Precise paving and perfect grade and slope control provide ideal conditions for Formula 1 drivers.

VÖGELE Pavers Build First Formula 1 Circuit Near New Delhi, India

More than 500 million people worldwide watched the first Formula 1 race in India's history on 30 October 2011. The drivers were thrilled by the new course. The asphalt circuit with its numerous bends and the peripheral area around the new race track near New Delhi were built by machinery from VÖGELE. The SUPER 1800-2 pavers triumphed, operating reliably and achieving an outstanding evenness right from the outset.

India // New Delhi

Job Site Details

Construction of new "Buddh International Circuit", New Delhi, India

Length of circuit:	5.1km
Width of circuit:	18 – 25m
Circuit areas:	150,000m² (approx.)
Peripheral areas:	600,000m²

Paving Details

Pave width:	6m
Layer thickness:	base course 10cm binder course 5cm surface course 4cm

Material

Base course:	asphaltic concrete DGBM 40*
Binder course:	special mix for racing circuits (asphaltic concrete)
Surface course:	special mix for racing circuits (asphaltic concrete)

* DGMB = "Dense-graded bituminous mixture", Indian standard

Equipment

4 SUPER 1800-2
with AB 600 Extending Screeds in TV Version

Working with four SUPER 1800-2 pavers, the "VÖGELE team" stood out particularly through their reliability and precision on the "Buddh International Circuit", the first Formula 1 race track in India. To build a perfectly even asphalt pavement for the drivers as they battle for milliseconds, contractor Oriental Structure Engineers LTD from New Delhi used VÖGELE pavers for the crushed-stone base followed by three layers of asphaltic concrete. A Big MultiPlex Ski was used to ensure perfect grade and slope control.

Demanding circuit

A demanding circuit distinguishes this newcomer to the Formula 1 racing calendar. The 5.1km circuit with 16 bends, a road varying between 18m and 25m in width, superelevations up to 12% and gradients up to 10%, demands considerable driving skill and offers optimum conditions for breathtaking overtaking manœuvres. Oriental LTD's experts opted for technology from VÖGELE in order to deliver top-quality paving results despite these demanding requirements. Aided by the powerful pavers, they built a two-layer crushed-stone base and paved roughly 325,000 tonnes of asphalt for the circuit and its peripheral areas in the course of the project. The requirements made on the asphalt layers were extremely high in terms of both material quality and paving accuracy. The permissible tolerances for binder content, grain mix and also evenness were far lower than those of German motorways.

Minimum tolerances for the surface course

Particularly stringent demands were made on the surface course. The planning engineers had reduced by half the permitted deviation of the granular material from the ideal aggregate grading curve, compared with the tolerances allowed under German regulations. What's more, aggregate with high resistance to polishing was used for the surface course. This mix guarantees a road surface with uniform texture depth and perfect tyre grip. All aggregate for the asphalt package was hauled to the mixing plants from specially selected quarries, some of which were several hundred kilometres away. The binder, too, was modified in line with the climatic conditions prevailing in northern India to ensure an outstanding mechanical and temperature stability at all times. Overall, the planning engineers' various measures allowed the achievement of an extremely uniform pavement structure whose properties will endure for many years, despite changing climatic conditions.

01 //


02 //

01 // The final touches: the surface course is made from a special asphalt containing aggregate with high resistance to polishing. This ensures that the road's good grip is maintained in the long term. The surface course was paved with an AB 600 Extending Screed in TV version.

02 // Dr Rainer Hart, specialist in race tracks, was full of praise for the Big MultiPlex Ski: "With this sensor technology, VÖGELE achieved an outstanding evenness".

03 // The evenness was continuously checked by the team during the paving process. Thanks to the Big MultiPlex Ski, the low tolerances specified for surface course were met right from the start when paving binder course.


03 //

The Big MultiPlex Ski was used for grade and slope control. Even long irregularities were easily levelled out with the Ski.

"Thanks to the VÖGELE pavers and expert advice from WIRTGEN India, we remained safely within the extremely tight tolerances."

Pankaj Gautam, Overall Project Manager
Oriental LTD

Impressive top-notch laydown rates

Asphalt paving extended over a period of roughly 14 months during which the work had to be interrupted temporarily, mainly on account of the monsoon rain, but also due to technical requirements associated with the project as a whole. In retrospect, however, the figures are still impressive: all in all, the VÖGELE pavers built both the roadbase and the two or three-layer asphalt pavement according to the highest technical standards over a total area of 750,000m².

Top quality assured by sample mixes and test areas

Quality was the most important aspect, particularly when it came to paving the asphalt for the race track. For this reason, numerous sample mixes were prepared and laid on test areas before the paving work began. The formula, mixing plant parameters and materials were perfectly matched by the team of German and Indian operators and laboratory technicians. Access roads and tangents covering several thousand square metres were built in this way. "Such sample mixes are essential for optimizing the quality of the asphalt surface course. All the various constituent parts of the asphalt, the mixing plant parameters and precision adjustment of the pavers can only be perfectly matched with one another on the basis of such tests," explains asphalt specialist Dr Rainer Hart. He developed the concept for the race track asphalt and supervised the asphalt work from selection of the aggregate in the quarry to paving and compaction.

Lower compression stress, better tyre grip

On a racing circuit, the base and binder courses are very much thinner than on normal roads. This is due to the lower pressure acting on the asphalt package. Non-skid properties and evenness are far more important here. That is why the paving teams paid more and more attention to the pavement's evenness as they worked their way up to the top of the asphalt package. And they were successful, too, for VÖGELE set new records in evenness long before the first race in India.

Big MultiPlex Ski for potentially record-breaking evenness

A Big MultiPlex Ski was fitted on each side of the SUPER 1800-2 pavers when placing all three layers – a move which indisputably paid off, particularly when a maximum permissible tolerance of 3mm per 4m has been specified. "The evenness achieved by VÖGELE is outstanding, thanks to this sensor technology. To the greatest possible extent, the surface unevenness was less than 1mm over a distance of 4m," says Dr Hart, who was delighted with the excellent pavement results. He has supervised the paving work on numerous Formula 1 circuits in the past.

Long irregularities are levelled out

The Big MultiPlex Ski uses the proven VÖGELE technology of the sonic grade sensor. Three multi-cell sonic sensors are mounted on a beam with a maximum length of 13m. They simultaneously scan a reference at several widely spaced points. NIVELTRONIC Plus®, the VÖGELE System for Automated Grade and Slope Control, calculates a virtual reference from these picked-up values. The Big MultiPlex Ski is capable of detecting and levelling out long irregularities in the surface, such as undulations, over a maximum distance of 13m. The Ski consequently operates with greater precision than a single grade sensor. It is controlled as usual via the screed operator's console. Variability is also assured: the individual sensors of the Big MultiPlex Ski can be moved along the beam to optimally adapt to any job site.

Good work, even at very high temperatures

The racing circuit near Greater Noida is only a few kilometres away from the Indian capital New Delhi. The temperatures in this region are famously high, but the VÖGELE pavers did not baulk, even at these extreme conditions. The SUPER 1800-2 pavers reliably met all expectations. "Even at temperatures of more than 40 °C the pavers continued to operate faultlessly," reports Service Technician Ralf Peter on site. Pankaj Gautam, Oriental LTD's Overall Project Manager, also had nothing but praise for the WIRTGEN Group's machines and team: "With their profound know-how and skilled eye, the service technicians from WIRTGEN India and VÖGELE gave us optimum support when fine-tuning the pavers." And the result really was record-breaking: the German Formula 1 world champion Sebastian Vettel not only won the first race, but also broke the first course record with a lap time of 1:27 mins.