

Beyond Bending – Learning from the past to design better

This lecture will present new computational form-finding and optimization approaches for exploring three-dimensional equilibrium shell structures based on the stability analysis of Gothic masonry vaults. Thanks to intuitive graphical methods, the designer gains control over the exploration of form, which allows designing vaults with little or low-quality material or designing efficient and expressive surface structures.

Several projects will demonstrate the power of these innovative methods for the safety assessment of historic masonry vaults with complex geometries and for the design, engineering and fabrication of novel masonry shells, which range from sustainable construction solutions for developing countries to unique, unreinforced vaults in tile or cut stone.

The last part of the lecture will demonstrate how we can learn from the Master Builders to design better – well beyond masonry.

Philippe Block is Associate Professor at the Institute of Technology in Architecture at ETH Zurich, where he directs the Block Research Group (BRG) together with Dr. Tom Van Mele. The BRG focuses on equilibrium analysis, computational form finding, optimisation and fabrication of curved surface structures, specialising in unreinforced masonry vaults and thin concrete shells. Within the Swiss National Centre of Competence in Research (NCCR) - Digital Fabrication, the BRG develops innovative structural design strategies using bespoke prefabrication. Block studied architecture and structural engineering at the VUB, Belgium, and MIT, where he earned his PhD in 2009. With the BRG and as partner of Ochsendorf DeJong & Block (ODB Engineering), he applies his research into practice on the structural assessment of historic monuments and the design and engineering of novel compression structures. He has won numerous awards for his research, has lectured at top universities and leading engineering and architecture offices worldwide, and is regularly invited as an expert consultant.