

Elephant House Zurich Zoo,  
Switzerland

**Allplan Engineering in practice**

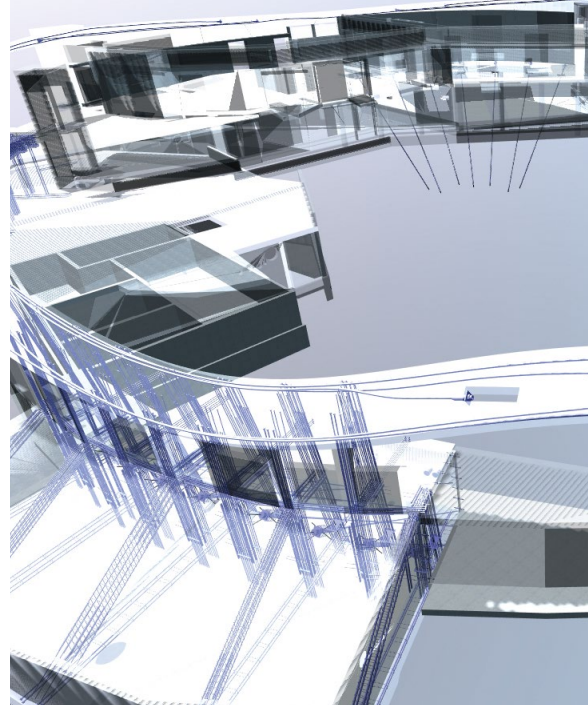
## ALL WRAPPED UP

**The new Kaeng Krachan Elephant Park at Zurich Zoo is a fine example of the international change taking place in zoo philosophy: More space for elephants, more proximity for visitors.**

The new home for a family of eight elephants extends over an area of more than 11,000 m<sup>2</sup>. This is approximately six times the size of the old facility and provides the animals with more space, more family life and more room for movement.

Zurich Zoo is also treading new paths with the design of the Elephant House: a 6,800-m<sup>2</sup> free-form roof shell in wood spans the interior landscape. The roof structure, with its leaf-like appearance, integrates perfectly into the surrounding wooded landscape and is intended to emphasize nature in

the mind of the visitor. It is supported on a reinforced concrete roof foundation. The project was a daring experiment because a roof structure like this, with spans of over 85 meters, had never been built before. Yet digital building models allow such unusual structures not only to be designed but constructed with maximum precision and accuracy. This challenging job was placed in the hands of Swiss engineering consultants Walt + Galmarini who were responsible for the design appearance and the loadbearing structure of the Elephant House.



For many years, Walt + Galmarini has consistently relied on the BIM solution Allplan Engineering for realizing challenging designs with a high degree of quality. Once the digital building model has been populated with the design data, the engineers can derive all the relevant sections, views and perspectives. The 3D preliminary design check also proved to be extremely practical for the Elephant House: this check allowed the Swiss engineers not only to identify component collisions and other design errors immediately, but also to visualize complex geometries very easily.

The requirements of the structural design and construction of the Elephant House were every bit as complex as its geometry. The roof of the building is made up of many superimposed grid-like rays, resulting in the complete absence of timber columns or other supporting elements from the interior. Before the wooden shell could be constructed, the first, essential step was to erect a loadbearing scaffold over the complete interior landscape. Then, from this scaffold, the ribs were erected to millimeter accuracy to form an inverted shell version of the final roof shape. Three-ply boards were joined together – in three layers and rotationally offset by 60° to one another – to create the shape of the roof. Each of the 600 boards was 3 to 4 meters wide, between 10 and 20 meters long and had to be cut to its own individual shape. They deflected under their self-weight alone, so the first layer was erected as a solid layer over the full soffit to provide structural stability. The second and third layers had

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#### PROJECT INFORMATION AT A GLANCE

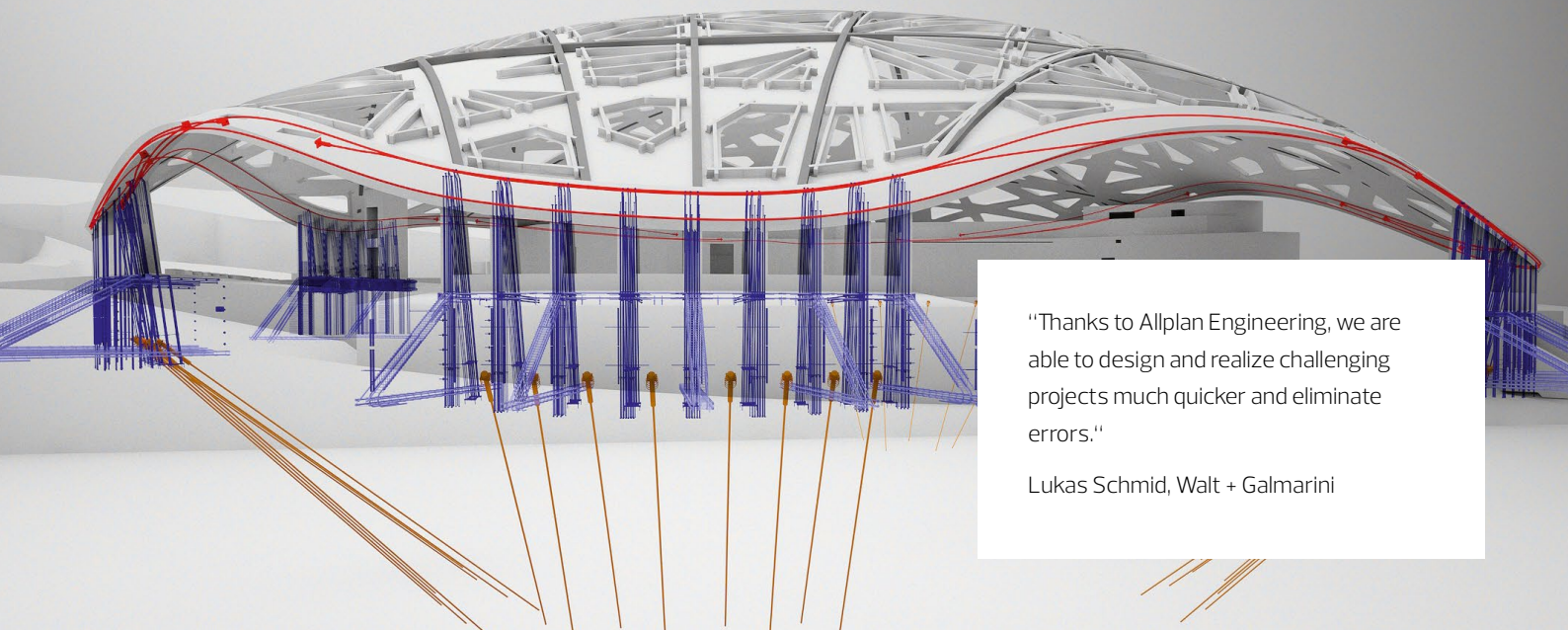
- > **Focus:** Structural engineering services from preliminary design to final completion
- > **Software used:** Allplan Engineering

#### PROJECT DATA

- > **Client:** Zurich Zoo
  - > **Design started:** 2009
  - > **Construction began:** 2012
  - > **Completed:** 2014
  - > **Roof area (including edge zone):** 6,800 m<sup>2</sup>
  - > **Building area:** 5,400 m<sup>2</sup>
  - > **Building volume:** 56,000 m<sup>3</sup>
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their light openings already cut out before erection. The completed roof weighs around 1,000 tonnes. The weight bearing loads were transferred to the lower parts of the roof and the load paths become denser towards the edges, where a concrete ring beam acts as a continuous tension member.

Thanks to the proven expertise of the engineers and the use of the powerful software package Allplan Engineering; all the geometric challenges presented by the structure of the Elephant House were overcome with flying colors. This exceptional experiment was a success and the elephants were able to move into their new home at the Zurich Zoo exactly as planned.



"Thanks to Allplan Engineering, we are able to design and realize challenging projects much quicker and eliminate errors."

Lukas Schmid, Walt + Galmarini

Walt + Galmarini was founded in 1956 and operates today as a public limited company. The engineering consultancy employs around 35 staff members and focuses mainly on integrated structural design in steel, timber, reinforced and pre-stressed concrete, special foundations and earthworks, and in the structural refurbishment of existing buildings and bridges.

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## ABOUT ALLPLAN

ALLPLAN is a global provider of BIM design software for the AEC industry. True to our "Design to Build" claim, we cover the entire process from the first concept to final detailed design for the construction site and for prefabrication. Allplan users create deliverables of the highest quality and level of detail thanks to lean workflows. ALLPLAN offers powerful integrated cloud technology to

support interdisciplinary collaboration on building and civil engineering projects. Around the world over 500 dedicated employees continue to write the ALLPLAN success story. Headquartered in Munich, Germany, ALLPLAN is part of the Nemetschek Group which is a pioneer for digital transformation in the construction sector.

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