SMB

STRABAG - MAX BÖGL

Automotive Proving Grounds

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SMB Construction International GmbH (SMB) is the result of years of mutual trust and successful collaboration between the companies STRABAG and Max Bögl in the construction of automotive proving grounds. In this specific sector of road construction, highly developed construction techniques and innovative plant and equipment are used to satisfy the high demands of the automotive manufacturers.

SMB has pioneered the way particularly in the construction of very steep sloped curves on highspeed tracks. A highly motivated team of employees with the best technical training and the meticulous preparation of individual projects are part of our skillset. Giving expert advice to the employer and designer at an early stage is part of our business philosophy.

An additional part of the SMB business is the construction of safety driving centres whose extreme tracks and unusual lane designs with challenging surfaces and unexpectedly occurring obstacles that train drivers skills. SMB has comprehensive expertise and experience in the construction of landmark projects.

Thanks to numerous successfully completed projects, we are trusted by major companies in the automotive industry. It is essential to reconfirm this trust consistently. With a high degree of dedication and flexibility, the SMB team rises to the constantly changing and growing challenges of the international automotive industry.

Dr. Markus Limbach
STRABAG International GmbH

Klaus Görgner
Max Bögl Group


STRABAG – MAX BÖGL

Unique plant and equipment

for the construction of parabolic-shaped banked curves

With the development of a globally unique range of plant and equipment for the construction of parabolic-shaped banked curves, STRABAG and Max Bögl – here united as SMB – demonstrate the highest degree of innovation and experience in this specialist area, road construction. The accurate high-quality laying of all road surfaces is made possible by state of the art technology in the form of a highly developed bridge paver and the reliable accurate compaction by precisely controlled rollers.

With the greatest precision, the bridge paver can lay asphalt courses as well as gravel base courses (and hydraulically stabilised base courses) in level, inclined and parabolic surfaces. The paving screed is replaceable and can be adapted to any width required to be able to produce the lane in one piece without any longitudinal joints.

Highly-precise sensors scan the reference rails on the side next to the paver chassis horizontally and vertically and transfer this data on to the central computer. This enables the various hydraulic systems to accurately move the paver chassis and the screed to the required positions.

The bridge paver is fed using the storage tank mounted on the side which is filled by either using a refilling machine or by an excavator or wheel loader. Screw feeders and conveyer belts carry the material to the paving screed, which ensures an even distribution of the mixture over the entire width.

The accurate compaction of the parabolic surfaces is carried out by specially-shaped rollers, which are guided by supporting equipment with electronically-controlled hydraulic cable winches. Rollers with differing drums are used depending of the shape of the parabolic or transition curve.

This unique and specialized laying method without joints combined with maximum compaction achieves the best possible quality and displays very good long-term characteristics over decades.

Circular and oval tracks

with parabolic-shaped banked curves

New vehicles must be carefully planned and designed. They have to outclass the predecessor model with technical innovations and quality improvements, be superior to the competitor's product and be brought to market as quickly as possible. Part of this ever-shorter development cycles is the testing in the open, on snow and ice, on „torture tracks" and in endurance tests.

To test endurance, SMB builds individually tailored test tracks all over the world: High-speed ovals or circular fast tracks with banked curves enable driving without centrifugal force at speeds of up to 250 km/h or more depending on the chosen curve radius. The SMB bridge paver makes it possible to construct banked curves with up to 49° cross incline. The curve transitions are usually created in the shape of sinusoids, Bloss or McConnell-curves.

For the reconstruction of deteriorated fast lanes, which are frequently re-designed with steeper and therefore faster curves, it is necessary to mill off the existing road profile precisely to a newly defined level. SMB has developed modern milling technologies for this purpose and has already implemented them successfully.


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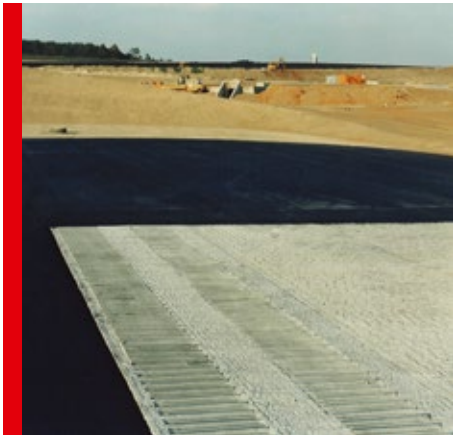
Special surface courses

Gradient tracks

Tiled section / skid pads



Concrete surface courses

Water handling track

Level crossing

Tracks for endurance and individual testing

Special Surfaces

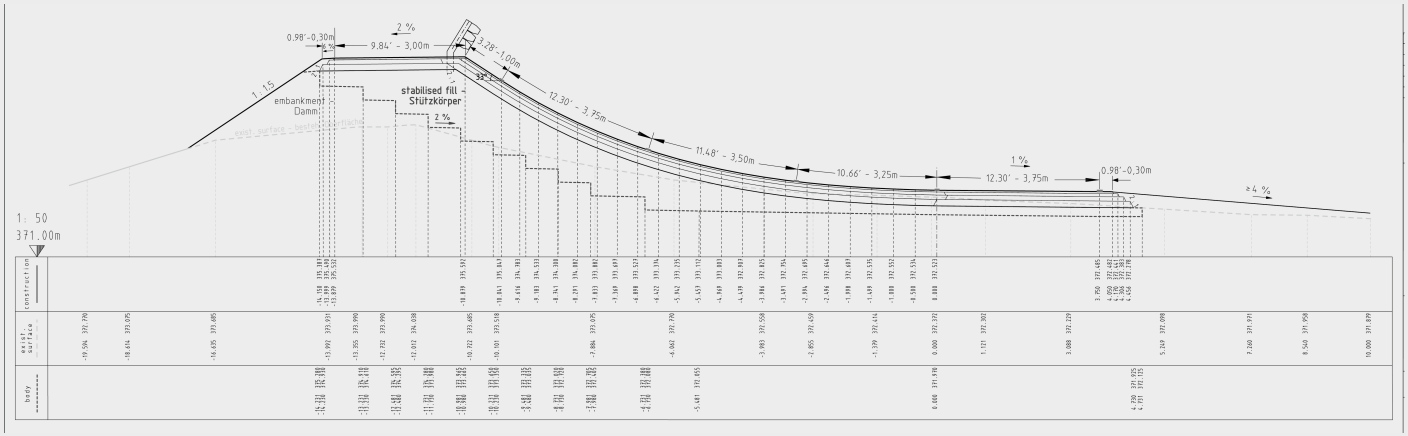
To ensure market maturity, prototypes and pre-production vehicles have to be tested on a wide range of tasks and applications. Several million test kilometres are covered under extreme dynamic and topographical conditions before the first series models will be produced and delivered to the customers. When testing on modern test tracks and special surfaces, aspects such as reliability and durability, speed and drivability, comfort and suitability for everyday use are considered.

SMB has pertinent experience in the construction of special surfaces which must be created with great precision. SMB additionally displays expertise in the construction of brake testing tracks with concrete, natural stone, flagstone and sheet steel surfacing as well as skid pads. SMB is experienced in creating inclined tracks with gradients of 30% and more as well as in the construction of accurate acoustic tracks. SMB's experience is rounded off by a variety of rough road and handling tracks with differencing curvatures and inclines for an ever demanding sector.

Planning & consulting

Within the framework of conceptual design for a testing site, the dimensions of the high-speed track with its recommended speeds need to be determined accurately. Depending on the shape and size of the plot of land, this results in flatter or steeper curves to ensure the centrifugal force is countered when driving the track.

Over the years, SMB has become an important consultant for automotive manufacturers and their suppliers when it comes to dimensioning and budgeting high-speed tracks, often for the entire testing facility. This applies not only to new construction, but also to the planning and designing of binder and surface course replacements on existing tracks while simultaneously optimising the geometry.



The core issue when designing high-speed curves is the selection of a suitable parabola for the desired track speeds and the appropriate transition curve onto the level track. After checking the conceptional design using driving simulation, detailed planning takes place and the curve data can be copied to the bridge paver's control menu. For the detailed design, it is important that the working width of the bridge paver and the roller groups are taken into account both in a flat position and at an angle. This includes a sufficiently wide, flat and stable crest path and an equally stable and flat supply path on the inside of the curve which usually is used as the breakdown lane.

For the substructure of the banked curve it is recommended to use, a suitable sub-structure of aggregate is laid in horizontally compacted layers to support the corresponding gradient. The road surface is built on this sub-structure, starting with a hydraulically stabilised sub-base. The sequence between laying the fast track and the crest path is selected to ensure that the upper edge joint is of maximum quality. For compaction, vibration rollers with variously shaped drums are used behind the bridge paver. A roller plan determines the areas where the various rollers are used depending on the surface curvature.

Safety driving centres

The constant increase in private travel and the associated risks mean that the safety requirements of people on the road are increasing. The need and dependency to travel, including the ever more demanding requirements on the logistics providers, necessitate further safety training opportunities.

Training to master frequently occurring hazardous situations will therefore represent a mandatory skill needed on the road for all drivers in the future. Building on years of experience in the construction of large test and training tracks for the automotive industry, SMB is also involved in the planning, construction and operation of safety driving centres (SDC).

Thanks to the latest technology, drivers at these facilities can familiarise themselves with handling the vehicle's physical and technical limits as well as the ability of their own body to work under pressure. Early detection of possible sources of danger and appropriate responses are the focus of the training programme. These are realistically simulated with the help of sprinkling systems, water fountains, skid pads, mountainous and gradient tracks as well as dynamic and sliding surfaces in various speed ranges.

References:

- SDC Berlin-Brandenburg
- SDC Lüneburg
- SDC Gründau
- SDC Ludersdorf (Austria)
- SDC Pachfurth (Austria)

Cooperation based on trust

Long-term partnership

References

Aldenhoven Testing Center	Proving Ground (PG) Aldenhoven	Germany
Beijing Benz Automotive	PG Beijing	PR of China
Audi	PG Neustadt	Germany
BMW Group	PG Miramas	France
Bosch	PG Boxberg	Germany
Bridgestone	PG Aprilia	Italy
CATARC Yancheng Automotive	PG Yancheng	PR of China
Chongqing Changan Automobile	PG Chongqing	PR of China
Daimler AG	PG Immendingen	Germany
Daimler AG	PG Wörth	Germany
Daimler-Benz	PG Papenburg	Germany
DaimlerChrysler	PG Sindelfingen	Germany
EuroSpeedway Lausitzring	PG Klettwitz	Germany
FAW-VW Automobile	PG Changchun	PR of China

Ford	PG Lommel	Belgium
Matra / Ceram	PG Mortefontaine	France
Nokian Tyres	PG Santa Cruz de la Zarza	Spain
Opel	PG Dudenhofen	Germany
Porsche	PG Nardó	Italy
SAIC General Motors Wuling Automobile	PG Liuzhou	PR of China
Shanghai General Motors	PG Guangde	PR of China
Toyota	PG Zaventem	Belgium
Volkswagen	PG Wolfsburg	Germany
Volkswagen	PG Ehra-Lessien	Germany
Volkswagen	PG Maricopa	USA
Volkswagen	PG Shanghai	PR of China
Volvo Car Corporation	PG Hällered	Sweden
Zhongya Linglong Tyres	PG Zhaoyuan	PR of China

STRABAG

STRABAG is a European-based technology partner for construction services, a leader in innovation and financial strength. Thanks to the hard work and dedication of our more than 75,000 employees, we generate an annual output volume of around € 16 billion and are one of the few companies capable of offering services along the entire construction value chain – from design to planning, from construction to property and facility services, from operation all the way to demolition.

STRABAG brings together people, materials and machinery at the right place and at the right time in order to realise even complex construction projects – on schedule, of the highest quality and at the best price. An extensive network of more than 700 locations worldwide, along with access to the necessary raw materials, supports the strong position on the European market. STRABAG is market leader in several countries, including Germany, especially in transportation infrastructures. In this segment alone, more than 12,000 employees in Germany deliver first-rate construction services that go far beyond classic road construction.

STRABAG is driving forward the use of digitised procedures in its work processes and covers the entire value chain in the construction of infrastructure facilities. Our focus here is on the connectivity of the various players in road construction, on digital construction planning with BIM 5D® and on LEAN principles for systematic process optimisation. Especially in the field of asphalt and concrete technology, we are constantly working on the further development of the building materials and techniques used. Our developments include a sustainable high-tech asphalt (ClAir® Asphalt) capable of reducing nitrogen oxide levels, concrete roadways with a noise-reducing grinding texture, and an autonomously functioning asphalt paving system – examples of how our research into innovative products and processes allows us to constantly expand our leading position in the competition.

Max Bögl Group

With over 6,500 highly qualified employees at 40 locations worldwide and an annual turnover of over 2 billion euros, Max Bögl is one of the largest construction companies in the German construction industry. Since its foundation in 1929, the company's history has been characterised by innovative strength in research and technology - from tailor-made individual solutions to constructionally and ecologically sustainable overall solutions.

With forward-looking in-house developments on topics of our time, such as renewable energies, urbanisation, mobility and infrastructure, the Max Bögl Group is already realising solutions for the megatrends of our globalised world.

Based on many years of experience and competence in high-precision precast concrete construction, Max Bögl is also positioning itself as an important driving force in the development of innovative products, technologies and construction processes.

The wide range of services and the high level of vertical integration with our own steel construction, our own precast plants, the most modern fleet of vehicles and equipment as well as our own raw materials and building materials guarantee the highest quality. The use of BIM, lean management/ production and standardised project management ensures adherence to schedules and cost-effectiveness from the initial concept idea to the finished building product.

Max Bögl Group 02/21; Photo credits: Jürgen Wiscow (title, p. 2, 7, 9); Foto Wagner (p. 2); Privat (p. 2); Max Bögl Group (p. 5, 6, 10, 12, 13, 14); Strabag SE (p. 10, 11); Christian Brinkmann (p. 10)

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