



# Free Form structures

Reshaping timber architecture



08/2025 | Fotos: Diverse Fotografen für Blumer-Lehmann AG

Free Form timber construction is the pinnacle of timber engineering – bold, unique, and tailored in every detail. Fueled by modern technology and passion for wood, we bring architectural dreams to life and create landmark structures that redefine the limits of what can be achieved.

Shigeru Ban Architects

# Haesley Nine Bridges Golf Club

## The first Free Form project

The spectacular clubhouse for the Haesley Nine Bridges golf resort in South Korea is the first Free Form project that we implemented in 2008. Both the idea and concept for the unique building housing a restaurant, bar and spa were developed by Tokyo-based Shigeru Ban Architects and South Korean architect Kyeong

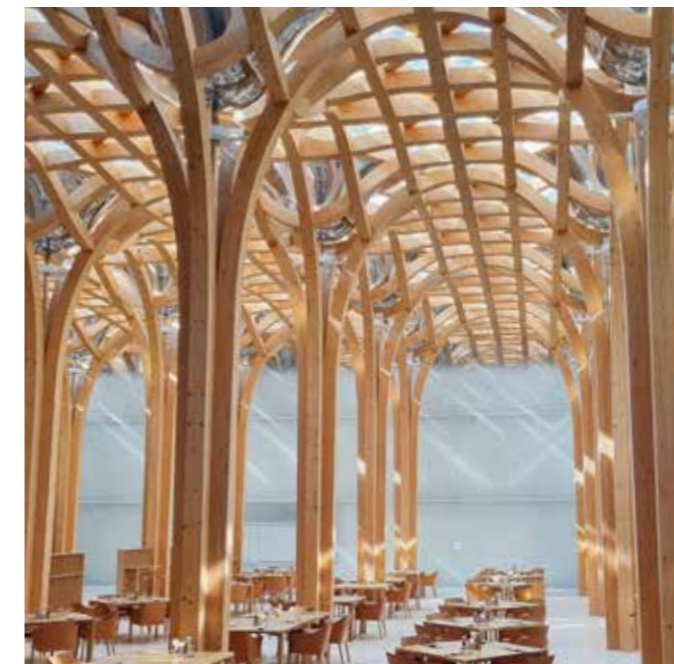
Sik Yoon. The fundamental architectural concept for the construction of the clubhouse roof is based on the geometric pattern of traditional Korean basketwork and combines various influences from nature.

↳ [blumer-lehmann.com/haesley-nine-bridges-golf-resort-reference](http://blumer-lehmann.com/haesley-nine-bridges-golf-resort-reference)



© Hiroyuki Hirai

© CJ Group



Free Form

We use our knowledge, our experience and our fascination with wood as a renewable raw material to create seemingly impossible Free Form structures. In all dimensions. All over the world.



Around 10 years after constructing the clubhouse, we had the opportunity to create six more exceptional Free Form buildings at the Haesley Nine Bridges Golf Resort – including the Grand Hall and the Learning Centre – based on designs by Shigeru Ban Architects.

↳ [blumer-lehmann.com/haesley-nine-bridges-additional-reference](http://blumer-lehmann.com/haesley-nine-bridges-additional-reference)





Swatch and Omega, Biel – Shigeru Ban Architects

# A milestone in modern timber construction

The spectacular building of the Swatch headquarters is characterised by its Free Form supporting structure, made of timber frame construction measuring 220m long and around 50m wide. The timber structure is clad with a facade or roof cladding composed of 11 different facade types. The building stretches across the factory premises like a snake and sweeps over the roof of the newly constructed Cité du Temps museum building. The Omega production and logistics building further to the west is another timber structure.

through the timber construction technology used. A building material becomes a hero material when it not only fulfils its function, but also expresses individuality and identity. By using a specific building material, the builder consciously communicates, creates or consolidates a message or an image.

**Perfectly timed timber construction for Omega**

The Omega production and logistics building is also an architectural and technical highlight of sizeable proportions. The five-storey building – which is located further west on the same site – meets the highest energy efficiency and environmental compatibility standards. But that’s not all. The timber used comes exclusively from Swiss forests.

**Planned with parametric precision**

The three buildings illustrate what is possible when innovative architecture, parametric planning processes and precision manufacturing production methods are combined.

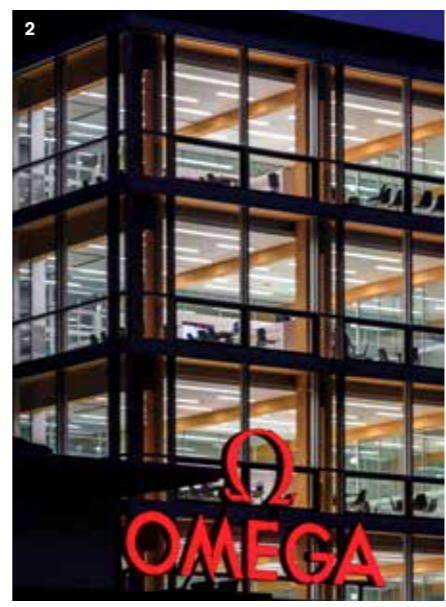
**Hero material**

As a logical consequence of the client’s sustainability goals, architect Shigeru Ban designed all three of his buildings in timber, expressing the character of the brand in question

↳ [blumer-lehmann.com/swatch-project](http://blumer-lehmann.com/swatch-project)



1 Anything but classic office block architecture. Beneath the Swatch building’s Free Form support structure, spacious work, retreat and creative spaces are spread over 25,000 m<sup>2</sup>.



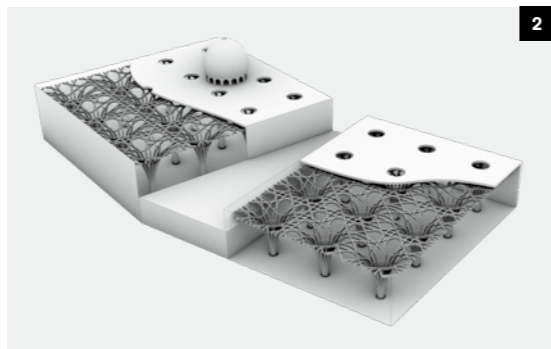
2 The five-storey Omega building for watchmaking, training and quality control meets the highest energy efficiency and environmental compatibility requirements.



© Swatch



1



2

- 1 The first of a total of 30 timber columns can be seen in the entrance area as they soar upwards like trees, merging with the lattice-like ceiling structure to form a vast tracery of timber.
- 2 The Free Form project team overcame the planning and production challenges by developing a kind of modular system comprising 2,746 components in 145 variants.

Cambridge Mosque – Marks Barfield Architects

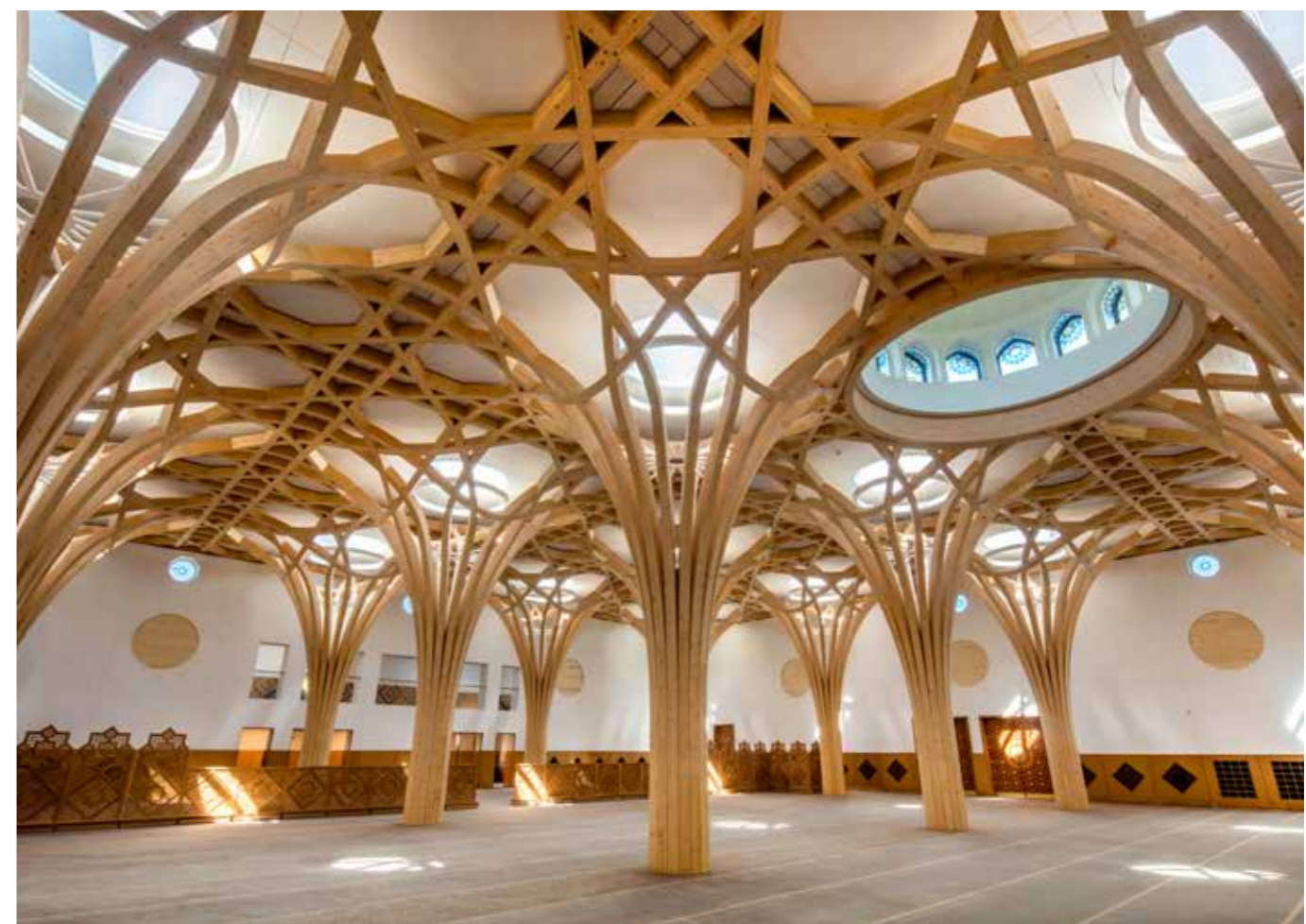
# The load-bearing trees of the Cambridge Mosque

Covering an area of 4,000m<sup>2</sup>, the Cambridge Mosque with its striking timber construction provides space for a prayer hall capable of accommodating 1,000 worshippers, as well as a café and two apartments. The mosque's architecture was designed by the London-based architecture firm Marks Barfield Architects.

The atmosphere in the building's interior is generated by the 30 Free Form, tree-like timber pillars, which are connected to one another

through the ceiling structure. The branches of the trees form an octagonal structure. An octagon provides space for a prayer hall capable of accommodating 1,000 worshippers, as well as a café and two apartments. The mosque's architecture was designed by the London-based architecture firm Marks Barfield Architects. An octagon is a traditional shape from Islamic architecture that symbolises the rhythm of life.

↳ [blumer-lehmann.com/cambridge-mosque-reference](http://blumer-lehmann.com/cambridge-mosque-reference)



© Morley von Sternberg

Sunflower timber sculpture –  
Blumer Lehmann and Dimensional Spin

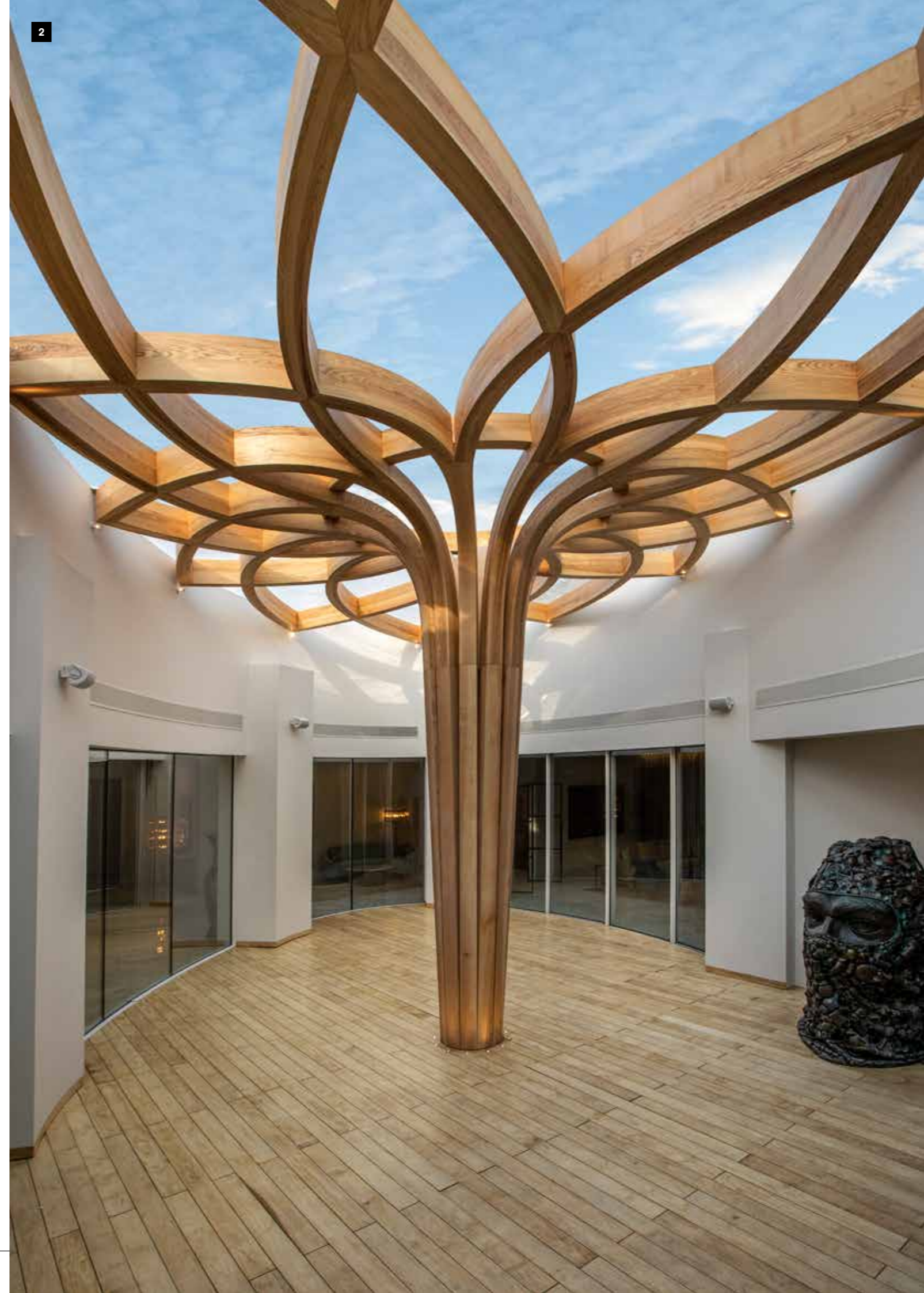
# A sunflower made of timber

The Free Form 'Sunflower' sculpture adorns the atrium of a private residence in India. The design was developed by our very own Advanced Geometry Group, working in collaboration with the client's architect. It draws on the Indian motif of an elliptical sunflower and translates it into a Free Form supporting structure made of steam-bent laminated timber beams. The timber structure is clad with customised glass elements.

↳ [blumer-lehmann.com/sunflower-reference](https://blumer-lehmann.com/sunflower-reference)



- 1 The timber beams of the Sunflower sculpture are made out of ash timber, as this type of timber is easy to bend even in designs involving tight curves.
- 2 The Sunflower timber structure sits beneath customised glass elements, which also protect it from strong sunlight by providing shade.



© Vadehra Builders



Hillmaru Golf Clubhouse, Pocheon – YKH Architects

# An impressive Free Form geometry reception area

The Hillmaru Country Club in South Korea welcomes its guests with a Free Form entrance portal of impressive dimensions. Under the two tree-like structures made of spruce that straddle the driveway, there is a multi-lane drop-off zone. Based on the designs by YKH Architects, the Blumer Lehmann project team planned, produced and assembled the building on site in Switzerland. The entirety of the

contoured roof surface spans the 160-metre-long clubhouse and is complemented by a projecting roof over the reception area.

↳ [blumer-lehmann.com/pocheon-reference](https://blumer-lehmann.com/pocheon-reference)



The clear design and material language with lots of visible timber is also continued inside the Hillmaru Country Club.



© Studio Time of Blue

# Free Form roof redefines the future of timber construction

Wisdome Stockholm is a scientific experience arena being built at Sweden's National Museum of Science and Technology. The Free Form roof was designed by the Swedish architecture firm Elding Oscarson in collaboration with the Norwegian construction engineer Florian Kosche. Based on their designs, we created the detail plans for the unique Free Form building together with their planning partner.

The heavily curved Free Form timber roof connects the inside and outside areas of the National Museum of Science and Technology and creates a spectacular interior for the dome structure of Wisdome Stockholm. The roof geometry spans a footprint of 25 x 48 metres, without columns. On three sides of the building, a projecting roof supplements the roof support structure and brings the curvature of

the roof surface level with the eaves line. The Free Form structure is based on a grid system of LVL beams. The dome below the vaulted roof is made from cross-laminated timber. A requirement of the architecture competition was that timber – in particular cross-laminated timber (CLT) and laminated veneer lumber (LVL) – be used in the construction. One of the main partners of the Wisdome Stockholm project is Stora Enso, one of the world's largest forestry firms.

↳ [blumer-lehmann.com/wisdome-stockholm-reference](https://blumer-lehmann.com/wisdome-stockholm-reference)



The unsupported Free Form roof made of laminated veneer lumber and arranged as a visible lattice shell spans an area of 25 x 48 m.

© Anders Robert



1



2

- 1 The actual 'Wisdome' dome structure – complete with a 3D cinema – is located inside the complex timber construction with its curved roof.
- 2 Blumer Lehmann joined forces with its engineering and geometry partners to develop the highly complex roof support structure and was responsible for planning and production of the components, as well as assembly.



The Red Sea Golf Clubhouse – Foster + Partners, London

# Luxury in timber on the Red Sea

The golf clubhouse on Shura Island and designed by Foster + Partners is one of the new buildings in the gigantic 90-island tourism project. The group of buildings with its unusual roof comprising five contoured leaf-shaped sections houses a restaurant, reception area, golf shop and changing rooms. The 664 double-curved laminated timber beams – each one unique in both shape and size – form the roof.

The Blumer Lehmann project team developed a complex parametric model that covered all the elements necessary for planning – from the axis model and static calculations all the way to detailed connection points.

↳ [blumer-lehmann.com/golfclubhouse-shura-island-reference](https://blumer-lehmann.com/golfclubhouse-shura-island-reference)



# Iconic resorts in harmony with nature

On Saudi Arabia's west coast, The Red Sea Project sets new benchmarks for sustainable luxury tourism. Blumer Lehmann plays a key role in two iconic developments on Ummahat Island: the organic Free Form architecture by Kengo Kuma and the shell-shaped villas designed by Foster+Partners. Both projects share one vision – exceptional design realised with precision timber engineering that goes hand in hand with nature.

## Sculptural roofs for the Nujuma Ritz-Carlton Reserve

For Nujuma, a Ritz-Carlton Reserve, Foster + Partners designed 82 beachfront villas inspired by seashells. Their defining feature: curved timber shell roofs composed of 171 prefabricated wooden elements, manufactured at Blumer Lehmann's Gossau production site.

With over 30,000 m<sup>2</sup> of timber used, the roofs are as striking as they are sustainable. Lightweight construction ensures minimal environmental impact during assembly – a crucial factor in preserving the pristine island setting.

## Free Form elegance for St. Regis Red Sea Resort

Just steps away, Kengo Kuma's architectural language unfolds in a series of villas and public buildings with gently flowing Free Form roofs. Echoing dunes and coral formations, these structures combine natural inspiration with advanced timber technology. Meeting the strict environmental standards of 'The Red Sea Project', the Ummahat Island Resort demonstrates that large-scale luxury can be sustainable, sensitive and stunning.



1+3 Kengo Kuma's design for the water villas, with their spiral shape and panoramic views, is inspired by sea corals.  
2+4 The Free Form roof structures of the Nujuma Ritz-Carlton Reserve flow organically, expressing the elegance of complex timber geometry.



↳ [blumer-lehmann.com/nujuma-a-ritz-carlton-reserve-reference](https://blumer-lehmann.com/nujuma-a-ritz-carlton-reserve-reference)



↳ [blumer-lehmann.com/st-regis-red-sea-resort-reference](https://blumer-lehmann.com/st-regis-red-sea-resort-reference)





Blumer Lehmann Stammhaus, Erlenhof – K&L Architekten

# A built manifesto for an extraordinary timber construction

At its headquarters in Gossau, Blumer Lehmann has created a building that embodies its own values: pioneering spirit, craftsmanship, and the expressive power of timber.

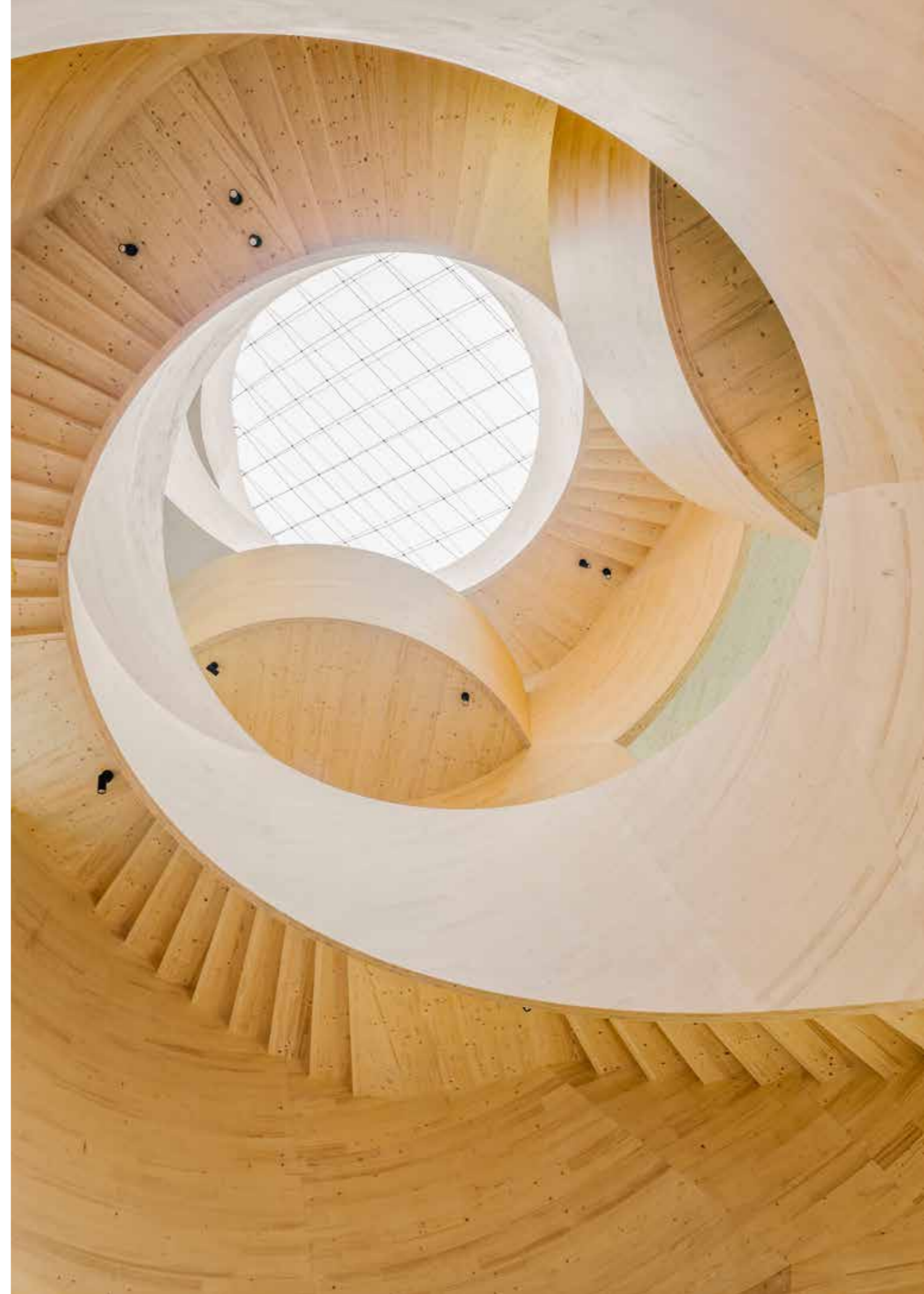
## **Sustainable and sensory architecture**

With 180 workstations, a spacious entrance hall, event space, cafeteria and terrace, the Stammhaus is both functional and forward-thinking. Its façade combines vertical timber elements and shading structures for a striking yet efficient exterior, while the building's indoor climate is regulated through natural ventilation, night cooling and geothermal energy via activated piles.

## **A sculptural statement in wood**

Designed by K&L Architekten and realised in collaboration with the University of Stuttgart's ICD institute, the building features a breathtaking centrepiece: a freeform staircase made from Blumer Lehmann's own CLT-curved elements. Winding upwards like a tree trunk through a central atrium, it connects four open levels and demonstrates the potential of digital timber construction. The flowing geometry brings movement and softness into the architecture – a bold expression of form, material and innovation.

↳ [blumer-lehmann.com/stammhaus-reference](https://blumer-lehmann.com/stammhaus-reference)





Developed in collaboration with ICD and ITKE at the University of Stuttgart, the 22-metre-high viewing tower was realised as a research project for the 2024 National Horticultural Show in Wangen.

Wangen Tower – ICD und ITKE University of Stuttgart

# Great views for timber construction

Visible from afar and rooted in sustainability: the accessible viewing tower built for the 2024 National Horticultural Show in Wangen im Allgäu is both a technical feat and a symbol of the future of timber construction.

## Pioneering through natural forces

The special thing about the tower is, that it's the world's first accessible tower built from curved cross-laminated timber components shaped by the natural shrinking behaviour of wood. This innovative method – developed in collaboration with ICD and ITKE at the University of Stuttgart – replaces force-based bending with a more sustainable, material-driven approach.

The 22-metre-high structure consists of six prefabricated timber elements that were assembled on-site in just three days. Their sculptural curves lend the tower a striking and

organic presence, echoing the surrounding landscape and the natural forces that shaped its materials. Despite its light and elegant appearance, the tower is engineered to withstand significant wind loads – a necessity, given its exposed hilltop location.

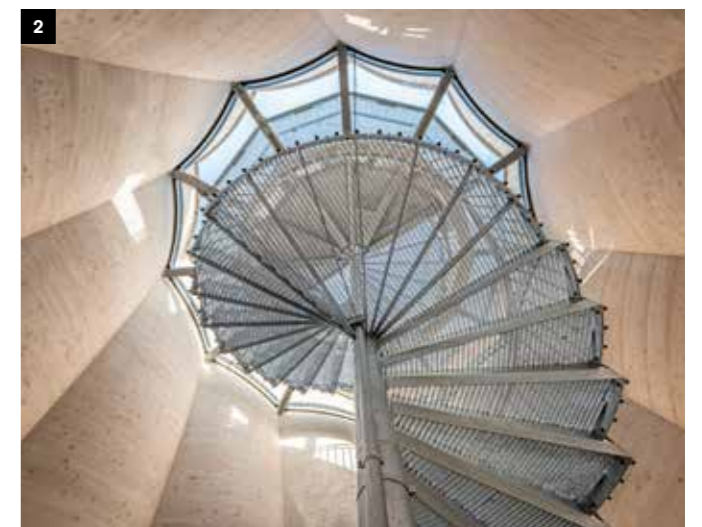
## Sustainable from the ground up

The foundation of the tower consists of recycled concrete and low-carbon cement; The exterior is clad in vertical larch panels that age beautifully over time. Built to withstand strong winds yet light in design, the tower offers an accessible experience of height, perspective and harmony with nature – reached by climbing 113 thoughtfully integrated steps. Erected in just three days, the tower showcases the potential of intelligent prefabrication and innovative materials to bring modern architecture into harmony with nature.

↳ [blumer-lehmann.com/wangen-tower-reference](https://blumer-lehmann.com/wangen-tower-reference)



- 1 Transport of prefabricated oversized timber components to the construction site.
- 2 Visitors ascend the tower via a carefully designed steel staircase with 113 steps, leading to a panoramic viewing platform.



© ICD | ITKE University of Stuttgart



Holland Casino, Venlo – MSVA Architects

# Flowery architecture and impressive Free Form structures

The image of a flower provided the inspiration for the appearance and interior design of the Holland Casino in Venlo, making a striking allusion to the importance of flowers in the Netherlands. A Free Form laminated timber structure rises up through the casino's atrium like a flower on its stalk. The artfully curved supporting structure comprising some 300 Free Form parts measures 55 m by 45 m in the roof area, is almost 25 m tall and is supported by a stalk

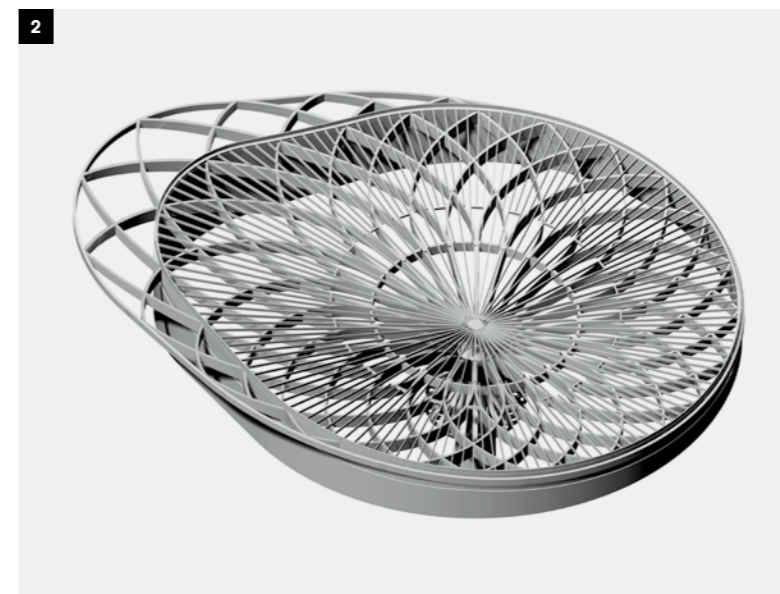
measuring 3.2 m in diameter. In the previous project development phase, the first task was to translate the architectural designs by Amsterdam-based MSVA Architects into viable geometric specifications.

↳ [blumer-lehmann.com/casino-venlo-reference](https://blumer-lehmann.com/casino-venlo-reference)



© MSVA | Laurens Eggen

© Barwerd van der Plas



- 1 Spruce arches form a flower stem emphasised with bands of light around the 3.20 m-thick, solid timber column in the casino's atrium.
- 2 The casino's seemingly delicate flower head gives no hint of just how complex the supporting structure needs to be to hold it in place.

# Therapeutic architecture for body and mind

The Maggie's Centres in the UK support people diagnosed with cancer in their daily lives. The founder Margaret 'Maggie' Keswick Jencks, herself a cancer patient, believed that architecture and timber as a construction material could have a healing effect.

Studies show that patients recover quicker and need less pain medication when they can see parks and trees from their hospital rooms rather than just staring at a concrete wall. Colours, lighting, acoustics, materials, sensory surfaces, smell, temperature and indoor air quality can also have a positive impact on

patient recovery. This is where timber as a natural construction material can fulfil some core functions within modern therapeutic health-care buildings. It ensures comfortable indoor conditions and has an appealing sensory quality, while also creating a connection to nature.

The timber frame construction of Maggie's in Leeds creates an unusually curved building and room shape, which helps to create a pleasant atmosphere.

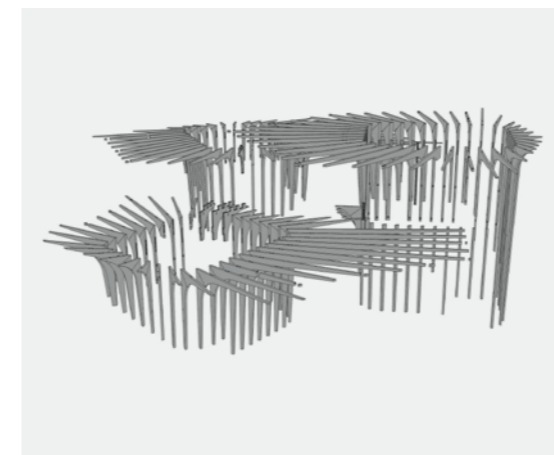


© Nigel Young | Foster + Partners

## Maggie's Leeds, Heatherwick Studio, London

Maggie's in Leeds is an example of how an outstanding architectural fusion of nature and timber as a sensory material can look. Based on designs by the architects at Heatherwick Studio in London, we completed Maggie's Leeds as three pavilions. They all differ in height and contain an airy interior that houses spaces for both meeting and retreating. Lush plantings on the rooftops also offer accessible garden spaces and restorative outdoor areas.

↳ [blumer-lehmann.com/maggies-centre-leeds-reference](https://blumer-lehmann.com/maggies-centre-leeds-reference)



Laminated timber elements arranged radially around the pavilions support the roof elements. Prefabricated from spruce in the Blumer Lehmann factory, the elements were transported to Leeds and assembled on site.



## Maggie's Manchester Foster + Partners, London

Foster + Partners' architectural idea for Maggie's in Manchester is based on the skeleton of a bird. The architects chose timber as the main construction material. Throughout the centre, the focus is on natural light, green spaces and a view of the garden. The supporting structure is a filigree framework with 17 axes. The surfaces of the components are made of spruce and have a furniture quality.

↳ [blumer-lehmann.com/maggies-centre-manchester-reference](https://blumer-lehmann.com/maggies-centre-manchester-reference)





# Practical construction with timber

Timber is the all-rounder capable of overcoming the challenges of our time. Its properties and practical advantages make it the construction material of the future.

## Climate friendly

Timber generates less grey energy and fewer greenhouse gases than other materials. Throughout its entire lifecycle – i.e. harvesting, processing and transporting – timber's energy footprint is unparalleled.

## Healthy

Timber creates a comfortable indoor climate by binding pollutants and regulating humidity.

## High-tech

Timber is lightweight, yet sturdy and capable of bearing heavy loads. The material is also pressure-resistant and moisture-regulating and has high thermal insulation properties.

## Carbon sequestration

Wood protects the climate. It sequesters CO<sub>2</sub> as it grows and stores it – even when it is in use. One cubic metre of wood sequesters around one tonne of CO<sub>2</sub>.

## Renewable

Timber is a renewable raw material. Thanks to sustainable forestry, the material is endlessly available.

## Efficient

Timber is easy to process at low energy consumption. Prefabricated components lessen the effort required on the construction site and shorten building times.

## Safe

The behaviour of timber in a fire is more predictable than other materials because it contains water, conducts heat poorly and burns slowly.

## Limitless

Thanks to new technologies and timber products, there are almost no limits to the architectural possibilities.

## Zero waste

We do not waste a single part of a log. In addition to sawn timber, we also produce pellets, animal litter and energy.

## Recyclable

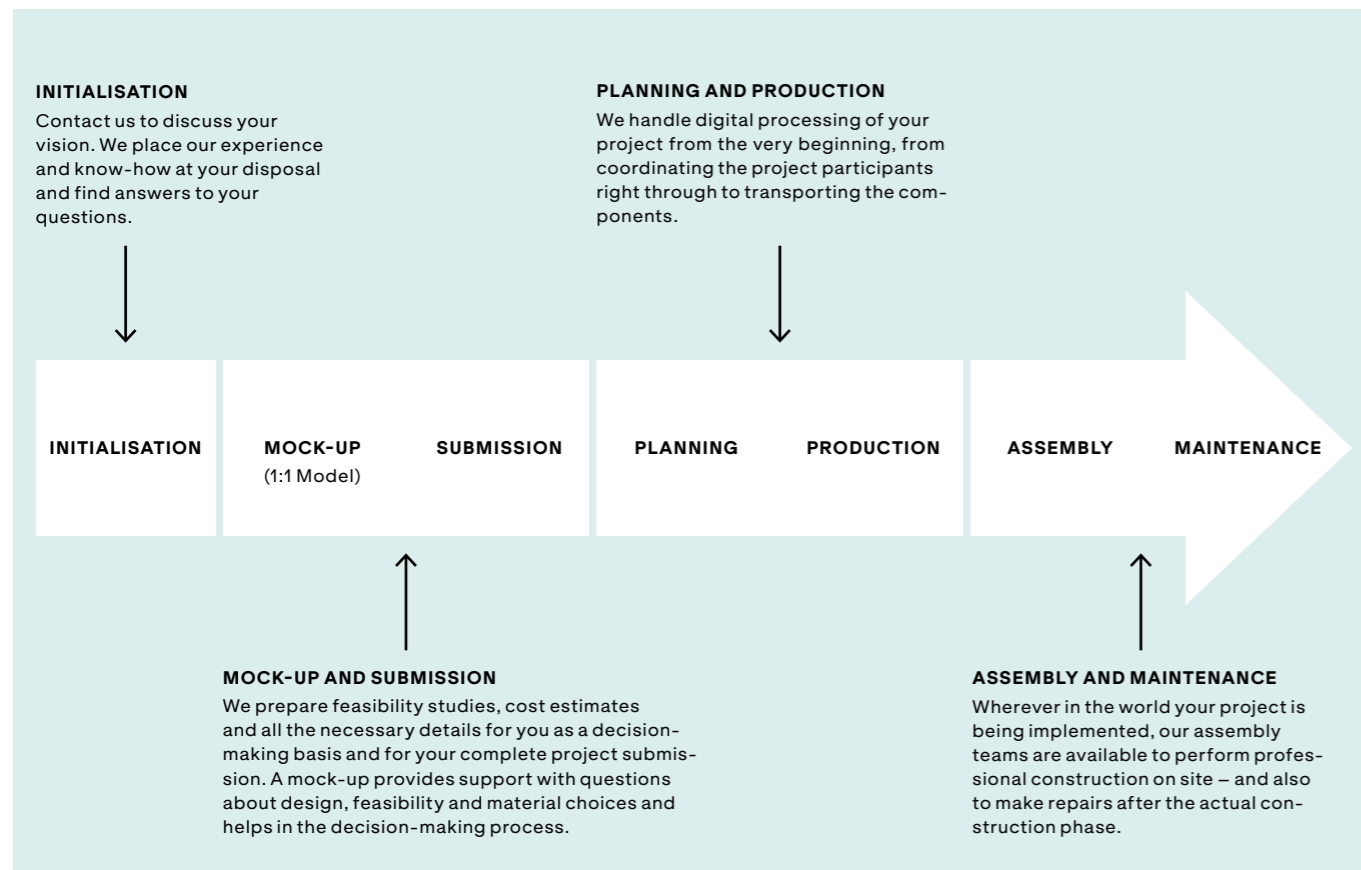
Timber components can be dismantled in a non-destructive manner and reinstalled elsewhere.

↳ [blumer-lehmann.com/sustainability](https://blumer-lehmann.com/sustainability)



# From the idea to the finished Free Form building

Whether it's spectacular in size or visionary in shape, we offer comprehensive services for extraordinary timber construction: on time, on budget and of the highest quality. We support you from the initial idea to the finished structure. Let us help you turn your architectural dream into a reality.



## More information about our services for extraordinary timber construction projects

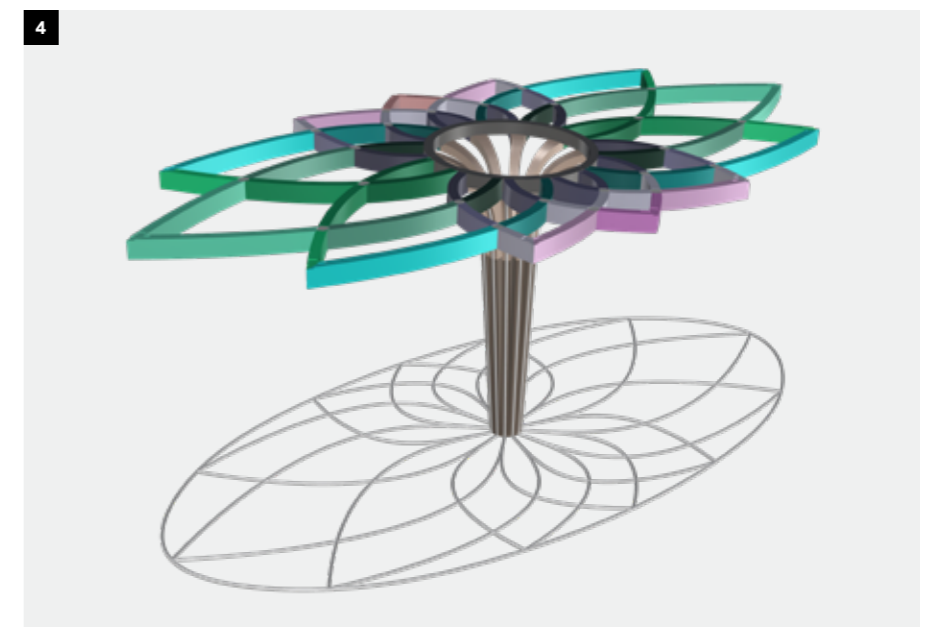
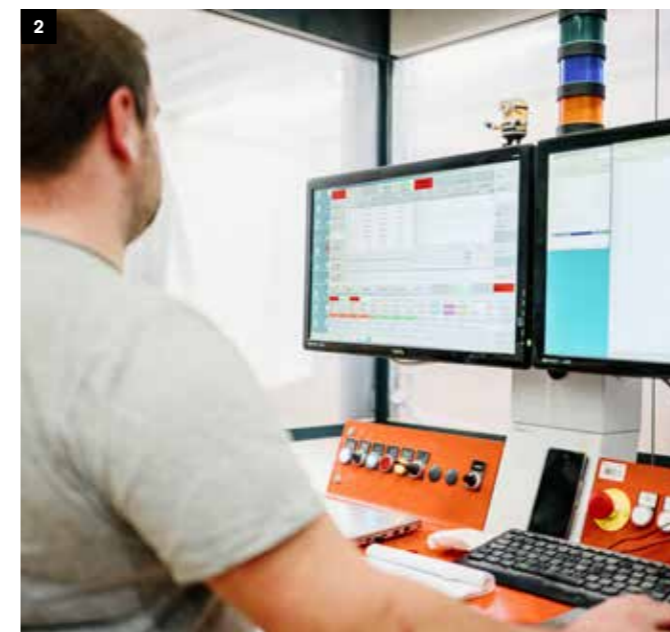
Timber construction planning  
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- 1 Parametric planning on the digital 3D model enables us to perform highly complex construction, flexible planning and defect-free production.
- 2 From the 3D model to production: digital process chains create a direct connection between the CAD design of the building to computer-aided CAM production.
- 3 Our largest CNC system with three five-axle assembly units and eight transport vehicles enables the processing of a single-curved or double-curved component on all six sides.
- 4 With parametric planning tools, we can quickly make adjustments and incorporate information into the digital plans for transportation, segmentation, assembly sequences, etc.



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