

PRESS RELEASE

Gossau, October 2022

Free Form roof redefines the future of timber construction

Wisdome Stockholm, Tekniska Museet Stockholm

Wisdome Stockholm is a scientific experience arena being built at Sweden's National Museum of Science and Technology. With its wave-like roof made of spruce laminated veneer lumber, it pushes the boundaries of what was previously considered possible. 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, the timber construction specialists at Blumer Lehmann created the detail plans for the unique Free Form building together with their planning partners. Since the start of construction, they have also been responsible for ensuring that the project is executed in accordance with the plans.

The pioneering timber construction project Wisdome Stockholm is already being characterised as one of Sweden's most important building projects. It features a spectacular timber construction with a surface area of 1,325 square metres and a unique vaulted main roof. Inside this experience arena is a hemispherical dome theatre with a diameter of almost 22 metres and a height of around 12 metres. The theatre includes a 3D cinema with 100 seats. With 360-degree 3D projections and cutting-edge visualisation technology, it allows visitors to experience the world of science and engineering in a new and fully immersive way.

Pioneering timber design

The striking design by Elding Oscarson and Florian Kosche emerged as the winner of an architecture competition. 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 be used in the construction, in particular cross-laminated timber (CLT) and laminated veneer lumber (LVL). One of the main partners of the Wisdome Stockholm project is Stora Enso, one of the world's largest forestry firms. The Finnish-Swedish company also supplied all the timber construction material for the project. The flagship building marks a milestone in sustainable, climate-friendly construction. It pushes existing technical boundaries and is intended to showcase what is possible with wood as a climate-friendly construction material.

Roof support structure with 20 km of LVL panel strips

With its experience in timber construction and its technical expertise in project planning and the implementation of sophisticated Free Form geometries, the Swiss timber construction company Blumer Lehmann was the perfect partner to execute this ambitious project. Supported by partners from many previous Free Form projects, the timber construction engineers from SJB Kempter Fitze with Hermann Blumer, and the parametric planners at Design-to-Production, the Blumer Lehmann team got to work planning the highly complex roof construction in detail.

'Our main job was to develop a concept for the supporting structure that would allow the chosen architectural design to be implemented,' remembers Martin Looser-Frey, who serves as Free Form Division Manager and is responsible for international sales at Blumer Lehmann. For the main roof, the timber construction engineers at SJB Kempter Fitze opted for a lattice-shell structure with criss-crossing LVL beams. With interlocking dowel joints and the help of cutting-edge planning tools, these were connected to form a double-curved grid. The differently vaulted roof construction is supported around the edge by 24 solid columns that are made from block-laminated LVL with dimensions of 60 x 80 and 60 x 60 centimetres. The columns are connected rigidly to the approximately 1.20-metre-high concrete base. To limit the horizontal deformation of the roof support structure, tensioning rods are integrated into the wooden columns, to which a considerable pretensioning force is applied after assembly. A solid edge beam is arranged on the column heads to enclose the Free Form construction all the way round.

1:1 model for the roof construction

Two mock-ups provided the information needed for the construction design. 'This allowed us to instil confidence in the client,' says Looser-Frey, looking back. The lattice-shell roof support structure consists of three transverse layers of LVL beams and two longitudinal layers of beams. Unlike constructions made of laminated timber, which are bent and milled in the factory beforehand and delivered to the construction site as complete components, for construction of the main roof only the lowest panel strip layer was laminated in the required curvature and delivered as a finished component. This layer served as a scaffold and structural aid for the complex assembly process. The remaining four beam layers were only bent and dowelled during assembly on site. All the connections are designed with dowels and peg connections, which are milled from the same LVL material. The timber construction work for the main roof started in June 2022.

The actual dome inside the building is made entirely of cross-laminated timber (CLT). It was produced back in the Stora Enso factory in Sweden and then assembled on site underneath an assembly tent.

The Blumer Lehmann team from Switzerland also carried out the detail planning for this timber construction. Wisdome Stockholm is scheduled to open in 2023.

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Construction details

Project: Wisdome Stockholm at the National Museum of Science and Technology
(Tekniska museet)

Address: Museivägen 7, 115 27 Stockholm, Sweden

Project type: Art and culture, museum construction

Client: Tekniska Museet, Stockholm

Architecture: Elding Oscarson Architects, Stockholm

Supporting structure: Florian Kosche AS, Oslo, Norway

Timber supplier and main partner: Stora Enso, Sweden

Timber construction engineers: SJB Kempter Fitze, Gossau, Switzerland, with Hermann Blumer

Parametric design: Design-to-Production, Erlenbach, Switzerland

Planning and execution of Free Form timber construction: Blumer Lehmann AG, Gossau, Switzerland

Construction type: Free Form

Execution: Start of planning 5/2021, start of construction 6/2022, handover 1/2023
(planned)



Images:



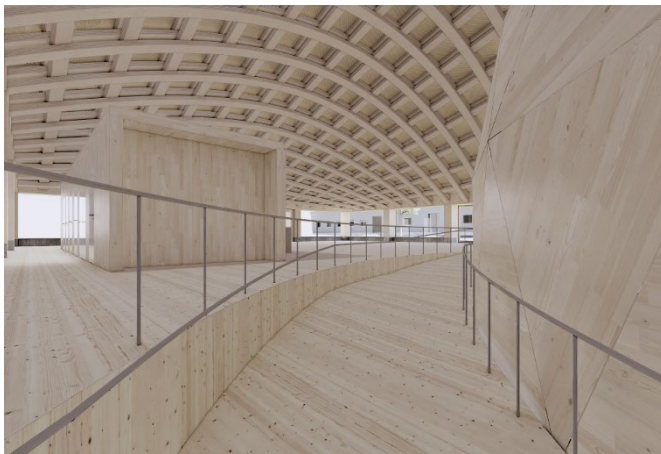
Wisdome Stockholm is a spectacular timber building with a surface area of 1,325 square metres and a unique vaulted Free Form roof. The building, which is situated on the premises of Sweden's National Museum of Science and Technology, is already considered to be a showcase for pioneering timber construction.

Visualisations: Elding Oscarson Architects



Wisdome Stockholm is an interactive experience arena and digital learning environment in which scientific phenomena and complex interactions are communicated using cutting-edge visualisation technology. Below the undulating roof is a dome theatre with a 3D cinema, the 'Wisdome' itself.

Model: Tekniska Museet, Stockholm



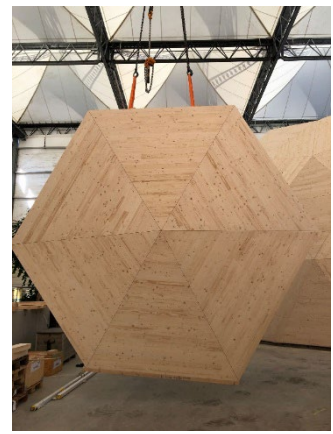
The main roof consists of a Free Form construction that spans a footprint of 25 x 48 metres. The planning, production and execution of the highly complex roof geometry were handled by the Free Form specialists at Blumer Lehmann, together with their partners.

Visualisation: Elding Oscarson Architects



The beams are made of spruce laminated veneer lumber and arranged as a lattice shell. In total, 20 kilometres of LVL panel strips make up the grid of the roof support structure.

Photograph: Blumer Lehmann



Photograph: Blumer Lehmann

The dome structure of Wisdome Stockholm is made from cross-laminated timber (CLT). It was produced in Stora Enso's Swedish factory based on the detail plans of Blumer Lehmann, then assembled on site underneath an assembly tent.

Assembly of the main roof: Only the lowest panel strip layer was laminated in the required curvature and delivered as a finished component. This layer serves as a scaffold and structural aid for the following complex assembly process.

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Blumer Lehmann

Blumer Lehmann, a leading Swiss timber construction company, offers comprehensive sector expertise encompassing consultancy, design, production, erection and project management as either a general or full-service contractor. In collaboration with internationally renowned architects such as Foster + Partners, Shigeru Ban Architects and Herzog & de Meuron, Blumer Lehmann has completed pioneering timber structures all over the world. The company has become known as a specialist in the digital production of Free Form timber structures thanks to its extensive expertise and wealth of experience.

Blumer Lehmann also specialises in modular and temporary structures. Standardised modular room concepts are used to construct schools, office blocks, residential complexes or temporary showrooms. In January 2021, Blumer Lehmann launched its German branch in Großenlüder near Fulda, covering sales and project development as well as modular construction finishing. A business presence has been active in Luxembourg in sales and project development since 2019.

The Lehmann family's group of companies has been closely linked with timber for several generations. The former sawmill operation at Erlenhof, founded over 147 years ago, has grown into a family-run group with three business areas employing around 400 people.