SC/Tetra

Cradle
MSC Software Company

Wind Resistance on a Sea Carrier Transporting Wood Chips

Case Study for Sanoyas Holdings Corporation

SC/Tetra is used to evaluate the wind resistance on a sea carrier transporting wood chips and predict effects caused by fitting-out equipment on the deck

Reducing Wind Resistance on Chip Carriers

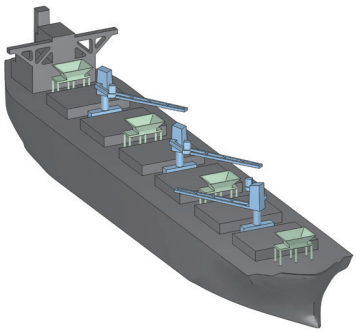
One of the problems that sea carriers loaded with lightweight wood chip face is slow vessel speed during stormy weather.

The wind pressure acting on the carriers is known to be strongly affected by the fitting-out equipment on the deck. The shape and appropriate allocation layout of the equipment are critical for minimizing the wind resistance.

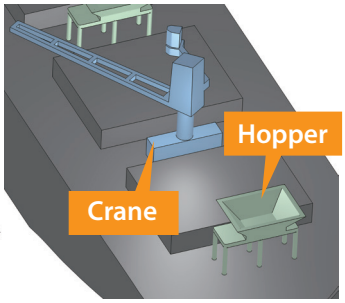
In this case study, CFD was used to calculate the wind pressure resistance acting on a wood chip sea carrier. Evaluations included analyzing the wind resistance due to changes in wind direction, and analyzing how the wind resistance changes with and without fitting-out equipment.

Model of wood chip sea carrier

Entire model

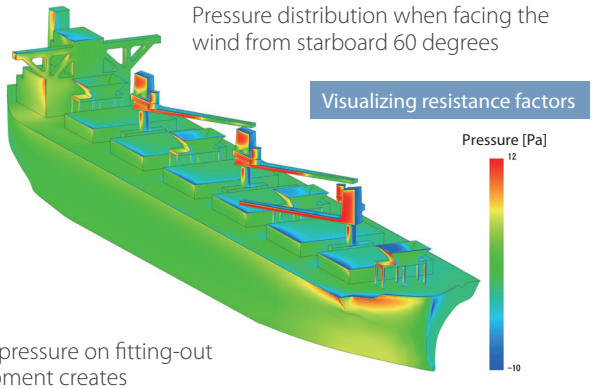


Fitting-out equipment



Surface pressure distribution

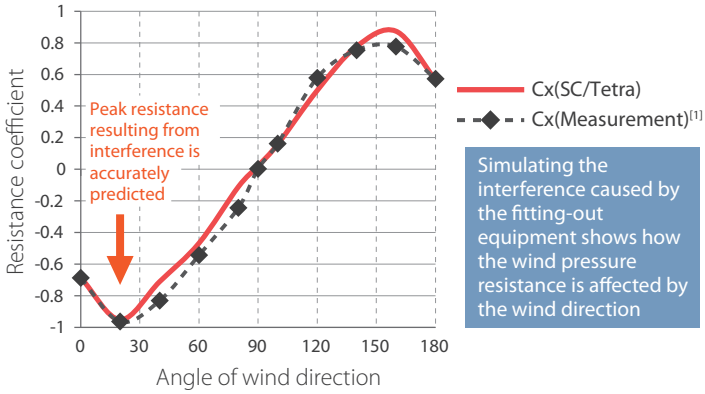
Pressure distribution when facing the wind from starboard 60 degrees



High pressure on fitting-out equipment creates substantial wind resistance

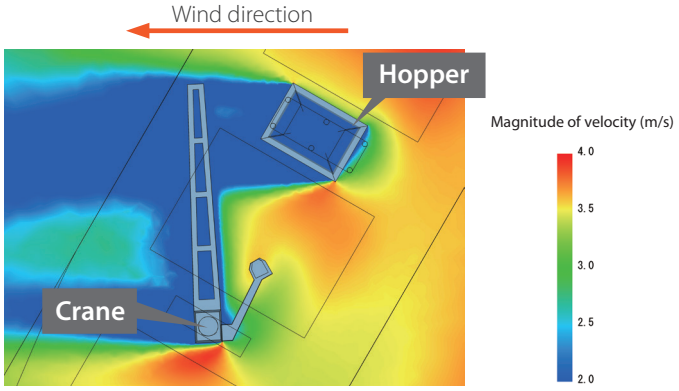
Comparison between analysis results and measurement

Wind pressure resistance affected by changes in wind direction angle



Simulating the interference caused by the fitting-out equipment shows how the wind pressure resistance is affected by the wind direction

Interference between fitting-out equipment

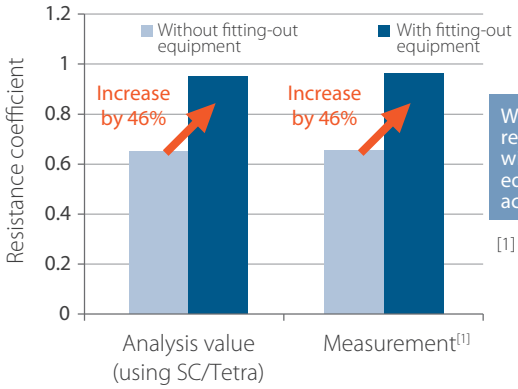


Wind resistance is reduced by locating the end of the crane downstream of the hopper, where the wind velocity is lower.

Changes in wind pressure resistance

With and without fitting-out equipment

(* wind resistance when wind direction angle is 20 degrees)



Wind pressure resistance with and without fitting-out equipment are accurately predicted

[1] Mizutani, Akiyama, Akiyama, He, and Ikeda. 2014. Conference book of the Japan Society of Naval Architects and Ocean Engineers. 18th issue: pp.421-424

Customer Comments

Wind resistance on wood chip sea carriers was analyzed using SC/Tetra. Analysis results agreed extremely well with model test results. CFD can be used to accurately calculate wind pressure resistance and validate the optimal layout and shape of the fitting-out equipment. This will reduce the time and cost of developing more fuel-efficient chip carriers.