

Media Information

6 November 2025

Technology partners BMW and the German Bobsleigh, Luge, and Skeleton Federation fine-tune final details ahead of the Olympic Winter Games.

+++ Automotive technologies from the BMW Group powering the hunt for Olympic hundredths on the ice track
+++ Development of customised spike shoes for bobsleigh and skeleton athletes reaches the next level
+++ Data-based optimisation of material and racing line in luge for the new Olympic track in Cortina (ITA)
+++ Images and video material available on the joint technology projects +++

Munich. At the Olympic Winter Games 2022, Team Germany celebrated twelve gold, ten silver, and five bronze medals. The German Bobsleigh, Luge, and Skeleton Federation (BSD) contributed the majority of them - nine golds, six silvers, and one bronze in Beijing (CHN). It was an outstanding team result that the national bobsleigh, skeleton, and luge squads are eager to repeat when the next Olympic Winter Games take place in Milan and Cortina d'Ampezzo, Italy (6–22 February 2026). Achieving that requires hard work in every area and a constant pursuit of optimisation. To this end, the BSD continues to rely on its technology partnership with the BMW Group, established in 2010.

Drawing on BMW's expertise, technological capabilities, and innovative strength from automotive engineering and motorsport, two projects have been advanced for the 2026 Olympics - both designed to deliver those decisive fractions of a second in the ice track: the BMW Data Coach in luge and customised spike plates for bobsleigh and skeleton shoes.

Individual spike shoes for greater push-off performance.

It's no secret that start times in bobsleigh and skeleton are crucial, as they determine the speed athletes carry into the run - there's no "gas pedal" after that. To translate their athletic power into acceleration on ice, athletes depend on the right footwear. The force is transmitted

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solely through spike plates on the forefoot, with more than 250 small, sharp spikes per shoe gripping the ice and converting energy into motion. Any improvement to these plates directly enhances performance in the track.

Surprisingly, standard shoes are typically used in bobsleigh and skeleton - without considering athletes' individual preferences or anatomical differences. The BMW Group identified optimisation potential and, together with the BSD, began developing custom spike-plate prototypes ahead of the 2022 Winter Olympics for skeleton athletes. These plates can be mounted onto any preferred track-and-field shoe using existing spike threads for secure fastening.

Manufactured at the BMW Group Additive Manufacturing Campus in Munich, the spike plates are produced using 3D printing - a process BMW has been employing since 1991 across the entire vehicle lifecycle, from concept to production and spare parts. This highly efficient process uses a specialised design software that allows fast, automated, and athlete-specific generation of 3D-print data. Parameters such as geometry, stiffness, and spike shape are customised and adapted to each athlete's shoe using 3D scans. This algorithmic design process offers enormous time savings and maximum flexibility as plates can be printed, tested, and re-optimised in rapid cycles.

The 3D-printed spike plates made their World Cup debut last season, with teams such as Adam Ammour's using them extensively. However, development continued - athlete feedback and summer gait analysis data revealed that some athletes performed better with softer soles and plates. As a result, a second development track was launched, strongly supported by Felix Straub, brakeman for Francesco Friedrich's team. In this version, the plates are milled from nylon, fitted with steel spikes, and then glued and riveted to the shoe.

A key material challenge is ensuring the steel spikes withstand extreme loads without wearing or breaking. BMW specialists in materials and

process engineering developed a solution: the spikes are plasma-nitrided - a hardening process in which nitrogen is ionized in a vacuum at high temperature and diffuses into the steel, improving surface hardness. BMW uses this technique for crankshafts in BMW Motorrad engines and in motorsport applications.

Now, all athletes on the German bobsleigh and skeleton teams can choose between both systems, test them extensively before the Olympics, and select their preferred option. After four years of development, the result is a range of individualised options for every athlete, foot type, shoe model, running style, and push-off position - replacing the one-size-fits-all solution.

Data-driven optimisation of material and racing line.

In luge, the interplay between athlete and sled involves many interdependent factors — optimising as many as possible for the best run time is the key challenge. The BMW Data Coach delivers a major advantage by enabling data-based analysis and optimisation of these factors. The ideal interaction varies between athletes and tracks, much like individualised car setups in motorsport. For the 2026 Games, a new ice track has been built in Cortina, with only a limited number of runs available before competition - making data-driven insights even more valuable.

Based on measurement and simulation methods, the Data Coach gives lugers new ways to fine-tune their sled setup and identify the ideal racing line. This approach is well-established in vehicle development and motorsport. Since 2016, the BMW Group and BSD have been applying and refining these methods in luge.

Special sensors installed in the sled record extensive dynamic data, allowing each run to be precisely reconstructed using dedicated analysis software. The software was developed by former Junior World Champion luger Dr. Julian von Schleinitz, now Head of Tech Excellence at the BMW Group, who combines his athletic experience with

engineering expertise. Over the years, the growing dataset has made the BMW Data Coach increasingly effective in identifying optimal lines and refining sled setups.

Today, the data volume is so large that - combined with computer simulations - it allows predictive testing of new components and configurations virtually, before any physical prototype is built or a new line is tested on track. This significantly increases efficiency and insight within the complex system of sled and athlete.

For the Olympic season, the system - used extensively by 13-time World Champion Felix Loch and six-time World Champion Max Langenhan - has been further enhanced. The sensors now deliver more precise readings on wet ice, and the hardware has been miniaturised to fit into a regulation-compliant racing sled. This marks a major step forward, as the measurements now come from a sled identical to competition equipment.

During the first international training period in Cortina in late October and early November, valuable data were already collected. These will now be analysed in detail to shape the Olympic race strategy. A second test event at the Olympic track in late November will offer another opportunity for refinement - before the athletes battle for gold in February 2026, where every thousandth of a second counts.

Further information, images, and video material:

BMW Group 3D-printed spike plates:

<https://www.press.bmwgroup.com/global/article/detail/T0439879EN/customised-spike-plates-from-bmw-group-3d-printing-accelerate-the-german-bobsleigh-national-team>

The BMW Data Coach:

<https://www.press.bmwgroup.com/global/article/detail/T0439282EN/bmw-data-coach%E2%80%99-on-hand-as-world-championships->

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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 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 2024, the BMW Group sold over 2.45 million passenger vehicles and more than 210,000 motorcycles worldwide. The profit before tax in the financial year 2023 was € 17.1 billion on revenues amounting to € 155.5 billion. As of 31 December 2023, the BMW Group had a workforce of 154,950 employees.

The economic success of the BMW Group has always been based on long-term thinking and responsible action. Sustainability is a key element of the BMW Group's corporate strategy and covers all products from the supply chain and production to the end of their useful life.

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