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ATTILIO MASINI



**LAMBORGHINI CARBON FIBRE MAN.** MYTHS AND THE LEGENDS HAVE BEEN WOVEN OVER THE YEARS TO OBSCURE THE TRUTH ABOUT CARBON FIBRE IN THE SAME WAY THEY OBSCURE THE TRUTH ABOUT MOST THINGS.

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# ATTILIO MASINI

TEXT Michael Taylor · PHOTOS Roberto Carrer



McLaren, for example, did not have the world's first carbon-fibre Formula One car. McLaren might have announced its car first, but Lotus had its carbon race car running on the test track a week earlier.

McLaren is also credited with having the first carbon-fibre supercar but, again, it was beaten to the punch, only this time, it was beaten by years, not days. And it was beaten by Lamborghini. The myth persists, but even while others are dwelling on false history, Lamborghini is moving on into the future. The technical tie-up with Boeing and the University of Washington means the world is finally understanding that Lamborghini is involved in carbon-fibre.

But the truth is now, as it's always been, that Lamborghini isn't just involved. The truth is that every other car company is, as they always have been, trying to catch up to Lamborghini's carbon technology. What's puzzling, though, is that to understand how far Lamborghini has always been ahead of its carbon-fibre rivals, you don't even need to plough through university libraries or explore government patent offices. In fact, all you need to do is to ask one man, because he's been there for almost all of Lamborghini's adventures in a technically difficult material that offers huge leaps forward in car design.

Attilio Masini is one of the world's leading carbon-fibre intellectuals and the author of dozens of books, articles and papers on the light-weight, super-strong material. But he's not just a laboratory boffin. He is a 25-year veteran of Lamborghini's Composite Materials Research & Development department and he has pushed more and more carbon into Lamborghini road cars with every model since the mid-1980s.

And, what's more, he's been the source of inspiration and a mentor for another of the world's leading carbon researchers, Professor Paolo Feraboli, whose work led to the Boeing 787 Dreamliner, saw the aerospace company team up with Lamborghini and with the University of Washington. And it has changed the face of carbon production. It's a tie-up that reinforces what the rest of the world's carbon enthusiasts have known for 25 years: if you want to understand something about this wondrously complex, high-tech material, all you have to do is turn up at Masini's doorstep.

He wasn't at Lamborghini when its composites department opened in 1983, but he arrived only two years later, straight out of military service and technical college and armed with a love of cars and an insatiable curiosity. Not only that, but he was born in May, under the sign of the Bull, and he joined Lamborghini in May as well. As was Lamborghini's way back then, even high-ranking people were put onto the production line to gain a full understanding of the impact their later decisions would make, and Masini was no different. "It was perfect for me," Masini admitted. "From my first ideas when I was a child, it was cars and design.

"When I came here and started working in production, I saw big differences for my passion for design. It turned my ideas from just design, like drawing and imagination, but design that could have an application."

After his five months putting Countachs together, he was drafted in to the two-year-old composites department in 1985, with just 40 square metres of space, another technical man and the head of the department who, as a nice twist, was an ex-Boeing engineer. The first sign the world had that the department existed was the front bumper bar on the Countach QV – the world's first use of carbon-fibre in a production car, just two years after carbon-fibre appeared in Formula One – but it wasn't to be the last.

"After we put that in production, we started on the engine cover, but we had to do two versions, because there was the injection version for the US and the carburettored version for Europe. It was very different to today, though. We had one oven, one vacuum pump and nothing was automatic or computer controlled. It was all pre-prag and it was very new then."

Then came the biggest breakthrough in carbon fibre production cars yet seen anywhere. Years ahead of anybody else, Masini and the tiny composites team built a carbon-fibre Countach. It didn't just have a carbon panel here and there, but it had a full carbon-fibre monocoque chassis and body. That Countach Evoluzione became a benchmark in automotive history and it proved once and for all Lamborghini's place in the pantheon of high technology. It may have looked like a normal Countach from the outside, but the Countach Evoluzione was stiffer, stronger and around 500kg lighter than a normal Countach.

It quickly became test-driving legend Valentino Balboni's personal favourite and he used its 5.2-litre, 490 horsepower V12 to clock 330km/h at Nardò's high-speed bowl.

"That was the most special car. We loved it, Valentino loved it. Everybody loved it," he said. It was completely in carbon-fibre – and you had to understand where everybody else was back then – but only the body parts were made to a production standard.

"Valentino drove it for a year and loved it. We could never get him out of it. The engine was the same as the standard production car, but it was stiffer, so it handled better, and it was hundreds of kilos lighter, so it went faster."

The Evoluzione no longer exists, though, because its experimental status saw it eventually smashed against a crash barrier to give Lamborghini another world first (the first crashed carbon-fibre supercar), along with another mountain of data to comb over.

"It passed, but it was destroyed. It was a prototype, so that was what it was for, but it is still a shame not to have it in the museum. Normally, even then, people would think about aluminium honeycomb for energy absorption, but we had done our homework and the front was a complete crash box from carbon."

With such a small composite department, there was a lot of trial and error – not to mention taking advantage of the most advanced tools in Europe at the time.

"We made a lot of experiments with Dallara (the Italian open-wheeled race car maker) because they had their own autoclave, which was very new and unusual in 1987. We used it to experiment with different processes, because they weren't even sure what to do with it so we had time there. We used to make the parts here and go up there to finish them in the autoclave."

But Lamborghini invested in its own autoclave in 1989 and the composites department has never looked back. Though the ability to build full-line carbon monocoque supercars was still a long way away, it was getting closer all the time. The Diablo was the first car to have composite body parts, because every panel other than the roof and the doors was carbon-fibre.

"I'd been offered a job somewhere else in the dark days, but when Audi bought the company, I saw that in the future Lamborghini would be the company that moved faster and pushed new ideas. That's one reason I chose to stay here." From the Countach, with around 10 percent of its body parts in carbon, the percentage leapt to 70 percent in the Diablo, then the Murciélago broke new ground by using carbon on structural parts, such as the wheel house and the transmission tunnel. The ascent of carbon composites at Lamborghini, then, has been a progressive and organic one that was always designed to keep moving forward without overstretching the technology or the company. Now, Lamborghini is the "go-to guy" for carbon for anybody in the Volkswagen Group, including Bugatti and Audi.

"For the Gallardo Spyder, for example, we collaborated with Audi to develop the new RTM technology for the roof and engine cover," Masini demonstrated. "The aluminium engine cover for the Gallardo Spyder was 18 parts and 22kg, but with carbon it is two parts and 15kg, so if you do it properly, you save time and parts and that improves the quality and also the performance."

If Masini makes carbon-fibre sound as simple as its future seems inevitable, that's because he's been working with it for so long and understands its intricacies like few others. "For a composite part, it can be made from carbon fibre and resin. That's it. It's the mix of these two elements that creates the parts and varies the strength," he insisted.







"The important point is to understand what you want and what you need before you start, and that allows you choose the best use and the best cost for industrialization. The key and the big advantage is to make the best integration. If it takes 20 parts of aluminium, I can make it with one part of carbon fibre."

But if Lamborghini's composites department flew beneath the radar of the world's mainstream motoring press, it was well known in the academic world and Masini's presentations became sought-after all over Europe. And one such presentation had a massive effect on carbon fibre's future in the wider world. It was at one symposium in Bomperto, Italy, that Masini was approached by a creative and promising student named Paolo Feraboli.

"He was very interested in how we were using carbon-fibre and he saw in me new ideas in carbon fibre use. He started with us while he was still studying and after three months, we began working on a building-block approach that was new to the field. We used this approach to develop a door completely in carbon-fibre and that had never been done before. It met the US and European homologation first time, because it even had a carbon-fibre intrusion bar. So with this building-block approach we developed that way a first step and it has lead to many, bigger steps since then."

Indeed it has. When Feraboli finished at the University of Bologna, he moved to the University of Santa Barbara in California for his doctorate, and he and Masini strengthened their connection by publishing a book and many other articles on the work they did together at Lamborghini. Feraboli eventually took a Professorship at the University of Washington, near Boeing, and it was his history and continued close connection to Masini that lead to the official research connection between Lamborghini, Boeing and the University late last year.

"He's a great choice. He knows the traditions here and knows what it is to be Lamborghini and he understands the industrialization we can do here," Masini said. "This new building-block approach, which is also used by Boeing, means we can create material parts before we create the final parts. That's so we can calculate the best process and the best cost and the best accuracy before we do the big thing.

It's important, because it's not like metal. If you use the same carbon-fibre properties and change the process, you get a different result, and we don't want that, so we have developed this approach. It's like a pyramid structure and at the top is the car. We do so much background work on each part before we ever start making a car.

We never reached the maximum performance of the material before because nobody used this approach before. Boeing uses this approach for the 787 for the first time and when we visited there, the plane is completely in carbon fibre and I saw a lot of integration. I saw that, like us, the plane has a lot of simulations before the parts begin.

After that I saw, like us, a similar method and a similar approach to the production of carbon fibre.

"The mainstream of carbon fibre has gone one way and I saw that Boeing was going another way, which was the same way we were going. They're doing it bigger – there are 19 tonnes of carbon fibre in a 787 and 85kg in a Murciélago – but it's the same way!" .....