WACHENDORFF
Automation GmbH & Co. KG

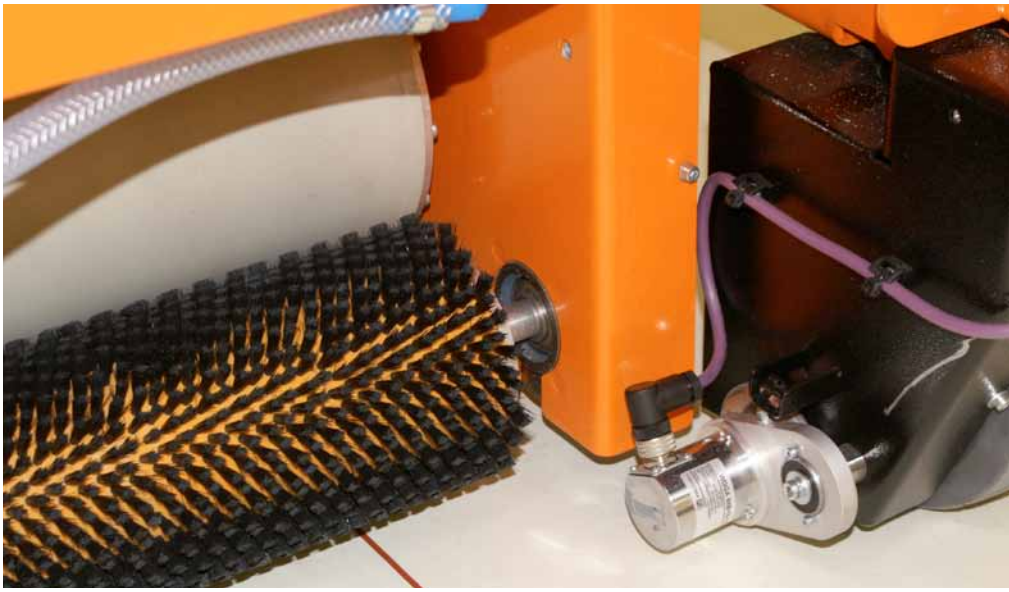
Mobile cleaning machines

Fully-automatic hall cleaning

- Save time and costs
- Cleaning and maintenance down to the millimetre
- Communication with CANopen
- Minimum space requirement, no wear
- Robust and precise

WA1201

Industrie ROBUST



Clean in an instant

This newly developed cleaning machine rapidly and fully automatically cleans and maintains sports floors. The WDGA CANopen absolute encoders from Wachendorff with EnDra® multiturn technology ensure that the machine remains on the right path in the hall.

Cleaning sports halls is an important issue - especially if sports are being played in which the floors are polluted by certain substances. In handball, adhesive agents with a resin or wax basis regularly allow players to grip the ball better. However, these adhesive agents leave dangerous, dull stains on the floor which frequently lead to accidents.
Aids such as talcum powder are also used in gymnastics, which can roughen the floor if they are not removed after training. At dance events agents are even deliberately introduced to the floor in order to influence the gliding behaviour. All of this means that cleaning sports facilities is an almost daily occurrence and is normally extremely laborious and time-consuming. There is also the problem that many substances remain in the air for an extended period and only gradually settle on the floor. Cleaning is therefore only really effective if it is performed after a certain delay in time. In addition, one cycle is often not enough in order to remove sticky resin from the floor.

Automatic cleaning saves time and money
The Infrasport company has been working on developing fully automatic cleaning robots since 2000. Last year the patented „Bodenwart 240“ finally celebrated its world premier.
The machine, driven by an electric motor, covers the entire hall independently and both cleans and maintains floors. Different programs can be selected depending on the degree of soiling. Water and cleaning agents are added to the floor, while the dirty water is removed by brushes and a roller and temporarily stored in a process water tank. Only a protective layer remains, which provides the ideal level of sliding friction for sport according to DIN.
The CANopen protocol ensures communication between all the automation components in the Bodenwart 240. „The CAN Bus system is at home in the mobile area,“ explains Francisco Delgado, who is responsible for programming at Infrasport. „All the interfaces and protocols that we needed for our applications were already available“. A Hirschmann SPS assumes the control functions. Not only is the tank‘s fill level monitored, but the positioning of the machine in the hall is also calculated.
„The steering axles remain rigid during cleaning,“ explains Delgado. „Curves are navigated by varying the speeds on both sides, whereby the measurement has to be extremely precise.“
The Infrasport designers used encoders with CANopen interfaces from Wachendorff, which allow the machine to determine its position in the room down to the millimetre,at any time.
„We need particularly robust components - that‘s why we appointed Wachendorff,“ says Delgado. „Luckily the range of products also included encoders with CANopen interfaces which allowed us to use these encoders for our prototypes and now also in the series. The WDGA encoders even allows me to parameterise how precisely I want to record the position values. I can select the optimal value depending on the radius of the wheel,“ explains Delgado.

New multiturn technology for absolute value encoders: EnDra®
For the Bodenwart, Infrasport selected encoders that operated with the EnDra® technology developed by Wachendorff. Mechanical gears are no longer required to detect the direc-

tion of rotation and speeds. Instead, these parameters are determined by an energy wire that operates according to the Wiegand wire principle. The absolute position per revolution (single turn) is measured with four hall sensors and a magnet on the rotating shaft. When the magnetic field moves along the Wiegand wire due to the rotation of the shaft, the soft magnetic core attempts to follow the field, but is prevented from doing so by the hard magnetic sleeve. A constantly increasing field difference exists in the wire - comparable to tensioning a bow. As soon as the external field reaches the sleeve‘s field strength, the sleeve is demagnetised and the built up core tension springs around. This speed-independent pulse is generated twice per rotation and converted into an electrical pulse by a coil. They generate enough energy to operate a FRAM memory and also provide information of the number of revolutions that have taken place (multi turn). Once external tension is present once again a micro-controller calculates the correct value from the position and number of revolutions and sends the value to the control.
number of revolutions. The advantages and benefits that arise for the machine builder from the EnDra® technology in combination with the famous Wachendorff strengths are diverse and have been proven in practice: Unaffected by temperature, low space requirement, no environmental pollution, no maintenance or disposal expenses and free from wear.

Difficult conditions

Ideal measuring conditions are not often present in halls. Floors are often uneven. Crucial tolerances in the Bodenwart‘s mechanics and wear means that the distance or the symmetry of the axles change slightly over the course of time. In order to ensure that the Bodenwart continues to operate along a precise path a camera has been installed, which constantly checks its positions via reference points on the hall floor.
The entire hall is therefore measured and provided with separate floor markings before the cleaning machine is introduced. One defines the starting point. This is where the hall administrator has to move the machine, which is made extremely easy by the use of a joystick. Steerable axles ensure that it is extremely flexible and that it fits through narrow corridors and doors. Additional reference points are used for position control during operation in the hall.
The hall administrator only has to position the machine, select the right program and start - everything else is regulated by the machine itself. Hall operators don‘t even have to buy the Bodenwart - they can use the device, including maintenance, for a certain period via a rental model.
A pilot series of the patented cleaning device is already in operation in some Swiss sports halls; series production is due to start in a few weeks. The machines will then also be equipped with the option of intelligent remote operation - Wachendorff will of course also be used in this case.

Image 1
Lots of internal technology: In the foreground the control, behind which are the freshwater tanks, the cleaning and maintenance products.

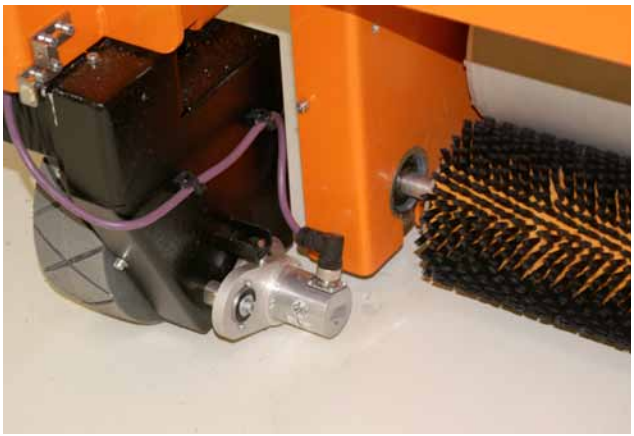


Image 2/3
The WDGA encoders with CANopen interfaces from Wachendorff are both compact and robust. The measured values that they provide allows the control to calculate the precise position at any time. The brushes are used for mechanical cleaning.

Image 4
The Bodenwart cleans a path 240 centimetres wide, completing the wet cleaning of an entire sports hall in 15 minutes.

Image 5
A good team: Bernd Rottorf, Sales engineer at Wachendorff provided Francisco Delgado, SPS programmer at Infrasport with advice and support during development.

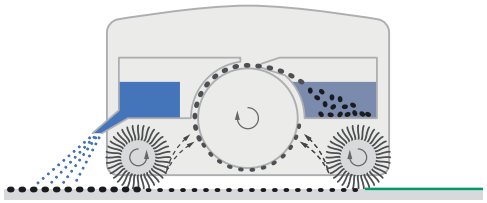


Image 6
How the machine works. Dirt is removed and a protective film, which ensures optimal sliding friction, is left behind.

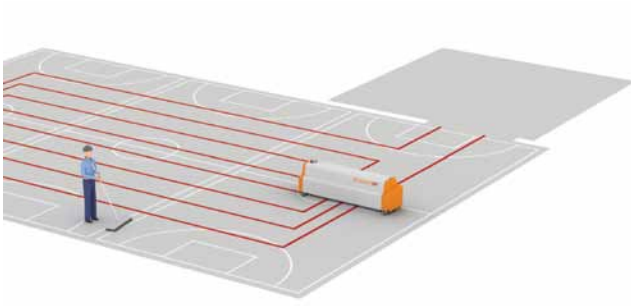


Image 7
The Bodenwart works much more quickly and effectively than what can be achieved by manual cleaning.

WACHENDORFF

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