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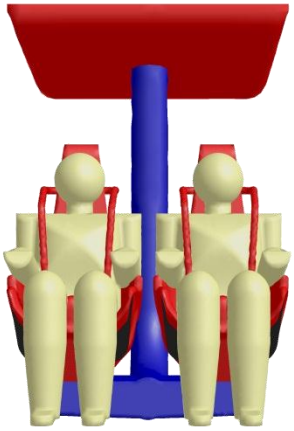
Huisman-Itrec/Vekoma
www.vekoma.nl

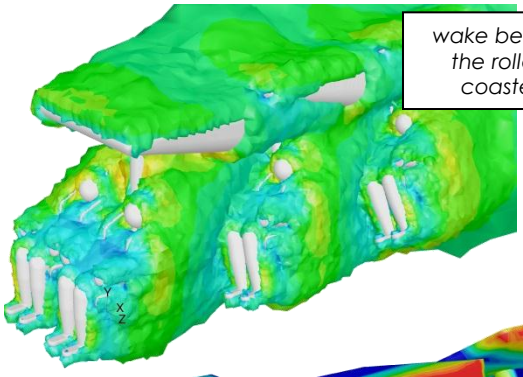
Looping in computers

Vekoma Rides Manufacturing B.V. is a market leader in the global amusement industry in the design and manufacture of family coasters, thrill coasters, and family attractions. Boasting a wide product range, Vekoma is responsible for such all-time favourites as the Boomerang, the Invertigo, the Suspended Looping Coaster, and the Junior Coaster. Vekoma's latest developments, the LSM coaster, the Flying Dutchman, the Giant Inverted Boomerang, the Suspended Family Coaster, and the Tilt Coaster, are driving the roller coaster industry of the future by setting new standards for quality and innovation.



A roller coaster is essentially a gravity-powered train. When the train is pulled up the first hill, gravitational potential energy is transferred to the train. Once the train begins to descend, the gravitational potential energy gets transferred to kinetic energy, the energy of motion. During the ride, there is a continuous conversion of energy back and forth between the two forms, but gradually energy is lost to friction and air resistance, and the latter can affect the speed and length of the ride. As modern roller coasters become faster and the rides longer, the structures increase in size. Because wind conditions are often more severe at greater heights, wind loading is particularly noticeable on taller roller coasters. To account for high speeds and wind loading, aerodynamics must be an essential part in the design of a modern roller coaster.

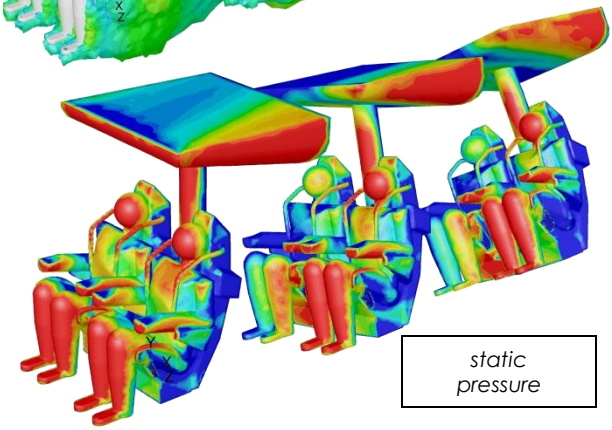
Vekoma has sought the assistance of FlowMotion for the optimization of their High Speed Suspended Looping Coaster Train. Using Computational Fluid Dynamics (CFD) the airflow around the carriages including occupants was simulated for several wind speeds and directions.



wake behind the roller-coaster

The CFD simulations indicated that the size and shape of the wake behind the leading carriage is critical for the overall aerodynamic drag of the train. While extensive streamlining of the first carriage may reduce its wake, it can also lead to more exposure of the second carriage to the undisturbed wind, resulting in a higher overall drag.

Also, in high speed twisting parts of the track, the drag is increased considerably when the individual two-seat carriages fan out and more frontal area of the train is exposed to the wind. Based on the CFD results, a redesign of the seat shape was done that balanced the operating requirements and resulted in a significant performance improvement.



static pressure

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