Technical article, published in: Technische Logistik (5/2022)

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Technische Logistik

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LogiMAT SPECIAL

SENSOR TECHNOLOGY

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View from above: Laser sensors detect and signal the existence of pallets or containers, as well as fill levels, for example in LLC.

Integration in information flow

Material supply: transparency from start to finish

Sensors have an important role to play in material requirements planning (MRP) for e.g. assembly lines. They detect the current stock status at the various assembly points and can then send a signal triggering needs-based material flow management. This works particularly well when the sensors transmit their signals within a wireless system developed especially for this purpose.

At first glance, and in theory, a wireless eKanban system does not immediately appear to be necessary. Was that not the reason to install an ERP system, controlling material demand at e.g. assembly points?

Reasons for under- or oversupplying

In practice, however, materials which are not core components can be under- or oversupplied. There are several reasons for this:

- Requirements are only registered directly at the assembly point itself. Containers which are on their way are not captured by the ERP system.
- Several hours elapse between requisitions, making the stock balance overly positive.
- There is a delay between the requisition being sent and the supplies being delivered. And there are supply peaks because orders are often sent at the beginning of shifts.

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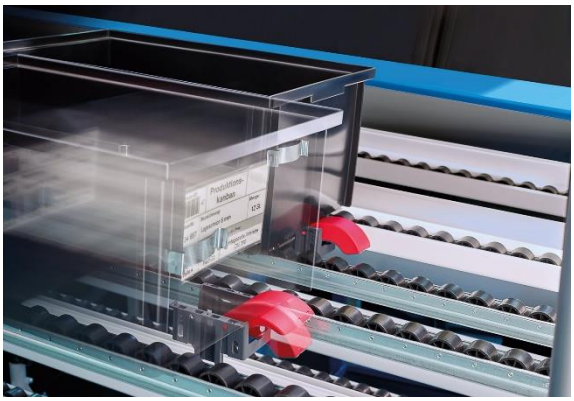
In the "stations" or "material supermarkets", sensors capture the position of dollies and tugger train trailers.



Sensors detect the positions of containers in racks and signal the information via remote control.

This all means: when stock levels are captured, there are both spatial and temporal discrepancies. Towards the end of the flow chain, the IT system presents not a realistic picture, but a rough estimate.

Efficient realisation of uninterrupted information chain

This is precisely where the remote electronic Kanban system developed by the steute business unit "Wireless" comes into its own. The "nexy" system spans a wireless network, in which different sensor types can be integrated, across the shop floor. This facilitates real-time visualisation of the actual material flow at all times. Every pallet is monitored, as well as every small load carrier (SLC) in every rack (as well as removal from that rack), every dolly or tugger train in the materials "supermarket" or station.

An up-to-date and completely real visualisation of material stock and movement is thus created – a "digital twin" of the material flow, so to speak. Put another way: an automated material requisition system is realised which works in line with actual demand, according to the pull principle.

Different wireless sensors for stocktaking

The basic idea is to equip not the containers themselves (the effort would be too great), but the transporting vehicles and storage locations or lanes with wireless sensors, and to span the network across the entire shop floor.

In practice, this automated requisition system works as follows: wireless laser sensors (Fig 1) capture the stock levels of large load carriers (LLC) or SLC in the assembly area or material supply "supermarkets". They can also detect the fill level of containers and trigger replenishments accordingly. Since they transmit their signals via remote control, they are additionally able to monitor the stock of moving units such as tugger trains or mobile eKanban racks. There are special designs available for monitoring e.g. dollies in monorail tracks (Fig 2), as well as containers in Kanban racks (Fig 3). An additional field of application is transfer points between stationary and mobile conveyors, for example from roller conveyors to automated guided vehicles (AGV).

The wireless system has been adapted to the special requirements of industrial production. It even works extremely

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dependably in conjunction with adverse conditions (radiation, other wireless networks, a high number of sensors within one network...), transmitting signals reliably. The system is continually undergoing further development, and even sensors from third-party manufacturers can be integrated using a "nexy" open radio module.

A software and hardware system

"nexy" is a complete "ecosystem" that typically forwards shop-floor events directly from a Sensor Bridge to an existing backend application, where these events are then processed. The basic platform already contains all functions for typical applications in industrial logistics, including eKanban systems and AGV. From the user's point of view, this simplifies implementation of the system, adaptation of existing requisition systems to changing requirements, and the integration of additional wireless sensors in existing wireless networks.

The Sensor Bridge device management provides complete control over the "nexy" infrastructure. Integration is simplified through various interfaces enabling sensor events to be communicated to backend or automation systems, including SAP (Idoc, RFC), WebServices (HTTP notification, REST), REST API and Modus TCP. In addition, the "nexy" Sensor Bridge is so open that it can easily dock onto the architecture of modern ERP and PPS systems.

Various real-life examples demonstrate that a wireless automated material requisition system works in practice. Sensors, sometimes as many as several thousand, ensure material flow transparency, although splitting the overall system into several smaller separate systems, each with its own wireless network of up to

Greater transparency, more precise control

- The concrete benefits of a wireless-based requisition system that docks onto an ERP or PPS system are greater transparency and more precise control over material flow. Wireless sensors also capture processes in and on mobile units (racks, AGV...) and facilitate a reaction in real time. The consequences are improved, needs-based material supply and a reduced error rate. Not only that: an inventory management which perfectly mirrors reality reduces the cost of capital without the risk of increasing bottlenecks or production downtimes. This is precisely what makes Kanban systems so advantageous.

More precise stock control, more efficient assembly

- The cost effectiveness of such a solution can be further increased if the wireless system – as is easily feasible – assumes additional tasks, for example the integration of Andon systems or the automated transfer of materials to AGV.
- In this case users have at their disposal more information, and more up-to-date information, giving them superior control over in-house material flow. Put another way: the ERP system is supported by a wireless network with an eKanban application, facilitating more precise stock control and greater efficiency, meaning greater profitability.

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1500 wireless devices, has proven beneficial in order to avoid data collision in the wireless traffic.

A key question when evaluating such a requisition system based on "nexy" is: Does it make economic sense? This is easy for steute to answer in the affirmative, as shown by exemplary profitability calculations. Taking various baseline conditions, the system pays for itself within just a few months – including when retrofitting existing assembly lines with a "nexy" wireless system. One of the reasons for the short amortisation period is its simple implementation.

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