

Reconstruction and design of a timber membrane stadium roof

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Abstract

The timber membrane roof of a small soccer Stadium in the City of Boeblingen of south west Germany had to be renovated after a storm ripped off parts of the drastically aged Polyester PVC membrane from the 1970's. Following the wish of the client to maintain as much of the existing timber structure as possible the authors set off to study all original Architecture and Engineering documents to gain a profound understanding of the original structure. Comparing the original analytical calculations and load conditions with the results of a FEM analysis unveiled great insight into both the precision and limits of calculating membrane roofs by hand. Understanding the available load reserves in the calculated structure as well as data about the varying timber conditions on site formed the starting point for a re-design of the roof.

This Paper will present the analysis and comparing calculation results to give insight into the developments of membrane engineering over the last 40 Years. The design and formfinding process will be discussed to show how ridge cables were used to guide the forces towards parts of the structure where the highest load reserves were detected.



Fig 1: Original roof of the Dagersheim Stadium and its re-design