

Application Report

Move, safeguard and control

Autonomous driverless transportation systems at Volkswagen are equipped with Safety Laser Scanners from Leuze electronic.



With the high demand for the new Volkswagen Tiguan came the conversion of a production line at Volkswagen in Wolfsburg. Also affected by this change was the driverless transportation system for cockpit assembly. This has its roots in SEW-EURODRIVE's modular system and ensures maximum system availability thanks to contactless energy transfer and optimum personnel protection through the Safety Laser Scanner from Leuze electronic.

The order numbers exceeded all expectations-the demand for the Tiguan sport utility vehicle (SUV) was huge from the very beginning. Just four months after introduction onto the market, the 100,000th order arrived at Volkswagen. In order to meet delivery times, Volkswagen converted an existing and active assembly line at its main plant in Wolfsburg to the production of the Tiguan, which has a production capacity of 450 vehicles per day.

Efficient operation

Part of this extended assembly line serves cockpit production. The special challenge in the planning and realization of cockpit production was to optimally adapt the equipment, including the material handling system with *autonomous, driverless transportation systems*, to the employees and to arrange the production process to be so flexible that several different vehicle models could be assembled on the line. This goal was achieved: on a circuit measuring 190 m in length, the autonomous, driverless assembly trolleys pass through various stations at which the Tiguan cockpit is assembled piece by piece. At the end of cockpit assembly, the line runs parallel to a skid system on which the car bodies of the compact SUV are transported. A robot applies an adhesive bead to the cockpits. The assembly trolley then moves to the installation station. Here, the cockpits are removed by a handling unit and placed in the car body. A few meters further, the empty assembly trolley is again "loaded" with the cockpit base module and the assembly process is repeated. During the entire assembly process, a Safety Laser Scanner on each assembly trolley monitors its travel route, thereby ensuring the safety of the employees and a smooth assembly process.

Solution from the modular system

Volkswagen specifically required of SEW-EURODRIVE that the driverless transportation system be equipped with a contact-free energy supply. The drive specialist from Bruchsal converted 30 driverless assembly trolleys for the assembly of the cockpit to enable contactless energy transfer. This solution is called MAXOLUTION AGV (*Automatic Guided Vehicle*).

Contactless energy transfer

The driverless assembly trolleys consist of a towing vehicle and a parts trailer. The standard energy supply of the *AGV vehicles* is based on the principle of inductive energy transfer with the MOVITRANS energy supply system. In this system, energy is transferred without contact from a fixed conductor to one or more *AGV vehicles*. Another big plus: this type of energy transfer is maintenance- and wear free as well as insensitive to environmental influences and is completely safe to touch.

Underway at various speeds

During the assembly process, the assembly trolleys do not move at a constant speed. Rather, the circuit is divided into four speed zones. In flow production, the trolleys must adhere to the specified, adjustable cycle speed. Between the last assembly station and the waiting station before the bonding robot, the trolley moves at high speeds of up to 30 m/min. The bonding and installation station is then navigated at a lower speed of 3 m/min. After the assembly trolley has been unloaded, it returns to the start of the assembly line at maximum speed.

Over the entire path, the trolleys must also maintain a minimum spacing of 80 cm to ensure that employees can easily move between the trolleys. This accessibility from all four sides was the reason Volkswagen chose a driverless transportation system over a trolley line.

During each of the individual assembly steps, travel of the assembly trolley is safeguarded by means of a ROTOSCAN RS4 Safety Laser Scanner. The small device, simply integrated in the front part of the vehicle, uses its flexible protective areas to unobtrusively monitor the transportation path and, thus, the safety of employees working along the assembly line. The scanners neither influence the assembly process nor do they restrict the required freedom of movement at the system.

PLC-free solution required as well

SEW-EURODRIVE satisfied the requirement for autonomous operation without a primary control with MOVIVISION, an object-oriented configuration software package specifically designed to meet the demands of complex production and transport systems. Using ready-made objects, the corridor supply vehicles can quickly be started up by means of a simple configuration.

This autonomous operation of each individual assembly trolley is supported further through "safety on board". Each trolley is monitored with its own Safety Laser Scanner and, if necessary, stopped. The result is a fully independent, individual system that can be added or even removed from the overall system at any time.

((In boxes:)) **ROTOSCAN RS4: Always the right range**

Whether horizontal, vertical or mobile personnel protection - the ROTOSCAN RS4 Safety Laser Scanner flexibly adapts to every situation. The user can choose from three function packages: Basic, Extended and MotionMonitoring. The "Basic" function package is intended for users who would like to implement danger-zone guarding; the "Extended" variant facilitates the construction of vertical point-of-operation guarding and access guarding. The "MotionMonitoring" function package, on the other hand, was developed specifically for the transportation path safeguarding of mobile systems, for example of side-tracking skates. With the ROTOSCAN RS4 Safety Laser Scanner, the protective fields extend from 2.15 m to 4 m to up to 6.25 m. This graduation allows the user to individually select the appropriate protective field width for his operating situation. ((End box))

Figures and captions



Figure 1. *Autonomous operation: Cockpit assembly on Automatic Guided Vehicles (AGV)-a distance of 80 cm between the vehicles was required.*



Figure 2. *"High-speed journeys" at 30 m/min are also part of the operating procedure.*

Press inquiries

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