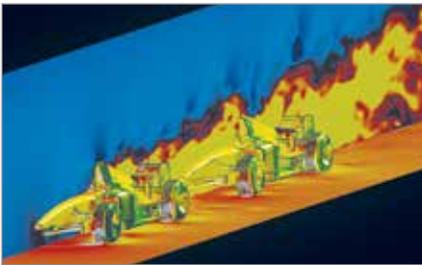
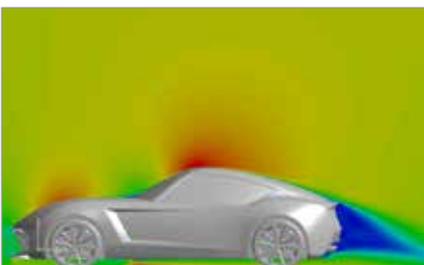


Product Highlights

- Modern Virtual Wind Tunnel Simulation Environment
- Accurate, Robust and Scalable Computational Fluid Dynamics Solver
- Highly Automated and Streamlined Workflow Process
- Seamless Connection to High-Performance Computing



High fidelity results for complex transient applications



Accurately and quickly predict automobile's aerodynamic performance

HyperWorks Virtual Wind Tunnel™

Better Technology, Better Solution

Altair® introduces HyperWorks Virtual Wind Tunnel, a unique vertical application designed for a better external-aerodynamics simulation experience that is intuitive and efficient in process, and accurate and robust in solution.

About HyperWorks Virtual Wind Tunnel

Altair's HyperWorks Virtual Wind Tunnel (HyperWorks VWT) is a new vertical solution from Altair, designed to provide a better wind tunnel simulation technology and user experience. With a highly automated and streamlined workflow process and high-quality CFD technology, Altair's HyperWorks VWT is able to more accurately and quickly predict an automobile's aerodynamic performance, including aerodynamic lift, drag, pressure distribution, flow field (flow separation), aero-acoustics and other factors, resulting in safer, better-performing, and more fuel-efficient vehicles.

HyperWorks VWT combines several Altair's state-of-the-art technologies, from advanced meshing to high-fidelity computational fluid dynamics simulation; rich and powerful CFD post-processing; and an intuitive, simulation-driven design workflow and interface. HyperWorks VWT delivers a vertically integrated and powerful solution for a perfect virtual wind tunnel simulation experience.

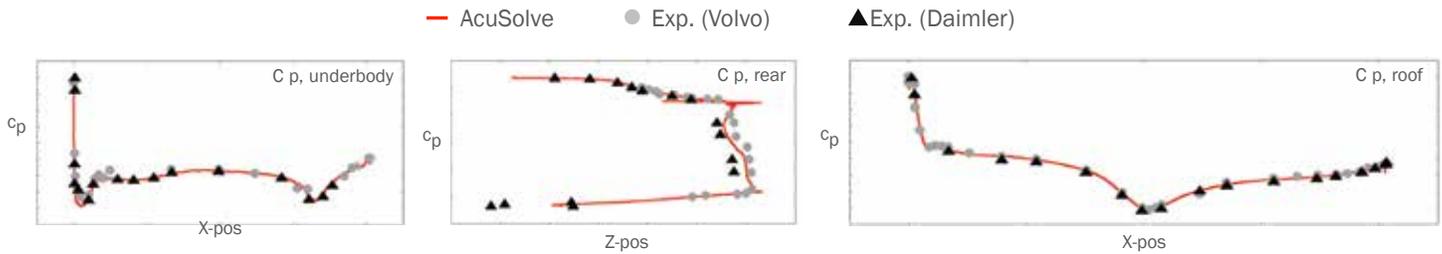
Accurate, Robust and Scalable CFD Solver

HyperWorks VWT is powered by Altair's leading computational fluid dynamics solver, AcuSolve®, a general-purpose, finite element based flow solver that is highly differentiated by its solution speed, scalability, accuracy and robustness.

Based on a sound mathematical foundation, AcuSolve is capable of efficiently solving complex and large-scale industrial CFD problems. Architected for parallel execution on shared and distributed-memory computer systems, using a hybrid parallelization technique, AcuSolve provides fast and efficient transient and steady-state solutions for unstructured element topologies, and it is capable of scaling over a large number of computing cores.

HyperWorks VWT utilizes Reynolds-Averaged Navier-Stokes (RANS) and Detached-Eddy Simulation (DES) technology to model turbulent flows and to predict the flow field and flow separation. DES technology combines fine-tuned, statistical RANS technology for modeling near walls and attached boundary layers with the ability of large-eddy simulation (LES) to model the separated regions in the wake behind the vehicle. Accurate external aerodynamics results are achieved for both steady-state simulation using the RANS approach when physics allows and transient simulation using the DES approach. Since AcuSolve uses a very efficient and robust numerical scheme to advance in time, a transient simulation can be achieved in an acceptable time frame. This enables a more realistic and accurate simulation using transient analysis instead of being forced to use steady-state simulation to approximate the flow field around a vehicle.

As a general-purpose CFD solver, AcuSolve provides many physics, with rich features and functionalities, such as aero-elastics and aero-acoustics simulation, rigid body coupling,



Excellent correlation for classical aerodynamic benchmarks (ASMO)

fluid-structure interaction (FSI) and external aerodynamics for simulating a vehicle and its components, providing a realistic and complete modeling environment for automotive virtual wind tunnel simulation.

Advanced Meshing

HyperWorks VWT comes with a fast and efficient, fully automated unstructured mesher with boundary layers. It is built on top of a powerful and flexible meshing technology for surface and volume meshing, including advanced meshing techniques such as boundary layer propagation, surface and volume extrusion, anisotropic meshing, edge blend meshing, mixed topology element support, region of influence and user-defined functions. Volume meshing for an external automotive aerodynamics analysis (including underbody, underhood compartment and boundary layers) is typically done in much less than a couple of hours.

HyperWorks VWT's CFD solver is very tolerant of element qualities. It is capable of efficiently handling unstructured meshes, including those with high aspect ratios and badly distorted elements commonly produced by fully automatic mesh generators. Because of this tolerant nature for element qualities, the mesh optimization step often required by other solutions can be skipped, which further reduces the meshing time.

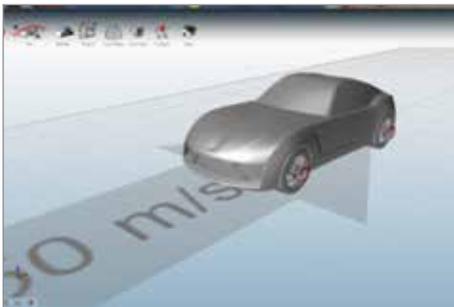
Highly Automated and Streamlined Workflow Process

HyperWorks VWT comes with a friendly and intuitive user environment. It is an all-in-one environment where users can bring in the surface mesh, set up the problem, submit the simulation and obtain a final report. The setup process is highly automated, with a minimum number of parameters,

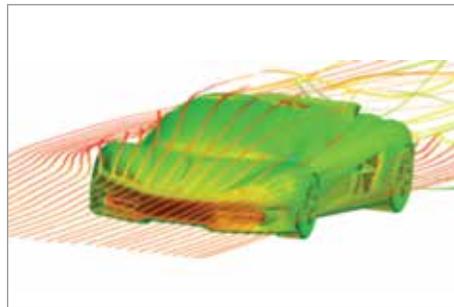
and without compromising the solution quality. Additional controls over the various parameters are provided in the user environment.

Submitting the simulation to high-performance computing systems can be done easily from within the HyperWorks VWT environment to expedite memory and compute-intensive tasks such as volume meshing, solving and post-processing.

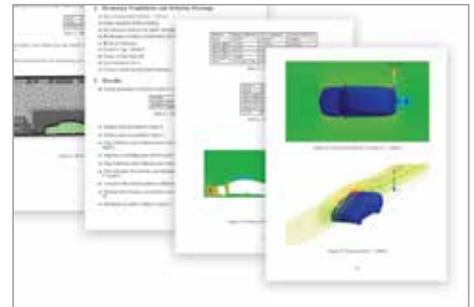
A customizable report containing problem setup, mesh statistics and results is generated automatically after completion of the simulation. In addition, advanced CFD post-processing may be performed for the most complex and large CFD data visualization, interactively or via batch processing mode.



Intuitive and highly automated GUI for problem setup and advanced meshing



Accurate and robust external aerodynamic calculation



Customizable report automatically generated at completion of simulation



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