

Wind comfort studies



Queen Mary 2, for which extensive wind comfort studies were performed

Open recreational areas on cruise vessels, ferries and yachts are often subjected to strong wind. Partly due to the harsh marine environment that vessels often operate in and partly due to the wind that the ships' forward motion creates. These factors typically reduce passenger comfort and are thus essential to take into account in the design stage of the vessel.

Issues

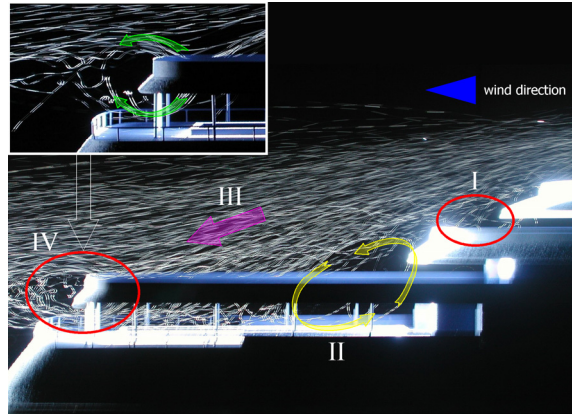
Our customers face a major challenge in optimizing passenger comfort on open recreational areas. For example, passengers expect to sit or stroll on the decks during the cruise without experiencing discomfort of strong gust winds. To assure that the comfort criterias are met, it is essential to produce reliable data on the implications that the local gust winds will have on the actual design of the recreational areas.

We help you with your challenges

FORCE Technology has performed wind comfort studies on most types of passenger vessels – ferries, yachts, cruise vessels, just to mention a few. As such our professional staff of naval architects can help you with almost any challenge that you may have in regards to optimizing passenger comfort.



The model of Queen Mary 2 in the wind tunnel



Wake flow pattern of a cruise vessel visualised with helium bubbles

Benefits

The benefits of our analyses are noteworthy and allow optimal design-decisions to be made. For example we can analyse different design options so you can decide on the most effective design with regard to comfort and costs.

If the wind comfort studies are performed in an early design stage sheltering elements like windscreens can be implemented in the design of the vessel, leaving the exterior design more homogeneous.

Test facilities and technical issues

The windtunnel test programme is determined in close collaboration with the customer, whom we also recommend to be present during the tests.

The tests are performed in one of our three wind tunnels. The model of the vessel used for the tests typically has a length of 1.5 – 2.0 m.

The model is exposed to a wind profile, which resembles an ocean wind with regards to velocity distribution as well as turbulence intensity.

Tests and analyses

The wind comfort is governed by two major factors:

- The mean wind speed
- The turbulence intensity or gustiness of the wind.

The wind test programme normally includes a visualization technique and a quantitative technique. The purpose of the visualization technique is to understand the wind gustiness locally and to identify the potential problem areas. The purpose of the quantitative technique is to put values on the local wind speeds.

An effective way to determine gust wind speeds over a large area, is to perform erosion tests. By distributing an erosive material into the area of interest and by gradually increasing the windtunnel speed, isoclines of the speed-up ratios are achieved. By using the quantitative hot-wire anemometry at selected points of interest (based on the erosion tests) the local flow vectors are determined.

Helium-filled soap bubbles of neutral buoyancy are used to visualize local flow properties and detect unsuitable construction details. Based on the traces of the photographed bubbles the streamlines can be visualized and areas of stagnation, separation and reattachment can be detected.



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Subject to changes without notice