

ACTIVE Shuttle:

Setting your intralogistics

in motion



**VDA 5050
INTERFACE**

**FUTURE PROOF
FLEET SAFE**

**With Plug & Go start quickly
and move safely**



**WE MOVE.
YOU WIN.**



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All technical details and accessories
can be found online at
www.boschrexroth.com/activeshuttle



Just try it!
We offer various scenarios for testing our products
in your production environment – see page 17.



ACTIVE Shuttle provides answers to your questions regarding Intralogistics 4.0

Increasingly individualized products, a wider range of components, fluctuating production figures – the competitive pressure in intralogistics is ever growing. Autonomous transport systems provide the necessary flexibility and transparency. With ACTIVE Shuttle, Bosch Rexroth sets a new standard here. The autonomous mobile robot (AMR) transports loads of up to 260 kilograms robustly, efficiently and fully automatic. Transparently controlled by the ACTIVE Shuttle Management System (AMS) or via VDA 5050 with an existing fleet manager. With maximum freedom for you. That is Intralogistics 4.0!

REQUIREMENT

SOLUTION



Minimal installation work



Transparency



Highly robust processes in high-traffic environments



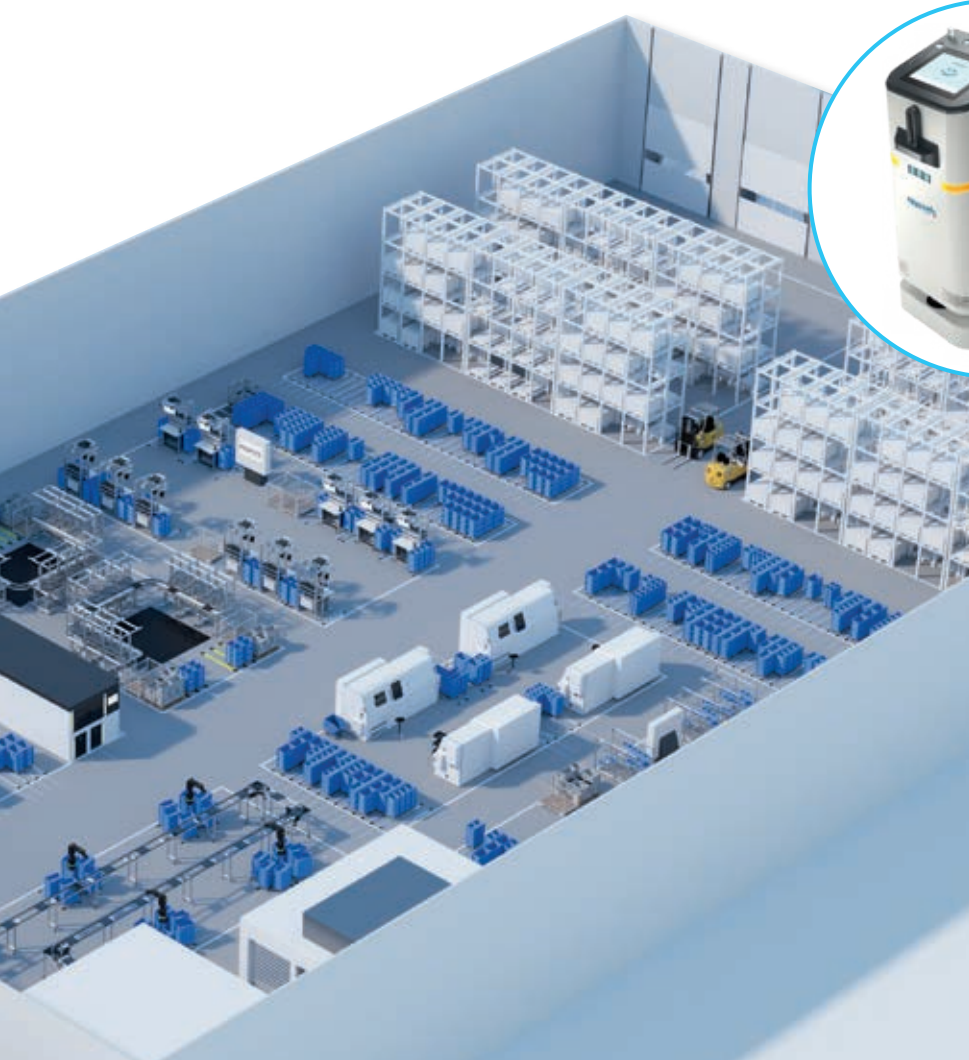
Plug & Go without adapting the existing factory infrastructure



Transport runs depicted in real time in the AMS Intuitive operation of the ACTIVE Shuttle via a touchscreen



Laser navigation plus 3D obstacle detection, continual, automatic map updates for the entire fleet









Factory of the Future

Now. Next. Beyond.

THE OVERALL AMR + AMS SYSTEM YOUR ADVANTAGES

- ▶ Plug & Go – quick and easy to implement without adapting the existing factory infrastructure
- ▶ Automated materials transport with fully automated loading and unloading
- ▶ Easy, intuitive operation of the entire system
- ▶ Navigate safely around obstacles
- ▶ Create and configure logistics scenarios easily
- ▶ Return on investment (ROI) within two years
- ▶ Comprehensive safety concept, designed for continuous 24/7 mixed operation with humans and machines
- ▶ Reduced workload
- ▶ Standard interface for connecting to third-party systems
- ▶ Greater transparency
- ▶ Less space and materials required

 <p>Easy integration</p>	 <p>Fewer manual handling steps</p>	 <p>Reduced safety stocks and storage requirements</p>
<p>Standard interfaces for connecting to third-party systems</p>	<p>Fully automatic materials transport</p>	<p>Flexible, needs-based material supply, efficient order management</p>
		

Automate your flow of materials and goods. It has never been easier.

The ACTIVE Shuttle autonomous mobile robot is already making the transition to the Factory of the Future possible: It can be implemented quickly without having to adapt your existing factory infrastructure. It is also intuitive and easy to operate, fully connected and safe for use around people! Create transparent and efficient internal processes using ACTIVE Shuttle.

SIMPLE



Plug & Go

Thanks to Plug & Go, the autonomous mobile robot can be quickly and easily integrated into your intralogistics. Changes to the infrastructure are not required thanks to the reliable laser navigation.

Intuitive operation

The intuitive touchscreen display ensures full transparency: Order information, sensor data and troubleshooting details etc. are available in plain text format.

Automatic map handing

Once recorded, the map of the surroundings is kept up to date at all times. New mapping is not necessary, even in a dynamic environment.

FLEXIBLE



Full flexibility

Orders can be fed in manually or fully automatically thanks to the existing standard interfaces (sensor, PLC, MES/ERP etc.). Transport requirements are assigned to available ACTIVE Shuttles via the AMS.

A wide range of supply principles

With the AMS, a wide range of supply principles is possible – from cyclic transport to a needs-based material supply.

Variable job templates

With easy-to-configure job templates, you can put in place a wide range of transport concepts.

SAFE



Safety concept

The safety concept designed in partnership with the German Social Accident Insurance (DGUV) association ensures safe continuous 24/7 mixed operation with humans and machines.

Scanner performance level d

The safety laser scanners used offer the highest reliability in continuous 24/7 operation.

Battery performance level c

The highest standard minimizes hazardous situations.



ADAPTIVE



AMS live map

The ACTIVE Shuttle fleet immediately records changes in the production environment and automatically updates the reference map in the AMS. Transport orders can be tracked in real time.

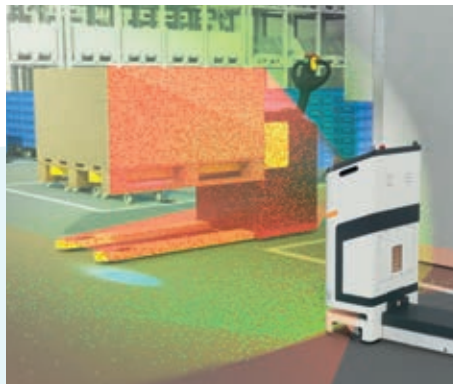
Quick and flexible changes

Unplanned changes can be made during live operation with just a few clicks in the AMS.

Traffic management

If a number of ACTIVE Shuttles are in use, the AMS takes care of route planning for the entire fleet and coordinates the vehicles.

ROBUST



Obstacle management

The obstacle management system integrated into the AMR software enables you to brake in time and pass obstacles on the route safely.

3D obstacle detection

In addition to the safety laser scanner, stereo cameras scan the room in 3D. As a result, even objects protruding into the ACTIVE Shuttle's path are recognized.

Robust transport

The robust construction and the use of proven navigation and sensor technologies ensure high reliability in dynamic production environments.

EFFICIENT



Zero manual handling

With the lifting platform, dollies are loaded and unloaded fully automatically – with no need for manual intervention!

Easy order management

The order management system ensures that pending transport orders are prioritized and distributed optimally to the ACTIVE Shuttle fleet.

Long-term optimization

Using the ACTIVE Shuttle saves space and materials and significantly reduces throughput times.

Streamline the value chain

Optimize your intralogistics by automating the flow of materials and goods using the ACTIVE Shuttle.

ACTIVE Shuttle – the autonomous transport system for future intralogistics

A taxi instead of a bus: The ACTIVE Shuttle autonomous mobile robot moves dollies, which are loaded with small load carriers (SLC), automatically and quickly from A to B, for example from the goods warehouse directly to the point of use.

The material flow in modern production plants is complex – the points of use vary and can be far away. With the ACTIVE Shuttle, manual material transport is a thing of the past. With its robust and reliable laser navigation and 3D obstacle detection, the ACTIVE Shuttle can move freely in the plant with no need for changes to the factory infrastructure and thus automates the flow of materials and goods.

In practice, compatible dollies with a surface area of 600 x 400 mm are driven under automatically and lifted slightly with the integrated lifting platform. These dollies can be loaded with a wide range of load carriers: Small load carriers (SLC), blister packs or other containers.

As soon as a transport order is assigned to an available ACTIVE Shuttle, the ACTIVE Shuttle heads for its destination and automatically unloads the transported material. This way, the material flow between different sources/sinks in the value stream can be realized and the dollies are ready for the next process step.

ACTIVE Shuttles are equipped with a VDA 5050 interface. This interface, which was defined to be compatible with products from a range of manufacturers, standardizes communication between a master controller and all driverless transport systems (AGVs) and autonomous mobile robots (AMRs). This is an important step towards full interoperability.



Exemplary dolly (600 x 400 mm) as a flexible basis for a wide range of load carriers

**VDA 5050
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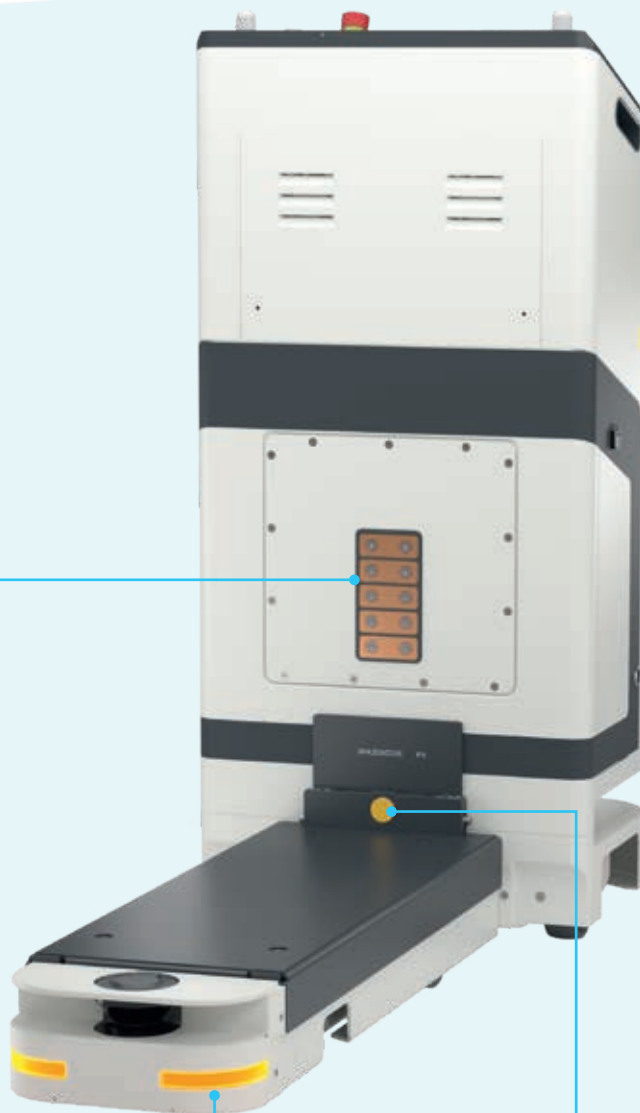
KEY TECHNICAL DATA

- ▶ Load dimensions (L x B x H): 600 x 400 x 1,200 mm
- ▶ Navigation technology: SLAM algorithm, laser and odometry data
- ▶ ACTIVE Shuttle dimensions (L x B x H): 1,046 x 405 x 912 mm
- ▶ Transport weight: Max 260 kg
- ▶ Travel speed: Max 1 m/s
- ▶ Gradients: Up to 2.5% when traveling forwards (up to 6 % with a reduced load)
- ▶ Laser type: Safety laser scanner, type 3, SIL 2, performance level d
- ▶ 3D obstacle detection: 2 stereo cameras
- ▶ Touchscreen display: 10.1 inch, 1,280 x 800 pixels
- ▶ Power supply: Lithium-ion battery (51.8 V, 29 Ah, PL c)
- ▶ WLAN: IEEE 802.11.ac/a/b/g/n
- ▶ ESD (electrostatic discharge): Yes, derivative value of the loading area: $1 \times 10^4 \Omega \leq R_V \leq 1 \times 10^9 \Omega$
- ▶ Conformity: CE



ACTIVE Shuttle – the AMR with smart and clever features

Sophisticated technology, practical details and perfect interaction of form and function – the ACTIVE Shuttle fits seamlessly into existing intralogistic systems. And makes them faster, more efficient and future-proof. See for yourself.



ESD
You can also use the ACTIVE Shuttle in ESD areas.

Charging contacts
For straightforward docking on the charging station.

Direction indicator
Complete transparency regarding the vehicle status thanks to clearly visible light signals.

Dolly detection
With the inductive safety sensor, dollies are detected reliably and loaded safely.



WLAN communication
For direct communication with the fleet manager.

Operator panel
On/Off button, acknowledgment button, hole for the safety flag, port for the manual control unit, emergency stop function – everything is available centrally.

Touchscreen display
For direct interaction in the factory – easy and intuitive.

3D obstacle detection
For detecting objects outside the laser scanner level.

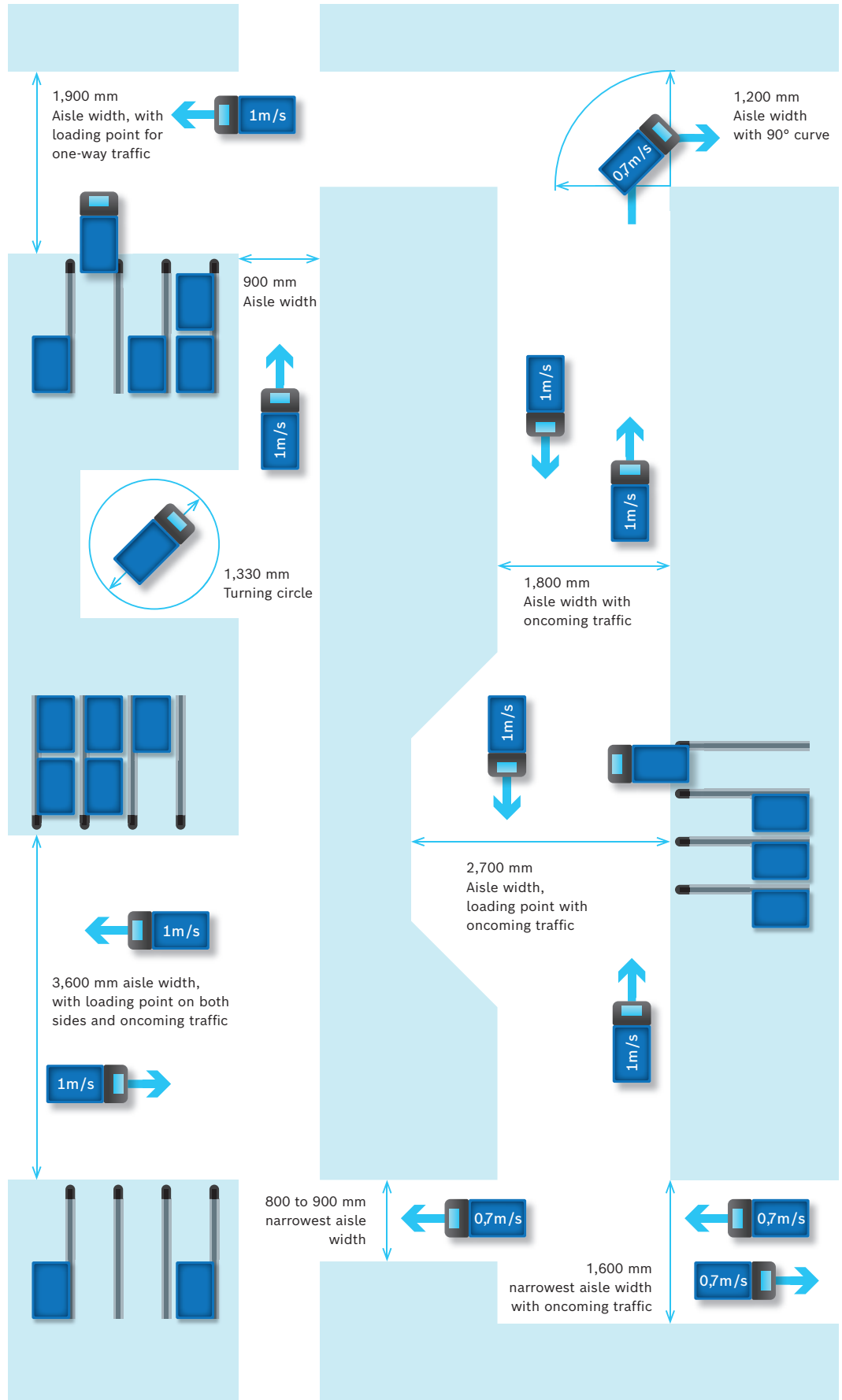
Blue spot
For improved visibility of the ACTIVE Shuttles and maximum protection for employees.

Lifting platform
The lifting platform loads and unloads the dollies fully automatically.

Brake release
Easily accessible from the operator panel.

Laser scanners
Integrated safety laser scanners (front/rear) ensure safe mixed-mode operation.

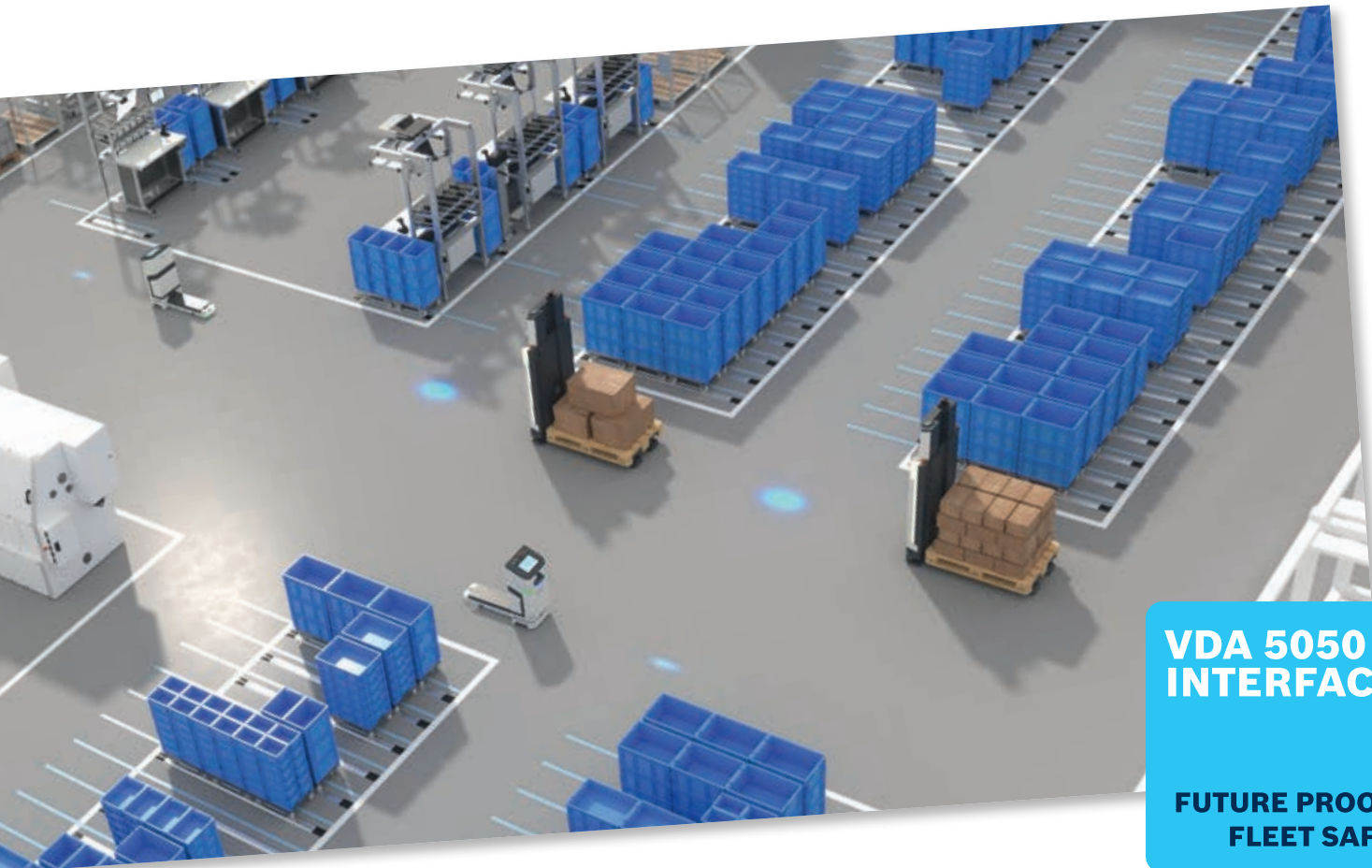
LITTLE SPACE REQUIRED, LOTS OF POWER



Fits even in the narrowest lanes
 ACTIVE Shuttles require only very narrow lane widths. They can pick up material directly even in narrow lanes and transport it right up to the machines. Manual reloading on the way to the machine is no longer necessary, thus relieving the burden on employees.

Even in narrow spaces and oncoming traffic, ACTIVE Shuttles can travel at **maximum speeds** of between 0.7 and 1.0 meters per second. And if things get even tighter, the AMR automatically adjusts its pace. To help with planning, the depiction provides a brief overview of the necessary corridor widths.

VDA 5050 – a flexible, future-proof interface



**VDA 5050
INTERFACE**

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The VDA 5050 interface was defined to be compatible with products from a number of manufacturers. It standardizes communication between a master controller and AMRs as well as other AGVs (driverless transport system). It is the result of a collaboration between specialists from the automotive industry, materials handling and intralogistics for international applications.

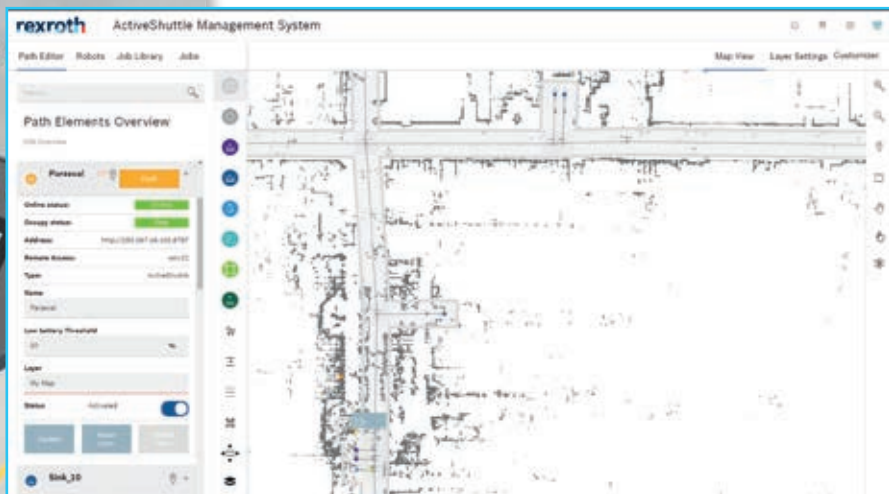
VDA 5050 makes it easier to operate mixed fleets with tractors, forklifts or AMRs. Users can put together their fleet individually, regardless of manufacturers, and operate it “as a team” under a master controller. Standardization ensures full interoperability during day-to-day operations and the various vehicles can travel jointly defined routes.



The ACTIVE Shuttle Management System (AMS): Intelligent control, flexible configuration



The ACTIVE Shuttle Management System (AMS) is the control center for the entire system and centralizes control of the complete ACTIVE Shuttle fleet. As the control software, the AMS displays the live status of your fleet, assigns pending transport orders to available vehicles and lets the user control and flexibly configure the logistics scenarios during operation.



▲ For highly flexible order management, you have all processes in view and can intervene at any time.

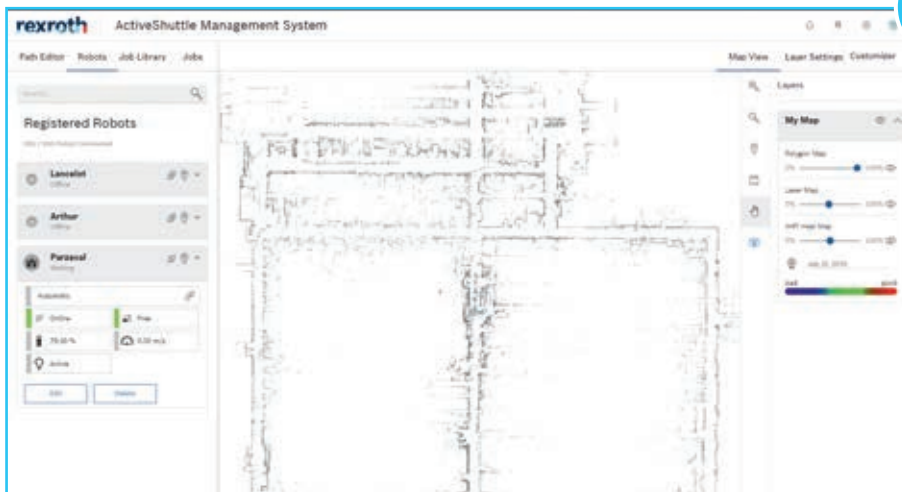
THE AMS TAKES ON ALL ASPECTS OF FLEET AND ORDER MANAGEMENT

You remain fully flexible and up to date at all times.

A wide range of supply principles is possible – from cyclic transport to a needs-based material supply. Via the web-based user interface, you can enter transport orders manually, e.g. using a tablet, or fully automatically thanks to the interfaces provided. Higher-level IT systems such as MES or ERP systems send details of transport requirements to the AMS which in turn assigns a transport order to an available ACTIVE Shuttle.

The system steers itself.

Once it is set up, the system steers itself to various destinations fully automatically – even in the event of volatile material requirements. Traffic management ensures smooth and coordinated transport. Even if the environment changes, the overall system remains stable thanks to automatic map updates (AMS Live Map). Changes are automatically detected by the vehicles during live operation and communicated to the entire ACTIVE Shuttle fleet. This way, the map is always up to date and manual re-mapping is no longer required.



Connection to shop floor infrastructure

Machines, robots and sensors (such as dash buttons) can also be integrated into the AMS in order to communicate with the ACTIVE Shuttle. If a shortage of materials is imminent, details of transport requirements are transmitted directly to the ACTIVE Shuttle Management System (AMS). As a result, assembly and logistics can be linked together even more closely. This gets intralogistics moving. And it is a further step towards the Factory of the Future.



AMS FUNCTIONS

- ▶ Order management: Prioritizing and distributing transport orders to available ACTIVE Shuttles
- ▶ Job templates: Easy configuration of your transport concepts
- ▶ Traffic management: Transport control center ensures efficient and smooth transport
- ▶ AMS Live Map: Changes in the environment are automatically detected by the vehicles and communicated to the entire ACTIVE Shuttle fleet
- ▶ Energy management: Fully automatic, configurable charging concept
- ▶ Web application: Intuitive and user-friendly user interface

Next level intralogistics: The ACTIVE Shuttle product structure

Put together your perfect package for your Intralogistics 4.0: ACTIVE Shuttle with open interface – flexible use via any VDA 5050-compatible control system. Or as an overall ACTIVE Shuttle system – the convenient complete solution with the ACTIVE Shuttle Management System (AMS).

AMR

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ACTIVE Shuttle AMR with VDA 5050 interface
Autonomous mobile robot – compatible with third party systems and mixed fleets

AMR + AMS



AMR with ACTIVE Shuttle Management System
For intuitive, highly efficient fleet management

ACCESSORIES



ACTIVE Shuttle charging station
Docking station and wall box for wall mounting



ACTIVE Shuttle mounting kit
If wall mounting is not possible



TRY IT NOW!

With its Plug & Go concept, ACTIVE Shuttle can be used straight away without making changes to the factory environment. A pilot application can be up and running in just a few hours. **Try the ACTIVE Shuttle in your production environment: We offer various testing and demo scenarios – contact us!**

SERVICE



ACTIVE Shuttle service portfolio

Testing, help with commissioning, training etc. – we take care of it!

EXTRAS



ACTIVE Shuttle apps and add-ons

These include the ACTIVE Trigger app for easy manual orders

ACTIVE Shuttle lithium-ion battery

With high capacity – for a long range and a short charging time



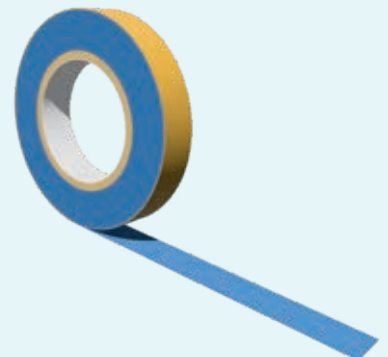
ACTIVE Shuttle manual control unit

Can be used intuitively thanks to a clear key layout



Optical track guidance

Easy attachment, high abrasion resistance and excellent adhesion



WE MOVE. YOU WIN. ACTIVE SHUTTLE IN PRACTICE

Take advantage of our wealth of experience when it comes to integrating AMRs into the internal flow of goods.

Clever transport between sources and sinks

THE CHALLENGE

The requirements in intralogistics are increasing all the time. Manufacturing is becoming more individual, motion sequences are becoming more complex, execution must be ever more precise and interaction with people and multi-variant environments means ever higher safety requirements.

THE ACTIVE SHUTTLE SOLUTION

The ACTIVE Shuttle provides the technical basis for perfect orientation in space, perception of the surroundings and precise navigation. It is highly practical in everyday industrial use too. Plug & Go ensures that it is ready for immediate use, while it can be integrated easily into existing processes and third party systems and pays for itself quickly. Ask us about our experiences.



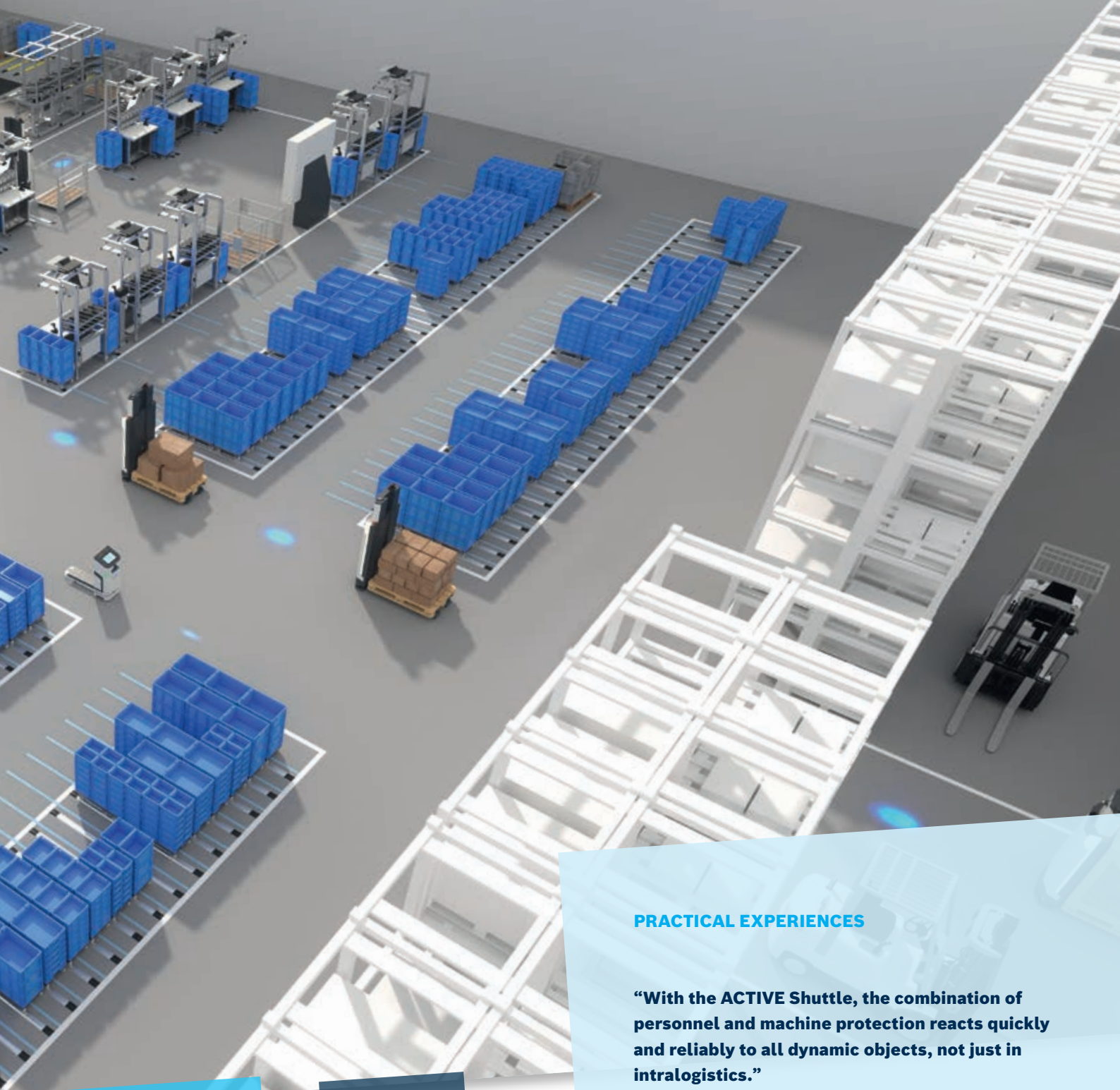
Full transparency for everyone involved



High level of flexibility for individual designs



Open interfaces for interoperability



Integrative freedom for existing systems

PRACTICAL EXPERIENCES

“With the ACTIVE Shuttle, the combination of personnel and machine protection reacts quickly and reliably to all dynamic objects, not just in intralogistics.”

Plant manager, process automation

“Thanks to Plug & Go, pilot applications can be up and running in just a few hours!”

Project manager intralogistics, mechanical engineering

“The ACTIVE Shuttles support staff and can be integrated quickly into the team.”

Process manager, equipment manufacturing

“In practice, projects with an ROI of less than 2 years are possible.”

Logistics manager, automotive sector

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ACTIVE Shuttle on the Bosch Rexroth website
www.boschrexroth.com/activeshuttle



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