

Media Information
20 November 2008

Super sleds - in search of vital milliseconds.

German Luge and Bobsleigh teams undergo aerodynamic testing in the BMW wind tunnel.

Oberhof / Munich. With speeds on international sliding tracks rising year on year, optimum aerodynamics are becoming a decisive success factor for competitors in Bobsleigh and Luge events. Which explains why German athletes have been coming to the BMW Group wind tunnel to test their sports equipment for over 20 years now. In a sport where victories are often decided by thousandths of a second, it can fairly be claimed that the precision data provided by the BMW Group wind tunnel may literally be worth gold.

Cars are tested at the BMW Group wind tunnel on a daily basis to optimise aerodynamic drag, lift and flow profile. The findings play a part in reducing fuel consumption and increasing dynamic performance. The wind tunnel is also used to test acoustics, comfort, cooling and dirt build-up. Tests involving the athletes, on the other hand, serve mainly to determine drag, which should be as low as possible – even with speeds approaching 150 km/h.

The 2007/2008 season proved outstandingly successful for the Bobsleigh and Luge Federation for Germany (BSD). Seven out of a possible eight World Cup gold medals for Bobsleigh and Luge were won by German sliders. In addition, the German team scooped all the titles at the World Championship in Altenberg. But success like this does not come by accident. Just last June the new prototype four-man bobsleigh was put through its paces for the forthcoming season at the BMW Group wind tunnel to measure aerodynamic drag, lift and downforce. The Luge team was also able to use the wind tunnel to optimise body positions, materials and equipment. A crucial element of testing is the accuracy with which data is measured, as well as the ability to test equipment at high speeds. The BMW wind tunnel is just such a facility. And it was an honour for the BMW Group aerodynamics engineers to lend the athletes a hand in their quest for Olympic gold.

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Cars and bobsleighs are actually not that dissimilar. “The main difference is that our vehicles have wheels, whereas the bobsleighs have runners. Otherwise the principles are the same,” explains Hans Kerschbaum, Head of Aerodynamics at

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the BMW Group. Of course, the bobsleigh's frontal area is much smaller – more akin to that of a motorcycle than a car; but the C_d figure, or drag coefficient, is higher than for many current car designs. For example, the latest BMW 3 Series has a C_d value of 0.26, compared with between 0.32 and 0.35 for a bobsleigh.

Tensing muscles at over 140 kilometres per hour.

Aerodynamics are particularly critical for luge racers. Even more so than for bobsleigh racers, equipment set-up and body position are crucial. Which is why in September, Germany's luge specialists were invited to visit the BMW Group wind tunnel. Patric Leitner and Alexander Resch, the highly successful veteran doubles team, have their sights set on the 2010 Winter Olympics: "We still have a score to settle as far as the Olympic Games are concerned, because sixth place in Turin was not what we had hoped for. That's why we're determined to make the start in Vancouver and fight for a medal. This will be our last race – and we would love to crown it with a place on the podium."

To achieve this they honing what might appear to be minor details such as foot position. Norbert Loch, the Luge team's chief coach, gives an insight into wind tunnel testing: "We evaluate the best foot position for each individual athlete; then they go away and train so as to reproduce this optimum position under competitive conditions." Measurements in the wind tunnel show up even the slightest variations. Weight sensors under the sled also record minute differences in lift or downforce, i.e. values measured in grams. And smoke plumes allow the experts to observe any turbulence – with a luge racer this is usually around the feet, in cars behind the wing mirrors, for example. In either case, what matters are position and angle.

The doubles team of Tobias Wendl and Tobias Arlt describe the sensation of lying down in hurricane-force wind speeds: "Sure, your muscles tighten up. It forces you to keep your body taut. After three minutes in the wind tunnel you realise you are starting to lose concentration." Reigning singles champion Felix Loch and runner-up David Möller also placed themselves at the mercy of the wind forces. Testing for the women's team was undertaken by Tatjana Hüfner and Natalie Geisenberger.

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The medal hopefuls were also eager to see the results with the new sled, since these are made-to-measure. Thomas Schwab explains the detail: "We modified the trim on the underside of the sled and adapted it to fit each competitor more closely. Here in the wind tunnel our aim is to optimise the racing position of individual competitors for their specific sled." Schwab knows what he's talking about. As a practitioner of the luge, he too has spent time lying in the BMW wind tunnel.

High-speed testing for the four-man bobsleigh.

Last season got off to a problematic start for the four-man bobsleigh crew. So chief coach Raimund Bethge has accorded this sled top priority. This year the new prototype was sent for testing in the BMW Group wind tunnel back in June in preparation for the forthcoming season.

Comparative tests between last season's sled and the prototype have so far proved promising. Figures for aerodynamic drag and lift were much improved, despite the athletes benefiting from extra space. But this did not stop the engineers from immediately trying out a range of modelled front ends to gauge the effects these had on the sled's front-end lift.

Bethge is already looking further ahead – to the 2010 Winter Olympics in Vancouver: "Whistler is a high-speed sliding track, so aerodynamics will play a very important role – which is why our preparations are already in full swing." Triple Olympic champion Kevin Kuske explains the importance of wind tunnel testing: "Many people may not realise it, but like cars we operate at relatively high speeds – up to 160 km/h and in Vancouver maybe even in excess of 160 km/h."

At the end of the day's testing there are contented faces. Even the secretary general of the BSD, Thomas Schwab, is smiling: "We were looking for an improvement in overall aerodynamics and today's results suggest this may be achievable – linked, of course, to improvements on the track." Having seen the results for himself, B-team pilot Karl Angerer needed no further convincing of the potential of the new bobsleigh: "I think we can expect it to be faster – it might be

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a tenth of a second or just a few hundredths. But in bobsleigh every hundredth counts. If we've sliced off a couple of hundredths, then that's a real result for us.”

Sound partners for efficient dynamics.

The BMW Group is delighted that its wind tunnel test facilities have been playing a part in the success of Germany's Luge and Bobsleigh teams for over 20 years. A cooperative venture between the BMW Group's Heat Treatment Centre and the Luge team has been ongoing since the 1990s. This is where luge runners have been optimised for the past few years.

Precision measurements even at high speeds are the basis of vehicle development. And it is this precision, made possible by the BMW Group wind tunnel, that gives a decisive competitive edge to athletes for whom victory is often measured in milliseconds.

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