THE USE OF THE KNOLL TS-Z TRANSPORT SYSTEM AT LINDE MH



Open to Customer Requests
KNOLL provides flexible transport/assembly system for Linde lift trucks

Fit for the future: the new hydrostats from Linde Material Handling with load capacity of 2.0 to 3.5 tons.

For the pre-assembly of its new generation of lift trucks, Linde Material Handling, Aschaffenburg, selected KNOLL's TS-Z pull chain conveyor. The Bad Saulgau company scored points for its frame and overhead guard assembly line thanks to numerous special developments For example, these include the extremely low overall height without ground construction, line guidance in a U or O shape, and custom mounting trolleys.

In November 2019, Linde Material Handling (MH) presented the new generation of its combustion engine counterbalance truck: the "Swiss Army Knife" of intralogistics, as this world-renowned storage technology supplier calls it. These hydrostats with a load capacity of 2.0 to 3.5 tons are setting standards for the future in several ways – with regard to availability, efficiency, sustainability, and safety. The new Linde lift trucks are also completely networked and thus prepared for any Industry 4.0 applications.

In connection with the development of this new generation of lift trucks, Linde invested in the Aschaffenburg "Plant 2" in new solutions for the large component pre-assembly of frames and overhead guards, which are both conceived as mixed model assembly lines.

Responsible at Linde Material Handling for planning, project development, and procurement of such pre-assembly lines is the Industrial Engineering department. Department manager Jan Scherthan explains: "Here, for example, sheet metal parts and units are mounted on the frame. Then these frame components are transported to the main line, where they are married to other elements to create the finished vehicle."

Pull chain transport system with special solutions

The transport system is an essential component of the pre-assembly areas. Initially, Linde MH examined equipment from several providers. "In comparison, it became clear that the solution KNOLL was offering based on its TS-Z pull chain transport system best suited our specific requirements for this project," explains Jan Scherthan.



For a new lift truck generation that is built by Linde in the Aschaffenburg "Plant 2," KNOLL developed two pre-assembly lines – for the frame and the overhead guard (in the picture).

Essentially, the people in charge placed great value on the kind of robust technology that a drag chain conveyor provides. It should be in a position to convey the relatively heavy components at a slow speed of up to 0.3 m/min constantly.

Another critical specification: the transport position may not require any floor construction, since there is a cellar below the assembly area. On the other hand, the pedestal height should be as low as possible. Project manager Rocco. A. Inglese, who is responsible for the pre-series planning of the latest lift truck generation sees this as a strength of the KNOLL solution: "We were promised that in the end, the TS-Z would have an overall height of less than 60 mm. This is a benchmark for such systems that we truly appreciate." This way, workers can climb up and down to the work level almost without barriers. Similarly, picking and material trolleys can be pushed up without lifting technology. Furthermore, thanks to the low overall height, the shelves for material provision can be used optimally even outside the work level.

Now, we also "do curves"

The layout planned by Linde MH also provided a U shape or O shape for the transport line in order to enable short return paths for the mounting trolleys. Danny Zinßler, responsible project manager at KNOLL, explains: "Previously, we had only offered our TS-Z as a straight variant with rotating transfer units. For this order, we developed a so-called quattro steering for our carriages that could drive curved paths easily. Overall, special attention was paid to the mounting trolleys: for the layout was supposed to be developed specifically for the requirements of frame and overhead guard mounting. Here we had to ensure that the workers could access the product from all sides and climb up to defined points – taking into consideration all ergonomic aspects. Various load lifting devices, interfaces to picking trucks, etc. were supposed to be present.



The frame components are assembled at eight stations. Each one is five meters long and takes nine minutes to traverse.

Included in the requirements specification was the modular structure of the transport system. "This is the prerequisite

for long-term, flexible use. At the moment, our focus is less on any expansion of the system. Instead, in the near future, both lines will be moved to another hall, which means that a modular structure provides important benefits," explains Rocco A. Inglese.

A pre-mounted frame unit moves off the belt every nine minutes

After conceptual workshops and initial discussions about the special requirements, KNOLL made an offer with the best conditions – and received the go-ahead. Not for the first time. In past years, Linde NH had trusted this Bad Saulgau supplier in its other plants. In October 2018, the contract for the frame line and in 2019 the contract for the overhead guard line was signed. In each case, the transfer was made eight months later, and in January 2020, "just in time for the start of production of our new lift truck generation, we made the final inspection of the overall system," explains department manager Scherthan with satisfaction.

Meanwhile, the pre-assembly lines have been put into service. The frame line consists of a total of eight station areas. Each one includes a section of five meters, which are traversed in approximately nine minutes. The flow begins with the attachment of the frame including drive axis to the



For the TS-Z mounting trolley, KNOLL developed a quattro steering that enables driving on curves.

mounting trolley. Then the frame is equipped successively with various individual parts and pre-assembly groups. Several cranes are in use in order to handle special tools. According to the strict regulations, these are locked to the system with safety devices. At the end of the stations, the frame is packed on a transport frame and conveyed to the main assembly line.



With the stopping unit, the trolley can be separated or coupled controlled by the advancing of the chain. In addition, it is possible to fix the position.

The flow on the overhead guard line is essentially similar. However, here there are eleven station areas where individual parts and assemblies are added to the lift truck's overhead guard. For this, the worker uses a defined work area on the somewhat more generously dimensioned mounting trolley.

Flexibility even in the final project planning phase

Project manager Inglese is very satisfied with the partnership with KNOLL and the result. "Thanks to close cooperation, we were able to design and realize a system custom-tailored to our requirements. A highlight is the overall height, which is actually less than 60 cm; it more or less ensures that there are no barriers and also allows us to design material provision optimally." He points out the very good processing of all system components and the constant enhancement of the systems by KNOLL, right down to the smallest details. "The transfer system and the pull chain were improved constantly. This is a sign of lessons learned," is how Rocco A. Inglese formulates it. In the course of the project, KNOLL implemented what it learned from experience very well." Department manager Scherthan agrees and adds: "I was especially impressed by the great flexibility of the KNOLL employees, who even in the final project planning phase were still willing to seek solutions for new requests."

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KNOLL Maschinenbau GmbH
Schwarzachstraße 20, DE-88348 Bad Saulgau
Tel. +49 7581 2008-0, www.knoll-mb.com

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From R to L: Jan Scherthan and Rocco A. Inglese, both of Linde Material Handling, accompanied the planning and introduction of the pre-assembly lines for frame and overhead guard. Partner KNOLL – represented by project manager Danny Zinßler – provided the transport system.

Linde – The finest forklifts and storage technology

Linde Material Handling GmbH, a company of the KION Group, is a leading global manufacturer of forklifts and storage technology, as well as a provider of intralogistics services and solutions. With a sales and service network in more than 100 countries, the company is represented in all important regions of the world. In 2019, the operating unit Linde MH EMEA (Europe, Middle East, Africa) achieved sales of approximately EUR 3.5 billion and employed 12,000 people. Around the world, more than 135,000 vehicles bearing the Linde brand were sold in 2019.

Linde Material Handling GmbH
Carl-von-Linde-Platz
DE-63743 Aschaffenburg
Tel.: +49 6021 99 0
Fax: +49 6021 99 1570
info@linde-mh.de
www.linde-mh.de



KNOLL Maschinenbau GmbH – Transport systems for assembly and logistics

KNOLL transport systems are ideally suited for assembly and logistics tasks, even for heavy and very large parts. Since the KNOLL systems are modular with regard to their mechanical, electrical, and software systems, the KNOLL development team can assemble custom-tailored solutions. Such systems guarantee a short amortization time and can be expanded nearly at will. The input-side visualization of the controller makes for easy operation.

For assembly work – whether timed or continuous – KNOLL focuses primarily on the best ergonomics and assembly "at eye level". Low-building conveyor systems contribute to this, as do additional platforms and lifting units. Turning and/or swiveling workpiece holders ensure perfect accessibility to the object.

For logistics applications, KNOLL prefers to use standard conveyor technology that can be designed so that it is cost-effective and reliable. Customer-specific solutions can be built from the existing building blocks on request. Even long lines are possible.

KNOLL Maschinenbau GmbH
Schwarzachstraße 20
DE-88348 Bad Saulgau
Tel.: +49 7581 2008-0
Fax: +49 7581 2008-90140
info.itworks@knoll-mb.de
www.knoll-mb.com

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