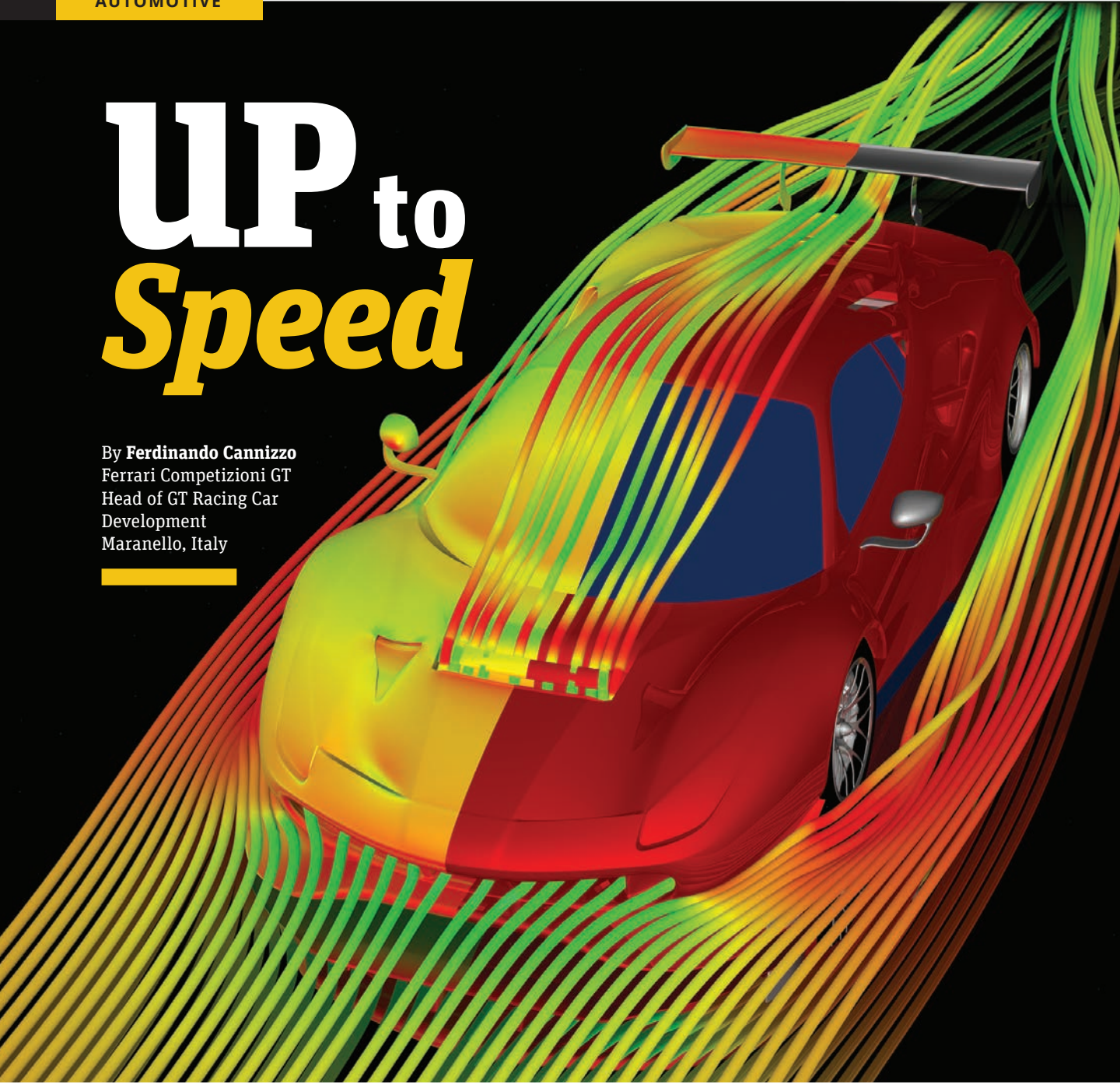


# UP to *Speed*

By **Ferdinando Cannizzo**  
Ferrari Competizioni GT  
Head of GT Racing Car  
Development  
Maranello, Italy

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**A longtime user of engineering simulation, Ferrari Competizioni GT leverages next-level, automated meshing capabilities from ANSYS to increase its simulation productivity by 300% — placing new designs on the track in a fraction of the time required previously. The Ferrari**

**name is known around the world for speed, high quality and precise engineering, and its GT race cars both reflect and reinforce the company's automotive leadership.**

**K**nown for its luxury sports cars – which have become an automotive industry standard for speed and performance – Ferrari is also known for its success in Gran Turismo, or GT, racing. Each year, the Ferrari Competizioni GT racing organization competes in about 25 international events, battling teams from around the world.

Ferrari engineers work constantly to optimize aerodynamics and other aspects of vehicle designs, with the goal of crossing the finish line first and reinforcing Ferrari’s brand leadership.

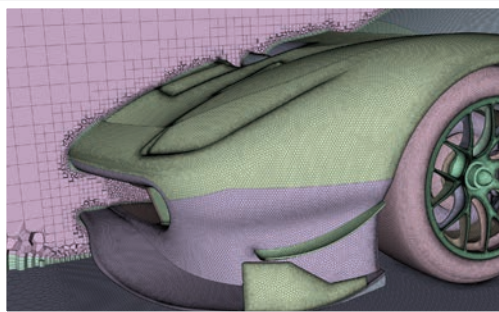
Every two or three years, the Ferrari Competizioni GT engineering team pushes itself to engineer an upgraded GT race car within a 12-month window. These changes must not only improve performance but must reflect new industry standards introduced by the Fédération Internationale de l’Automobile (FIA).

**“Ferrari engineers can run three times as many *CFD simulations* in the same amount of time – and *develop cars faster* than ever before.”**

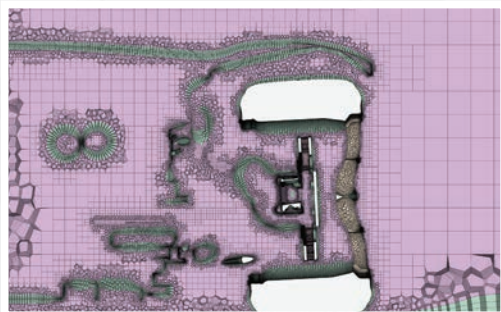
#### SETTING THE PACE

To meet this aggressive schedule and succeed in this intensely competitive environment, Ferrari identifies and applies the most innovative engineering technologies available. Since 1998, the team has partnered with ANSYS to ensure that it is constantly adopting the most advanced simulation capabilities, as well as best-in-class engineering simulation practices.

For years, Ferrari Competizioni GT has leveraged the power and scope of ANSYS Fluent computational fluid dynamics (CFD) software to optimize the aerodynamics of its race cars. Supplementing physical wind-tunnel testing – which is time- and cost-intensive – with CFD simulations in a virtual world has yielded significant benefits for Ferrari. Engineers can generate a fully realized, virtual 3D vehicle design much faster than building a physical prototype – then test a large population of geometrical variations to assess their effects on the model’s aerodynamic performance. This allows Ferrari’s product development team to build expensive, scaled-down prototypes of only the most promising designs to validate with physical wind-tunnel testing.



By creating a finely detailed mesh of the race car’s chassis, the Ferrari GT engineering team can simulate and optimize the effects of air and other physical forces that will impact the vehicle’s performance under real-world racing conditions.



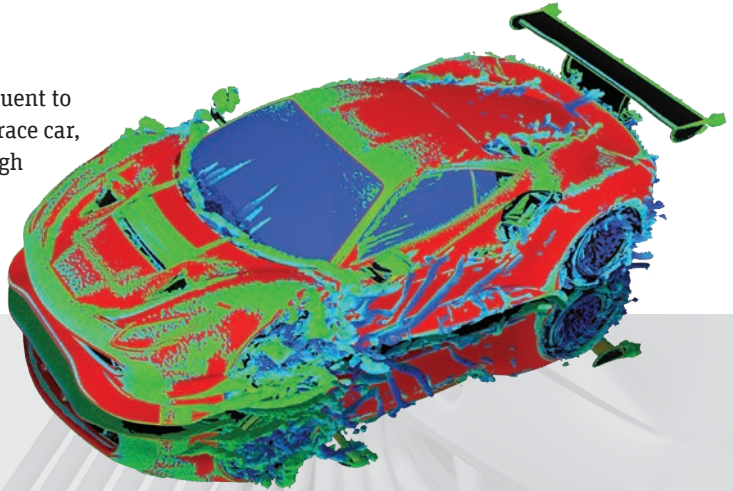
Fluent’s task-based workflows speed the creation of a high-quality Mosaic-enabled mesh for complicated geometries such as the underside of this Ferrari GT car.

This process has proven highly successful, cutting time and costs from the overall design cycle for a new race car. In addition, Ferrari has been impressed with the power and fidelity of ANSYS Fluent, particularly in modeling highly complex physical phenomena such as turbulence. The CFD simulation results have predicted the wind-tunnel tests with a very high degree of accuracy.

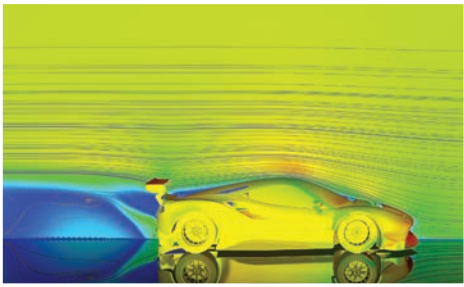
Recently, Ferrari Competizioni GT reached an agreement with ANSYS that has given its engineering team access to a groundbreaking new simulation capability in ANSYS Fluent: Mosaic-enabled poly-hexcore meshing.

### BREAKING AWAY FROM THE PACK

In the past, Ferrari engineers used ANSYS Fluent to generate a finely detailed mesh around the race car, which enabled flow simulations at a very high degree of accuracy. However, creating this fine mesh and running CFD simulations on it required a high level of expertise and



ANSYS Fluent simulation results show flow vortices created by the sharp corners and body details of a Ferrari GT race car.



ANSYS Fluent simulation showing pressure contours and air velocity around the Ferrari GT car



mean hours of hands-on time spent optimizing mesh quality — resulting in a large computational size and a correspondingly long run time for each CFD study.

By collaborating with ANSYS, the Ferrari Competizioni GT development team has achieved both a meaningful mesh resolution level and rapid results. By applying Mosaic-enabled poly-hexcore meshing capabilities in ANSYS Fluent, the Ferrari engineering organization has been able to achieve an even higher level of simulation accuracy with fewer cells, leading to less manual work and a much faster solution time. The Fluent solver handles hexcore cells very efficiently, leading to productivity gains.

This meshing capability also supports fully automated meshing, with little to no user intervention. Once a new design option has been defined, its surface mesh is automatically partitioned and sent to different cores of a distributed, parallel computing architecture. By batch executing the standard, repetitive tasks involved in meshing via Mosaic-enabled technology — combined with robust Fluent Meshing native scripting — even less-experienced engineers can realize a 4-times speedup in meshing speed and efficiency.

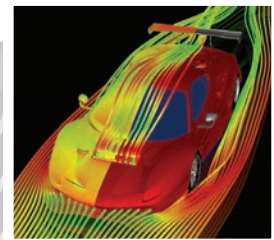
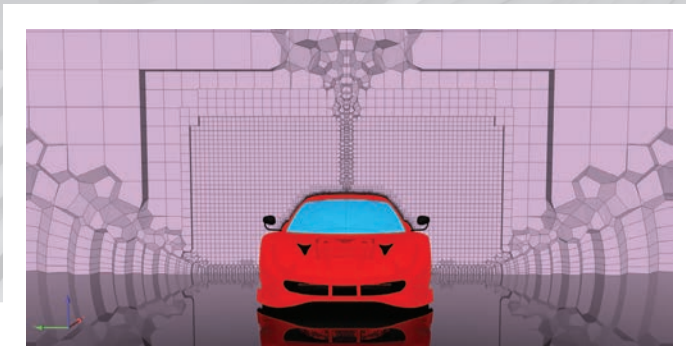
This means that Ferrari designers can look at a larger number of geometry options very quickly, thanks to the built-in automation of Fluent's task-based meshing workflows. In the past, users had to create custom scripts to enable automated meshing in Fluent — but now an entirely new vehicle geometry can be introduced and automatically meshed in just a few hours.

Innovations in ANSYS Fluent such as Mosaic meshing have enabled tremendous workflow and productivity benefits for Ferrari Competizioni GT. This automated workflow boosts productivity by

reducing the user learning curve, minimizing the chance of human error, and freeing engineers to focus on higher-value work. This helps the Ferrari development team make significant changes every three years and prepare a new car for the racing season in less than a year, with a limited amount of resources.

Thanks to Mosaic-enabled poly-hexcore meshing, Ferrari engineers have been able to decrease the number of meshing cells by 15%. This reduction, when combined with the new hex-dominant mesh, delivers solution times that are twice as fast. For an organization focused on speed, that is an enormous improvement. By relying on Mosaic technology and the Fluent end-to-end workflow, Ferrari engineers can run three times as many CFD simulations in the same amount of time — and can develop cars faster than ever before.

**“This automated workflow *boosts productivity* by reducing the user learning curve, minimizing the chance of *human error* and freeing engineers to focus on higher-value work.”**



Mosaic-enabled meshing

#### **FERRARI'S PARTNERSHIP WITH ANSYS: A WINNING COMBINATION**

GT competitive racing has always been part of Ferrari's DNA. Ferrari Competizioni GT will race two cars in the 2019 season: the 488 GTE and the 488 GT3. These two turbo-engine cars will compete in the most demanding endurance races and the most important national and international GT series. The 488 GTE has already won two Manufacturers' titles in the FIA World Endurance Championship, while the 488 GT3 has won more than 230 races, two IMSA GTD class titles and one Asian Le Mans Series Championship.

Ferrari's partnership with ANSYS has been an important element in this successful track record. In the modern competition environment, simulation is essential to provide a reliable answer to the tough challenges associated with GT racing. Without simulation, no team stands a real chance of delivering results in a cost- and time-effective manner. Ferrari Competizioni GT's use of advanced simulation capabilities from ANSYS, including the Mosaic meshing and the watertight workflow, has given the team a dramatic performance advantage on the track.

In June 2019, the Ferrari team driving the 488 GTE won the 24 hours of Le Mans for the 36th time, a monumental achievement.

Ferrari will always invest heavily in research and development, including engineering simulation, to make sure the company retains its edge as technologies change. Upgrading or adapting its cars, and constantly introducing new models, means that Ferrari must also stay ahead of the pack in adapting best-in-class engineering solutions. 🚗