

Scissor Lift Wind Load Analysis

Analysis Type:

CFD, Steady State, Incompressible Flow

Discipline:

CFD, CFdesign, AutoDesk Simulation CFD, Computational Fluid Dynamics, Fluid Mechanics, ASCE Wind Load Analysis, ASCE 7-02, Stability Analysis, Tipping Analysis, US Air Force



Project Overview

A scissor lift with sensitive electronics equipment needed to be analyzed to determine the wind conditions it could withstand. The model was built with client supplied CAD geometry (see Figure 1).

The tipping force was calculated at varying extension heights. The computational fluid dynamics (CFD) analysis was run to determine the force on the structure at varying wind speeds. These forces were verified against wind load calculations from ASCE 7-02, Minimum Design Loads for Building and Other Structures. A typical calculation table can be seen below in Table 1.

Typical CFD results can be seen in the figures below. Air flow traces and static pressure can be seen in Figure 2 and a typical velocity magnitude plot can be seen in Figure 3. The CFD study allowed the client to give a wind rating with high confidence. It additionally saved the client thousands of dollars since they did not need to do physical wind tunnel testing.

Wind Speed	Velocity Pressure	Total Load
25	1.85	382
30	2.66	550
35	3.62	748
40	4.72	978
45	5.98	1,237
50	7.38	1,528
55	8.93	1,848
60	10.63	2,200
65	12.48	2,582
70	14.47	2,994
75	16.61	3,437
80	18.90	3,911
85	21.33	4,415
90	23.92	4,949
95	26.65	5,514
100	29.53	6,110

Table 1: Total calculated wind load as a function of the wind speed.

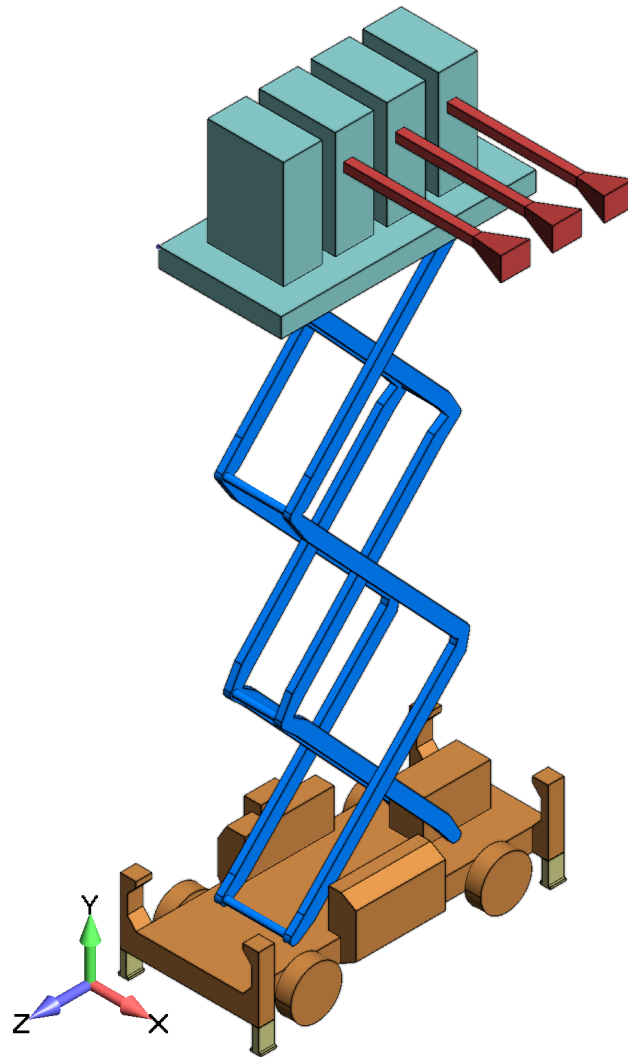


Figure 1: The simplified geometry based on supplied CAD models.

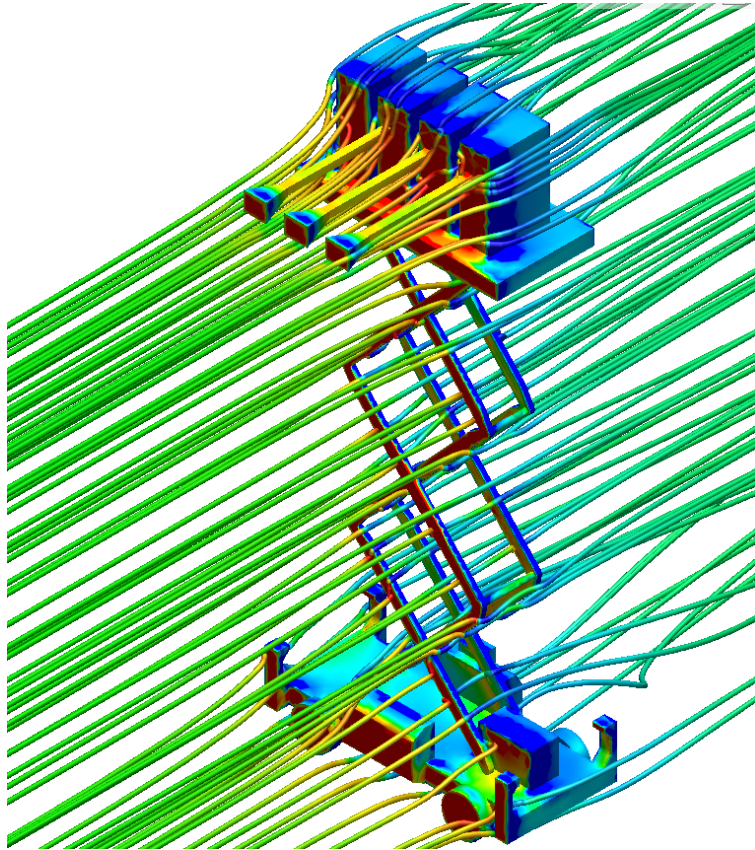


Figure 2: Air flow particle traces and static pressure contour.

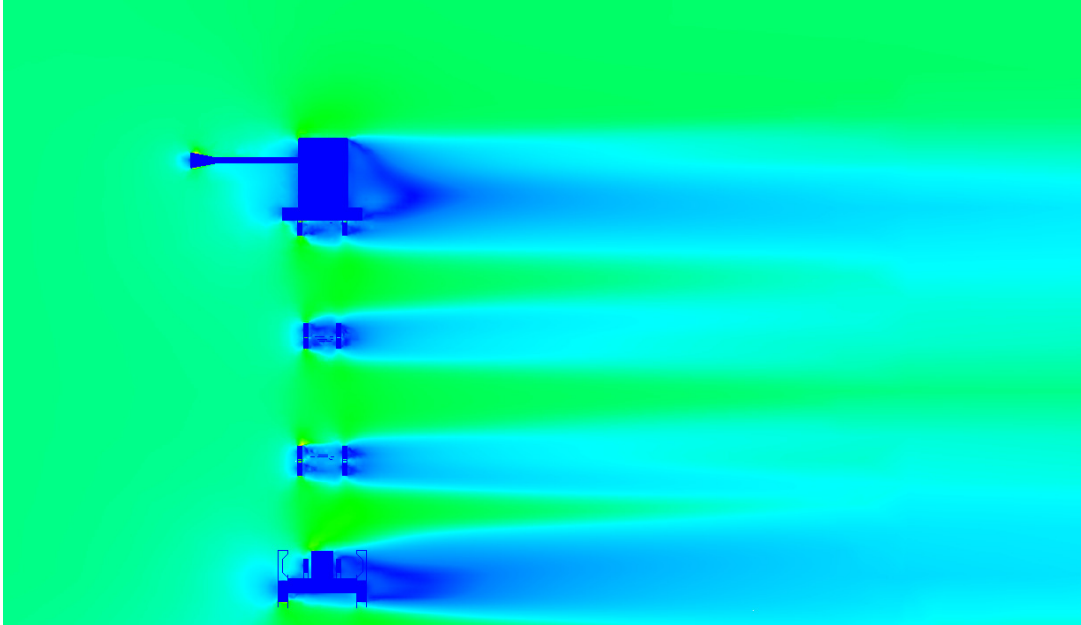


Figure 3: Air velocity contour plot.

Contact



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