DESIGNING THE WIND

WIND ENVIRONMENT SIMULATION

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MANAGING THE WIND

WIND IS A DETERMINING FACTOR IN THE OUTDOOR ENVIRONMENT. RAMBOLL RISK AND SAFETY IS A KEY PLAYER IN ESTIMATING THE WIND CHALLENGES IN A GIVEN SITUATION.

The amount of sunlight and rainfall are not the only factors determining how we spend our time outdoors. Wind is another essential component in our overall perception of the weather and our level of comfort.

Buildings create solid obstructions for the wind to pass over or around, resulting in highly complex flow patters often with localized zones of high wind current or no wind current. Both of which can lead to an unpleasant wind environment and even potentially hazardous situations for pedestrians.

Variations in building heights, openings onto squares or harbor front and the street layout all affect the local wind environment experienced by pedestrians and cyclists at street level. Unfortunate layouts can even lead to dangerous situations. When planning new tall buildings or urban areas it is therefore essential to consider the resulting effects on wind currents.

Getting the complete picture of windyness

With Computational Fluid Dynamics (CFD) is a well established method for investigating local wind environments. It is possible to create very detailed models of 1:1 scale of large urban areas by creating a virtual wind tunnel in the computer software. Combining simulation results with regional wind data of yearly wind directions and wind speeds gives a complete picture of the "windyness" over at any given point in the analyzed area.

Such information is invaluable for architects, master planners and design engineers in the positioning of access ways into building and planning of the utilization of the outdoor areas. With the very high level of output information, the relative fast turnaround times and visual representation of results, CFD analyses are ideal for an optimization process of the building configuration.

The additional possibility of expanding the simulations to include other parameters such as thermal comfort and air quality means that CFD simulations can give a complete picture of the outdoor climate.

Referencer

- King Abdullah Financial District (Saudi Arabia),
- Wind environment and air ventilation assessment DNU (DK),
- Wind environment analysis, Nordhavn urban development (DK),
- Wind environment optimization KUA (DK),
- Wind environment analysis, Reykjavik opera house, wind environment analysis

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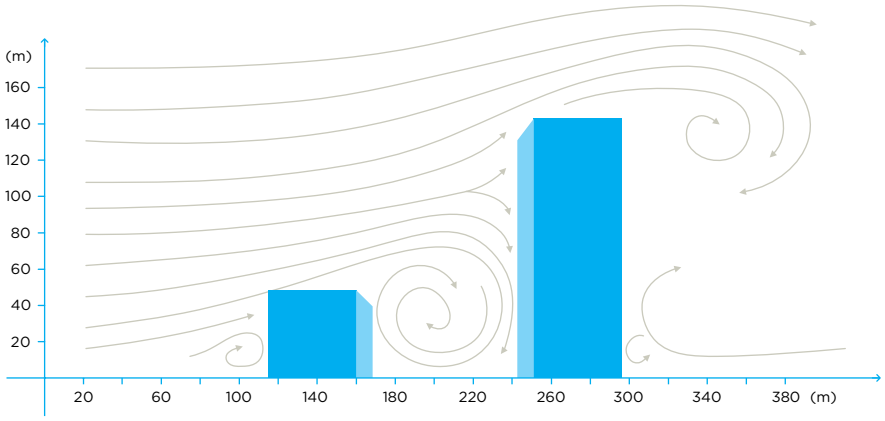
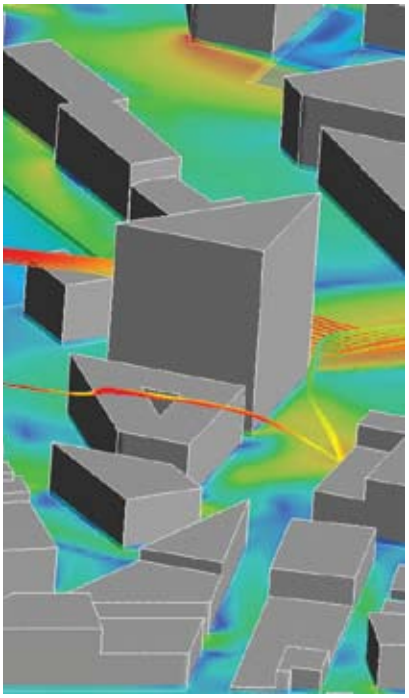
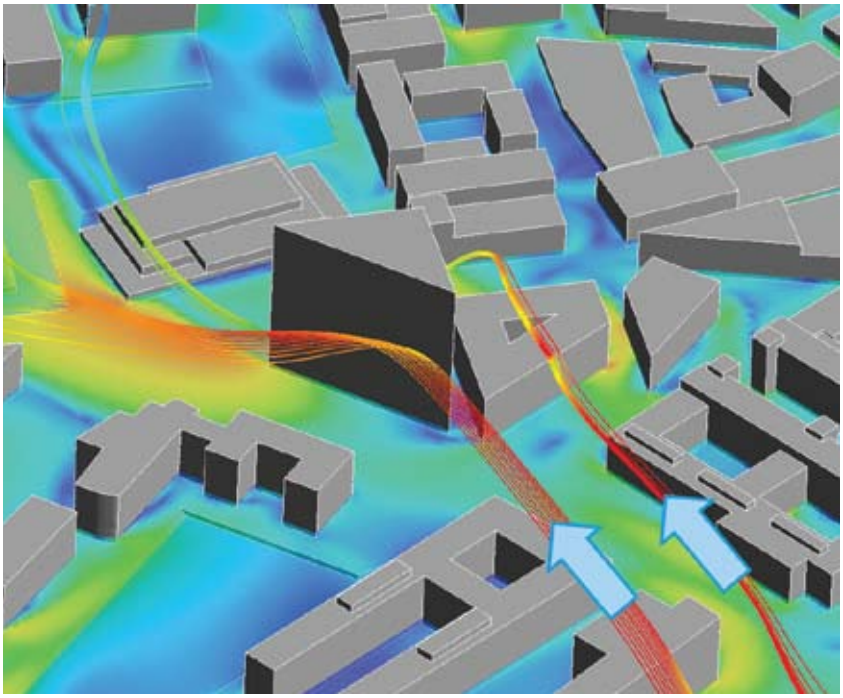


The principal flow patterns in two dimensions when wind passes over buildings of different heights. When more buildings are involved, as in normal urban areas, it becomes impossible to accurately predict the flow without experiments or numerical simulations.





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WHO WE ARE

The department of Risk & Safety in Ramboll has a dedicated CFD group with many years of experience within a wide range of industrial application as well as with the performance of outdoor climate wind environment studies in built up areas.

The Ramboll Group employs 9.000 ambitious experts. We are a leading knowledge-based company operating in a broad international context from close to 200 offices around the world. We provide engineering, consultancy, project development and operating services within the areas of Buildings & Design, Infrastructure and Trandsport, Energy & Climate, Environment & Nature, Industry & Oil/Gas, IT & Telecom, Management & Society.

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