WIMBLEDON NO.1 COURT RETRACTABLE ROOF

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Abstract

Following the successful design of the retractable roof on Center court in 2009, the All England Club confirmed its intention to build a retractable roof over No.1 Court.

No. 1 court retractable roof is a lightweight structure, supported on flexible steel trusses, with primary fabric fields of PTFE interfacing with the moving trusses.

Having worked on the Center Court roof, Tensys Consultants provided continuity in the design process involving a new design team. This insured the philosophy of the original design remained, particularly with regard to the complex modelling of the deployment process.

The design, analysis and patterning of the retractable roof on Wimbledon No.1 court involved a number of challenges and alterations from the Centre Court roof installed in 2009. Similar in design to Centre Court, there are a number of geometrical differences in the bowl structures. Most noticeable is the larger opening on No. 1 court which results in a greater extent of moving roof. Although located at the same location, the geometric differences required a new set of wind and snow loads, with RWDI providing a specific wind tunnel report and loading document.

As the roof deploys the fabric fields generate varying load conditions on the trusses. It was found that form finding the roof in its deployed position and retracting over a number of analysis cycles into its parked position resulted in extremes of fabric prestress. For this reason the deployment process was reversed such that the form found state was that of the parked position. This provided a long term state that would be much more satisfactory in terms of potential creep for both fabric and belts.

Lessons learnt from Centre court provided valuable design changes to No. 1 court related to detailing, elements that were required to be incorporated into the updated numerical models. Additional models were analysed to improve the performance of local details, most notably evolving the design of drainage outlets from Centre Court.

Furthermore, the patterning process was altered due to the fabric contractor requiring modifications to the applied compensations/decompensations. The supplied cutting patterns also contained additional information to aid with fabrication.

This paper looks at the lessons learnt, and improvements made from Centre Court, along with the processes involved in dispensing relevant information to the designers and installation team to ensure a successful project completion.