TUCKER GmbH
Giessen / Linden, Germany

TUCKER Gmbh

TUCKER GmbH, headquartered in Giessen, was founded in 1959 and has been part of STANLEY Engineered Fastening since 2010, making it part of the Black & Decker Corporation. Over 1,100 employees develop and produce innovative, high-quality fastening and joining technology for distribution around the globe. The company's customers include car manufacturers as well as leading suppliers and companies from countless other sectors such as the electronics and sheet metal processing industries. Besides production and sales, technical training courses are also provided at the Giessen site. The Linden location includes a dispatch warehouse, to which all parts manufactured in the production facilities in Giessen are delivered before being shipped around the world. Every day, around 36 million parts leave the dispatch warehouse in 12,500 containers, on 723 pallets and in 550 parcels.

2124 Barrett Park Drive, Ste 100
Kennesaw, GA 30144
678-388-2880
casestudies@knappusa.com
Knapp.com/us

The smart Open Shuttle solution enables TUCKER to boost productivity even further. It highlights areas of potential that the company could unlock by using flexible and scalable technologies.

Wolfgang Skrabitz

Managing Director, KNAPP Industry Solutions GmbH

Growth & Impact

36 million parts leave the dispatch warehouse every day

2 decentralized workstations

3 open shuttles operating

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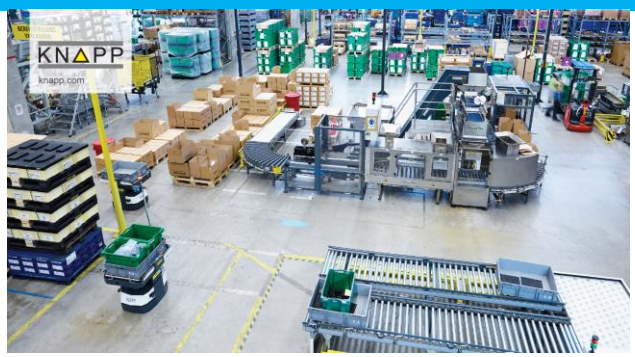

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The initial situation

The Linden site is the company's global innovative flagship location, from which tried and tested solutions are rolled out. In order to meet the company's target annual production increase of 5 %, processes had to be optimized without increasing the number of personnel. This led TUCKER to decide to automate the transport of goods and supply of workstations in the future. Modifying the workstations and using automated conveyors weren't an option due to lack of available space. Instead, the manual transport of small parts from the automated small parts warehouse was automated using KNAPP's Open Shuttles – autonomous mobile robots.

The challenge

The challenge in this solution lay in the constantly changing warehouse environment and the large amount of traffic within the facilities. Because all goods are shipped from the Linden site, all the goods are delivered here, relocated, picked, packaged and then dispatched. Pallets are positioned in any free space in the warehouse and are constantly repositioned. The Open Shuttles move on the shared travel paths and supply two workstations near the dispatch sorters with small parts. While on the move, they have to dodge obstacles such as other transport vehicles (forklift trucks, pallet trucks, etc.), persons in the warehouse and any pallets that have been left in the way. This dynamic environment meant it was impossible to use markers such as reflectors or guiding lines. TUCKER had to rely on the shuttles' ability to navigate freely and the Open Shuttles were the perfect solution for this very reason. The solution had to accelerate the goods flow, particularly along the length of the transport paths from the small parts warehouse to the workstations. In addition, the solution had to provide maximum flexibility as well as scalability.

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The automation solution for TUCKER had to fulfil the following requirements:

- autonomous mobile robots that navigate freely without aids such as reflectors or guiding lines
- consideration for the large volume of traffic generated by forklift trucks, manually operated vehicles and persons
- factoring in the dynamic, changing environment
- avoidance of diverse obstacles
- transport of diverse materials with varying weights
- automatic workstation supply with the goods that are required there
- integration into the customer's software system
- automatic transfer of goods between the automated small parts warehouse and the Open Shuttles
- fleet that can be expanded flexibly.

The solution at a glance

To fulfill TUCKER's demands, 3 Open Shuttles were integrated in the existing warehouse infrastructure to transport containers.They automatically bring goods from the small parts warehouse to the decentralized workstations.

The customer's system transfers the orders to the fleet management system, KiSoft FMS, which then distributes the transport orders to the Open Shuttles. These orders are then carried out by the individual shuttles completely autonomously.

A special indicator light (blue light) on the Open Shuttles makes them more easily visible during busy operating periods. The Open Shuttles are also equipped with additional sensors to detect obstacles such as the protruding forks of a forklift truck. As a result, persons, forklifts and the Open Shuttles can all work together safely.

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Goods-in

After the goods are delivered on pallets from the manufacturing facilities in Giessen, they are separated at the workstations and then stored in the small parts warehouse.

Goods transport

When goods from the small parts warehouse are requested at one of the two decentralized workstations, the KiSoft FMS transmits the transport order to the shuttles. An Open Shuttle then goes to the source station, which is a defined transfer point at the automated small parts warehouse and retrieves the container. Once the transfer procedure has been completed, the Open Shuttle heads off to the target station.

During its journey, the Open Shuttle constantly looks out for any possible obstacles and avoids them automatically, even re-planning its route if its path is blocked. Thanks to its first-rate navigation software, the Open Shuttle always manages to keep an overview despite a constantly changing environment. Once it has arrived at the target station, the Open Shuttle hands over the container automatically. The employee at the work station can then process the container.

Once this step is completed and the container is no longer required, it is placed on a source conveyor ready to be transported back automatically by the Open Shuttle. The KiSoft FMS transmits a transport request to initiate this. The software then generates a transport order and transmits it to the Open Shuttles. An available Open Shuttle that is close by collects the container from the conveyor and transports it back to the automated small parts warehouse where it is returned to storage.

Efficient and autonomous energy management

The Open Shuttles are kitted out with an intelligent charging system. When they have no orders to process, they head to the nearest charging station automatically.

Innovative free navigation and swarm intelligence

Their ability to navigate freely allows the Open Shuttles to fit right in with the existing surroundings and offer maximum safety for people and stock. Consequently, it's no trouble at all to modify the structure of the warehouse or integrate the shuttles in a different area.

The freely navigating Open Shuttles draw on their swarm intelligence to distribute orders among the entire fleet in a clever and adaptive way. The vehicles communicate constantly with one another and distribute orders flexibly. This opens new opportunities to optimize routes and transit times.

Outlook

At TUCKER, the Open Shuttles have been integrated seamlessly into the existing structures and are providing employees with welcome support. The miniature colleagues named R2D2, C3PO and BB8 were welcomed with open arms. Additional Open Shuttles can be added to the fleet quickly and easily.

Now, nothing stands in the way of the Giessen facilities achieving even higher levels of productivity.