BMW Yachtsport

Press Information
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From sailing to flying: Aerodynamics have become a key factor in the America's Cup.

Technology Partner BMW supports Defender ORACLE TEAM USA with know-how and infrastructure.

Munich/New York. The ability of the America's Cup catamarans to foil – that is, to fly across the surface of the water on daggerboards – has revolutionised the "Formula One of sailing". This applies on the one hand to the crew, but also to the design team: aerodynamics play a far greater role in yachts that travel across the regatta course almost completely out of the water. In the pursuit of aerodynamic advantages, Defender ORACLE TEAM USA can rely on Official Technology Partner BMW, who bring valuable expertise, a wealth of experience and an ultra-modern infrastructure from the world of automobile design.

"Everything above the surface of the water can be optimised exactly the same way as we do with our cars," said Holger Gau, BMW expert in the field of 3D simulation methods. "We look at turbulence, we look at wakes, and we try to minimise resistance by modifying shapes." When performing these tasks, the BMW engineers can call upon the outstanding infrastructure at the BMW Group Research and Innovation Center (FIZ) in Munich: one of the largest wind tunnels in the world, which can achieve wind speeds of up to 300 km/h, and huge computer capacity. "The BMW Group is very well equipped on the virtual side," said Gau. "Different software tools allow us to assess the aerodynamic qualities of the boat and to optimise them virtually. The testing and fine-tuning then takes place in the wind tunnel. This procedure is similar to the one used when developing cars. It is all about combining the benefits of both worlds – digital and in the wind tunnel – as efficiently as possible."

Ian Burns is the ORACLE TEAM USA Performance Director and values the support of the Munich-based car maker. "America's Cup campaigns are like startups – there is a high emphasis on time to market and developing, producing and repeating the cycle as many times as possible. This doesn't always involve deep technology from the world's best engineers and scientists. Having access to these resources is where BMW provides a huge advantage," he said.

At the 35th America's Cup, the design of large parts of the platform, above all the hulls, is specified in the regulations. When it comes to optimisations, there are not that many things that the engineers can actually modify. One of them is the connection of the cross beams to the hulls. Here, Gau and his team are working on improving the shape of the beam to allow it to perform better, particularly when the airflow is coming in diagonally from the front. "On the aerodynamics side, BMW has an excellent knowledge of how exactly to improve these detailed modifications to the connection points," explained Gau. "Furthermore, we BMW engineers have an extraordinary wealth of experience in designing prototypes from the automobile sector. That helps enormously during development, as we know the answers to questions in this area: How do you connect such parts? How can you measure the differences?"

The aerodynamics at the FIZ also work on the position of the crew, to ensure that the sailors generate as little drag as possible. "We want to find out the ideal positions when performing various manoeuvres. Must the sailors position themselves in each other's slipstream? Must they sit lower in the hull? Do we need something upstream, like the windscreen on a motorcycle, to minimise the crew's aerodynamic drag?" said Gau, who brings with him valuable experience in this area from another high-tech sport: BMW is also Technology Partner of the German Bobsleigh, Luge, and Skeleton Federation, a role that sees it assist with the aerodynamic optimisation of the bobsleighs and luges of the German athletes, who have enjoyed great success at world championships and the Olympic Games.

The process is similar. For the America's Cup project, Gau began by comparing the virtual methods, as BMW and ORACLE TEAM USA use different software. This alignment is important, as the defending America's Cup champions also develop the design virtually at first. "In the second step, we use our methods to provide input on the places where there is still room for improvement," Gau explained. "After that we head to the wind tunnel. We can, for example, test the crew positions with various superstructures. In the tunnel, we develop potential improvements, which we then test virtually on the complete model. At some point you have identified so many improvements that it is time to put them into practice on the real boat." That boat is the yacht charged with helping ORACLE TEAM USA to its third successive America's Cup victory next summer. Should the team achieve the "three-peat" in Bermuda, the BMW aerodynamics specialists at the other end of the world will know they have once again done an outstanding job.

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