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A WALKABLE SCULPTURAL STRUCTURE STRESS RIBBON BRIDGE AT TIRSCHENREUTH, GERMANY

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Summary

As part of a landscape architectural competition the pedestrian and cyclist bridge perfectly reflects the concept of the State Horticultural Show: Nature. In the course of the opening the sculptural bridge with a length of 85 m was brought into service on May 29, 2013.

The paper deals with conceptual design development, appropriate solutions, aspects of detailed design, assembly and dynamic excitability.

Keywords: aesthetics; structural concepts; stress-ribbon; wooden structure; high strength steel; dynamics

1. The Project

The story of the bridge project is closely linked with the small town of Tirschenreuth located in a forested rural region with a series of lakes and ponds. The specific occasion were urban restructuring measures including a State Horticultural Show with the title: "Nature at Tirschenreuth".

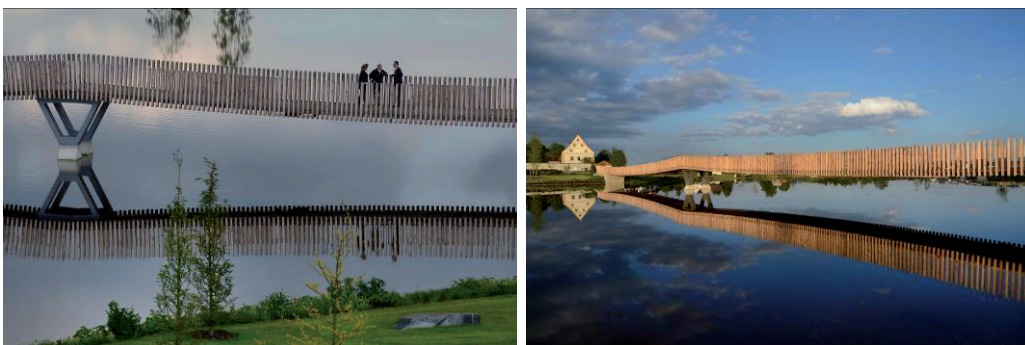


Fig. 1-2. A walkable sculptural structure

2. Conceptual design

Architects and engineers discussed two main aspects:

- the best location for the bridge
- a significant object representing "Nature at Tirschenreuth"



Fig. 3. Clear view on the water surface and surrounding landscape

It was therefore a straightforward decision to choose a natural structure made from untreated wood as a direct link across the new lake. The basic demands were:

- provide a "clear view" on the water surface and surrounding landscape. Hence, a minimum of supports in the lake and a light long-span structure were required
- on the other hand: a concise statement making wood visible and give people access to the haptical dimension of the material

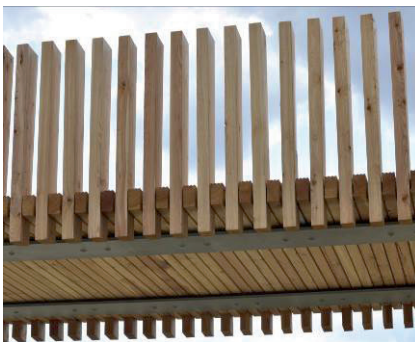


Fig. 4. High strength steel and wood: a unique shape

Now the challenge was how to reconcile these diverging positions?

Wood is not material of first choice for a long-span bridge above water. As wooden structures usually become quite massive following questions were to be answered:

- Can the primary supporting structure be of different material far better suited to a long-span-construction?
- Can the bridge deck consist of massive wood only, whereas the primary structure remains a kind of invisible?
- Can the bridge deck and the railing define an integrated and unique shape?

The answer was staring us in the face. In a critical debate the concept of a stress-ribbon as a minimized primary structure in combination with a wooden deck was developed. The unique form combined with high-tech materials makes the bridge a structural statement of the 21st century.

3. Detailed design and assembly

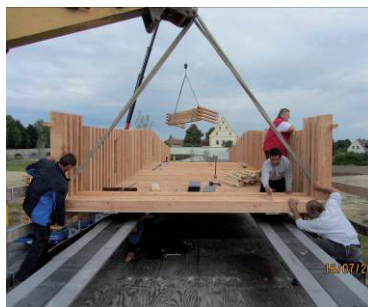
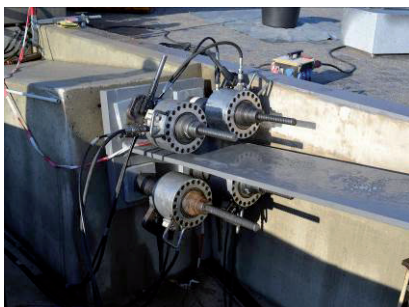


Fig. 5-7. Assembly of stress ribbon and wood structure

4. Dynamic excitability



Fig. 8-9. Dynamic absorber, mounted under the bridge

Already during the design phase a dynamic absorber has been developed serving following goals: adaptation to measurement results, minimized dimensions and subsequent mounting. Further enhancement of the dynamic absorber led to a hardly perceptible combination of leaf springs and oil dampers.