# New expressway around Minsk –

# Wirtgen SP 850 paves concrete in two layers

In 2015, the first half of a new expressway was built around the Belorussian capital Minsk, home to over a million people. During the summer months, the state-owned company DST-5 built almost 50 km of the ring road with a total length of 86 km. Wirtgen GmbH supplied the key technology needed to pave the concrete: Two slipform pavers of type SP 850, specially equipped for dual-layer paving and with a non-contacting 3D control system. They were followed by a texture curing machine of type TCM 1800 for producing a high-grade finish.

The M9 highway encircles Minsk and is one of the most important long-distance traffic arteries in Belarus. For several years, public authorities have noted a major increase in domestic traffic, as well as in the east-west transit traffic passing through Belarus every single day. To relieve the M9, the Ministry of Traffic and Transportation decided to build a second expressway. It is hoped that this will help to improve the quality of air in the capital city. The new highway girdling the metropolitan region with a population of 2.6 million is designed with two lanes of traffic in each direction and two separate concrete profiles each 7.50 m wide and 24 cm thick. Belorussian planning engineers opted for cost-efficient dual-layer paving in order to achieve this.

**Wirtgen slipform paver SP 850: A multi-purpose machine**

The slipform paver SP 850 from Wirtgen was deemed to be the right machine for the job, being extremely versatile: This machine can pave roadways between 2.50 m and 10.0 m wide and up to 450 mm thick. In addition, it can be equipped with a dowel bar inserter, as well as with a middle bar and tie bar inserter. Last but not least, it owes its outstanding maneuverability and good traction to four separately driven and steered crawler tracks. In short, it is an ideal machine for small, medium and large roads, as well as for other infrastructure projects.

**Operator training before starting**

The DST-5 team was thoroughly trained by Wirtgen instructors before the paving work started. Vyacheslav Bruyok of PC Fomar Ltd., the Wirtgen Group's dealer in Belarus, explains why this was needed: "Due to the large number of suitable quarries, concrete is widely used as a construction material in Belarus. However, such a large concrete paver as the SP 850 has never before been used here."

**Economical method**

Paving of the first section between Ostroschizki Gorodok and Aksakowschtschina started in mid-June 2015. With a total thickness of 24 cm, the roadway comprises 18 cm of bottom-layer concrete with dowel bars and 6 cm of top-layer concrete. The bottom-layer concrete contained 320 g cement per kg, while the more heavily stressed top-layer concrete was produced in the form of washed concrete containing 420 g cement per kg. As considerably less concrete is needed for dual-layer paving, costs can be cut significantly.

**First SP 850 for dual-layer concrete paving**

Although Wirtgen has already delivered machines for dual-layer concrete paving to many countries, there was one special feature about the Belorussian project: The technology used for such jobs has never before included an SP 850. The two pavers – one with dowel bar inserter for the bottom-layer concrete and one with super-smoother for the top layer concrete – were classic machines of the type built in series. The problem was that a module for transporting the top-layer concrete with hoppers did not yet exist for the SP 850. As a manufacturer with over 25 years of experience in paving concrete, Wirtgen dug deep into its "slipform paver kit" and soon found a special solution that proved reliable from the outset.

**Dual-layer paving with 3D control**

Once the two SP 850 pavers had made a start on the concrete paving work, there was one more job to do: A 3D control system from Leica was to be integrated. A total station "tracks" the slipform paver and continuously establishes its position. The measured values are radioed to an on-board system computer on the paver. Two sensors on the machine additionally measure the paver's longitudinal and cross slope. The system computer uses these data to calculate the machine's momentary position and direction of travel. They are constantly compared with the planning data for the concrete profile which were previously saved in the system computer as a digital model. In the event of discrepancies, height, slope and steering are corrected as required by the machine control system of the slipform paver. The resultant concrete profiles meet the specifications with millimeter precision.

Leica specialists from Moscow came to Belarus to train the DST-5 team in the use of the technology. The transition from a stringline to the 3D system then proceeded step by step. The control system of the paver for bottom-layer concrete was changed over to the non-contacting system first, followed by the control system of the paver for top-layer concrete. In the end, the team supervised and monitored six total stations altogether – three for each SP 850. "Dual-layer paving presents a number of logistical challenges. We therefore are very pleased to note that we soon were able to operate the system independently, due not least to the excellent initial instruction," says Valery Vladimirovich Gabets, Managing Director of DST-5.

**Daily performances of over 800 m**

Altogether 48 km of the complete highway with two lanes in each direction were built in summer 2015. In other words, the DST-5 team paved a total of 172,800 m³ or 380,000 t of concrete. The paving rate after initial instruction was over 800 m per day. Managing Director Gabets is very happy with the pavers' performance and with the support that his team received from Wirtgen: "Wirtgen's service technicians and application pros gave us really good advice and drew our attention to innumerable little details that have a decisive effect on the quality of the concrete paving. This was enormously useful and assured the success of our efforts." He is optimistically looking forward to 2016, for the paving crew will resume their project as soon as the weather permits so that they can complete the road and relieve traffic loads around the capital in the longer term.

Photos:

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|  | SP850\_00788 An unusual sight: Two SP 850s from Wirtgen as a train for the dual-layer paving of a new highway around the Belarusian capital Minsk. |

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|  | SP850\_00790\_HI The TCM 1600, a texture curing machine from Wirtgen, sprayed the top-layer concrete with a retarding agent which prevents the uppermost millimeters of the washed concrete from curing. They are subsequently removed by brushing in order to obtain a skid-resistant, low-noise pavement. |

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|  | SP850\_00789 Valery Vladimirovich Gabets, Managing Director of the state-owned construction company DST-5, experienced at first hand just what Wirtgen means with its motto "Close to our customers": "The concrete surfacing is of outstanding quality, but what impressed me even more was the know-how and enthusiasm with which the Wirtgen team instructed and supported our staff." |

*Note: These photographs are only intended as a preview. For printing in publications, please use the photographs in 300 dpi resolution that are available for download from the Wirtgen GmbH / Wirtgen Group websites.*

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