CASE STUDY

COMFORT MEETS SAFETY

CFD SOLUTIONS TRANSFORM DEVELOPMENT, REDUCING COSTLY EXPERIMENTAL TESTS

About the Customer

The Doppelmayr Group is an international manufacturer of ropeways and innovative transportation systems for ski areas, urban transport, amusement parks, and material handling systems. Today, more than 3,300 employees in 50 countries around the world plan, develop, design, manufacture, build and support innovative projects, including high-performance ropeways for passenger and material transport, efficient intralogistics systems, and creative experience concepts. From ropeway pioneer to world market leader, the company's history is characterized by its visionary spirit, courage, and experience. To realize product innovation, Doppelmayr deploys Altair's state-of-the-art-solutions.

Their Challenge

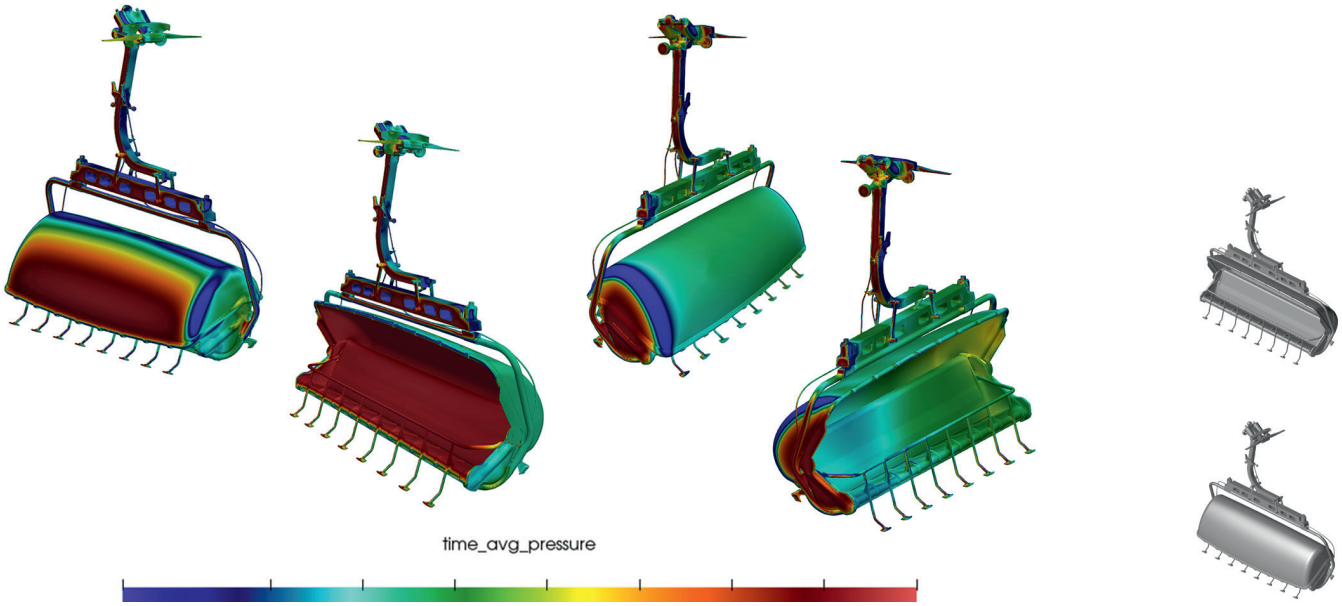
Ski resorts situated in mountainous, high-altitude regions often face challenging weather conditions characterized by strong and gusty winds. For this reason, it's necessary to conduct a thorough assessment of the wind forces exerted on ski resort transport systems. Typically, wind tunnel tests are carried out to study the aerodynamic behavior of a transport device, which is key to ensuring its performance and passenger safety.

But these wind tunnel tests are complex, expensive, and time-consuming. The manufacturer needed conclusive simulation results that would enable them to accurately calculate the generated drag, conduct a comprehensive analysis of the flow field surrounding the lift's structure, and compare the aerodynamic performance of various configurations across different operating conditions. The Doppelmayr engineers, who have experience using and deploying Altair's technology, turned to Altair to provide a solution.

UP TO

100%

CORRELATION BETWEEN SIMULATIONS AND WIND TUNNEL TESTS



LEFT: Using Altair ultraFluidX, the engineers examined the aerodynamic behavior of the chairlifts in headwind and sidewind conditions.
RIGHT: The study involved simulations across different chair models to investigate the impact of the position of the protective canopy (both fully extended and closed).

Our Solution

Altair and Doppelmayr collaborated on a study using Altair® ultraFluidX® – part of the Altair® HyperWorks® design and simulation platform – which is a tailor-made software designed to study external aerodynamics and turbulent flows around complex geometries. This study involved several simulations across different chair models to investigate the impact of two main factors: the position of the protective canopy (both fully extended and closed) and the deflection angle of the chairlift from the applied loads. The study also examined the chairlifts' aerodynamic behavior in headwind and sidewind conditions. ultraFluidX, powered by a highly efficient implementation of the Lattice Boltzmann Method (LBM) and 100% GPU acceleration, enabled comprehensive and rapid overnight simulations on a single server. This blend of speed, automation, and thoroughness was crucial, as was the software's ability to handle large-scale, high-precision volume meshes with minimal user input. This streamlined approach to model preparation – requiring less manual intervention for CAD file preparation while retaining detailed and complex characteristics of the initial geometry – sets ultraFluidX apart from conventional CFD methods.

Results

The simulations conducted using ultraFluidX proved highly successful, showing a strong correlation with existing wind tunnel data. More specifically, in benchmark cases, the simulations' drag values – critical for understanding airflow and resistance – matched experimental data with an impressive accuracy deviation of less than 5%. This high degree of accuracy signifies a major advancement, as it implies a substantial reduction in time and cost associated with traditional wind tunnel testing. Additionally, ultraFluidX's advanced post-processing capabilities allow for a more detailed analysis of the aerodynamic behavior of chair models, surpassing what is currently not attainable through experimental methods.

To learn more, please visit altair.com/altair-hyperworks