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RFID solution with smart forklifts and IT integration via middleware from Turck Vilant Systems ensures reliable and fast goods flows in Chinese automotive plant

The Chinese plant of a leading Japanese car manufacturer needed to optimize its processes in order to meet the increased requirements. Many processes in the production and logistics of vehicle parts were still managed with paper kanban cards, and the movements of finished parts at nodes in the transport chain were recorded manually – a process that was very prone to errors. Moreover, production and logistics data could not be synchronized in real time with information management systems such as WMS, MES or ERP. Result: time-consuming and inaccurate inventory management often makes on-time parts deliveries impossible.

The customer now relies on RFID technology to achieve error-free and transparent logistics management. With the digitalization of information on containers and stamped parts, it was possible to implement the automatic inspection of finished parts in real time – across the entire process chain. The transparency achieved by this reduces errors and ensures more efficient operating processes.

Marriage of containers and finished parts

Turck China developed the tailored Turck Vilant Systems UHF RFID solution for the customer. This

system uses a passive UHF RFID tag with a unique PC code for storing features like the article number and the quantity of finished parts in order to mark the finished parts containers. The containers thus act as goods carriers when tracking the logistics process of the finished parts.

After production, the finished parts are placed in the container, both with the help of robots and manually. A Q300-LNX RFID reader identifies here the container IDs. The Turck Vilant Engine on the reader is used to assign containers and the contained finished parts to each other in the WMS. This enables the objects to be identified quickly and reliably at any time. The containers are then transported to the warehouse using a smart forklift equipped with RFID reader, monitor and Turck Vilant Client. The UHF antenna on the forklift automatically identifies here the container ID and updates the container and product location in the WMS as “stored”.

The smart forklift is used to bring containers with finished parts into the warehouse, to store finished parts, and to transport finished parts and containers from station to station. The reliability and accuracy of the forklift is the basis of the system functionality. The benefits of the Turck Vilant system on the forklift

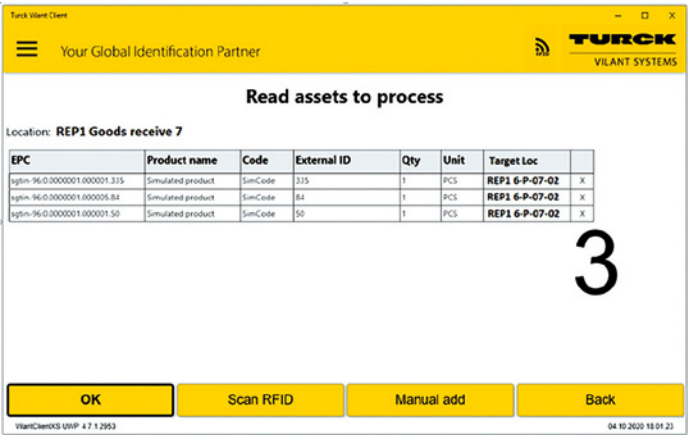
The smart forklift truck detects the transport containers fitted with UHF RFID tags and transports them to the designated storage location



The UHF antenna on the truck identifies the container ID and updates the location in the WMS; the transport jobs are displayed directly on the monitor



The targeted detection of the right parts are a major challenge for UHF RFID applications in confined storage conditions



The driver can check his load directly on the monitor of the forklift truck and avoid incorrect deliveries

are indispensable here. These include standard data interfaces for easy connection to backend systems, landmark detection function for detecting the direction of movement, and the stray read removal function.

For example, when a delivery order is received from the body shop according to the production schedule, the RFID forklift truck drives to the appropriate storage location and picks up the container with the desired finished part. The Turck Vilant client on the forklift identifies the container and displays the current material information of the finished part on the monitor of the forklift. This enables the driver to easily check whether the order matches the request and avoid incorrect deliveries. Orders that were verified to be correct are then distributed to the requesting stations according to the on-screen instructions.

Landmarks to detect the direction of movement

The forklifts with landmark recognition deliver the requested materials to the corresponding stations in the body shop via multiple lanes. Ground location marks are located at the exit/entry points of the lanes so that they detect the finished part exit and the empty container entry. The entire RFID system bridges the gap between the shop floor and IT information systems, providing transparent information across the entire process chain. It not only improves efficiency and accuracy at the operational level, but also enables real-time tracking and planning.

Precision through stray read removal function

The UHF RFID technology used also allows multiple tags to be read simultaneously over large distances. However, the smart RFID forklifts are used in storage areas where finished parts are stored close together and so read errors must be reliably ruled out. “Accurately detecting objects that are in the read range is a major challenge for UHF RFID system applications,” explains Turck project manager Sun Zhenjun. “This is because the magnetic field range of UHF RFID is very extensive and irregular. In extreme cases, several dozen tags appear simultaneously in the magnetic field of the smart RFID forklift. If the forklift is not able to

locate the correct target items, this results in incorrect information and a large number of error events in receiving and shipping, as well as incorrect inventory data.”

Bridge between OT and IT

“By introducing the UHF RFID system, we have created the information-based monitoring of the entire process for the user and automated the flow of goods,” says Sun Zhenjun. “The RFID forklifts equipped with the Turck Vilant client in particular are the key to success. The landmark detection function allows them to automatically identify the correct direction of the transported goods. As a result, the system does not require RFID gates, which significantly reduces the cost to set up the system.” If required, additional forklifts, RFID gates, E-KANBAN and other devices can be connected to the Turck Vilant Visibility Manager IIoT platform, which connects the logistics site to the enterprise management system. As a bridge between OT and IT, it thus creates the basis for transparency and availability of logistics data in real time and enables increased efficiency at the operational level.

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QUICK READ

The operator at the Chinese plant of a leading Japanese car manufacturer is now automating the tracking of logistics processes for finished parts with RFID. The new system ensures end-to-end transparency and thus smoother processes as well as more efficient operating procedures. Turck developed the RFID system solution based on the Turck Vilant solution for smart forklifts to provide better transparency and real-time availability of logistics data.