

Networks for flexible material flow

AGV: remote "wake-up" call

Automated guided vehicles are the talk of the town. And in many situations they are not replacing industrial trucks, but stationary conveyor systems. A wireless network can put vehicles "to sleep" and then "wake" them again as needed. This saves energy and increases flexibility. The wireless system can also assume other tasks.

Before the onset of the coronavirus pandemic, the majority of AGV manufacturers faced one key challenge: to meet the steadily increasing demand for AGV, manage this growth and deliver on time.

The end of the production line

The reason for this development can ultimately be traced back to Industry 4.0 or "Material Flow 4.0". Compared to stationary conveyor systems, AGV fleets provide much greater flexibility. One example: when the planners of car plants opt to use AGV instead of fixed production lines and overhead conveyors, they can eliminate static loops and also assemble different types of car. Individual autonomous AGV can "cut loose" as required and assemble e.g. special editions. Assembly steps can be completed at fixed workstations and/or by workers riding pillion. Furthermore, it is no longer necessary to procure completely new assembly equipment for each new vehicle



Fig 1 Ford introduced mass production with fixed conveyors back in 1918. Many state-of-the-art automotive manufacturers are currently installing more flexible AGV in their assembly processes.

model. This principle is attractive, at least for the manufacturing of smaller series, meaning that AGV are in demand – and not only in the automotive industry.

In various pilot projects and factories, car manufacturers are currently testing "conveyor-free serial production". Porsche has even put it into practice already, for its Taycan production in Stuttgart-Zuffenhausen. Both the car body and the complete vehicle (following the "wedding"



Fig 2 In pilot factories, car manufacturers are testing flexible serial production without stationary conveyors, using automated guided vehicles.

of body and chassis with battery) are transported on AGV from one assembly point to the next. The workers can even ride pillion and carry out further assembly steps as they travel. That means that the transport time is also used for value-adding activities. The required assembly parts are provided by smaller, feeder AGV. A similar AGV-based concept is used by Daimler in its pioneering "Factory 56" in Sindelfingen, which is due to commence operations any day now.

So AGV manufacturers have their hands full right now. This is also true for dpm Daum & Partner Maschinenbau GmbH, a company which has developed a special safety and personal protection system enabling workers to ride pillion on AGV. To control the vehicles effectively and efficiently, it uses the steute wireless system "nexy".

AGV "woken up" by remote control

With this system, dpm ensures energy-efficient battery management: during downtimes of up to three weeks, the entire



Fig 3 Access Points receive wireless signals from individual switches or sensors and pass them on to the IT infrastructure of the company via e.g. WiFi or Ethernet.

AGV fleet – or individual vehicles – can be put into a "deep sleep" mode. In this mode, the energy supply is cut off completely, meaning that the vehicles require no power whatsoever. One of the advantages of this system is that they can remain parked wherever they happen to be, and do not have to return to a central charging station first. Only a buffer battery is in operation during this time, supplying a wireless receiver with power. When this receiver receives a "wake-up" signal, it starts the corresponding AGV remotely.

Wireless network for intralogistics

The wireless systems solution "nexy", used here, was developed especially for intralogistics applications and features the special function of a "deep sleep" mode with short wake-up times. In Europe, this network transmits on the 868 MHz waveband as a Low Power Wide Area Network (LPWAN) via a proprietary wireless protocol optimised for its wide spectrum of applications. Despite its very low energy requirement, it achieves a long range, even in unfavourable ambient

conditions, as well as high transmission reliability.

The wireless connection to the AGV is set up via Access Points distributed throughout the shop floor. If an AGV is standing still in its energy-saving "deep sleep" mode, and if it is now once more required to participate actively in the material flow, it receives a "wake-up" signal from the Access Point assigned to its location. This is triggered – if not otherwise configured – by the fleet management system. Installation and operation of nexy systems solutions are simplified by their central Sensor Bridge software, which takes care of both configuration and maintenance.

New functions: updates "on air"

For steute, the planning and installation of nexy wireless networks is project business and therefore also a new business model – which is why a new business area has been created, with its own brand name. An in-house development and application team is driving forward the market launch of additional functions. Current new features include an OPC UA interface for cross-platform data exchange.

Also new is the possibility to operate the Sensor Bridge on an Industrial PC (IPC) and thus to increase the reaction times and processing speeds of data from the field. In addition, the Sensor Bridge in its latest software version can also communicate with the SAP system of the user, and connected nexy field devices receive new firmware updates "on air", i.e. remotely. These updates are made available on the Sensor Bridge and then distributed throughout the local network. In this way, all terminal devices are guaranteed to have the latest software version with minimum effort at all times.

One wireless network – multiple applications

Multiple nexy applications – e.g. AGV fleets, eKanban and/or Andon systems to confirm to-bin and from-bin commands – can be operated within one and the same network while all being connected with the customer IT infrastructure. For such applications, reference projects already exist. Users can integrate all manner of wireless switches and sensors in the nexy platform – even switches and sensors not from the steute product range. Which makes the wireless network even more versatile.

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