**SECTOR:**
**CONSTRUCTION**

**OFFERINGS:**
**ENGINEERING SIMULATION SERVICES**

**TECHNOLOGY:**
**FLUID DYNAMICS**

# WIND LOADS ANALYSIS OVER FABRIC ROOF SHADES OF A COMMERCIAL BUILDING

Our customer is an International firm involved in the production and installation of state-of-the art roofing system built from advanced fabrics. The customer is required to install roof shade structure on a super-size commercial mall. Being a roof installation, the supporting structure for shade should be light weight while being able to sustain extreme wind loads. Hence, for optimal design it was essential to have a precise estimation of wind load distribution on the fabric shade. Presence of parapet and other building features on the roof create local flow accelerations and blockages. Therefore, it was felt that CFD analysis over multiple wind directions is the only method to get accurate wind loads.

Zeus Numerix performed CFD analysis to estimate wind load analysis over the roof surface. Pressure loads generated on account of wind are estimated for various structures of the shade like cushions, fabrics, glazing and claddings. Five possible wind directions were simulated to find the worst-case scenario. As the presence of the building can greatly influence the flow reaching the shade, the outer profile of the building is also considered in the CFD simulations. The wind speed at the roof height is obtained using logarithmic velocity profile.

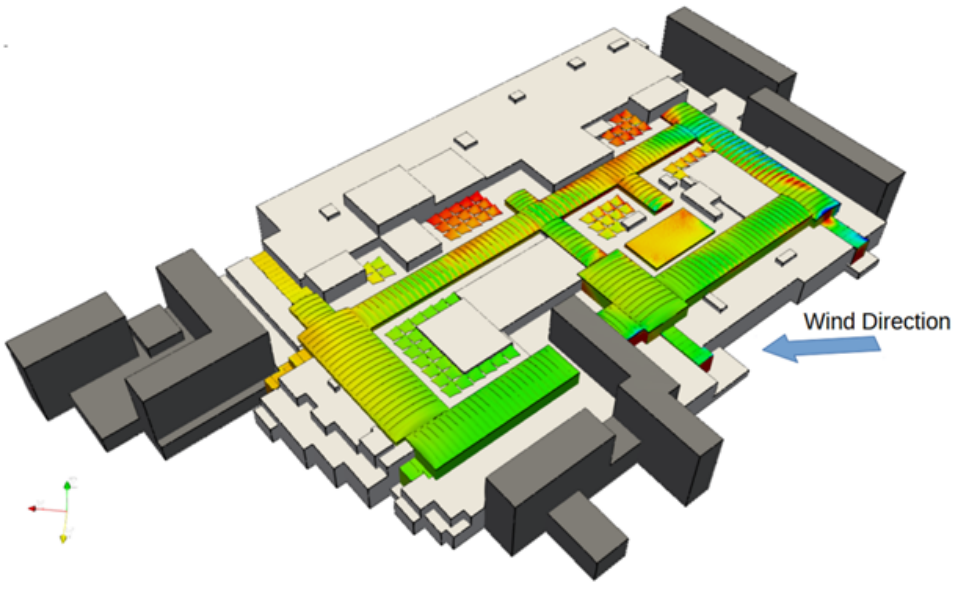


Figure 1: Wind Load Distribution on Roof Shades

The customer was provided the consolidated report containing pressure differential values as obtained on the cushion, fabric, glazing, and cladding surfaces. Plots of Path-lines and quantitative pressure map of


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the roof surfaces for all five wind directions were delivered to the customer that helped in the design of support structure.