The history of logistics dates back to the first ancient civilizations. Already the Egyptian empire developed transport and storage techniques to maintain a steady supply of food and basic commodities. Historically, intralogistics equipment was powered by humans and animals. In the meantime, electric-powered equipment is state-of-the-art. The automatization of intralogistics solutions is a relatively new trend. Autonomously driving vehicles and robots are increasingly in use.

The intralogistics market is growing

According to Next Move Strategy Consulting, a market-research company, the worldwide intralogistics market 2023 counted 43.13 billion US-$. It will grow to 115.92 billion US-$ in 2030. This is caused by the increasing international trade. The intralogistics industry facilitates the movement, handling, and storage of materials, goods, and information within a facility or warehouse. This includes also the packing and shipping of goods. Intralogistics involves the use of automated handling systems, conveyors, robots, sensors, and software.

The Logimat trade show 2024 saw nearly 70000 visitors. The international fair for intralogistics solutions and process management took place in Stuttgart (Germany) in March. Several CiA members and their customers exhibited CAN-based products and equipment. Often, CAN networks were deeply embedded and visible only on the second or even the third glance.

Logistics-IQ has published a market research study about AGVs (automated-guided vehicles) and AMRs (autonomous mobile robots). According to the study, the installed base will exceed 2.7 million units in 2028. Around 670000 units will be sold in 2028.

The evolution of AGVs/AMRs over the last 15 years has created a broad range of types and sub-markets on the factory floor, in the warehouse and, at home, not mentioning the special-purpose solutions for hospitals, hotels, and other unusual applications. One of the key chasms in the world of AGVs/AMRs is the safety requirement differences between "service" AGVs/AMRs and "industrial" AGVs/AMRs. While the intent is that no AGV/AMR harms a human, service robots operate in the realm of the human beings. Working environments for service robots might include operation in a grocery store, a retail store, a mall, a hospital, on the sidewalk, or in the home.

Forklifts and AGVs

The hype in intralogistics are the automated guided vehicles (AGV). They are used on the factory floor, in distribution centers, etc. In some cases, they have substituted classic forklifts. Many of these forklifts use embedded CAN networks to control the drive and lift functions. Forklifts are also becoming driverless. Movanis exhibited on the Logimat a Still-based forklift using CAN-connected cameras by ifm.
electronic. The boundary between forklift and AGV blurs. Some companies name their products AGV lifters.

Most of the AGV suppliers do not talk about the used control system and the applied communication network. Behind closed doors, they tell often that CAN-based networks are in the AGV. Especially, wheel-hub drives provide CAN interfaces. Franz Morat Group offers such products integrating CANopen drives by Dunkermotoren. Gefeg-Neckar is another wheel-hub drive supplier. Its CAN-connectable sub-systems are applied in minbar AGVs used in hotels.

EBM-Papst showed at the Logimat the Argodrive driving/steering sub-system, which comes with an embedded CANopen network. It has been launched in 2021. In combination with drive controllers from various manufacturers, the sub-system forms a functioning drive system that enables free-range mobility for driverless transport vehicles. The Argodrive sub-system comprises also a steering angle sensor and two electrical drives featuring an STO (safe torque off) functionality. The two motors contribute towards steering, acceleration, movement and braking. Just two Argodrives on opposite corners of an AGV guarantee full omnidirectionality, two additional freely moving support wheels ensure stability. Depending on requirements, any number of drive systems can also be installed.

B-drives partnering with EBM-Papst offers the E-Wheel sub-system, which features a double-axis controller coming with an optional CANopen interface. The drives provide STO functionality. The company has also integrated a redundant encoder system. It is combined with the host controller from Sick, which communicates with the two drives via CANopen.

Motors like those in the Argodrive also function as sensors that detect a large number of conditions. Due to condition monitoring, the necessary replacement of the wheel module can be announced before a malfunction occurs. The sub-system can be used even for heavy loads and on inclines. The company offers the sub-system in light, normal, and heavy versions for weight classes up to 100 kg, 300 kg, respectively 500 kg.

Figure 1: Four Agrodive driving/steering systems, for example, in the heavy version allow a total vehicle weight of up to two tons (Source: EBM-Papst)
Lafert, part of the Suitomo group, offers the Smartris AGV/AMR wheel sub-systems based on CiA 402 compliant drives by Suitomo. The sub-system comprises a drive unit, a servo motor, a wheel, and a gear. STO functionality is provided, too. Two sub-systems integrated in an AGV shuttle enable an electronic differential drive system. Beginning of this year, the product comes in a new more compact version, measuring 120 mm in length and weighing 0.3 kg. It is 80 % smaller than the predecessor.

The towing AMRs by Tractonomy are based on CANopen drives by Nanotec. They are designed to tow carts and waste bins, for example. They are equipped with 360° lidar sensors. The vehicles stop, when the towed cart is disconnected. Therefore, the drives feature an STO function.

For forklifts and AMRs with lifting functions, linear electric-powered drives are used, in some cases. Ewellix owned by the Schaeffler group has launched the E-Movekit, to replace traditional hydraulic devices. The linear drive comes with a CAN interface for integration into the in-vehicle network. Magazino, a Jungheinrich company, offers AMRs for material supply in assembly lines and warehouses. The products make use of the open-source Robot Operating System (ROS), a set of software libraries and tools that help building robot applications. There are libraries for CANopen drives (CiA 402) available.

Some AGV/AMR manufacturers implement only embedded CAN-based control networks. Safelog has accompanied the CAN-based backbone network with an ASi-5 bus system for I/O devices. Oceaneering does it the other way around: Their Unimover AGV is based on Profinet for functional-safety purposes and uses an additional CAN-based network for other non-safety tasks such as connecting I/O modules.

Eceon presented at the Logimat a truck-loading and -unloading robot, looking like a pallet mover. You can name it alternatively AGV with a lifting function. It uses a CANopen CC network as the backbone. The supplier claims a productivity increase, an error-rate reduction, and lower costs compared with traditional pallet movers.

The electric-powered AGVs and AMRs are often equipped with batteries, which have a CAN CC (classic) or CANopen CC interface. In some cases, the CAN-based interface is also used to communicate with the charging station. Multipowr located in Belgium launched at the Logimat the Buzzard80 charging station, which charges wirelessly the battery. The communication between battery (for example from Varta) and charger is based on CANopen FD. The protocol stack provider is Emotas.

Save the date

Broken down by sector, 52 percent of Logimat 2024 visitors came from industry and 16 percent from wholesale and retail. The majority of industry professionals (57 percent) were senior managers, who visited the tradshow to get a picture of the intralogistics solutions currently available and compare offerings. The full 38 percent of visitors came with specific investment projects in mind. And 24 percent of the visiting industry professionals awarded a contract during the show or plan to do so in the near future. These figures have been collected and evaluated by Wissler & Partner, an independent market research institute located in Basel, Switzerland. The next international Logimat trade show will take place in Stuttgart (Germany) from March 11 to 13, 2025.

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