



Job Report Slipform Paving

# Slipform paver SP 1600 paving concrete at Amsterdam's Schiphol Airport



## Wireless control guarantees maximum precision: Wirtgen slipform paver SP 1600 paving concrete at Amsterdam's Schiphol Airport

The Airbus A380 will land at Amsterdam's International Airport Schiphol on a regular basis very soon. Between touch-down and takeoff, the world's largest passenger aircraft will taxi and park on brand new concrete pavements in front of the terminal. Dutch contractor Reef Infra B.V. built the new, suitably large and stable parking and traffic areas in summer 2006 and spring 2007, using a Wirtgen slipform paver SP 1600. A special characteristic: Reef Infra B.V. did not use stringlines for levelling, but relied instead on the numerous benefits offered by wireless control.

### Daily production exceeds 2,000 cubic metres

Altogether, the SP 1600 placed a total of 31,500 m<sup>3</sup> of B 55 grade concrete for the new parking areas. During the second construction phase in spring 2007, a total surface of 27,000 m<sup>2</sup> was built in just 5 days: 6 sections of 450 m length, 10 m width and 42 cm thickness each, corresponding to a paving volume of some 2,000 m<sup>3</sup> per day. "We were able to achieve

such high daily production rates because the Wirtgen slipform paver worked non-stop and with maximum precision", explains Site Manager Tom Steenhagen.

The XXL-size aircraft has a maximum takeoff weight of 560 tons, which is higher than that of any other civil aircraft. To account for these high loads, the SP 1600 was equipped with a dowel bar inserter (DBI) which reinforced the concrete by inserting dowel bars with a diameter of 45 mm at 5 m intervals. The paver's central tie bar inserter (TBI) inserted longitudinal tie bars to reinforce the concrete across the paving direction. The slipform paver was additionally equipped with a heavy-duty oscillating beam and super smoother to ensure good surface evenness. A well-rehearsed team followed behind the slipform paver, applying a





Modern concrete paving using Wirtgen's wireless control system instead of accident-prone and error-prone stringlines: The concrete cross-sections precisely matched the specified requirements of the digital terrain model.

special manual broom finish and spraying a dispersion to prevent the concrete from drying out.

### Reliable technology requires less personnel

The well-organized crew from Reef Infra B.V. needed a surprisingly small number of personnel for the many different jobs to be carried out. In addition to the site manager and truck drivers responsible for transporting the concrete, no more than 2 machine operators, 6 concrete workers and 2 crew members taking care of the wireless control system worked in the immediate vicinity of the Wirtgen slipform paver. Product Manager Willem Verstraaten relies on the high performance capability of the Wirtgen machines, "Their high degree of automation and reliable engineering allow us to reduce the number of personnel to a minimum." At the same time, the client had set the bar high, allowing a maxi-

imum tolerance of 5 mm over a length of 3 m in both longitudinal and transverse direction.

### Wireless control produces perfect concrete surfaces

Excellent machine engineering combined with a highly mature machine control system that furnishes all signals for steering and height adjustment enable the slipform paver to achieve such a high degree of precision. In this project, the specifications for cross-section, line and level of the concrete pavement were not fed into the machine's control system by scanning a stringline, however, but via the computer of the wireless 3D levelling system. This 3D controller made by Leica Geosystems uses a special interface to communicate with the SP 1600's standard levelling and steering controller.



Loading the dowel bar inserter is semi-automatic, after which the dowel bars are inserted automatically at the push of a button.

An increasing number of Wirtgen customers have meanwhile discovered the benefits of this system. Road and railway construction companies have praise, in particular, for the drastic reduction of error sources, decrease in set-up times, improved safety and integrated documentation.

### The principle of wireless control

Two prisms are installed on the slipform paver, each of which has direct visual contact to a total station. The total station establishes the position of the prism at a frequency of 10 Hz, which is 10 times per second. The measured results are then transmitted by radio to the system's computer on the paver. Two multi-axial slope sensors integrated in the machine additionally determine the paver's longitudinal and cross slope. The system computer uses these data to calculate the machine's actual position and direction of travel. The position data are compared with the design data previously stored in the system's computer as a digital model. Any deviation is forwarded by the system computer to the SPS of the slipform paver within the fraction of a second. The SPS then initiates the required corrections in level, inclination and steering angle of the crawler tracks. The resulting

## Schiphol Airport

Amsterdam's Schiphol Airport counted a total of 46 million passengers and 1.5 million tons of airfreight in 2006, making it Number 4 in Europe. To retain this top ranking, preparations have begun in 2006 to establish the basis that will enable the giant Airbus A380 to land, taxi and park at Schiphol.

Schiphol is situated at an average altitude of some 3 metres below sea level, making it the lowest-level airport in Europe. In earlier years, the polder in which the airport lies was a large lake, and countless ships went down in its waters. The airport's name refers to the history of its location, as "Schiphol" means as much as "ships' hell". Several villages were founded after the lake had been drained in the middle of the 19th century, and the airport was opened in 1916.





Wirtgen's slipform paver SP 1600 met the high quality demands at Amsterdam Airport, which specified a maximum tolerance of 5 mm over a length of 3 m in both longitudinal and transverse direction, with superior ease.

concrete cross-sections meet the specified requirements with pin-point accuracy. Processing the data in the system computer also enables a complete documentation to be generated of the paving operation.

### Fast, safe and accurate

Concrete paving without using stringlines saves a lot of time: Costs are incurred neither for surveying and installing the stringlines nor for their subsequent removal. Work becomes easier also for the drivers of transport trucks and mixer trucks, since they need not pay attention to tensioned stringlines and can drive up to the paver straight away. This saves both fuel and time, thus increasing the overall profitability. The system also provides increased safety for the crew working on site, as the wireless system eliminates the hazard of stumbling over the stringlines.

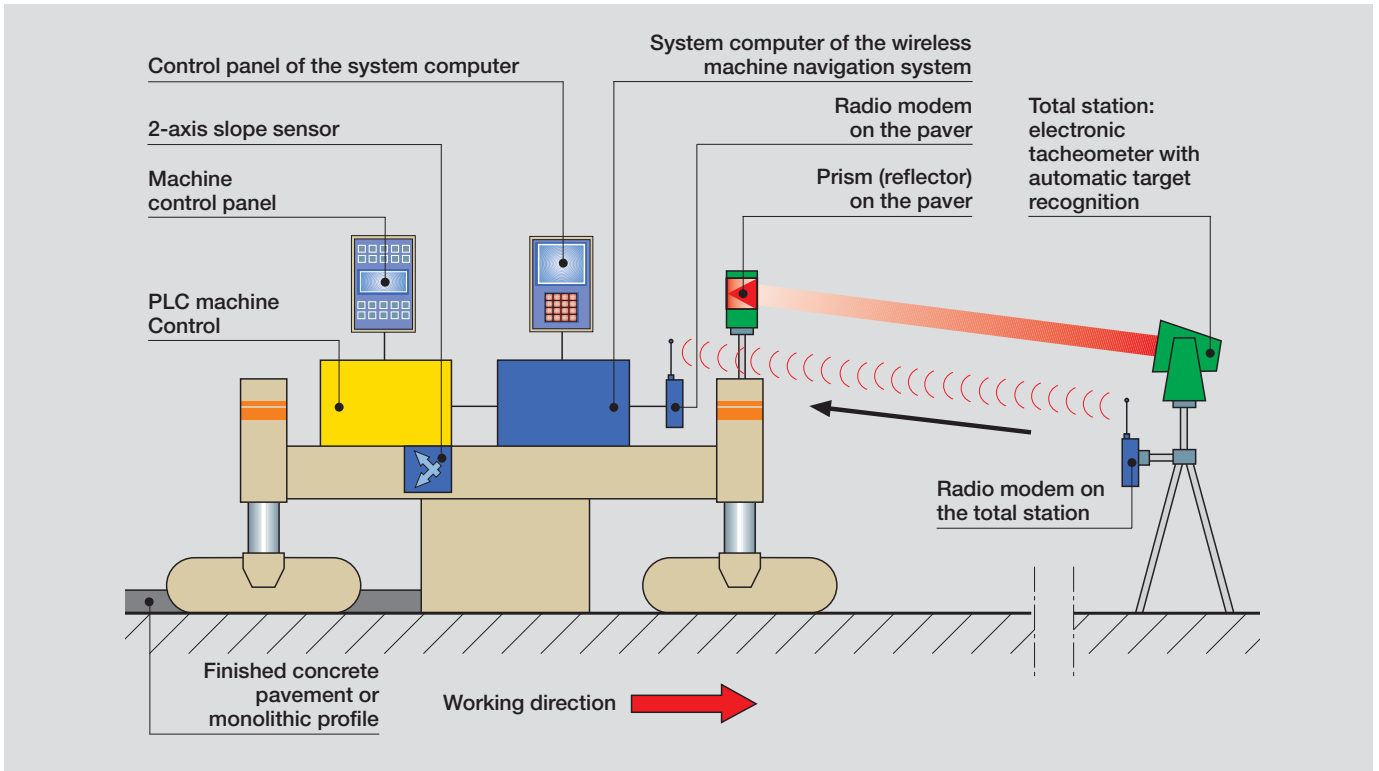
The system also offers a higher degree of operational safety: Touching the stringlines may alter their surveyed position, resulting in an incorrect position of the paved concrete layer. This is particularly critical, because damages to the stringlines or an alteration of their position are not necessarily



The total station is equipped with ATR (Type Leica TCA 1800), which enables it to automatically keep the prism on the paver in full sight.



Reef Infra's engineers Willem Verstraaten (left), Product Manager Concrete Paving, and Site Manager Tom Steenhagen rely on Wirtgen's slipform paving technology.



The wireless machine navigation system operates in real-time mode. The position of the machine is constantly determined by one or two total stations. The position data are processed by the system computer which transmits the corresponding signals to the machine control.



Two concrete mixing plants with hourly capacities of 200 and 50 cubic metres respectively processed granite gravel from Ireland and sand from the Dutch part of the North Sea, producing a total quantity of some 2,000 cubic metres of B55 grade concrete per day.

visible to the naked eye. This cause of sometimes serious mistakes is eliminated completely when using the wireless control system.

### Cutting costs, producing high quality

A positive side effect: sinking costs! All the performing construction companies have to do is engage a surveyor to establish the digital data model. And that service is much less expensive than the time-consuming installation of stringlines. Taking care of the wireless control system on site does not necessarily require a surveyor or an engineer but can also be easily performed by appropriately trained technicians.

### Positive summary

Civil engineer Willem Verstraaten is highly satisfied with the SP 1600 and its wireless control system. "Here at Schiphol, we would have had to install the stringlines in the very hard subgrade. That would have involved an extremely high effort. The wireless control system allowed us to save both the time and the costs. And the result meets all our expectations: It's perfect."



Verification measurements during the paving operation showed that the SP 1600 worked with maximum precision: Level and slope of the concrete surface precisely matched the specified requirements.



Preparations for cutting the contraction joints:  
The cutting lines were marked with pin-point precision.



Wirtgen GmbH  
Hohner Strasse 2 · 53578 Windhagen · Germany  
Phone: +49 (0) 26 45/131-0 · Fax: +49 (0) 26 45/131-242  
Internet: [www.wirtgen.com](http://www.wirtgen.com) · E-Mail: [info@wirtgen.com](mailto:info@wirtgen.com)