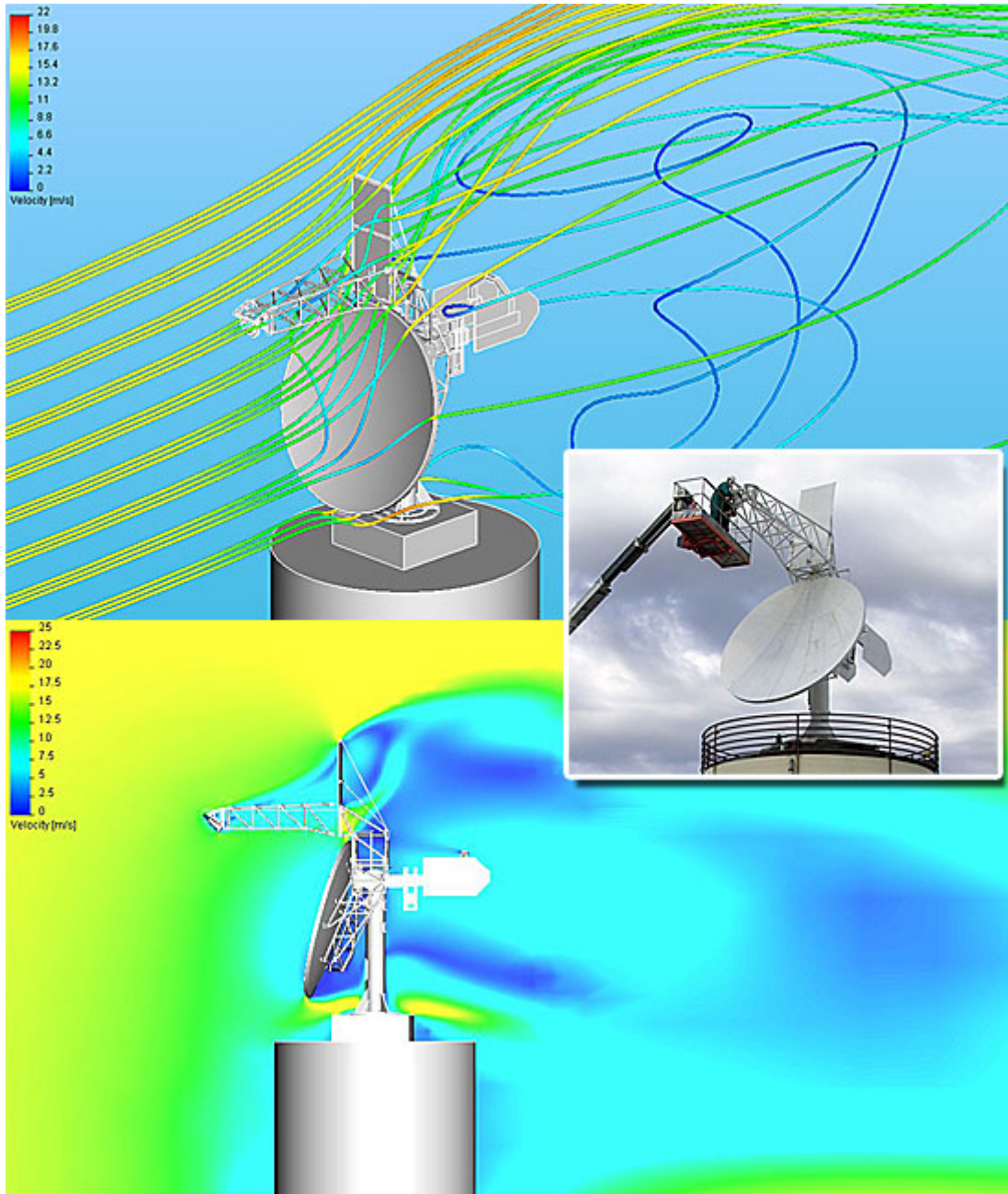


## C&C Analyze Wind Loading on RADAR Installations with FloEFD<sup>Pro</sup>



CAE & Cooling Systems (C&C) of Rome, Italy, was founded in 2007 as a mechanical and aeronautical engineering services company, with good experience in electronics cooling gained by utilizing CFD simulation software from the Mechanical Analysis Division of Mentor Graphics (formerly Flomerics). The small company employs 5 engineers and offers technical consultancy services to a number of Italian Defense and Research companies.

On behalf of CNR ISAC (National Centre for Research) C&C srl performed studies on a servo/antenna, part of a meteorological radar system. The Polar 55C is a polarimetric C-band

Doppler radar system used for research purposes. The study of this system is a preparatory analysis to the subsequent feasibility study for the technical modernization of the whole system.

This study required the development of a 3D CAD model to represent the geometry, the masses, and the inertia of the pre-existing antenna system. On the basis of this CAD model, one CFD and one FEM model were computed; the first was to analyze and calculate the loads acting on the antenna due to the wind action, while the FEM model was used to verify the strength for both the main elements of the structure and the kinematic mechanisms under the effects of aerodynamic, inertial and mechanical loads. It should be noted that the most relevant external loading is the aerodynamic wind load. This load, in fact, acts mostly on the parabolic reflector that is not adequately counterbalanced by the drag plates.

The CFD model has been computed using FloEFD<sup>Pro</sup>. In order to reduce the size of the computational domain, the software allows the insertion of a velocity for the bottom plane of the domain with the same value of the wind velocity: this boundary condition allows the effect of the real distance between antenna and ground to be simulated without the need to simulate the whole structure. Thanks to ease of use of the software and its capability to manage extremely complex geometries without substantial convergence problems, the antenna has been analyzed in several different configurations, with wind velocities averaging 60 km/h from different directions. For each configuration the reactions (torque and force) acting on the kinematic mechanisms of azimuth and elevation have been computed. The ease of use and speed of the software has impressed all our team.

FloEFD<sup>Pro</sup>, thanks to its tight integration with PTC Pro/Engineer, allowed us to evaluate the effects of possible counterbalancing solutions of the elevation axis loads in order to increase the stability and the accuracy of the system when subject to wind gusts.

C&C s.r.l.

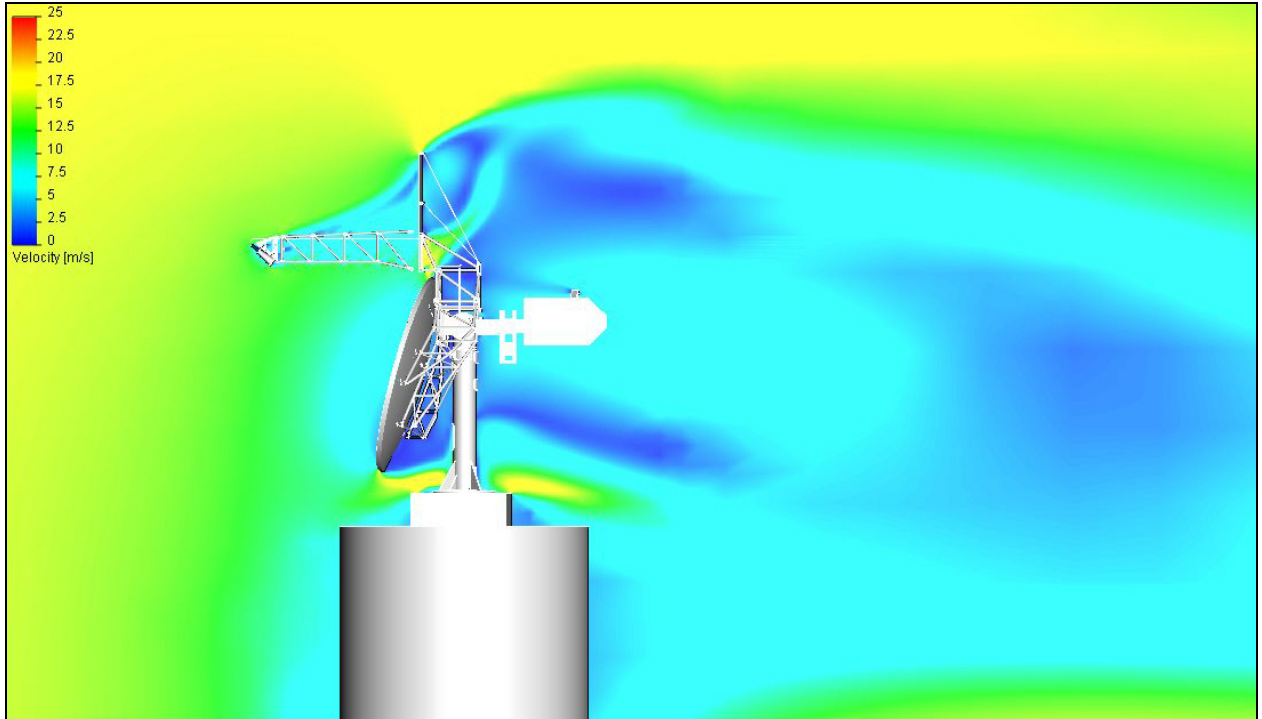
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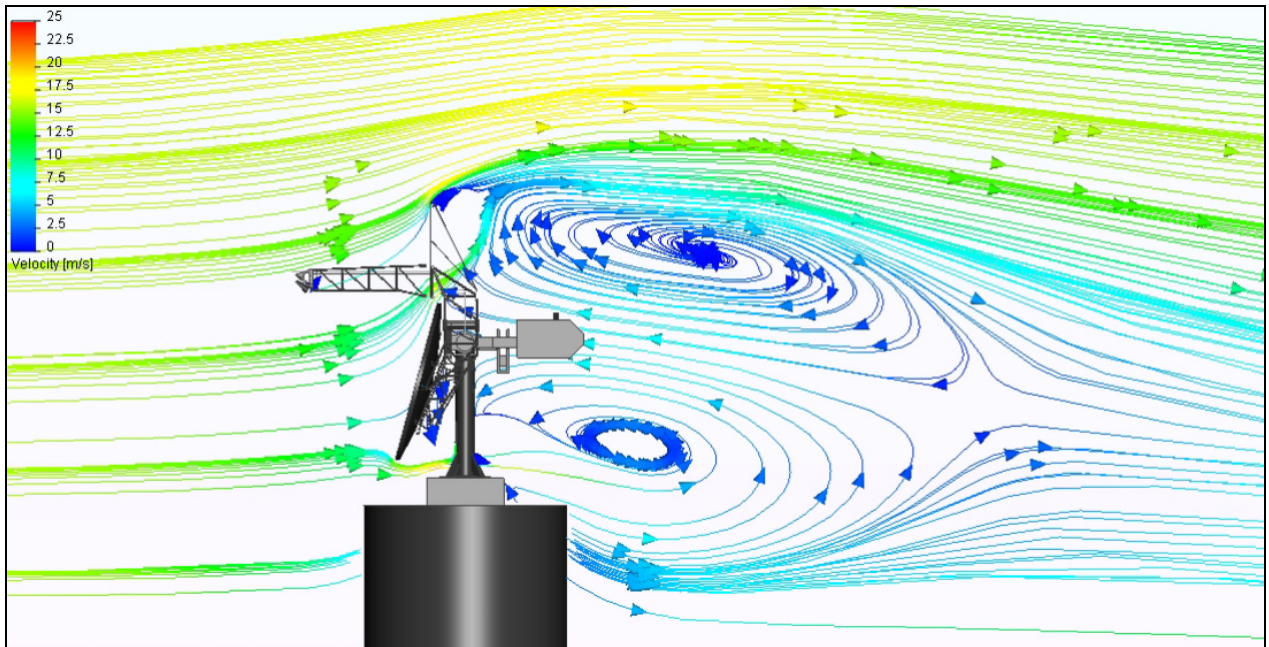
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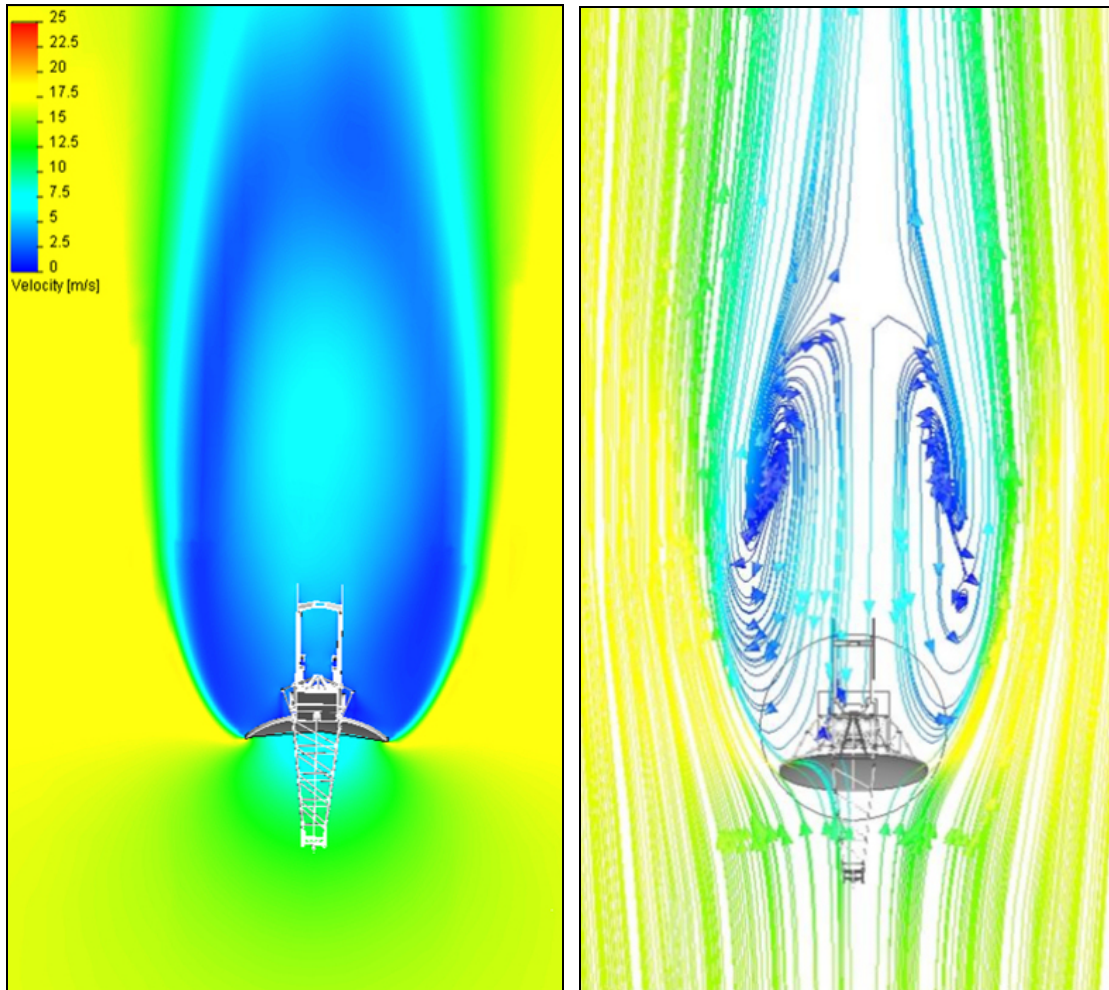
Email: [info@cae-and-cooling.it](mailto:info@cae-and-cooling.it)



Velocity map - vertical plane



Stream lines - vertical plane



Velocity map and stream lines – horizontal plane