

Fluid Dynamics

D2H maximizes efficiency in automotive engineering

- ENGINEERING AND TECHNOLOGY
- ▲ AUTOMOTIVE

“Between the flexibility OSC gives us and our drive for workflow efficiency and speed, we’re changing the map. The accuracy, speed and value we deliver is changing the way that people think about CFD.”

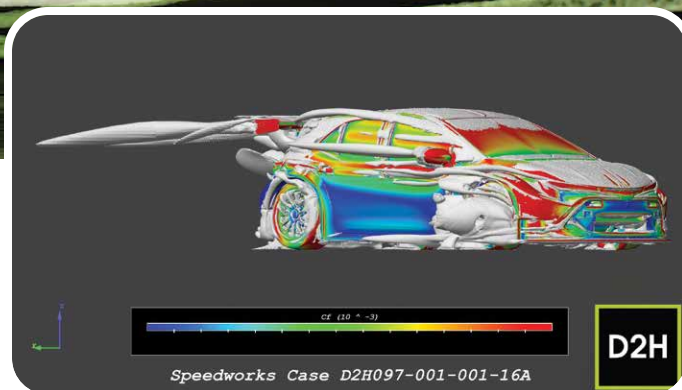
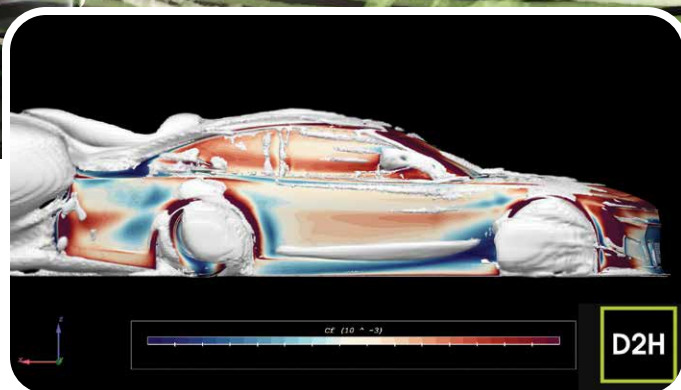
— Darren Davies, D2H CEO

Efficiency and accuracy are everything in motorsports. Finely tuned engineering workflows must operate on demanding timelines and reliably deliver aerodynamically optimized vehicles. Automotive and industrial company D2H Advanced Technologies relies on the Ohio Supercomputer Center’s (OSC) on-demand high performance computing (HPC) for maximum efficiency in both process and product.

With offices in both the UK and the USA, D2H operates in motorsports including NASCAR, high-performance sports including cycling and skeleton bobsleigh, as well as industrial technology, and automotive and electric vehicles. Among the firm’s technical specialties is computational fluid dynamics (CFD), used to model how fluids behave when they are moving through and around objects. This modeling provides engineers with crucial data, such as how air flows around a vehicle.

The accuracy and speed of solutions produced by D2H rival any engineering firm in the industry, according to CEO Darren Davies.

“Every millimeter cell around the car, we get the pressure, the velocity, vorticity, all of these parameters we need to tell what’s going on so that we can then go and make changes to the car,” Davies said. “Our models are an order of magnitude larger



Figures: D2H's computational fluid dynamics simulations generate data that guides engineers as they improve the aerodynamic profiles of vehicles such as the race cars pictured in these visualizations.

and more refined—amongst the most complicated and most detailed CFD models that anybody runs, commercial or industrial.”

These complex analyses reduce the need for expensive and time-consuming wind tunnel tests, as one skeptical manufacturer found out recently.

“They had already tested a vehicle in the wind tunnel,” Davies said. “The planning and execution of the tests took months, and I would estimate that it cost them between \$30,000 and \$40,000. They gave us the same problem in CFD on OSC and we turned it around within a few days at a cost in the low single-figure thousands of dollars, proving that CFD testing would have been much faster and better value, without detracting at all from the accuracy of the results.”

When preparations began in 2019 for a new D2H office in Winston-Salem, North Carolina, newly hired engineer and University of Dayton post-graduate Seth Morris suggested checking out OSC. After looking at the available resources, D2H decided to utilize OSC as a backup provider, but the Center's performance and reliability quickly changed the plan.

“Over the last year, OSC has stretched ahead, and comfortably so,” Davies said. “The true on-demand service with low wait times is unique. We don't have that anywhere else. And that's what keeps OSC ahead

of everyone else right now. The prices are great, the service is great and OSC keeps it all up to date.”

Mark Jackson, operations manager for D2H, feels the same way.

“We've been pushing to reduce all of our runtimes and make everything more efficient and then sometimes [with OSC's competitors] we're waiting in the queue longer than the jobs are taking,” Jackson said. “We haven't been getting that with OSC.”

The Center's recent Pitzer cluster expansion, which added dozens of GPU nodes and nearly tripled the total number of cores, has unlocked even more value. D2H has reduced the number of cores it uses by 5% without any increase in runtimes, translating directly to lower costs.

“It's still good for us to have two providers,” Davies said. “But right now, OSC is the stronger proposition and is our 'go to' provider of HPC resources” •

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