01 eKanban systems are increasingly being used in industrial production and especially intralogistics

# eKanban: supplying shelves by remote control

In these times of flexible product manufacturing, processing, storage and consignment, the flow of information needs to be equally flexible. This impacts everything within the system, right down to the individual sensors and switches at field level. Especially for assembly and intralogistics applications, wireless networks are becoming increasingly popular, for example eKanban systems.

The principle of Kanban cards is well-known throughout industry and has a long tradition. In 1947, Toyota manager Taiichi Ohno had the idea of attaching cardboard cards to storage containers. Production workers were requested to remove the cards and place them in a designated Kanban box whenever a container was empty. In this way, the logistics managers in the factories had a running feedback about all articles which needed to be produced or re-ordered. This

02 *Access Points receive wireless signals from individual switches and sensors and transmit them to the customer IT infrastructure via e.g. WiFi or Ethernet*
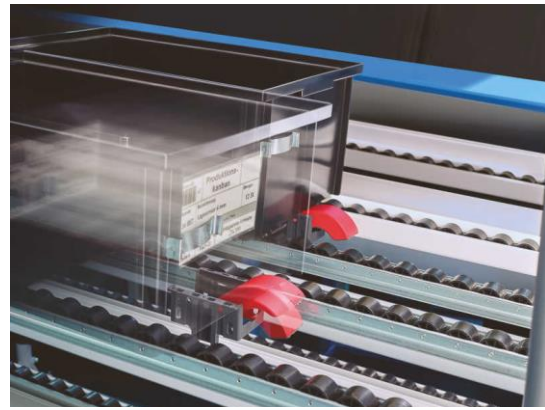
03 *Wireless sensors developed specifically for systems communicate the occupancy of eKanban individual rack slots to the warehouse management system via Access Points*

in turn made it possible to reduce stock levels without being in danger of running out – completely in line with the Japanese philosophy of "lean" production without waste. This principle is simple and practical – the reason why it has survived for so many decades.

Kanban without cards – via a wireless network

Like many other information processes at shop floor level today, the Kanban principle now also comes in a paper-free version. The basic idea: a wireless network is spanned across the assembly or logistics area (Fig. 1). Access Points (Fig. 2) assume the function of routers. They collect all signals from the field and transmit them, for example via Ethernet or cross-site via a web server, to a steute Sensor Bridge [1]. This middleware serves as an interface to the superordinate IT systems, for example ERP, production planning (PPS) or warehouse management (WMS).

Wireless switches or sensors mounted in the individual shelves or rows of Kanban racks function as end devices in the

"communication chain". They register whether a slot is occupied or a container has been removed and transmit a corresponding signal via the wireless network. The result is uninterrupted communication from the shop floor to the management level of the company IT or the Internet of Things.

Wireless sensor for eKanban applications

steute has developed just such a wireless network, called "nexy". The wireless communication is taken care of by industry-compatible "sWave.NET" wireless technology. Networks can be built to more or less any scale, incorporating as many as several hundred wireless sensors.

At the hardware level, steute has developed a wireless tilting sensor especially for eKanban applications (Fig. 3). By means of a wireless rocker it detects when a container (SLC – small load carrier) or box is removed from a shelf. A flexible mounting system enables the sensor to be installed in the rack systems of many leading manufacturers without any need for tools. Individual settings, such as the

04 "nexy" wireless networks also have many benefits for AGV applications

transmission interval or the angle of inclination at which the sensor will emit a signal, can be configured in the software. Since in practice multiple sensors are often integrated within one wireless network, keeping the costs to a minimum was also an important factor during the sensor development.

Tailor-made solutions for eKanban

At the software level, steute has also designed its own "nexy" system to suit the requirements of eKanban. Dedicated solutions are available for this application, making it easier for users to adapt the system to their needs. Configurations may involve one sensor per shelf, for example, or multiple sensors for fast-moving items. "nexy" thus digitally integrates and auto-mates the Kanban process. A dashboard provides a clear visualisation of the status of all eKanban racks at all times.

The wireless tilting sensor is only one of many wireless network-compatible swit-ches and sensors in the steute range. The number of options is further increased by the fact that "nexy" is an open system. This means: if an application demands the integration of sensors for variables not

covered by steute devices, third-party sensors can then be fitted with an "sWave.NET" module and integrated simply and easily within the network. This considerably increases both flexibility and expandability.

Benefits for AGV applications

In addition to eKanban racks, typical "nexy" application fields also include the integration of automated guided vehicles (AGV) (Fig. 4). Here, too, users profit from uninterrupted information flow in real time – from the sensor via the Access Points and Sensor Bridge to the IT, in other words to the fleet management system.

Several renowned AGV manufacturers already use "nexy" wireless network solutions, attributable to a special feature of the "sWave.NET" wireless technology. This technology is low-energy as a matter of principle and additionally incorporates a "sleep mode" in which individual AGV are switched off and can be reactivated by a "wake up" signal. This gives AGV operators the chance to park individual vehicles anywhere in the field, without having to return them to a charging station. In practice this means a huge increase in flexibility. From the operator's point of view, it is also advantageous that several applications can communicate via a single wireless network infrastructure.

Updates "on air"

From the standpoint of steute, the planning and installation of "nexy" wireless net-works is project-based work and thus a new business model – one of the reasons why a new business unit has been founded for this purpose and a new brand name

created. The "nexy" development and applications team is pushing the launch of new functions in the marketplace. Current new features include an interface to OPC UA for cross-platform data exchange.

Also new is the possibility to operate the Sensor Bridge on an industrial PC and thus to increase the response times and processing speeds of data from the field. In addition, the middleware in the new software version can communicate with the SAP system of the user, while the integrated "nexy" field devices receive new firmware updates "on air", i.e. by remote control. These updates are made available on the Sensor Bridge and distributed throughout the local network. All end devices are thus sure to have the latest software status at all times, and without any major effort .

Author:

Andreas Schenk
Product Manager Wireless
steute Technologies

Images: steute Technologies GmbH & Co. KG, dpm Daum + Partner Maschinenbau GmbH