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EDITORIAL

# Glass performance, from design, simulation and lab to construction site and beyond

**Jan Belis · Christian Louter · Jens Schneider · Mauro Overend · Jens H. Nielsen**



Heading towards the end of 2023 and with our recently obtained impact factor shining, Glass Structures & Engineering is planning to expand its Editorial Board further in 2024. We are starting this process with Prof. Yutaka Misawa from Hokkai-Gakuen University in Japan, who we warmly welcome as new Editorial Board Member of the journal.

Glass performance is key to meet high expectations and requirements demanded of high-end applications, such as advanced building envelopes or superyacht glazing. Often, such demanding glass performance owes its existence to scientific research, which in small or big steps enables innovations and technological improvements. In turn, the latter may later on lead to breakthroughs in real-world projects. In this issue, we present a fine blend of both scientific research and state-of-the-art masterpieces of glass construction.

The first set of three papers are research papers.

- The first paper presents new findings on the quantification of linear visco-elastic behaviour of multilayer polymer interlayers for laminated glass. The proposed method is applied to acoustic PVB but is also more generally valid for characterising polymer materials other than PVB.
- In the second paper, the strength of patterned glass with four different pattern geometries is investigated to assess the effect of the pattern on the strength. The paper demonstrates that the current design standards fail to account for the variability in performance of commercially available patterned glass.
- The third research paper discloses the results of a mechanical analysis of vacuum insulated glazing (VIG) subjected to wind load. The behaviour of the VIG's is compared to that of monolithic panels with equivalent thickness and compliance with standard requirements for wind load and glass design is evaluated.

The second set of papers contains three papers on recently built glass projects, namely the Lusail Plaza Towers in Qatar, the l'Oréal headquarters in Paris, and the kinetic glasshouse in Woolbeding Gardens, England, respectively.

- The paper on the Lusail project covers key innovations with respect to the design, fabrication and installation of 23,000 individually unique cold bended façade panels. In particular, the use of three-dimensional frames and the reverse-engineering process based on machine learning (ML) are of interest.

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- Subsequently, the manuscript on the l'Oréal headquarters focuses on the design and construction of a doubly curved innovative lamella type meshed glass/steel façade of the tower building. Key aspects here are the tight tolerances and the rotational stiffness of the connections, which are designed using finite element analysis assisted by testing.
- In the paper on the Woolbeding kinetic glasshouse, which is the third project presented in this issue, the authors present a glass/steel transformable structure which can open and close by means of ten hydraulic cylinders. The manuscript reveals details on the mechanics, the weathertightness, and the structural design and verification.

Finally, the last paper in this issue leads us to a shipyard rather than a construction site, as it presents advances in the application of structural glass in the design of a superyacht. Particular challenges here include the dynamic loading and accelerations on the glass, as well as the sub-modelling needed to account for global deformations of the ship's hull and superstructure.

Enjoy reading!