Driven to Success

Andrea Pontremoli, CEO and General Manager of Dallara Automobili, discusses the importance of simulation and innovation in the global automotive industry.

By *ANSYS Advantage* staff

Nearly every weekend, on race tracks from Brazil to Japan to the United States, a Dallara Automobili car is earning a checkered flag or setting a new course record. But while the company is known for its accomplishments on Indy, Formula 3, Grand Am and other tracks, 40 percent of its business is through its consultancy practice with giants in the so-called "super car" space, including Ferrari, Lamborghini, Maserati, Audi, Bugatti, Toyota, Alfa Romeo and many others.

Gian Paolo Dallara founded the company in 1972, near Parma, Italy, then handed over the car keys in 2007 to Andrea Pontremoli, a former president and CEO of IBM Italy. Pontremoli began his IBM career in 1980 as a customer engineer, then expanded his responsibilities to include creating IBM's Global Services in Italy. He was later, named vice president of global services operations for Europe, the Middle East and Africa and later, IBM global services general manager for south Europe. Engineering, though, has always been close to his heart.

Pontremoli recently talked with *ANSYS Advantage* about how Dallara uses engineering simulation to reduce costs while increasing automobile performance.

Dallara Automobili has a great reputation as an innovator in the automotive industry. The company is known for its race cars, but that's only about half of your business. What does today's Dallara Automobili look like?

Our business is made up of three areas. The first is automobile design using carbon fiber composites, which is our specialty. The second area is aerodynamics, and the third is simulation of vehicle dynamics. When designing using carbon fiber composites, as you can imagine, simulation is used a lot for structural analysis. I think that in this area we are at a very good level, especially with regard to dynamic crashes, which can be very complex to reproduce.

For aerodynamics, we have two state-of-the-art wind tunnels that are based on 60 percent car size. We also offer

Andrea Pontremoli, CEO and General Manager, Dallara Automobili S.p.A.

The driving simulator, being inspected by company founder Gian Paolo Dallara, teaches a driver how to navigate a particular car, then instructs the driver on the nuances of a specific race track.

advanced CFD capabilities. So we use a lot of supercomputers in combination with CFD tools, including ANSYS Fluent, the main solution that we use today.

The third area — the actual vehicle simulation — is closely linked with the other two aspects. We have just built a unique driving simulator that, first, teaches a driver how to navigate a particular car, then teaches the driver the nuances of a particular race track — aspects that he might not know or would like to practice on.

Dallara's driving simulator doesn't just allow you to practice on a Ducati or a Ferrari, but you can also test drive a virtual car — that is, one that hasn't actually been built. Is that correct?

That's true. Technically, the driver maneuvers via mathematical models that come from aerodynamics, structural and vehicle dynamics simulations. So this is, I think, the new frontier of innovation in the automotive arena. We are using the simulator to reduce the cost of development of a car and to test some innovations that today are not possible, because they are too costly. This simulator has fostered a lot of innovation because you can try out offbeat ideas with very little cost.

The simulator is the ultimate melting pot of information coming from the three main simulation areas and the "special data generator" that, in turn, feeds these very same areas. Sometimes it's extremely difficult, if not impossible, to collect all the inputs that are needed to perform good and reliable simulation if the car doesn't exist yet. With the driving simulator, a real driver can generate the physical engineering data — loads on single components or accelerations, for example — well before the first part for that particular car has been made.

To innovate, do you push the boundaries of what traditional CFD and other simulation software can provide?

We have many choices in the simulation area, especially for aerodynamics. We selected ANSYS Fluent because we think it is the most advanced tool. It allows us to do all the simulation that we need and to have a proper link with structural analysis data as well. This connection is so important to innovation today: to be able to see things both individually and at a system level. It's not only important that you have good software to do one thing, but that you are able to connect the results, as well as the inputs, to this tool. The openness of a tool is very important for us, and Fluent handles these connections very well.

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Shakedown of 2012 Indy car at Mid-Ohio track

An automobile is an extremely complex system, and designing one involves a series of trade-offs with various engineering disciplines. As a CEO, how do you manage that?

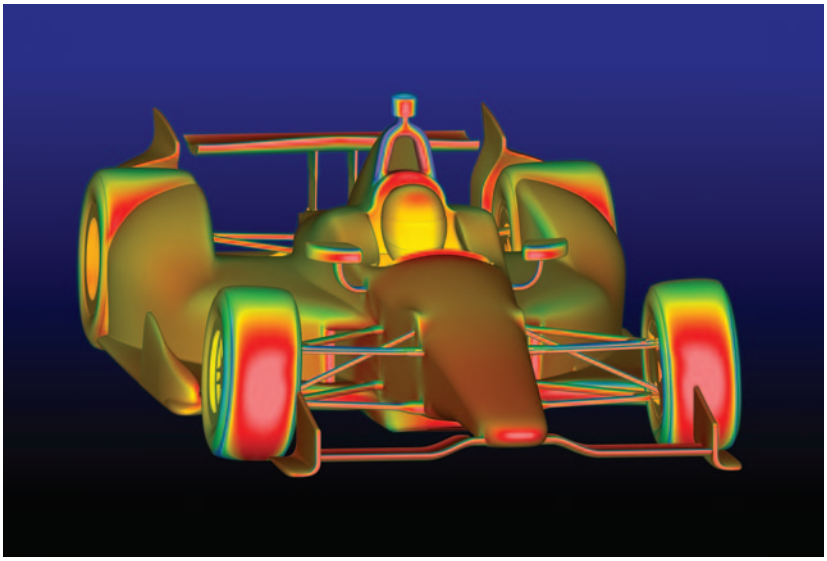
It actually comes down to taking a systems-level engineering view. Normally, the process is a fight among three different people: the head of the design office, who is the head of structural design; the aerodynamics specialist; and the vehicle dynamics engineer.

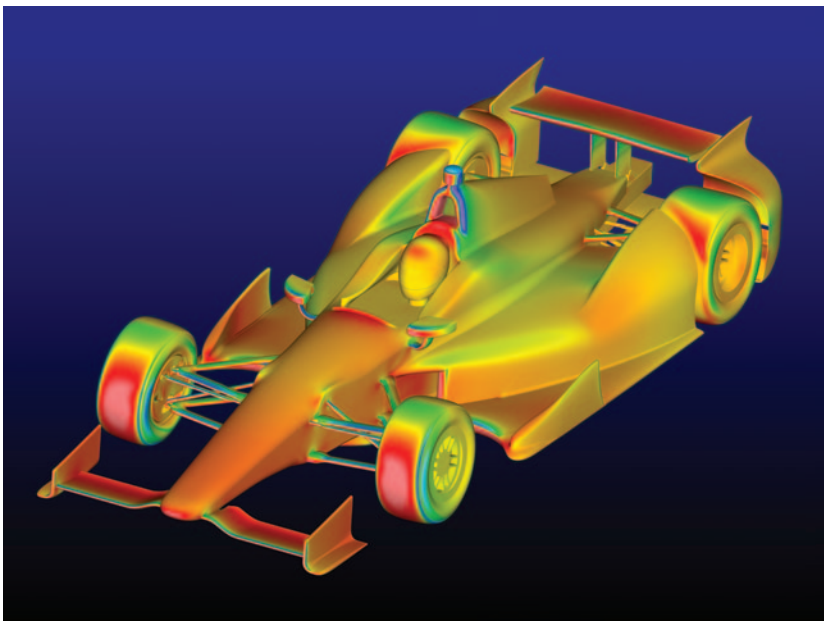
The vehicle dynamics group wants the car very low, to keep center of gravity low. Aerodynamics wants the wing very high, to spoil unfavorable air movement across the car's body and contribute to speed. And then you have the structural guy who says, "I don't know how to design the wing to link to the car." Sometimes it becomes a personal fight because these guys are very good at what they do.

The software helps us to argue the facts instead of reacting based on sense of "gut." I try to put all these elements together to see the results. To have a good racing car, it's not enough for every single element to be the best; you need to have the best compromise at the system level. And this can be very difficult to engineer.

It sounds like CFD and other simulation tools benefit Dallara in a lot of ways. How do you measure your return on investment from these solutions?

At the end of the story, the reason you use simulation tools is to keep down the cost of development and increase the vehicle's performance. These are the two simple things that we keep in mind. If you don't use simulation, you might need many years to recover the costs of development. But organizations need an immediate return. Performance is related to cost, period. For example, in the last car that we developed, we





ANSYS CFD allows Dallara to perform the simulations required and to link with structural analysis data. Pressure contours for the 2012 Indy car were generated using ANSYS Fluent software.

committed to reduce the cost by 40 percent and to improve performance. We were able to do this cost reduction only through simulation. If you do it in the normal way (through build and test), you will never achieve this. You might be able to reduce costs by 5 percent, but you'd never achieve that 40 percent cost reduction with better performance.

As a global automotive company, Dallara is fairly small — only 200 people.

How do you use innovation to keep competing against the larger players in the market?

Innovation, from my point of view, involves two things: One is uniqueness and the second is openness. To be unique, you have to be open. It seems a contradiction, but it is true.

IBM did a study a few years ago with 750 entrepreneurs from different-sized companies in various industries all over the world, asking them where they get their innovative ideas. They reported that only 30 percent of the innovative ideas came from employees. About 70 percent came from outside the company, mainly from customers, second from suppliers, and third from universities and research. This is why an innovative company is open. The information needs to flow through the company.

But then you must have the capability to transform this uniqueness to the marketplace. In today's global world, if you are a follower, especially if you are a small company, you will not survive. You must be able to say, "I am the only one able to do this. I am the only one able to produce this performance at this cost."

The very successful companies in the modern world are able to communicate this uniqueness message, which requires a lot of work. Most of this work is not done inside the company but through a network. You need software that is able to link all these things together so you can share information, not just data.

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