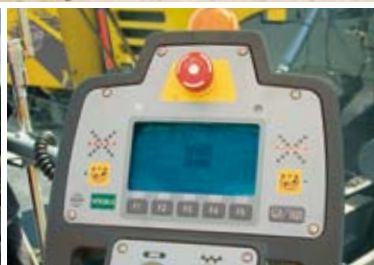




VÖGELE

VÖGELE NAVITRONIC® Plus

Innovative 3D Machine Control System





*Working with NAVITRONIC® Plus:
On this job site, a satellite-based
system is used for picking up the
screed's position.*

Innovative 3D Machine Control System NAVITRONIC® Plus.

The Navigation System for SUPER Pavers with Open Interface

NAVITRONIC® Plus, the innovative 3D machine control system made available by VÖGELE offers a number of economical advantages. The system, a new development from scratch, includes an open interface to which common 3D positioning systems, such as laser-based total stations or GPS from many renowned manufacturers can be connected. One crucial economic advantage of NAVITRONIC® Plus is that 3D positioning systems, already available in the clients' equipment pools for use with other machines, can also be used with the road paver. Thus, thanks to NAVITRONIC® Plus, the extra investment for asphalt paving is cut substantially. In addition, VÖGELE NAVITRONIC® Plus offers another outstanding advantage: existing survey data collected, for instance, for earthworks can in the wake also be used for paving operations. As a result, overall expenses are reduced considerably.

Saving costs with NAVITRONIC® Plus

With NAVITRONIC® Plus, VÖGELE make available a machine control system that handles not only grade and slope control but also controls fully automatically the screed's position and the paver's direction of motion, with millimetre accuracy. Thus VÖGELE NAVITRONIC® Plus is unique in the market.

When executing major road building contracts, such as motorway or large traffic areas, 3D control is already common practice for earthworks. When looking at the work carried out with road pavers, the focus not merely is on meeting tight tolerances but also on fast and cost-effective completion of the job. For the majority of contracts this scale, wires are tensioned for pavement construction. The tensioned wire serves as a reference for grade and slope control. Installing a wire, however, is a time-consuming job with high costs incurred for every project. As NAVITRONIC® Plus operates with a virtual reference, this expenditure can be dispensed with when preparing the job site, so that costs for acquiring the system will soon pay off.



NAVITRONIC® Plus controls the screed's position fully automatically.

NAVITRONIC® Plus as an upgrade of NIVELTRONIC® Plus

When used with the road paver, NAVITRONIC® Plus becomes an integral part of NIVELTRONIC® Plus, the VÖGELE System for Automated Grade and Slope Control. In addition to conventional grade and slope control (elevation and transverse slope of the screed), NAVITRONIC® Plus also controls fully automatically the screed's position and the paver's direction of motion. This renders NAVITRONIC® Plus a true 3D machine control system, made available in this form only by VÖGELE.

The open interface opens up NAVITRONIC® Plus to most varied positioning systems

The central component of 3D machine control, in fact the digital positioning system, is connected to NAVITRONIC® Plus via an open interface. Thanks to this type of interface, different systems from renowned manufacturers can now be selected for combination with NAVITRONIC® Plus. No matter whether this system is an optical one with a laser-based total station and prism or a satellite-based one with GPS receiver (e.g. mmGPS from TopCon). When considering that the use of 3D machine control systems is already widespread for earthworks, then the benefit becomes evident: with NAVITRONIC® Plus,

the same 3D positioning system can be used to control the road paver. This means that existing equipment can also serve for asphalt paving, thus increasing the equipment's degree of utilization and rendering it even more profitable.

Use of existing digital design data

Using the same positioning system also facilitates the import of survey data, the so-called pavement design specification. Existing data can simply be fed into the NAVITRONIC® Plus system for asphalt paving. On many projects, such data has been collected already for building the roadbase using graders and dozers. When working according to the conventional method with tensioned wires, surveying of the route often needed to be carried out anew when earthworks were completed to serve subsequent paving operations. With NAVITRONIC® Plus, this second surveying is a matter of the past as data, once collected, can easily be fed into the system and used for paving as well. In addition to saving time, this offers an extra advantage: the survey and paving teams can work with systems they are familiar with, without any instructions required. NAVITRONIC® Plus is controlled via the display of the 3D positioning system. While paving, corrections in layer thickness can be initiated, as usual, from the screeman's console.

NAVITRONIC® Plus at a Glance

Technological Highlights

- ▶ Extends NIVELTRONIC® Plus into a real 3D control system (control of elevation and slope of the screed as well as control of the screed's position and the paver's direction of motion).
- ▶ Uses the route's digital design data for accurate control of tractor unit and screed.
- ▶ Comes with an open interface to connect most varied 3D positioning systems offered by renowned manufacturers.
- ▶ Method of operation: comparison of the route's design data with calculated actual data.

Components of NAVITRONIC® Plus

- ▶ 2 NAVITRONIC® Plus operating consoles for the screed (software included)
 - ▶ Mast for mounting 3D receivers
 - ▶ Angle sensor for the mast
 - ▶ Sensors for picking up displacement of the screed's extending units
- ### System Requirements for SUPER Pavers
- ▶ VÖGELE NIVELTRONIC® Plus
 - ▶ Other components, such as laser-based total station or GPS combined with a laser receiver

Patented automated control of the paver's direction of motion

The new 3D control intervenes in the paver's steering system. This means that the road paver, whose position is currently

picked up by the laser-based total station or GPS, is guided fully automatically along the route's specified course. The paving team can monitor the position of the paver and detect deviations, if any, on the 3D control system's display. Automated navigation is a process registered as a VÖGELE patent.



Clearly arranged: the NAVITRONIC® Plus operating console for the screeman.



Just like the paver operator, the screed operator, too, can focus his attention on the process of paving and its results. Grade and slope as well as the pave width are controlled fully automatically by the 3D system.

Sensors measuring the displacement of the screed for an accurate pave width

In order to achieve the highest level of paving accuracy, the screed's position is precisely controlled through the intermediary of its extending units. For this purpose, sensors are installed on the two extending units picking up the screed's actual width. For the user, two options exist: he either defines the extreme left-hand or right-hand end of the screed as a specified reference so that paving will take place along this specified line. Or as an alternative, a fixed pave width can be set which will then be precisely adhered to over the full length of the section to be paved. Even deviations of the tractor unit from the specified course can be easily compensated by accurate control of the screed's extending units in width.

Automated control of varying grade and slope

When using NAVITRONIC® Plus, the whole project is completed fully automatically. This is a crucial advantage especially on those contracts featuring varying grade and slope. The system constantly monitors grade, slope and position of the screed and compares picked up actual values with digital values of the route's design specification. As soon as the paver reaches a point that requires a change in grade or slope, as is often the case in bends, a reaction of the screed is initiated automatically to match the new requirements.



Accurate control of the screed width by NAVITRONIC® Plus guarantees a screed position in absolute compliance with the route's design. No matter whether steering is manual or automatic.

Three Good Reasons for NAVITRONIC® Plus

NAVITRONIC® Plus combines control of grade and slope on the one hand, and control of the screed's position and the paver's direction of motion on the other, in one system. This makes NAVITRONIC® Plus a tool for real 3D machine control.

**A SYSTEM OF THIS KIND
SOLELY OFFERED BY VÖGELE**

- 1** NAVITRONIC® Plus is a non-contacting 3D control system for road pavers.
- 2** NAVITRONIC® Plus fully integrates into VÖGELE NIVELTRONIC® Plus, and carries out:
 - Conventional control of grade and slope.
 - Fully automatic control of the screed's position and the paver's direction of motion.
- 3** NAVITRONIC® Plus comes with an open interface to connect the positioning system. Thanks to this interface, different makes from renowned manufacturers can be selected for combination with NAVITRONIC® Plus – no matter whether this system is an optical one with a laser-based total station and prism or a satellite-based one with GPS receiver and laser receiver (such as mmGPS from TopCon).

Perfect basis for achieving the planned paving result

Based on the entirety of picked up data, such as position of paver, direction of motion, position of screed as well as grade and slope, NAVITRONIC® Plus is capable of controlling any point of the planned route in strict compliance with the specification. This system allows SUPER pavers to meet extremely tight tolerances which otherwise would only be possible by conventional paving using tensioned wires. Especially on large-scale contracts, NAVITRONIC® Plus offers crucial advantages:

- Existing survey data can be used for paver control.
- No installation of tensioned wires, thus saving time and costs.
- Job site operations not impeded by reference wires along the specified route.

All in all, NAVITRONIC® Plus boosts productivity in road construction above all when handling large-scale projects. Large road building contracts can be completed at lower cost within a shorter period of time, thus permitting new roads to be opened to traffic sooner.



The screed's position and elevation can be controlled and monitored precisely with GPS and laser receiver, for instance.



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