ACRYLITE®. I would imagine it akin to being on the inside of a diamond – a delight to experience the various facets of the material as light travels through it," Miremont enthuses.

Every time the Californian wine collector now invites friends over for a meal, he goes to the wine vault to fetch a select vintage with a spring in his step. He smiles as he reaches purposefully for the desired bottle. A place for everything, and everything in its place. jh

www.acrylite.net



No chance for wine bottles to hide in this rack.



Icicles of Light

Architects at the Berlin office of Barkow Leibinger Architekten are equally fascinated by details and the impressive bigger picture. They find skyscrapers just as exciting as delicate lamps. Small-scale objects provide ideas for large projects, making one-off lamps a means of experimenting with color and light.

► These lamps hang from the ceiling like icicles and entice exhibition visitors to take a closer look. The light shed by the ACRYLITE® lamps is sometimes bright and sometimes dimmed. Some of them glow with colored light. Visitors look up from below into the interior of the lamp, admiring the shapes that flow into each other. Each of these lamps is unique.

With his "Light Structure," architect Frank Barkow has developed a design concept that presents lighting elements from a completely new angle. "We are always researching to find new technologies with which we can machine and form conventional materials in entirely different ways," Barkow explains. The architect and co-owner of the Berlin office of Barkow Leibinger Architekten is known for his original industrial and office buildings, such as the Trutec Building, a high-rise office complex in Seoul that has a kaleidoscopic reflective façade. Since it was not clear at the time the building was planned how the neighboring houses in the new part of the city would be designed, the eleven-story house could not be adapted to its surroundings. So the architects decided that it should be unabashedly self-referential, mirroring and interpreting the neighborhood in its own way - an idea as simple as it is ingenious.

But why do architects who are known for their large buildings design something as

small as a lamp? "The small projects offer more scope for experiments. Apart from that, we can examine whether an idea can be implemented on a larger scale," Barkow explains. The research team at the firm of architects takes a purely experimental view of these drafts. While they are planning, they do not let themselves be influenced by established architectural standards and existing construction projects. Without respect for any conventions, they produce prototypes that gradually give rise to a collection of various architectural components, which serve as a store of ideas for subsequent projects.

Preprogrammed shapes

To produce the lamps, the architect chose clear ACRYLITE® tubes, in shades of Fluorescent Green, Green and Golden Yellow, which were especially made for this project by Evonik Röhm GmbH. A digital fabrication technique was chosen to fabricate the tubes. The special feature is the method of cutting the ACRYLITE® tubes. The architects established on the computer how the cut edges of the individual tubes were to be shaped. "Using the differently shaped cuts, we created a topographic surface on the underside of the lamp that has varying heights and depths. The tubes are sometimes longer, sometimes shorter, cut at an angle or straight across," Barkow explains. The difficulty lay in shaping the tubes so that



Frank Barkow's biographic details

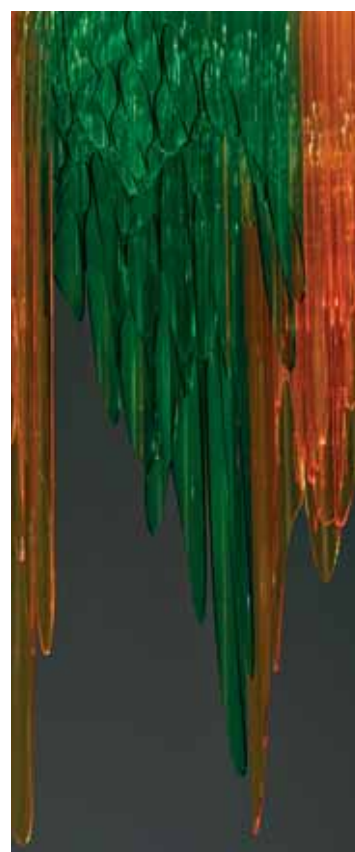
Managing Director of Barkow Leibinger Architekten in Berlin (guest professor at Harvard University, Cornell University and the Stuttgart State Academy of Art and Design), among others Master of Architecture, Harvard University Born in 1957 in Kansas, USA.

the cut-to-size edges form a precisely fitting surface, allowing the rings to join up in flowing lines. The "Light Structure" was made possible by a laser machine that could cut the tubes. The laser head moves in a circle around the ACRYLITE® tubes along a route that was previously programmed by the architects. Thanks to precise programming, each cut produced two usable tubes, which meant that less material was required. Twenty-five different cuts thus produced 50 individual tubes that were combined in groups of different sizes. The fact that the ACRYLITE® supplied by Ernst Kienzle GmbH & Co. KG, Stuttgart, was so simple to fabricate made this work much easier. "We form cellular structures of different size and complexity, then assemble them into an organic composition. Each has its own structure. That is also part of the organic vernacular," Barkow says. He originally meant to use the maps as part of a room design where several lamps directly corresponded to their surroundings. But the US architect can also imagine the lamp as an individual decorative element.

Glowing edges are eye-catching

The organic presentation is underlined by light. LEDs were installed on an individually cut-to-size aluminum sheet above each lamp, and emit their light

down the entire tube. That calls for good light-guiding properties. "ACRYLITE® is a fascinating material because it reflects light so well and has a timeless yet futuristic appearance," says Barkow. He places particular emphasis on the glowing edges. Unlike the rough, dull edges produced by CNC cutters, the laser gives glossy edges that look as if they have been polished. To prepare "Light Structure" for mass production, Barkow has already developed a sales idea, and is thinking on a larger scale for the lamps as well: "Buyers can decide on the color, size, length and number of tubes themselves. Like an auto configurator, only for lamps." cat





What a Whopper!

Tourists can board a submersible to explore the secret life below water

► Majestic clouds float across the sky like ocean cruisers. Below them lies the dark expanse of the Helenesee (Lake Helene). The air smells clean and fresh. The same cool wind that rustles in the reeds along the banks puckers the grey water and whips a crisscross of small waves across the ruffled surface. On the lake, a gigantic orange fish bobs about. It is the size of a small car and tugs at two white ropes that attach it to a floating wooden platform. On its back, the fish has two humps, which reflect a dazzling, errant ray of sunshine. Suddenly, the front hump opens up. A head emerges, belonging to a thick-set man with greying black hair and a beard. This is Thomas Breinig, captain and developer of the miniature submarine Nemo 100, out of which he is just about to climb.

Famous forerunners

Nemo has the white and orange stripes of a clownfish, like its famous counterpart in the cartoon film. "But actually, the name is taken from Jules Verne's Captain Nemo in *Twenty Thousand Leagues Under the Sea*," says Breinig, who used to work as a cameraman and filmed a large number of documentaries on ships. Up close, what looked from a distance like humps on the submersible's back are in fact transparent domes. They are made of ACRYLITE® GP and are sprinkled with countless water drops that glitter like jewels in the sun near Frankfurt Oder in the German state of Brandenburg. Captain Breinig has now opened the rear hump as well and asks his passenger to climb out. Beneath the round opening the size of a manhole, down in the belly of the vessel there is a black plastic seat without armrests, to the left and right control lights, switches and cables. The captain's seat is about eighteen inches further in front. He has a third "hump" in front of him in the floor, which offers a view of the blue-green water. Meanwhile, the sky has cleared and the sun burns the face, but the seat inside is cool. The long drawn-out cry of a water fowl can be heard from the nearby bank, drowning out the excited twittering of smaller forest birds.

Dipping into another world

Breinig's hand, with a thick diver's watch on his wrist, grips the solid metal

ring in which the dome is clamped above the passenger seat. The dome closes with a smack and shuts out all sound of the outside world. The slapping of the waves produces a metallic echo from the cool wall made of boiler steel plate that reverberates through the constricted space. Captain Breinig takes his seat and closes his dome. From now on, the only air comes from the inside of the vessel. It is dry and odorless, due to the CO₂ filter unit responsible for air treatment. If required, pure oxygen is added to the breathing air. There is a short, loud hiss, followed by another – the vessel begins to sink. The water climbs inexorably up the outside of the dome. The hissing becomes a loud bubbling as the four stainless steel pipes with their air exit valves dip under the water surface. Like in a whirlpool, a myriad of air bubbles escape through the pipes and leave the sinking ship. Now, only the tip of the domes is above the water. After a last glimpse of the clear blue sky, the dry world becomes hazy and the underwater world comes into sharp focus. The propellers begin to hum and Nemo picks up speed. More bubbling. Again, air bubbles float upwards like ghostly jellyfish, past small bits of wood and algae in the encompassing blue-green water. The vessel has now dropped to twenty feet below the surface. None of the pressure bearing down on the ACRYLITE® domes is felt on the inside. The milky yellow disc of the sun flickers high above in another dimension. Stray rays of light make their way down into the submersible. They appear unreal, like messengers from another, brighter world. On the right, frozen fingers emerge from the gloom, reaching out for the vessel. The tree trunks that have long lost all trace of their greenery are sunken witnesses of a time before Lake Helene existed and an opencast mine created its present shape. A silvery shadow approaches from the left and slips under Nemo's keel. As if greeting an old friend, Breinig says: "There's the pike." The silver fish with its pointed snout and questioning gaze is eighteen inches long. Suddenly, there is a crunching sound as the boat scrapes the bed of the lake. No cause for alarm, though - after a brief turning maneuver, Nemo lifts off again into the depths of the lake, past snaking underwater plants

Mini submersible Nemo looks like a giant clownfish.

"We are both divers and have always dreamed of having our own submersible. The domes are the prerequisite for using the vessel for tourists."

Jürgen Herrmann, TV journalist and inventor



A fish on dry land.



Jürgen Herrmann and Thomas Breinig fastening the domes.

whose finest fronds can be seen distinctly through the crystal-clear ACRYLITE® domes. A dark shape comes into focus in front of the vessel, which soon turns out to be a computer table complete with computer, all overgrown with algae. Who might its owner have been? That remains as murky as the water in which the table is soon left behind. Breinig fiddles around with a few buttons and prepares to resurface. Compressed air flows into the diving tanks and causes a distorted sawing noise. Slowly, the water surface and the world above come closer. The tip of the domes clear the water first.

A crazy idea goes mainstream

On the wooden platform, Jürgen Herrmann is already waiting with the white ropes to safely fasten Nemo again. "The domes are an absolute must for using the submersible for touristic purposes," says Herrmann, who is a self-declared submarine fan. He shares this passion with his associate Breinig, with whom he hatched the initially "crazy idea" in 2007 of building a civilian submarine themselves. "We are both divers and have always dreamed of having our own submersible, especially in winter," says the former television journalist with a smile that crinkles the sunburned skin around the eyes behind his glasses. The two men in their mid-fifties were provided with the prototype of the submarine by a local

inventor. They fine-tuned it until it was ready for serial production and started up their diving tourism enterprise Nemo Tauchtouristik in 2007: "Just for fun, I drew up a business plan and was surprised that the whole thing is certainly viable if you can find paying guests for the diving trips." But tourists want to see something for their money, so Herrmann and Breinig started to look for a manufacturer of transparent domes. They were disappointed. "We knew from the start that the domes had to be made of ACRYLITE®. This is the standard material for miniature submarines because no other material combines the same light weight, transparency and strength. But we couldn't find any fabricators who could have supplied us with domes in the sizes we wanted at an affordable price," Herrmann tells us. The two enthusiasts therefore got down to work themselves, at their very own shipyard in the converted garage of a former car sales company in Frankfurt Oder.

The quest for a dome

As you enter the workshop, the squeal of a metal cutting disc wounds the ear. The place smells of burnt metal. Behind an opened roll-up door with windows, a Nemo submersible lies on a car trailer like a beached fish. The front dome has been removed and makes the round hole look like a gaping mouth that is desperately gasping for air. To the left and right

are two black feelers with eyes at the end, gazing into nothingness. "Those are the LED headlamps," explains Breinig. He is sitting with his legs crossed, wearing grey overalls, with a cup of steaming coffee beside him, sanding down a new molded part for the paneling of the outer shell. Around him lie welding appliances, upright drills, metal shelves with cables, screws and every tool imaginable. Two huge steel hemispheres stand on a trolley in a corner. They look like giant soup tureens, are hollow inside and have a diameter of 24 inches. "We formed the first ACRYLITE® domes in those," Breinig says, pointing at the steel spheres. Blowing away a cloud of dust from his sanding job, he adds: "The advantage of ACRYLITE® is that it is very strong yet easy to fabricate." Breinig and Herrmann worked especially hard on the dome. "To start with, we experimented with inferior material. That was cheaper, but it always showed stress cracking. Then we used the original ACRYLITE®. Evonik also supported us with a lot of fabrication know-how," Herrmann says. After a few tries, he and Breinig succeeded in developing a process that they are currently having certified. "We combine two fabrication techniques. Our domes are thermoformed and hot-press molded. That appears to be unique with ACRYLITE® blocks thicker than one inch," Herrmann explains. This special fabrication technique provides a



Down they go – Nemo dives down to the depths.



A workplace under water.

hemisphere with a cylindrical part at the lower edge. Where the dome is connected to the submersible by a flange, it is only about one inch thick. At the pitch of the curve, the material thickness is only 0.78 inches. But that is enough to withstand a pressure of 16 bar, which corresponds to a diving depth of 525 feet. These values were proved in tests. "We even bashed the domes with a sledgehammer. Even at maximum effort, the material remained undamaged," Herrmann says.

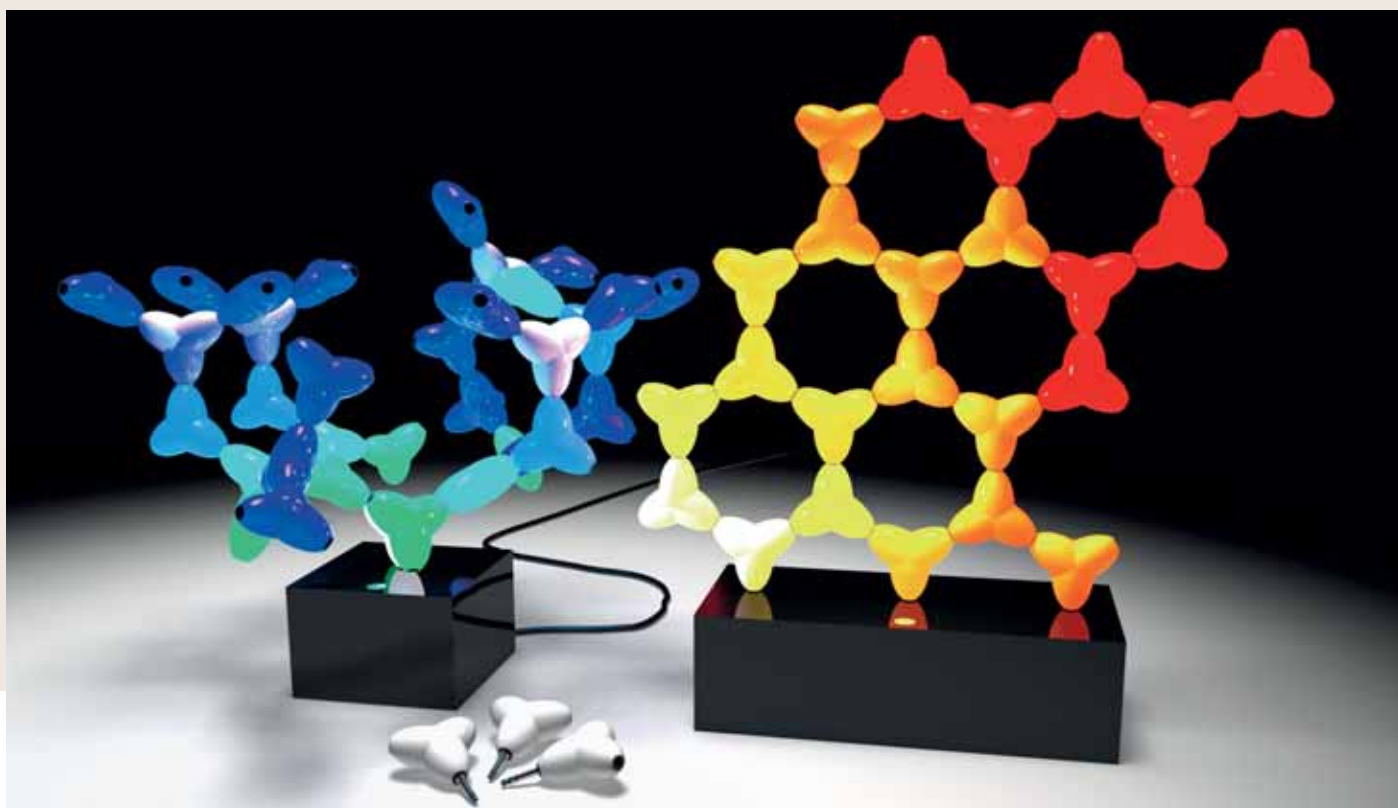
From Brandenburg to the seven seas

In order to certify the manufacturing process for serial production, each operation has to be exactly recorded. That costs a lot of time and effort. "The basic condition for certification is that we work with certified material to start with. We only get that in this quality from Evonik. Every block we are supplied with has its own batch number so that each dome can be accurately traced back," Herrmann, says. His cell phone suddenly rings. He turns away and goes through the door leading from the workshop into an office with a blue carpet. After a short conversation in English, Herrmann excuses himself: "An important potential customer from Dubai." He points to a map on the wall behind him,

which is studded with colorful pins. Most of them are stuck in the sunnier regions of the world, the Caribbean, the Pacific, the Mediterranean. A straw hat fittingly lies on a shelf nearby and exudes a touch of holiday feeling. "We have a lot of inquiries from areas with many diving tourists. For that we are currently developing a three-man vessel because couples often want to dive together on holiday," Herrmann says.

Nemo's natural habitat

The order books already contain the first orders. "Some customers are only interested in the ACRYLITE® domes so as to install them in their own submersibles. We have one request from Argentina, for instance." Soon, Nemo will not only ply German waters like the grey Lake Helene, but also be found in divers' dream destinations around the globe. hf



Lava Lamp 2.0

Playing with digital light: designer develops interactive living room lamp

► Lava lamps were cult objects in the 1970s and created soothing lighting effects, accompanied by psychedelic sounds. They came back into fashion in the 1990s. Meanwhile, they have lost some of their popularity. So now is the time to find a digital successor to the classic analog lamp, thought light designer Tobias Link and developed MAX – an interactive lamp that plays with light using ACRYLITE®. Like the lava lamp of yesteryear, it creates atmospheric light and also invites users to shape the lamp according to their preferences.

The urge to play

The lamp awakens the urge to play. Its basic corpus is the individual MAX module. This is an object consisting of three elliptical bodies that looks a little like a Mercedes star with the outer ring removed. At the lower end of the three-pronged star there is a plug, and a socket at both of the upper prongs. That means the modules can be inserted into each other on top of the rectangular lamp base to form three-dimensional sculptures. “Almost any shape is conceivable, from horizontal to tree-like. It’s all up to the user’s creativity,” Link says. Another design element is light. Each module has two RGB light-emitting diodes that can light up the front and back surface in different colors. The digital control electronics in the base recognize automatically at which part of the tree structure a module was inserted and transmit light to it accordingly. “This makes it possible to create three-dimensional light surges that follow the sculp-

tural branching, giving rise to a light sculpture that, like the old lava lamps, creates a succession of new, dynamic light pulses,” Link says. He has composed suitable light scores for different moods: fire, water, air and nature. “In the fire score, the color red is predominant, and the light transitions are abrupt, like the flickering of real fire. The dynamics of water are slower and wave-like,” Link says.

Experience of excellence

The module housing is particularly important for the right lighting effect. It has to show high transmission so that enough light reaches the viewer. At the same time, it must be highly light-diffusing to prevent the LEDs behind the modules from creating disturbing spots of light (so-called hotspots). When selecting the material, Link relied on his experience as a designer of architectural lighting: “I enjoy working with ACRYLITE® because it was specially developed for lighting with LEDs, is much lighter than other materials and less expensive than glass, for instance. In addition, it is up to 40 to 50 percent brighter than all other materials I have tested in our lighting laboratory.”

From facade to living room

So far, Link has mainly lit large projects like Leipzig’s Nova Eventis shopping center with its large-scale illuminated facade. His experience of specially developed solutions for industry stood him in good stead for his MAX lamp. “I had been toying for some time with the idea of designing a living room lamp. Just



Modular lamp: the lighting modules of the MAX lamp can be inserted into each other to form large and colorful structures.



Light designer Tobias Link wanted his MAX lamps to recall the lava lamps of the 1970s and 1990s.



then I received an inquiry from B+M Leuchten whether I would be interested in developing a lamp for them." So Link started putting his idea into practice. Although he quickly found the right material, ACRYLITE®, the details were challenging. "The modules needed to be as small as possible. That made the heat generated by the LEDs a big problem," said Link. The shape of the modules also posed a challenge for the fabricators at Hadisch GmbH. "They were dismayed at first when they saw the triple elliptical shape," Link recalls with a grin. "But with patience and good ideas, they developed a suitable aluminum mold for thermoforming the hemispheres of the modules." It was worth all the trouble, because the modules show high dimensional stability despite their extremely thin walls (4mm thick). To bond the two hemispheres together cleanly, the edges were routed at a precise 90-degree angle. "ACRYLITE® can be fabricated easily and with great precision. That meant we could also cut out the section where the connecting sockets are fastened at the tips of the modules without any problems. That would not have been possible using glass."

Eye-catching

MAX was introduced to the professional public for the first time at the German lighting exhibition Sauerland Lichtmesse. "There was a lot of feedback because MAX simply stands out from the crowd. Many people stopped to look and asked what kind of lamp it is," says Link.

Apart from its design, what professional visitors found especially convincing about the lamp was the property of ACRYLITE®: "Many people found it very impressive that this material has been specially optimized for lighting with LEDs. Even a lot of experts were not aware that such a material exists," says Link. The exhibition shows there is indeed potential for the MAX lamp, particularly among the younger target group. The lamp's market launch is planned for next year. hf



Aiming for the Top

This tree house clings to the trunk of a sequoia like an insect. A transparent ACRYLITE® roof protects the wood from environmental influences and affords a clear view of the stars at night.

▶ Many New Zealanders don't believe it exists. It's just a joke, they say, a piece of fiction, as is true of most advertising. But this tree house is real, just as real as Tracy Collins and her restaurant that she had built 33 feet up a sequoia tree in a forest near Auckland, on New Zealand's North Island. This job somehow fell into Collins's lap (she was selected from many applicants to organize the building work). But this was far from an ordinary job. Both the tree house and the restaurant were thought up during an advertising campaign and had to be planned, built and equipped within only four months. The young lady from New Zealand became the symbol of this campaign and organized the entire construction and equip-



ment of the restaurant. The only condition made by her client, the provider of New Zealand's yellow pages, was that Collins had to find everyone involved in the project, from architects, fire safety officers and engineers to city planners and suppliers, via the yellow pages and contact them using the data provided there. Only if the providers were listed in the printed, Internet or mobile versions of the index was Collins allowed to enlist their services.

Up until December last year, she and her team worked to create the 474-square-foot tree house that can seat 18 guests plus staff. "Planning it was a real challenge: The tree house had to be able to bear the weight of all these people and

somehow be fastened to the 40-year-old sequoia whose trunk is 5.6 feet in diameter," says Peter Eising from Pacific Environments, the tree house project architect. Finally, four huge steel clamps were precisely attached to the tree trunk, making it possible to add the wooden floor and rails. Collins studiously documented all the progress and setbacks in Internet videos and in a blog on the campaign website.

This project was a unique experience for Eising and his colleague Lucy Gauntlett. "I always used to build tree houses as a child on the farm where I grew up," the architect says. "Now I have designed a tree house for grownups, constructed with all the 'toys' we never had as kids."

The brief for the tree house was kept as open as possible so that Eising and Gauntlett could incorporate all their creative ideas. Taking their cue from the environment was especially important to them. "The organic shape we chose for the tree house can be found in nature, for example in butterfly cocoons," Eising says. This shape makes the tree house fit harmoniously into its setting. It is adapted to its surroundings without dominating them, but also without being hidden. Natural materials take center stage, and other materials are used sparingly. These include ACRYLITE® for the roof, which protects the tree house from all winds and weathers. "Very few people notice there is a roof at all," Eis-



The tree house clings to the 5.6 foot thick sequoia trunk like a cocoon, which looks both delicate and stable.



A wooden bridge leads from the ground straight to the treetop restaurant, which is bathed in gentle light at dusk.

ing says. The transparent ACRYLITE® is hardly noticeable among the wooden roof struts. Since the room is open at the sides apart from the wooden rails, people assume the roof is open too. Nor does ACRYLITE® obstruct the view of the trees rustling in the wind, of the sky and the stars. "It was important to the architects that the structure should look like a real tree house. They didn't want a roof that detracts from the design," says Chris Booth, Marketing Manager at PSP Auckland Office, a New Zealand supplier of construction materials and one of the biggest suppliers of acrylic sheet on the local market. For the architect Peter Eising, the material's high transparency was not the only reason for its choice: "We used ACRYLITE® because it is weather-resistant and light weight, making it perfect for a tree house. It is also easy to fabricate and that was a crucial factor for us." The individual parts were cut to size in the middle of the woods, as there were no production workshops nearby. "Each piece was fabricated individually. Nature knows no such thing as a straight line or edge." Tracy Collins and her team had finished the tree house by December 2008. And from January 9 to February 9, the restaurant was open to the public. During

this period, more than 2,000 guests climbed up the roughly 200-foot-long wooden bridge that led from the ground to the restaurant below the treetop. That is a real experience, especially in the dark. With every step, it feels more and more as if one were hovering above the ground. Light sources (strip lighting) on the floor between the wooden slats add to the ambience and make sure people don't step off the side. The light sources are covered with ACRYLITE® P95 to provide diffused lighting and bathe the wood in soft light. At dusk, the tree house appears to cling to the tree trunk like a giant glowworm. This was a sight granted only to the guests who received one of the coveted reservations. Only after receiving these were they told exactly in which part of the forest the restaurant was located. That is why many people doubt its existence. Most New Zealanders only saw the tree house in the media. Whether it will be reopened in this forest or elsewhere has not yet been decided

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"I always used to build tree houses as a child on the farm where I grew up. Now I have designed a tree house for grownups, constructed with all the 'toys' we never had as kids."

Peter Eising, Project Architect Pacific Environment







Making tea

As a rule, put one teaspoon of Pu-Erh per cup in a teapot. Pour boiling water onto the tea and let it brew for three to five minutes, over a teapot warmer if possible. The tea can be refreshed once or twice with more boiling water and is best sweetened with maple syrup.

It's Tea Time!

Pu-erh tea is one of the oldest teas in China and is traditionally picked from the Quingmao tea tree. A shop in the Chinese city of Kunming offers several hundred varieties of this tea. As with wine, the older the tea, the better its flavor and the higher its price.

► This is no ordinary tea. Not one of those greyish-colored teabags filled with peppermint, fruit or fennel that are first drowned in hot water, then left to stew for hours in the teapot. Tea as appreciated by the Chinese is completely different, not just in terms of flavor. It is a symbol of tradition and culture and links the present day with the ancient dynasties. All of China's emperors enjoyed tea, from the Han dynasty whose emperors ruled China from 206 BC, to the Qing dynasty that ended in 1911. Far from being merely a thirst quencher, it was savored in a formal tea ceremony.

Chinese tea culture has already existed for 2,500 years, and the traditional drink is wreathed in numerous legends. Tea is said to make the drinker immortal, according to one of the oldest stories about the monk Fa Yao, who lived during the Southern Dynasty between 420 and 587 AD. He lived to the age of 99 – almost immortal at that time, when life expectancy was much lower than today. Monks and scholars alike drank a lot of tea, since its ingredients stimulate thought processes and keep the body alert, for example during prolonged meditation.

Modern Chinese people also appreciate good tea such as Pu-Erh, one of China's oldest teas. It is still picked from the Quingmao tea tree in Yunnan Province as it was centuries ago. The Pure Pu'er tea shop in the town of Kunming, also in Yunnan Province, exclusively sells this kind of tea. Hundreds of different varieties are stacked on the shelves and sales counters at Sanshi Street 6. Tea leaves are also offered here in the form of compressed slabs or cakes, and are beautifully packaged. No paper teabags here, if you please. Visitors to the shop can sit down on stools and test one of the varieties offered. Some of these teas are over 100 years old. The same applies to Pu-Erh tea as to good wine: the older it is, the better the flavor and the higher the price. One British tea trader charges around US-\$ 110 for a cake of Imperial Beeng Cha Aged Pu-Erh.

"Pu-Erh tea links the past and the present, and that is just what our shop fixtures are meant to reflect," says Cyrus Sun, Product Manager at Evonik Degussa China. That is why, besides wood as a traditional, natural material, kiwi-green ACRYLITE® P95 was installed on the walls and counters. "Pure Pu'er wants to position itself between the olden days and the modern age. The interior is an embodiment of the brand," Sun says.

The shop design therefore creates the right sales atmosphere. At the same time, the sheets brighten up the room. ACRYLITE® P95 is fully illuminated because the incident light from behind is evenly distributed over the entire sheet by the material's incorporated diffuser beads. No scratches or signs of wear are visible even in this bright light because the luminous green ACRYLITE® is insensitive to both and stands up to everyday wear and tear.

The kiwi-green sheet refers to the original green color of the tea leaves (Pu-Erh is a green tea that only acquires its reddish-brown color after processing). The floral patterns on the sheets creates a further link with the tea leaves. "It is very easy to apply decorative elements to ACRYLITE®. That would have been much more difficult with glass," Cyrus explains. "The décors can be printed on the material or bonded to its surface."

As the centuries-old custom will have it, each tea on sale at the Pure Puer shop comes from Yunnan Province, more precisely from Mount Jing Mai near the southern town of Xishuangbanna. There, the leaves are subjected to a special post-fermentation process, whose precise details are a well-guarded secret. All we know is that storage, which can last from six months to 60 years, triggers post-fermentation. This gives the tea its red to brown color and earthy, almost smoky flavor that was much appreciated by the emperors of China, for its medicinal properties as well as its taste. Tea stimulates the body's meridians, whose various points are also treated during acupuncture. Traditional Chinese medicine early discovered tea as one of its remedies. The famous Pu-Erh tea is believed to lower levels of blood fats like cholesterol, and to break down body fats more rapidly in dieters. These properties make it popular in Europe too, much to the delight of the Chinese, who are keen to preserve the ancient tea culture in the modern world. What was appreciated by the emperors of yore must be useful today as well. Tea is good for the mind and promotes well-being, and is much too precious to end up in a teabag.

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Piwowarsky, Ute: page 7
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Wildhirt, Stefan: cover, pages 3 – 6

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