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How can automated guided vehicle (AGV) systems be integrated in a digital visualisation of material flow – even with parts which are not inventory-managed and even with AGV from different manufacturers? The answer is a wireless automated material requisition system.

Companies which produce AGV or components for them can look optimistically to the future. In 2023, the global market grew by approx. 10% to

US\$ 2.3 b. By 2030, the turnover is predicted to rise to US\$ 4.43 b. That is equivalent to a mean growth rate of 9.8% per year.

To a large degree, the current and predicted market successes are due to the architecture and features of the latest AGV generations. The AGV of today navigate freely. They are easier to adapt to individual tasks and are able, for example, to carry out orders "on their way past", that is spontaneously.

An additional reason behind the market growth is the variety of systems available –

from mini AGV to heavy-duty vehicles able to carry up to 500 tonnes. Moreover, the emerging autonomous mobile robots (AMR) are a class of AGV with extra freedom of movement (a robot arm), able to perform gripping and picking tasks all by themselves. Here the expected growth is even larger than for the „normal“ AGV. Market researchers predict mean growth rates by 2028 of more than 20% per annum.

NEW IT ARCHITECTURE: MANUFACTURER-INDEPENDENT FLEET MANAGEMENT SYSTEMS

The deployment of AGV and AMR has been given an additional boost by changes to the control architecture. Superordinate systems such as Agilox, Idelworks, MHP and Navitec have become established alternatives to manufacturer-specific AGV fleet management systems. They can control AGV fleets from multiple manufacturers while also providing interfaces to other systems controlling – for example – stationary conveyors or consignment tasks. Here the (new) VDA 5050 communication standard is instrumental. It facilitates the management of larger AGV fleets from multiple manufacturers or different product series via a shared software platform.

Standardised fleet management makes it easier to operate heterogeneous AGV fleets. In order to guarantee structured and optimised material flow, users and all AGV require additional information. For example, whether storage slots in materials hubs need to be identified or stipulated. Fill levels in large containers also need to be monitored and transport orders issued when replenishments are required.

These tasks can be assumed by the automated material requisition system nexy, as is already the case at various automotive suppliers and other factories. The nexy platform, developed by the steute business division Leantec, spans a wireless network across the shop floor or consignment areas.

Sensors detect material stock levels, for example in eKanban racks or supermarkets. When a minimum stock level is reached, the sensors send a signal via the Sensor Bridge interface to the company IT. Monitoring of material flow is uninterrupted and wireless – avoiding bottlenecks in the supply chain, as well as the build-up of excess materials.

GOAL: A REAL-TIME "DIGITAL TWIN" OF MATERIAL STOCK LEVEL

The "brain" within this communication network is the Sensor Bridge. It evaluates signals from wireless sensors in the field which are bundled via Access Points. At the same time, it functions as an interface to the company IT infrastructure. The wireless sensors have been developed specifically for their part in controlling the material flow. They include short-distance laser sensors, which detect the fill levels of bulk goods, and long-distance laser sensors, which identify free pallet zones in materials hubs. A sensor is also available for detecting occupancy in (mobile) supply racks, emitting a signal whenever a user removes a box.

In this way a "digital twin" of the material stock level is visualised, also for articles which are not inventory-managed. Data generated on the shop floor are forwarded via the Sensor Bridge to e.g. the ERP system of the user, where they are processed. This guarantees a continual and automated supply of replenishments.

Alternatively, the nexy system can also communicate directly with AGV fleet managers via various interfaces. In this application, the combination of wireless sensors and "docking" onto fleet management and material flow control is truly beneficial. Because the system communicates remotely, the mobile world on the shop floor is visualised in real time. And the wireless hardware can adapt quickly and easily to frequent layout changes and material flow modifications.

NEW: ON-PREMISE SOLUTION WITHOUT INCLUDED HARDWARE

The Sensor Bridge is the heart of the system. All signals from the wireless sensors arrive here and are then made available to the target IT system or fleet manager. The latest version, which steute Leantec will be presenting at the LogiMAT (Hall 5, Booth 5D61), is easier to install and operate. Instead of the industrial PC previously required for operations, the new version is hardware-independent, permitting users to run it on their own existing IT infrastructure.

This new option of a hardware-independent Sensor Bridge is interesting for companies looking for a lean IT hardware with as few edge devices as possible and correspondingly reduced administration requirements. They can still use all the nexy functions – without having to install and manage an additional hardware component.

AN IMPORTANT AGV APPLICATION – BUT NOT THE ONLY ONE

Many operators of AGV fleets use nexy for the task described here, i.e. replenishment of parts which are not inventory-managed. For this it has a specially designed application, but there are also others for additional material flow management tasks – nexy can be used in many different ways. Linking AGV with mobile and stationary conveyors is also interesting, for example. Here the wireless automated material requisition system can pass on relevant data simultaneously to transfer of the corresponding box to an AGV or conveyor, guaranteeing an uninterrupted flow of information. Another frequently used application is the monitoring of dollies (rolling racks), thereby also integrating them in the replenishment management system.

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