



A ROBOTRUCK FLEET COMMUNICATES THROUGH THE SATELLINE



Rocla Robotruck Oy in Finland is one of the world's leading manufacturers of automated guided vehicles (AGVs) used for indoor materials handling in a variety of industrial sectors including papermaking, printing and publishing, steel and heavy metal, food and beverage and automotive industries. The high degree of automation required for the management of a fleet of robotic trucks demands extensive data processing capacity, sophisticated software and reliable means of wireless communication. For more than a decade, Rocla Robotruck has trusted SATEL to supply advanced data transfer technology for their ROBOTRUCK® applications.

ROCLA, founded in 1942, has extensive experience in working with industrial indoor trucks, both driver-controlled storehouse trucks and, for already 30 years, automated guided vehicles. The company's product range today comprises a large selection of trucks designed for the handling of



an extremely wide range of materials and loads, extending from 30 kg to 40 tons, from light machine to metal coils.

Three different techniques are mostly used today for the navigation of the automated trucks in the storage/production halls. The oldest, traditional inductivity guidance, is based on electric guide wires imbedded in the hall floor. In another widely used method, laser beams reflected from a set of mirrors are used for navigation. The most recently emerged technique is based on an array of magnetic spots to mark the routes.

Heavy-duty data communication

In addition to navigation, the network of guide wires was previously used also for data communication between the AGV and the central computer. The development of laser-based navigation created the need for wireless communication. Radio modems were a well-suited solution to this task, mainly because of marginal operating costs and the fact

that an application-specific, disturbance-free operating frequency can be allocated to each user. Rocla Robotruck and SATEL have since 1993 cooperated in the development of a SATELLINE-based communication system for the Rocla Robotruck's AGVs.

Each truck in an AGV fleet is equipped with an on-board computer and a SATELLINE-2ASxE radio modem. A central computer (the Master) controls the entire AGV fleet (the Slaves) through another SATELLINE-2ASxE. The transfer of data through the SATELLINE-2ASxE is fully transparent, and no handshaking protocol is required between the Robotruck system and the radio modem. The amount of data required for the operation of a fleet of several Robotrucks is quite considerable. In addition to the data related to navigation and task handling, the Master computer keeps polling the status of each truck in the fleet. The status information includes, among other things, the truck location, loading situation, battery charge level, or any faults or operational disturbances.

The high level protocol of the Master computer controls a number of system-specific tasks, such as the allocation of a task to the most suitable truck, and execution of traffic rules for the vehicles. In case a truck needs to be reprogrammed, this can also be done remotely by using the high level software.

Speed and reliability

Efficient and trouble-free execution of the handling and transport tasks performed by the AGVs sets strict demands on the reliability of the real-time communication between the Master computer and the trucks. If, for any reason, the connection fails for more than 2 seconds, the truck stops. The SATELLINE-2ASxE transmits and receives data at a maximum data speed of 9600 bps. As the size of the fleet exceeds 10-15 trucks, the communication channel allocated to the system starts to get crowded. In order to secure fast and trouble-free communication, the system can be split by allocating another operating frequency to a part of the fleet.



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