



Media Information

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Top-notch BMW engineering, know-how and passion: the development of Alessandro Zanardi's driving systems, from 2003 to now.

- **Innovative ideas from the BMW 320i to the BMW M8 GTE.**
- **From the first modified brake pedal to the new hand-operated brake lever.**
- **Alessandro Zanardi: "What we have achieved here is also creating new opportunities for others."**

Munich. When BMW works driver Alessandro Zanardi (ITA) climbs behind the wheel of the BMW M8 GTE at the 24 Hours of Daytona (USA, 26th/27th January), he will embark on the latest chapter of his unprecedented career. Zanardi has enjoyed success in BMW race cars for many years. Just two years after his crash in a CART race at the Lausitzring, which resulted in the loss of both legs, he was back driving a specially modified BMW 320i in the 2003 European Touring Car Championship. Since then, he has raced for BMW M Motorsport in various series. In the process, he and the BMW M Motorsport engineers have been continually perfecting the systems that allow him to race. From the BMW 320i, the BMW Z4 GT3 and the BMW M6 GT3 to the BMW M4 DTM and the BMW M8 GTE: an overview of the continual further development of the modifications to Zanardi's BMW race cars.

"When I woke and realised that I no longer had legs, I did not ask myself: What am I going to do without legs? Instead, I thought: Okay, what do I need to do to be able to do everything I want to without legs," says Zanardi, recalling the time immediately after his crash on 15th September 2001.

His plans included a speedy return to racing. He did initially encounter a degree of scepticism regarding his comeback plans. After all, a double leg amputee was something new in the world of motorsport: "People were afraid that something could happen to me. However, if I break a leg, all I need is a screwdriver to repair it," he





explains, with his typical self-deprecating humour. “When I had to do the medical checks to get my licence, they performed countless examinations. I felt like they were just looking for an excuse to say: ‘Sorry, you can’t do it’. When they examined my head, I told them: ‘Hey guys, I lost my legs in the crash, not my head!’”

But not everyone was sceptical. In Munich, Zanardi was welcomed with open arms. “I was fortunate that a fantastic company like BMW was interested in the project. They were really interested in doing something more than just showing how technically advanced their methods were, and how good their cars are. It was about what a person needs. And the rest is history – here we are now.”

BMW 320i and BMW 320si – ETCC and WTCC.

The story began in 2003 with the BMW 320i. Together with BMW Motorsport and BMW Team Italy-Spain, which belonged to touring car legend Roberto Ravaglia (ITA), Zanardi planned to race at the season finale of the European Touring Car Championship (ETCC) at Monza (ITA). “At first, I thought that I would have to do everything with my hands. With the first system, I was braking with a ring on the steering wheel. I used another ring to accelerate and operated the H gearbox with my right hand. My fingers operated the clutch, via a button on the gear lever. I was basically steering using just the ball of my thumbs,” he recalls. “That was definitely too much. When I came back to the garage after the first test, I said to the guys: ‘I have so much to do, I am turning with my arms and hands – but if you could put a little brush between my legs too, then I could also sweep the cockpit.’”

And so it was that Zanardi suggested using his artificial legs: “The engineers were a little sceptical, but I was sure that I could apply enough force to the brake pedal if my artificial leg was attached to it and I could use my hips to apply downward pressure. All we had to do was to develop a brake pedal to which my artificial leg could be permanently attached. That proved to be a very efficient solution. I noticed in the very first test that I could not only apply the necessary pressure, but was surprised by how well I could control the pressure and feel the brake pedal.”

The system was decided upon: a ring on the steering wheel was used to accelerate, the brakes were operated via his artificial leg and the brake pedal, and the H gearbox was managed with his right hand. This system was then used in competition: in the ETCC from 2003 to 2004 and then from 2005 to 2009 in the FIA World Touring Car Championship (WTCC), in which Zanardi claimed four race wins in the BMW 320i





and BMW 320si. Over the years, the system was consistently optimised and made more efficient.

BMW Z4 GT3 – Blancpain GT Series.

Having focussed solely on his second passion, paracycling, for several years after 2010, Zanardi announced his return to motor racing in 2014. He competed for Ravaglia's team in the Blancpain GT Sprint Series – this time in a BMW Z4 GT3. "We transferred everything we had developed for the BMW 320i to the BMW Z4 GT3. It all worked perfectly," says Zanardi. One of the few differences was that he no longer changed gears using the H gearbox, but via shift paddles on the steering wheel.

However, circumstances then resulted in another big step forward: in 2015, Zanardi raced alongside Timo Glock (GER) and Bruno Spengler (CAN) in the 24 Hours of Spa-Francorchamps (BEL). He was now sharing the cockpit with other drivers – and the BMW engineers were faced with the task of modifying the BMW Z4 GT3 to allow both Zanardi and his non-physically impaired team-mates to drive the car. The result was a "very, very clever solution," to quote Zanardi.

"I showed the engineers in Munich my artificial leg, which is a hollow tube, and suggested that we could replace the brake pedal with a system, in which a kind of pin was slid into the prosthesis," the Italian reports. "They embraced the idea and developed a very thin brake pedal for me, which was fitted to the very right of the pedal box. Timo and Bruno used the normal accelerator and brake pedals in the middle of the pedal box."

The two brake pedals were linked and moved simultaneously. The clutch pedal was also removed completely from the pedal box and replaced with a clutch-by-wire system. This system was controlled using two clutch paddles. Instead of the clutch pedal, a footrest was fitted to the left of the pedal box for Zanardi. This gave his body extra support when braking. Zanardi's steering wheel was also completely new at Spa. It was based on the steering wheel he had used previously in the BMW Z4 GT3, but had been optimised in many areas.

BMW M6 GT3.

When Zanardi made his debut in the BMW M6 GT3 in 2016, the system was improved yet further. The clutch actuator was replaced by a fully-automatic centrifugal clutch, which was developed by ZF, Premium Partner of BMW M





Motorsport. This opens and closes automatically at a certain engine speed and need no longer be operated by the driver. For Zanardi, the system has the major benefit that he no longer needs to operate a clutch lever with one of his hands.

However, that is not the only reason that Zanardi is impressed by the centrifugal clutch: “It is astonishing how well this mechanism works. This clutch is extremely reliable. The wear is minimal and so there are fewer problems with this solution than with a standard clutch. Since we installed it in the car, it has done its job perfectly for us. When you set off again after the pit stop, it is impossible to stall the engine. Plus, it doesn’t matter whether the tyres are cold or warm. Whenever you set off, this clutch can manage the grip – probably better than a standard system.”

Zanardi’s debut in the modified BMW M6 GT3 was a great success: he took a highly-acclaimed victory in Sunday’s race at the season finale of the Italian GT Championship at Mugello (ITA).

BMW M4 DTM and BMW M8 GTE.

“The system we had in place at that point allowed me to be quick, even for a number of laps. But to be honest, it was really difficult to sit in the car for a long time, to really be of any assistance to my team over the duration of a 24-hour race,” says Zanardi. As he has no legs, he lacks important extremities, which help to cool the body through blood circulation. Furthermore, the close-fitting shafts of his artificial legs do not allow any perspiration: “Every time I climbed out of the car, I was thoroughly baked through.”

It was clear to Zanardi that he would be able to drive for far longer and feel more comfortable in the car without his prostheses. As such, he sat down with the BMW M Motorsport engineers in Munich and came up with a completely new system: a system, that would allow Zanardi to operate everything with his arms and hands. This would have been an issue in the BMW 320i in 2003, due to the H gearbox, however, the modern transmission in today’s GT race cars and the now established centrifugal clutch opened up new possibilities. This was initially tested in the BMW M6 GT3 and then given its first acid test, which it passed with flying colours when Zanardi made a guest appearance in the DTM at the wheel of the BMW M4 DTM at Misano in August 2018. All of this was leading up to one goal: Zanardi’s start in the BMW M8 GTE at the 24 Hours of Daytona.





The brake pedal was replaced by a brake lever, which Zanardi pushes forward with his right arm. This is mounted on the transmission tunnel and connected to the brake. Zanardi accelerates using a throttle ring on the steering wheel, which he predominantly operates with his left hand. He can change gear using a shift paddle on the steering wheel. At the same time, a switch is also attached to the brake lever, with which he can shift down through the gears when braking into corners.

Thanks to the hand braking system in the BMW M8 GTE, the physical problems Zanardi has struggled with in the past are no longer an issue. “If the regulations allowed it, I could do a 24-hour race on my own now,” he says, chuckling. “I am really comfortable in the car without my artificial legs. It is obviously a little bit more complicated, because I have so much to do with my arms and hands – but from a physical point of view it is like chalk and cheese.”

Passion is the key.

From the initial drafts in 2003 to the hand braking system in the BMW M8 GTE – development never stands still in the Zanardi project. For the Italian, being able to drive a GT race car without his prostheses is like “winning the race”. However, Zanardi is keen to stress that none of this would have been possible without the tireless efforts of the BMW M Motorsport engineers: “It obviously takes skill and effort – but above all that, you need passion. When the engineers are taking their work back home with them to their families, that shows how passionate they are. What we have here is the result of an enormous amount of commitment and passion, coupled with immense expertise.”

The hand braking system in the BMW M8 GTE also opens “a new dimension,” he emphasised. “BMW has introduced another real innovation with this. This system also works for others. Anyone who is unable to use their legs but has two arms could drive this car.”

When he wanted to race again after his crash, he was met with great scepticism. That would not be the case today – and Zanardi and BMW M Motorsport have been instrumental in changing this attitude: “It has been a long road, but I believe that what we have achieved has also created new possibilities for others. No longer does anyone ask whether a disabled driver can race. Take Frederic Sausset: he had both his legs and arms amputated and still raced in the 24 Hours of Le Mans in 2016. Or Billy Monger. The only thing people want to know nowadays is how good a driver





you are. Disabilities do not matter, as they know that you can overcome them with special solutions.”

An overview of Alessandro Zanardi's driving systems.

BMW 320i and BMW 320si (2003-2009): Modified brake pedal, attached to the artificial leg; steering wheel with ring for accelerating; gears changed using H gear lever, operated with right hand

BMW Z4 GT3 – Blancpain GT Series (2014): Modified brake pedal, attached to the artificial leg; steering wheel with ring for accelerating; gears changed using shift paddles on steering wheel

BMW Z4 GT3 – 24h Spa (2015): New, very thin brake pedal added to the pedal box and inserted into the prosthetic leg like a pin; steering wheel with ring for accelerating; gears changed using shift paddles on steering wheel; clutch-by-wire system with clutch paddles

BMW M6 GT3 (2016): Thin brake pedal, similar to 24h Spa; steering wheel with ring for accelerating; gears changed using shift paddles on steering wheel; newly-developed centrifugal clutch

BMW M4 DTM and BMW M8 GTE (2018-2019): Hand-operated brake lever for braking; steering wheel with ring for accelerating; upshift via paddle on steering wheel, downshift via button on brake lever, centrifugal clutch

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