

Media Information
24 November 2023

German Bobsleigh, Luge and Skeleton Federation is starting the new season with the 'BMW Data Coach' and spikes from BMW 3D printers.

+++ Technology transfer from the automotive industry to the ice track +++ Data-driven optimisation of material and driving line in luge +++ Individualised spikes from the 3D printer for faster starts in bobsled +++ Two home World Championships as season highlights +++

Munich. The German Bobsleigh, Luge and Skeleton Federation (BSD) is facing a new season that holds two highlights in front of a home audience: the FIL World Championships Luge (January 22-28, 2024, Altenberg) and the BMW IBSF World Championships Bobsled and Skeleton (February 19 to March 3, 2024, Winterberg). The BSD aims to continue its success in the World Cup and international events, and is building on the technology partnership with the BMW Group that has existed since 2010.

The BMW Group expertise, technological capabilities, and innovations in the automotive industry and motorsport particularly benefit disciplines where material plays an important role, such as luge, bobsled, and skeleton. At the BSD season-opening press conference at the BMW dealership in Dresden, the two projects on which the BMW technology transfer is focused this season were presented: the 'BMW Data Coach' in luge and spike plates for shoes in bobsled.

Data-driven optimisation of material and driving line.

The system of sled and luge athlete on the ice track is a combination in which many factors play a role and influence each other. The fundamental task in luge is to optimise as many variables as possible to achieve the best run time. The 'BMW Data Coach' provides significant added value in this regard. It is a data-driven evaluation and optimisation of relevant factors in the interaction between sled and athlete. This optimal interaction differs from person to person

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and from track to track. Therefore, an individual and location-dependent setup is required, just like in motorsport.

The basis for this are measurement and simulation methods that provide luge athletes with new opportunities for individual development and tuning of their sleds, as well as identifying the ideal driving line. This approach has long been established in vehicle development and motorsport. Since 2016, the BMW Group and BSD have been working together on this technology in luge and continuously refining it.

Special sensors in the sled record a variety of driving data, which can be precisely reconstructed on the ice track thanks to a special evaluation software. The software was developed by former luge junior world champion Dr. Julian von Schleinitz, who benefits from his experience as an athlete and his expertise as a data scientist at the BMW Group. With the data collected over the years, the 'BMW Data Coach' is increasingly able to determine the ideal driving line and optimise components and tuning of the sports equipment.

Von Schleinitz goes one step further: the data set is now so large that, in combination with computer simulations, predictions about the use of new components and setups can be made, or working hypotheses can be checked on the computer. This makes it possible to simulate a much larger number of variables in the complex system of luge and athlete virtually, more efficiently than if components had to be built and tested or driving lines had to be tried out.

The characteristic of the Altenberg World Championships ice track makes the 'BMW Data Coach' particularly valuable. The track is very long, making optimal sled tuning even more important. The same applies due to the numerous abrupt curves, entrances, and exits, as well as the pressure of more than 7G when entering the 'Kreisel'. Another setup factor in Altenberg, where the 'BMW Data Coach' helps, is the many open straights, whose ice is exposed to much greater weather influences than in covered ice tracks.

Interestingly, the data also showed that the top luge athletes Max Langenhan and Felix Loch drive significantly different lines in Altenberg. In simulations, the perfect combination of both lines should be calculated, learned by the athletes, and implemented in competition until the World Championships. Optimising such details gives the BSD an advantage in Altenberg for another reason, namely that the track has been on the competition calendar for a long time and is well known to international competitors, which reduces the home advantage.

Accelerating with 3D Printing.

It's no secret that start times play a crucial role in bobsleigh, determining the speed the sled carries into the ice channel – there's no 'pedal' afterwards. To translate the athletes' strength in pushing on ice into the acceleration of the sports equipment, the right footwear is crucial. The power transfer occurs solely through spike plates on the forefoot soles. Each shoe has more than 250 small, sharp teeth that must exert immense forces on the ice. Improvements to these plates directly lead to optimising performance on the ice track.

Once again, the technology transfer from automotive development and manufacturing has been enhancing the spike plates for the past three years for BMW and BSD. 3D printing is an established innovative method today, and BMW's technology experts have been using it since 1991, integrating 3D printing across the entire product lifecycle, from the conceptual idea of a vehicle to production and even for spare parts.

This technology is perfectly suited to the spike plates in bobsleigh, which, until now, was essentially off-the-shelf. 3D printing opens up entirely new possibilities. Performance factors such as geometry – where exactly the spikes placed, the number of struts and teeth, and the weight can be efficiently varied. The spike plates can be printed quickly and inexpensively, tested by athletes until the optimal result is achieved. There is no longer a standard; the efficiency of the

process allows for the production of individual plates for each athlete. The ongoing optimisations are expected to be completed by the 2026 Winter Olympics. The experts are also targeting the stiffness of the plates and, consequently, the shoes because not every athlete performs best with the same shoe stiffness.

Another milestone in this journey was reached this year. Various materials for 3D printing are now available for the spikes, tested by athletes. The use of special construction software is also new. It is utilised to optimise components for vehicles as well as equipment for BMW Group production systems in terms of weight and stiffness. This software also aids engineers at the BMW Group in designing the spike plates. It allows for the rapid, automated, and, above all, individually tailored creation of the respective 3D print data. The preferred parameters of each athlete – such as geometry, stiffness, number, and shape of spikes – are automatically incorporated into the design and adapted to the individual plates, based on 3D scans of the athletes' shoes. This algorithmic design process results in significant time savings and maximum variability.

Strong Partner in Bobsleigh, Skeleton, and Luge Sports.

In the 2023/24 season, BMW is not only present as a technology partner for BSD at international ice tracks but also continues to be the title partner for the BMW IBSF World Cup Bobsleigh and Skeleton and the BMW IBSF World Championships Bobsleigh and Skeleton. Additionally, BMW remains the main sponsor for the FIL Luge World Cup and the FIL World Championships Luge.

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The BMW Group

With its four brands BMW, MINI, Rolls-Royce and BMW Motorrad, the BMW Group is the world's leading premium manufacturer of automobiles and motorcycles and also provides premium financial and mobility services. The BMW Group production network comprises over 30 production sites worldwide; the company has a global sales network in more than 140 countries.

In 2022, the BMW Group sold nearly 2.4 million passenger vehicles and more than 202,000 motorcycles worldwide. The profit before tax in the financial year 2022 was € 23.5 billion on revenues amounting to € 142.6 billion. As of 31 December 2022, the BMW Group had a workforce of 149,475 employees.

The success of the BMW Group has always been based on long-term thinking and responsible action. The company set the course for the future at an early stage and consistently makes sustainability and efficient resource management central to its strategic direction, from the supply chain through production to the end of the use phase of all products.

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