

RACING BEHAVIOR



NASCAR, TOTALSIM MODEL AERODYNAMICS TO BOOST SAFETY, PERFORMANCE

Drive a car not originally built for racing around an oval track at 200 mph for a couple hours and you begin to understand why stock car drivers want the latest and greatest information on how their car will handle in close traffic on a banked curve. Traditionally, engineers in NASCAR relied on wind-tunnel and track testing. But in recent years, NASCAR began looking for an alternative.

In 2012, NASCAR turned to TotalSim USA, an engineering services provider and stalwart AweSim partner, to help teams and drivers leverage the valuable information computational fluid dynamics (CFD) can offer. TotalSim worked with Eric Jacuzzi, aerodynamics and vehicle performance engineer at the R&D Center for NASCAR, to teach him the necessary software tools and Ohio Supercomputer Center usage.

“Without the access to OSC’s resources and storage, what we do would be impossible.”

— Eric Jacuzzi, aerodynamics and vehicle performance engineer at the R&D Center for NASCAR

VIRTUAL DESIGNS. REAL BENEFITS.

This knowledge allows Jacuzzi and his team to study computational fluid dynamics to better understand the aerodynamic behavior of the cars—how they handle drag, downforce and sideforce—at high speeds in traffic and on different tracks, each with their own nuances. This scientific analysis helps Jacuzzi and NASCAR develop the best races for fans, drivers and the series as a whole.



AUTOMOTIVE



AUTOMOTIVE



2015

THE CHALLENGE

Ensuring each race is safe for drivers and fun for fans is of utmost importance to the NASCAR brand. So it's a must that the auto racing series uses every possible tool to improve safety and performance. But testing on the track or in wind tunnels is expensive and time consuming. Developing efficient processes to gain critical information to test aerodynamics and analyze racing behavior on various tracks to keep NASCAR ahead of the curve is imperative.

THE APPROACH

TotalSim – which boasts a deep background in helping auto racing teams perform at high levels – customized a version of the open-source CFD software package OpenFOAM, designing grids of 50-120 million polyhedral cells for a single car run. One example of a study featured a stationary lead car with a second car in a variety of trailing positions. These tests allow Jacuzzi to analyze and record aerodynamics and racing behavior on the various tracks NASCAR races during a given season.

THE SOLUTION

A series of 46 simulations generated 500 gigabytes of data. The study yielded important clues on a myriad of racing and competition-related issues, such as drag advantage, cornering performance, underbody downforce deficit and sideforce loss.

This information is a goldmine.

“The money spent for us on CFD saves us money in the long term because when we go to the wind tunnel, or we go to the track, we’re already 90 percent sure that we’re going down the right path.” – Jacuzzi



1224 Kinnear Road • Columbus, Ohio 43212 • (614) 688-0971 • AweSim.org



a program of

Ohio Supercomputer Center
An OH·TECH Consortium Member