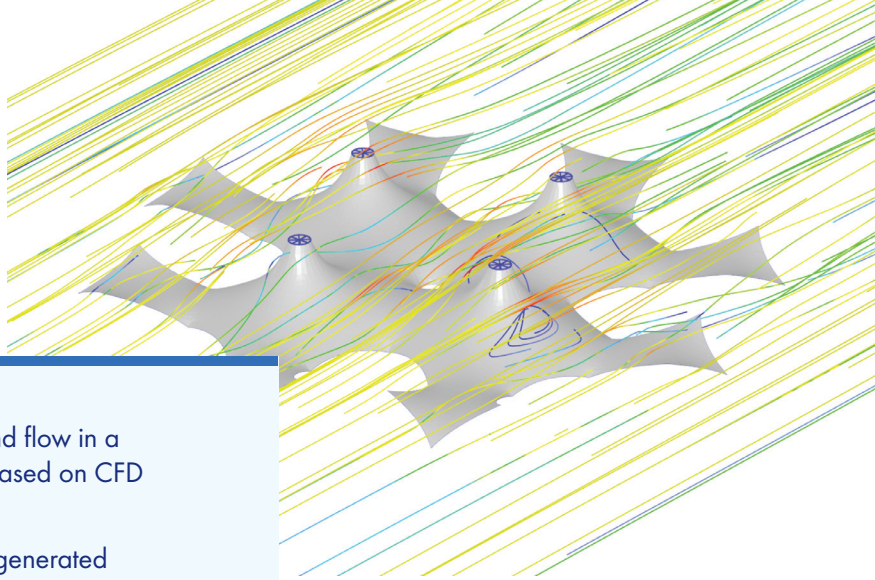
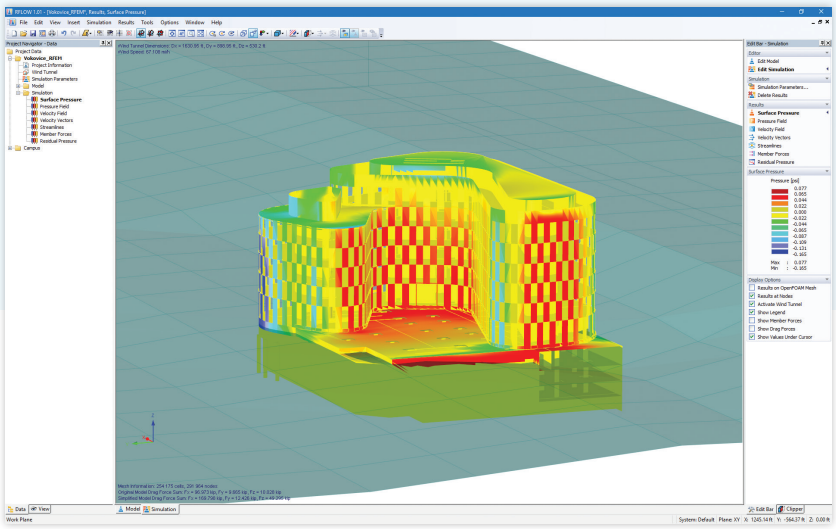
CFD Wind Load Generation for All Structure Types



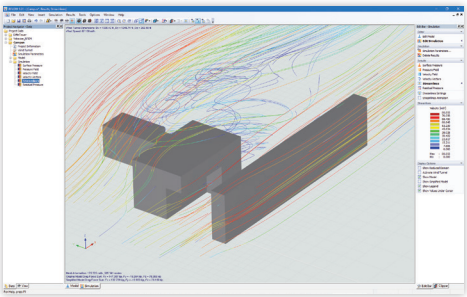
RWIND Simulation is a stand-alone program to analyze wind flow in a numerical wind tunnel around buildings or other structures based on CFD simulation (Computational Fluid Dynamics).

Simulate wind flow on simple or complex structures. Import generated wind loads directly to RFEM or RSTAB.



Consider Terrain Conditions in RWIND Simulation | © www.sta-con.cz

RWIND Simulation



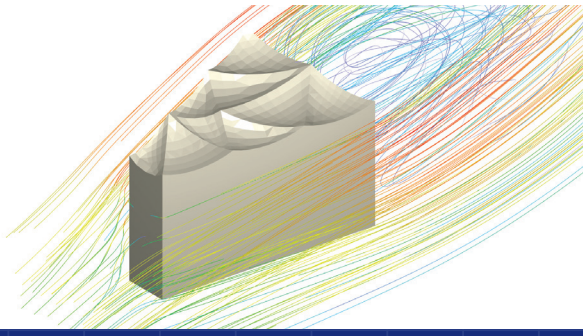
Wind Simulation Considering Adjacent Buildings

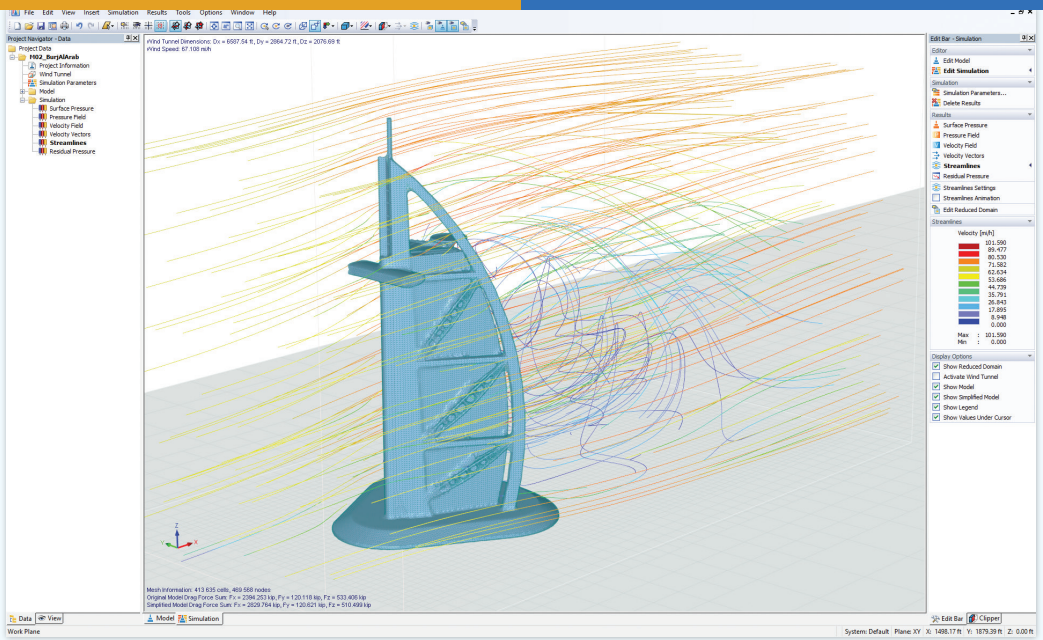
Features

- 3D incompressible wind flow analysis with OpenFOAM® software package
- Direct model import from RFEM and RSTAB or STL files
- Easy model modification with drag and drop and graphical manipulators
- Automatic model topology corrections with shrink-wrap mesh
- Consider surrounding objects (adjacent buildings or terrain)
- Elevation-dependent wind velocity profiles according to ASCE 7 and International standards
- K-epsilon and K-omega turbulence models
- Automatic model meshing according to selected level of detail
- Parallel calculation fully utilizing multicore PC performance
- Results in a few minutes for low resolution simulations (up to 1 million cells)
- Results in a few hours for medium/high resolution simulations (1-10 million cells)
- Graphically display results with clipper/slicer planes (scalar and vector fields)
- Graphically display results with streamlines

Input

- RFEM/RSTAB model (i.e. members, surfaces, and solids) direct export into RWIND Simulation
- Analyze wind cases from multiple angular directions
- Separate load cases for each wind angle
- Calculation settings include fluid parameters, turbulence model properties, and iteration parameters
- Manual or code-generated elevation-dependent wind profile
- Calculated directly from the RFEM interface or in RWIND Simulation
- Consider adjacent structure and terrain models





Velocity Streamlines in RWIND Simulations

Calculation

RWIND Simulation analyzes wind flow in a numerical wind tunnel around buildings or other structures based on CFD simulation (Computational Fluid Dynamics). Individual wind load cases are generated for the RFEM or RSTAB structural analysis and design.

RWIND Simulation generates out an automatic 3D meshing around the model based on user-defined meshing criteria. Wind flow and surface pressures are calculated with a numerical solver for incompressible turbulent flow. RWIND Simulation is programmed to work with several numerical solvers.

The OpenFOAM® software package is the currently recommended solver which has provided reliable results according to validation tests and is a frequently used tool for CFD simulations. Alternative numerical solvers are in development.

Output

Transfer calculated wind loads from RWIND Simulation to RFEM or RSTAB.

- Export calculated wind loads as member and surface loads to RFEM/RSTAB
- Individual load cases generated for each wind direction
- Combine RWIND Simulation load cases in load and result combinations

Additional RWIND Simulation CFD results available directly in the program.

- Surface pressure on structure
- Pressure field around structure
- Velocity field around structure
- Velocity vectors around structure
- Streamlines around structure
- Forces on members
- Calculation convergence diagram
- Structure flow resistance magnitude and direction
- Evaluate RWIND Simulation results graphically
- Freely adjustable “CFD solid results” planes available
- Activate 3D streamline results animation
- Export streamline results as picture or video files

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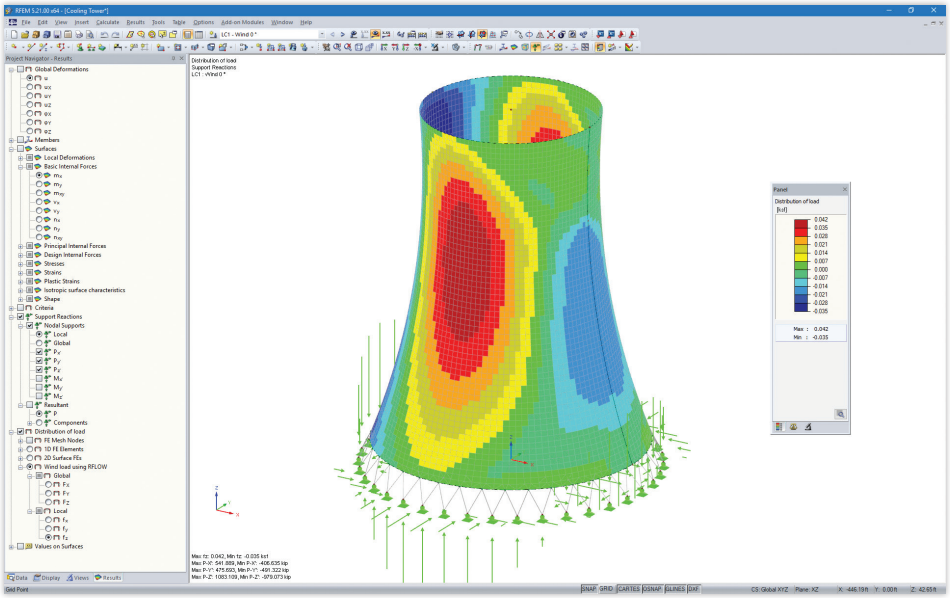

Wind Load Distribution in RFEM