

Surface Vehicle Aerodynamics

The NRC Institute for Aerospace Research (NRC Aerospace) has applied its expertise in aerodynamic research to the specialized field of surface vehicles for more than two decades. Cars, trucks, motorcycles, trains and ships are a few examples of the vehicles that have been studied using a potent combination of experienced aerodynamicists, in-house wind tunnels, purpose-built vehicle test installations and computational fluid dynamics (CFD). NRC Aerospace can measure and analyze the effect of aerodynamics on the fuel consumption, cooling, stability and handling of most surface vehicles. Engineering consultation is available and a wind tunnel program can be designed to suit any need.

Our wide range of experience with clients from diverse industries is our greatest strength. In recent years, the NRC wind tunnels have tested a variety of vehicles, including: production cars and trucks, highway tractors, NHRA dragsters, NASCAR stock cars and motorcycles. Our staff can draw upon this experience as well as on our strong research background to find unique solutions to your unique problems.

Facilities

The NRC wind tunnels are among the largest and most versatile facilities available for commercial testing and research in North America. These wind tunnels allow a full range of testing from model-scale development in the 2 m x 3 m wind tunnel (maximum speed 500 km/h, 300 mph) to full-scale refinement in the 9 m x 9 m wind tunnel (maximum speed 200 km/h, 120 mph).

Operated by experienced staff, the 9 m x 9 m wind tunnel is a superb facility for full-scale racing vehicle development. It is equipped with a six-component balance and full yaw



Aerodynamic test on a full-scale truck

capability. A floor boundary layer suction system for surface vehicle testing and a new PXI-based data acquisition and control system were recently installed.

The test section of the 9 m x 9 m wind tunnel readily accepts the largest passenger car, van or light truck and has tested full-scale tractor trailers and race cars in drafting positions. Available pressure scanning systems and anemometers mean that cooling performance can be developed in parallel with aerodynamic load measurements.

The 2 m x 3 m wind tunnel can test 3/8 scale passenger car models and 1/10 scale heavy truck models on its groundboard at speeds up to 120 m/s. Smaller vehicles, such as motorcycles, can be tested at full scale.

The 0.9 m pilot wind tunnel has a moving belt capability for research into vehicle configurations where the fixed floor ground simulation is inadequate.

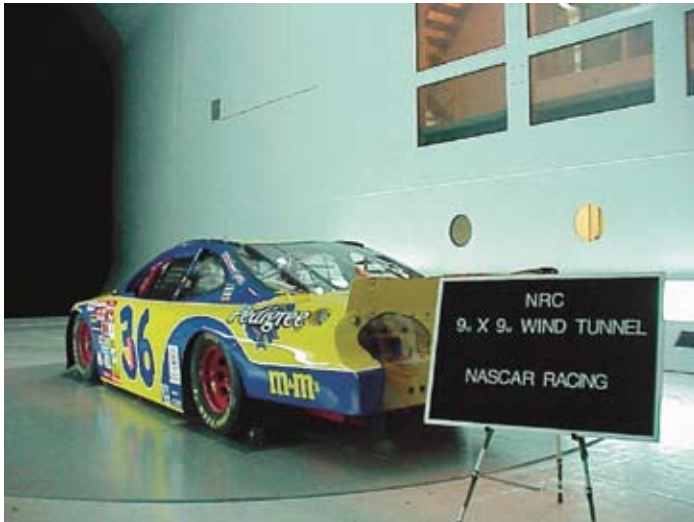
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Support systems

The NRC wind tunnels are packed with modern systems that many competing facilities cannot offer including, but not limited to: multi-component static and dynamic balances; sensor arrays for wake-flow measurement; acoustic arrays for flow-induced noise measurement; high-speed unsteady-pressure measuring systems; and laser flow visualization equipment integrated with advanced data acquisition and data analysis systems to provide a client with detailed on-line information during a test. Custom systems can be designed specifically for your test. Extensive design and fabrication facilities allow the preparation of complex models or special test fixtures.

Experience

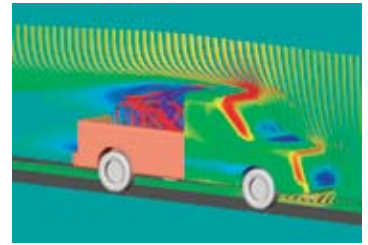
The staff at NRC Aerospace combine experience, flexibility, and imagination with ready access to the vast technical infrastructure of a strong R&D organization to solve client problems. NRC Aerospace has extensive in-house knowledge to back up its tunnels; our world-class experts in testing techniques are advancing the state-of-the-art in ground simulation and blockage correction methods. We deliver results, on time, and at competitive rates.



NASCAR racing car tested in 9 m x 9 m wind tunnel

NRC staff engineers can design and conduct a test program to suit your requirements, and our vehicle simulation program can be used to predict the resulting performance

improvements. The combination of racing performance simulation and wind tunnel development allows the optimum aerodynamic configuration to be found for any track. Clients may also use their own aerodynamic consultant, assisted as necessary by NRC staff.



CFD study of a generic passenger truck

Our unique combination of tunnel performance, size, instrumentation, cost and experience offers an invaluable tool for serious vehicle development. Call us for further details.

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