



Wiferion
a PULS brand

SYNAOS

item



Efficient intralogistics through standardization and interoperability

How VDA 5050 and modern technologies are
transforming the logistics industry

Contents

Editorial	3
VDA 5050 - where do we stand?	4
Optimum control of material flows with a single platform	6
The ideal charging concepts for mixed AGV fleets	10
The right peripherals for mobile robots	14
Three systems combined - live at the Mobile Robotics Summit	17
Conclusion	18
About Wiferion - a PULS brand	19
Contact Us	19

Editorial

The market for transport robots is booming. Numerous manufacturers are entering the market and offering different systems for a variety of tasks. Heterogeneous robot fleets are therefore often used in many production facilities, warehouses and distribution centers. However, universal communication interfaces are required to ensure that they work together harmoniously and that processes run smoothly. This is because a central control station can only communicate with transport robots from different manufacturers with the help of standardized commands and status reports. Until now, however, the coordination of different vehicle brands with individual control solutions has made it difficult to use the systems efficiently. Simple "plug & play" of the different robots based on a uniform standard would be desirable.

The interoperability of systems is one of the most pressing issues in intralogistics. This white paper

deals with this topic. On the one hand, it deals with software-based, cross-system fleet control on the basis of VDA 5050, and on the other, it also examines the mandatory standardization of hardware interfaces. This is because the charging structure must also enable the use of different vehicles. Finally, suitable peripherals for the transport robots are also crucial for successful automation. We explain the extent to which standardized basic trolleys in combination with individually configurable superstructures simplify integration into existing processes.

Have fun reading!

Matthieu Ebert, Director Product & Technology, Wiferion - a PULS brand

Dr. Philipp Schäfers, Head of Partner Management & Business Development, SYNAOS

Hannes Fröhlich, Product Manager Robotics, item Industrietechnik

VDA 5050 - where do we stand?

There is an increasing demand for automated and flexibly controllable material flows in production and intralogistics. Decreasing batch sizes and an increasing number of variants can no longer be managed with rigid processes. The shortage of skilled workers is another reason for the rapid development in the field of transport robots.

Experts are forecasting a double-digit annual growth rate for driverless transport systems. It is only logical that transport systems from different manufacturers are used in production and warehousing. This is because manufacturing companies and operators of warehouses and distribution centres usually require a variety of specialised transport solutions to automate their processes.

The problem:

different robot systems have to operate in the same areas and therefore communicate with the higher-level software system about orders and traffic in order to ensure efficient and safe operation.



VDA 5050 was developed to solve this problem. It regulates the communication between the master control system and the individual vehicles. The standardization of the structure and content of the communication enables the smooth integration, control and optimization of different robot types as well as the smooth operation of hybrid fleets. This increases flexibility, efficiency and scalability.

VDA 5050 has now become established in Germany and Central Europe and is a fixed criterion in many tenders for robot fleets and control center systems. In the future, the standard will also be able to be used for freely navigating vehicles (AMR). Numerous practical examples already prove that the standardized communication interface is a good basis for the successful implementation of small and large projects.

A standardization initiative has been formed in the USA with MassRobotics, but it is not necessarily comparable to VDA 5050. This is because the MassRobotics AMR Interoperability Standard is limited to information on the movement and status updates of robots. The focus here is on networking robot fleets with adjacent warehouse management or ERP systems. However, the MassRobotics standard does not cover the standardized transmission of transport orders from a central fleet manager to a heterogeneous vehicle fleet.

History of VDA 5050

The German Association of the Automotive Industry (VDA), in cooperation with the German Engineering Federation (VDMA) and supported by the Karlsruhe Institute of Technology (KIT), has developed a standardized communication interface: the VDA 5050. Initial discussions took place in 2017. Version 1.0 was published in 2019. At the beginning of May 2024, it was decided to publish version 2.1. The VDA 5050 working groups continue to meet regularly to drive forward further development.

Optimum control of material flows with a single platform



The complexity of intralogistics continues to increase. Transport vehicles and, in particular, mobile robots from different suppliers are increasingly being used to cover various transportation tasks. Until now, these have been controlled by vehicle-specific software. Communication with vehicles from other manufacturers and therefore operation in the same area was not possible. This could only be achieved through complex, individual integration projects.

Above all, the vehicles were incapable of sharing the same routes. There was

effectively one highway for BMW and one highway for Mercedes. So far aspect poses major challenges for manufacturers and operators of production facilities, warehouses and distribution centers, as space is often scarce. Every square meter is taken up and, for economic reasons, is preferably used for production or for storing goods rather than as a driveway.

In addition to modern vehicle systems such as AGVs and AMRs, conventional, human-controlled forklift trucks are still in use – sometimes even in direct interaction. But how can people, industrial trucks and driverless transport systems be coordinated without creating chaos? Interoperability offers the solution. Because only with a comprehensive communication system can heterogeneous intralogistics fleets be successfully orchestrated, thereby increasing efficiency and reducing costs.

The initial situation



Interoperable systems are not only required within a production facility or warehouse, but also for several locations. The following three examples illustrate the challenges facing companies today.

Example 1: Three robot types from three different manufacturers are in use within a large fleet at one location. These are to be controlled via a single system.

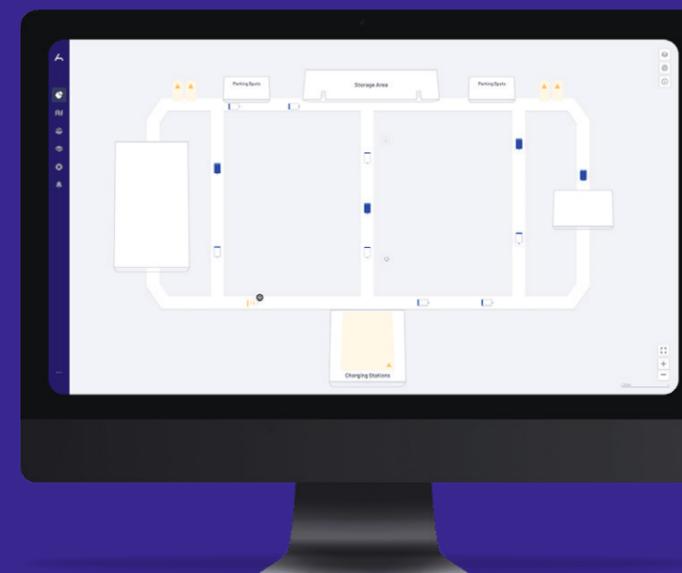
Example 2: A company has several sites and robots from manufacturer A are in use at one site, while robots from manufacturer B are in use at the other site. The company does not want to use different software solutions to control the mobile robots, but rather standardize its IT infrastructure across all sites in order to reduce interfaces, speed up the roll-out and lower operating costs.

Example 3: A company uses both driverless transport vehicles from different manufacturers as well as manually operated vehicles. Fleet management for mobile robots falls short here, as the manually operated forklift truck must also be integrated into the system in order to achieve holistic order and traffic management.

The solution



With the SYNAOS Intralogistics Management Platform (IMP), SYNAOS offers a system that is able to control and optimize complex processes and grow with dynamic requirements. Robots from various manufacturers can be integrated via the standardized VDA 5050 interface.



Special advantages of the solution:

1. Integration of all transport resources for holistic order and traffic management
2. Data-based optimization for highly efficient operation
3. Connection of peripherals (gates, fire alarm systems, elevators)
4. Standardized integration into the IT landscape, e.g. ERP systems, WMS



The platform always compares the known order pool with the current resource pool and makes an optimal allocation of orders. This analysis is not static but takes place continuously and is constantly

adjusted based on the system status. Traffic management is integrated into the platform in order to control the flow of traffic along the routes and avoid traffic jams. The optimum route for each vehicle is determined to ensure ideal vehicle movement. The status on the shop floor is monitored and visualized. This includes all vehicle, order and device messages. In this way, all events in production and logistics are constantly in view.

With the help of special computer vision technology in combination with standard hardware, transport units that were previously not recorded are localized and digitized – including industrial trucks operated by people. This means that manual processes can also be planned and optimized. All available transport resources are integrated into the system. Operating areas no longer have to be divided up according to the type of means of transportation. All resources can be optimally combined in a single area with a single system.

Last but not least, the software supports picking and commissioning processes. It enables customer-independent, multi-stage picking by bundling tasks – known as batching – and consolidating customer orders. This significantly reduces the order processing time.

TIP: Interoperability is not only crucial for companies that already have numerous systems in use and have been involved in automation for some time. Those who are implementing their first projects with mobile robots should also rely on standards from the outset. This makes it much easier to scale the systems, as it is usually not just a single robot.

short company information

SYNAOS

The German intralogistics software company SYNAOS with its nearly 100 employees shapes and drives forward the automation and digitalization of intralogistics. The industry-leading, scalable, and data-driven SYNAOS Intralogistics Management Platform (IMP) orchestrates material flows with mobile robots, forklifts and people inside factories and logistics centers.

Numerous transportation processes can be mapped on the SYNAOS platform:



A to B:

Simple transportation of materials from one location to another using any means of transport



Just-in-time:

Goods arrive exactly when they are needed



Just-in-sequence:

The goods arrive at the workplace in the correct order to be processed one after the other



Tour transports:

Route trains that transport materials from a central station to many different work stations.

The ideal charging concepts for mixed AGV fleets



It is not only the fleet control system that needs to be standardized if the robot fleets are to operate harmoniously. The harmonization of the hardware infrastructure is just as crucial. For example, there is currently no standard for the energy supply. Robots from different manufacturers each require their own specific charging infrastructure.

The initial situation



From battery charging systems with sliding contacts and inductive conductors integrated into the floor to charging concepts with plug-in contacts - there is a wide range of charging concepts available for supplying energy to mobile transport robots. If fleets of robots from different manufacturers are in use, users have to install several charging systems, as these are usually not compatible with each other.

This results in a number of difficulties and disadvantages:

- The installations are complex and cost-intensive
- Maintenance processes are becoming more complex and need to be coordinated
- The error rate increases as complexity increases
- Valuable space in warehouses has to be used for the charging infrastructure
- Even with standardised interfaces such as VDA 5050, the charging structure prevents easy scaling

The solution



To reduce complexity, a system is needed that can be used for a variety of vehicle types. Wireless charging with inductive point chargers is ideal for this purpose. Whether autonomous driverless transport systems, mobile robots or industrial trucks - with the etaLINK fast charging system, Wiferion offers a fully automatic charging option for all battery-powered vehicle types. The patented etaLINK charging technology includes a wallbox and a charging pad. The powerful electronics of the etaLINK products, with a receiver coil and energy storage, are installed in the vehicle. The technology enables magnetic and contactless energy transmission that is fast, efficient and maintenance-free.



The new CW 1000 - 1 kW charger from Wiferion

Special advantages of the solution:

- The charging pad can be installed at numerous locations in the logistics and production environment; separate charging zones with battery charging stations are not necessary.
- Even short stops are sufficient for charging. The wireless charging process starts fully automatically at high currents in less than a second.
- The charging system can generate all standard charging currents and voltages
- The charging points can be accessed omnidirectionally
- The system can be implemented quickly, and customisations are possible at any time.

In-process charging enables particularly economical operation.

The vehicles are in continuous use and do not have to interrupt their processes to recharge. Numerous intermediate charges at frequently used points, such as transfer stations, keep the energy level of the AGVs at a constant level. etaLINK charging technology not only helps to increase efficiency, but also supports the sustainability goals of customers. By eliminating the need for battery changing stations and reducing battery capacity and fleet by up to 30%, companies can improve their environmental performance and save costs at the same time. This results in a resource-saving and sustainable energy supply.



1000 Watt and 3000 Watt systems are available

Due to its simplicity, wireless charging offers itself as the new standard for the energy supply of industrial electric vehicles. It requires less equipment and less space, is robust and at the same time increases the productivity of each individual vehicle. Thanks to its universal use for battery-powered vehicles from different manufacturers, even large, heterogeneous fleets can be scaled safely and economically.



short company information



Wiferion is the standard for wireless power supply for mobile robots (AGV/AMR) and forklifts. The brand has been part of PULS GmbH as Wiferion - a PULS brand since 2023. The leading manufacturer of DIN rail power supplies and field power supplies (FIEPOS) is thus expanding its portfolio to include the etaLINK series of wireless charging systems. Founded in 1980 by Bernhard Ertl in Munich, the company employs around 1,400 people worldwide.

The right peripherals for mobile robots

With the right software, heterogeneous fleets can be easily controlled and managed. Vehicles from different manufacturers can be easily charged using intelligent charging technology. But how can materials be moved safely and reliably from A to B using various driverless transport systems? This requires constructions that have to be designed according to the manufacturer's specifications.



The initial situation



In automated processes, products, individual components and complete assemblies are transported on pallets, in pallet cages and small load carriers (SLCs) or with the help of racking systems. These superstructures must be securely connected to the AGV, be stable and transport the goods reliably. Although rigid, welded transport racks can be used as an aid, they have numerous disadvantages. For example, they cannot be adapted to changes. In most cases, however, there are still changes to the processes despite extensive planning. Rigid systems are also not suitable for heterogeneous robot fleets. If vehicles from different manufacturers are in use, the frames must also be modified or new ones must be assembled, since they must meet the specifications of the respective vehicle manufacturer. Among other things, the sensors, dimensions and docking mechanism of the mobile transport robots must be taken into account.

The solution



The modular system from item is designed for different vehicle types from well-known manufacturers and offers maximum flexibility as the superstructures can be individually configured. The standardized base cart is precisely adapted to the specifications of several manufacturers.

This ensures, for example, that the vehicle's sensors are not covered and that they can perform their function safely.

A range of different attachments can be connected to the Base Carts via a standard interface. These attachments – known as Top Modules – have the same footprint as a Euro pallet, making them the perfect match for the Base Cart. They can be designed to meet the specific requirements of the transport process. For example, a supply rack for transporting KLTs that consists of several levels is possible. Ready-made sample solutions for different areas of application can be used as a source of inspiration. Users can also configure the attachments individually, drawing on the extensive modular system from item. The item Engineeringtool is available for this purpose. This cloud-based configuration tool allows the Top Modules to be optimally adapted to the respective requirements. If necessary, they can also be bolted directly to the AGV. The transport solutions from item are particularly suitable for use in heterogeneous fleets. Instead of laboriously creating complete transport racks for the different vehicles, all that is needed is to select the Base Carts that match the respective manufacturer. The



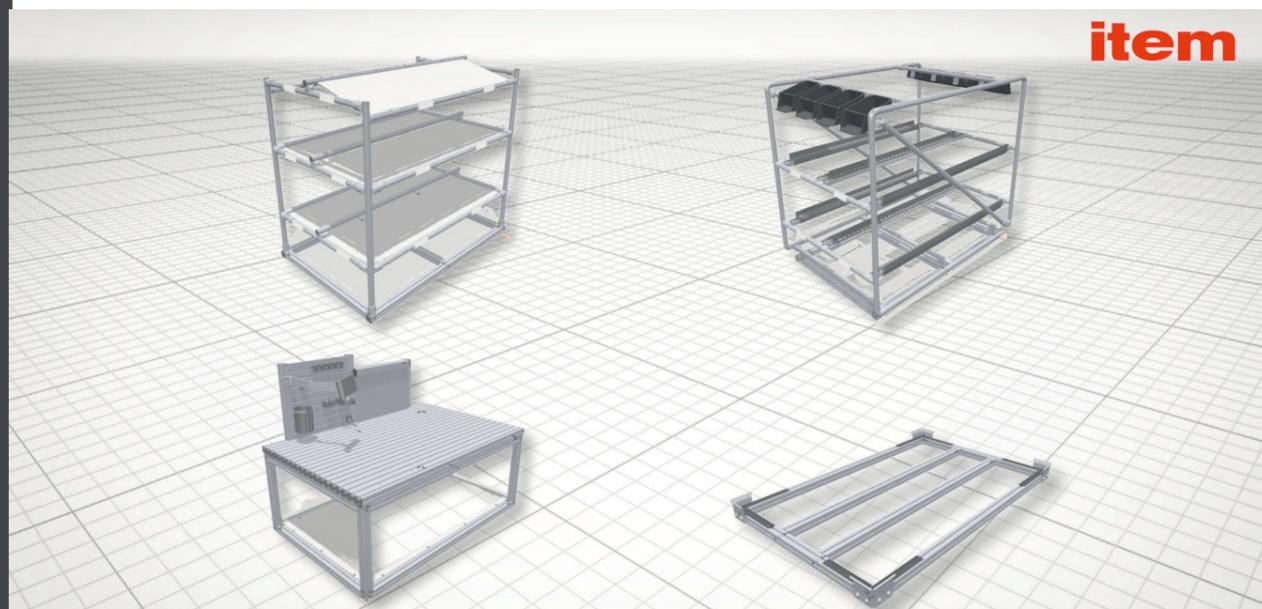
attachment can then be easily mounted on these Base Carts via the standard interface. As a result, the solution, consisting of a standardised base cart and individually configurable attachments, can be used for numerous applications.



short company information



item Industrietechnik GmbH is the pioneer in modular systems for industrial applications and a partner to the manufacturing industry worldwide. The product portfolio includes more than 4,500 high-quality components for the construction of machine frames, work benches, automation solutions and lean production applications. As a pioneer in digital engineering, item is driving the digitalisation of design processes with software tools developed in-house. The company employs around 900 people.



Efficient intralogistics through standardization and interoperability

Three systems combined - live at the Mobile Robotics Summit 2024

The Mobile Robotics Summit will take place in Düsseldorf on **October 9 and 10, 2024**. The new trade fair and conference for the implementation of mobile robot systems in corporate processes offers 16,000 m² of exhibition space for numerous companies. It took place for the first time in 2020 and brings together logistics managers with innovative thought leaders and solution providers. Among the more than 200 exhibitors are Wiferion - a PULS brand, SYNAOS and item.

At this year's Mobile Robotics Summit, interested parties can experience live how the operation of heterogeneous fleets works in practice. Vehicles from different manufacturers, which are controlled and optimized via the SYNAOS central control system, will be bustling around in one area. This is clear proof that VDA 5050 is suitable for practical use.



Conclusion

Interoperability has become indispensable in modern intralogistics. It enables the efficient and smooth operation of a wide range of transport systems on the shop floor by ensuring seamless communication and collaboration through compliance with common technical norms and standards. This leads to improved efficiency, reduced costs and increased flexibility in logistical processes.

As more and more diverse robots are being used in production and warehouses, there is an increasing need for powerful software to ensure efficient operation. With software from SYNAOS, not only is it possible to orchestrate heterogeneous robot fleets, but also to integrate manually guided vehicles. However, not only the software, but also the hardware infrastructure requires harmonisation. Wireless, inductive charging systems such as those from Wiferion are ideal for supplying power to the various transport robots. The entire fleet can be charged with just one charging station, regardless of the voltage, amperage or battery type required.

Ultimately, the periphery of the AGV must also enable different vehicles to interact. For safe and reliable transport, the superstructures must be optimally

matched to the transport robot and, on the one hand, be robust and stable, but on the other hand, be able to be quickly adapted to changes. With the Base Cart and individually configurable top modules, it offers a solution that is ideally suited for a wide range of applications.



About Wiferion - a PULS brand

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PULS manufactures all products in its own plants in Chomutov/Czech Republic and Suzhou/China as well as in Drebach/Germany. PULS power supplies regularly set standards in terms of high efficiency, compact design, durability and reliability. Founded in 1980 by Bernhard Erdl in Munich, the company employs around 1,700 people worldwide.

Contact Us:

Wiferion - a PULS brand
PULS GmbH
Heinrich-von-Stephan-Str. 25
79100 Freiburg
Phone: +49 (0) 7611 542 67 0
info@wiferion.com
www.wiferion.com

**A competent team is
available to answer
your questions.
We will be happy to
help you.**

