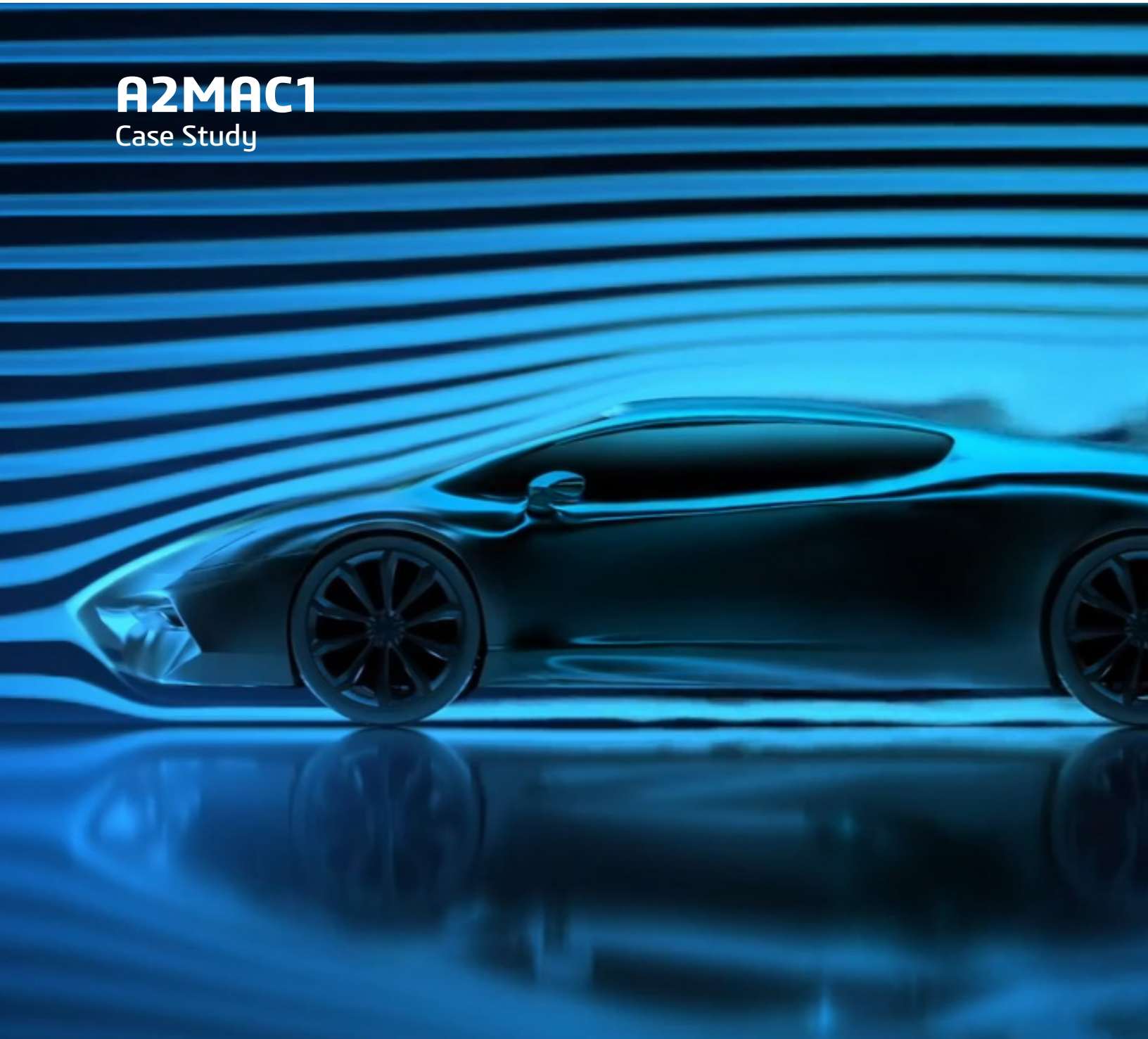


A2MAC1

Case Study



Challenge:

A2Mac1 required simulation tools that could make the complex task of dynamic benchmarking quicker and simpler while still providing a thorough evaluation of vehicle performance.

Solution:

A2Mac1 chose SIMULIA's simulation tools to virtually disassemble and reassemble vehicles, enabling manufacturers to experience aspects such as noise, vibration and handling without needing a physical prototype.

Benefits:

SIMULIA's tools allowed A2Mac1 to significantly compress model preparation time, allowing them to produce results from a digital mock-up in just three days. These quick results provided manufacturers with insight into the performance of each vehicle element.

AUTOMOTIVE BENCHMARKING

For more than 20 years, A2Mac1 has been a global leader in benchmarking, with clients in industries ranging from automotive to agriculture, appliances, construction and aeronautics. Its slogan, "Your global partner for benchmarking," rings true for both large and small companies that include Audi, FCA, John Deere and many more. So what exactly is benchmarking?

"Benchmarking is a way to extend the knowledge you have of your own production to the worldwide view...and based on that knowledge you can innovate," says Jacques Leveillé Nizerolle, CEO of A2Mac1. "Benchmarking is basically helping you [expand] on your knowledge about car engineering in general, to innovate not only from what you do, but innovate from what everybody is doing. So it's a way to help you innovate and optimize the work that you do in engineering."

Although its reach extends to the multiple industries named above, A2Mac1 is primarily an automotive benchmarking company that studies about 100 cars per year, disassembling them and then reassembling them in a virtual space through use of 3D scanners. This is known as static benchmarking, but A2Mac1 goes a step further into what is known as dynamic benchmarking, which involves measuring the experience of the vehicle as well as the physical product.

"We're driving the car, measuring thermal, measuring energy management, measuring aerodynamics," continues Nizerolle. "We can do it physically with the car, or we can do it virtually using the data that has been created in 3D to basically simulate, using simulation tools, the behavior of the car."

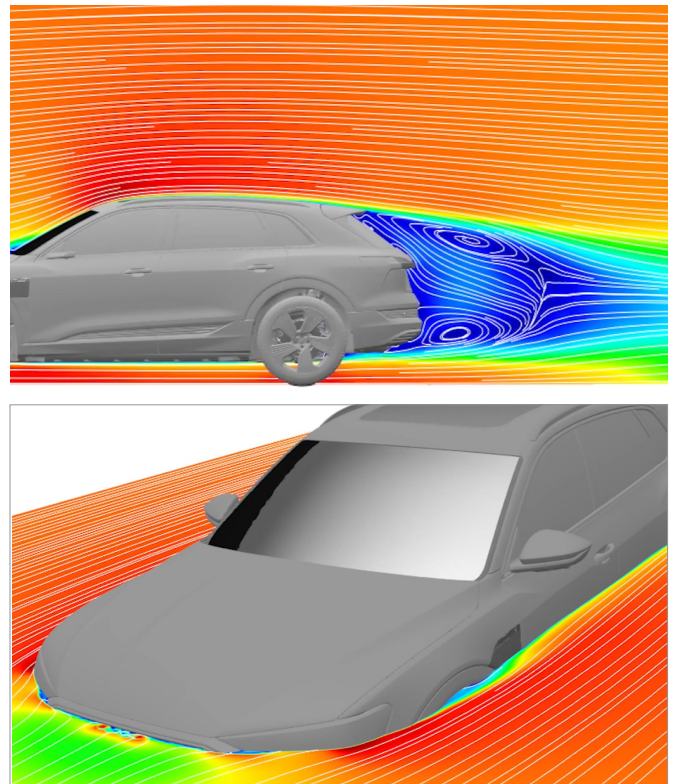
Simulation is changing the way companies do benchmarking, and benchmarking is changing the way manufacturers design cars. This, in turn, changes the way consumers buy cars – giving them more options for customization, comfort, and cost-effectiveness, just to name a few of the aspects that customers look for in a vehicle.

SIMULATING VEHICLE PERFORMANCE

A2Mac1 is enabling customers to see and discover things they wouldn't be able to see and discover otherwise—like noise, vibration and handling, which are critical to customer comfort but impossible to judge without actually riding in a car—or seeing a high-quality simulation, which is what A2Mac1 provides using SIMULIA software.

"We have all the automotive customers in the world and most of the suppliers," says Vincent Keromnes, Dynamic Benchmarking Domain Leader at A2Mac1. "Dynamic benchmarking...makes visions of simulation and tests affordable to everybody. To make sure that all the automotive industry contributors have access to something that traditionally is very expensive, but that can be a lot of value because it's all about the market as it is right now."

Simulation has taken benchmarking to a whole new level. Take aerodynamics as an example—previously, testing a vehicle's aerodynamic performance would involve multiple wind tunnel tests, which are time-consuming and expensive. In a virtual setting, however, tests can be run and run again as many times



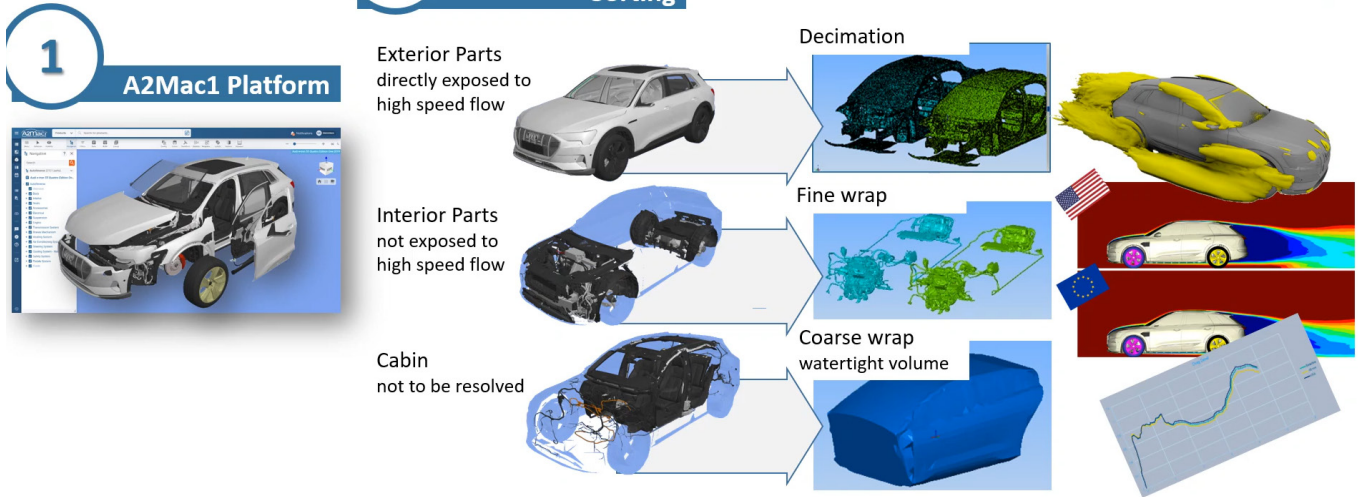
Velocity cut plot post processing in SIMULIA PowerVIZ—
Audi Etron aerodynamics

**"I love simulation because it helps to
push the frontier of innovation."**

—Vincent Keromnes, Dynamic Benchmarking Domain Leader,
A2Mac1

3DS SIMULIA PowerFLOW Solution

Detailed Process



A2Mac1 Platform to SIMULIA PowerFLOW process

as needed without additional cost, and with minimal additional time. This allows OEMs to go in-depth and zero in on small details and specifics situations. A2Mac1 is versatile in handling simulations according to the customer's needs, either running a full simulation for them or providing raw data so that they can run the simulations themselves.

Keromnes gives an example of a manufacturer that had designed an electric SUV with a hood shape that is more commonly seen on a two-door car. Since A2Mac1 already had the digital mock-up of that hood shape, the manufacturer was able to easily try it on as a virtual prototype to see how it affected drag, acoustics, and vibration.

BENCHMARKING WITH SIMULIA

A2Mac1 delivers results quickly, which is largely thanks to their choice of SIMULIA simulation tools. SIMULIA's tools allow the company to significantly compress the preparation time —of which, according to Keromnes, 70 percent was spent on cleaning up geometry. With that extra time cut down, A2Mac1 is able to produce results from a digital mock-up in just three days.

"We decided to work with SIMULIA because they have some of the best tools in the market today for automotive simulation," says Nizerolle. "I really trust the tools, and the customers trust the tools, and this is very important."

"With simulation, we are able not only to get the performance of the car with this device or that device, but we are also able to better understand the configuration of each element," adds Keromnes. "And this is something you could do in physical testing, but it's very complicated and you cannot push it to the limit. But with the simulation, once we have the digital mock-up of the car, it's very easy to replace one device with another one."

"So we are generating simulation data and we want everybody to be able to access it and to get the value of it and then to do engineering jobs, which is from the simulation data to take the right decision to improve the product and to innovate."

—Vincent Keromnes, Dynamic Benchmarking Domain Leader, A2Mac1

Replacing a mirror with a camera could be one such example, as OEMs begin to shift more towards the design and manufacture of electric and autonomous vehicles. This is, overall, a huge shift, but simulation and benchmarking are making it so that engineers are not working blindly to redesign these vehicles from the ground up.

"It's a complete process of reinventing the way to do cars," Nizerolle says of the shift. "And in that context, customers need to understand the way others are trying to solve problems, are trying to enhance design to make it more effective. And so benchmarking is critical and it's getting more and more critical."



Realistic rendering in SIMULIA PowerVIZ – Jaguar I-Pace aerodynamics



BOOSTING INNOVATION THROUGH DEMOCRATIZATION

A2Mac1 believes that leveling the playing field by making world-class benchmarking available to all manufacturers will accelerate automotive innovation as a whole.

"We want to democratize the access to the simulation data," says Keromnes. "So we are generating simulation data and we want everybody to be able to access it and to get the value of it and then to do engineering jobs, which is from the simulation data to take the right decision to improve the product and to innovate."

New challenges are arising not only in the form of autonomous and electric vehicles, but in new regulations such as the Worldwide Harmonized Light Vehicle Test Procedure (WLTP), the newest standard for measuring fuel consumption and emissions in vehicles, as well as simply more discerning customers. Automobiles must be designed more carefully and consciously than ever before, and to avoid falling behind, OEMs need to be able to see what others are doing to meet these challenges. For this, simulation is vital.

"Simulation is getting more important because we are moving from product to experience again," says Nizerolle. "Now, what's important is the driving experience. And the driving experience means comfort and the different aspects of comfort. The handling of the car and all those things have to be simulated. So if you want to benchmark the driving experience,

you need to simulate the behavior of the car. I love simulation because it helps us bring the benchmarking to a new era, bring the benchmarking from product benchmarking to experience benchmarking."

Keromnes agrees. "I love simulation because it helps to push the frontier of innovation," he says.

A2Mac1 offers a subscription model in which they disassemble and reassemble a certain number of cars each year, which customers voting on which cars they would like them to study and benchmark. In this way the company brings true democratization to automotive design, allowing manufacturers to learn from each other as they navigate the challenges of today's automobiles.

For more information: www.A2Mac1.com

Our 3DEXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the 3DEXPERIENCE Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating 'virtual experience twins' of the real world with our 3DEXPERIENCE platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit www.3ds.com.



3DEXPERIENCE®