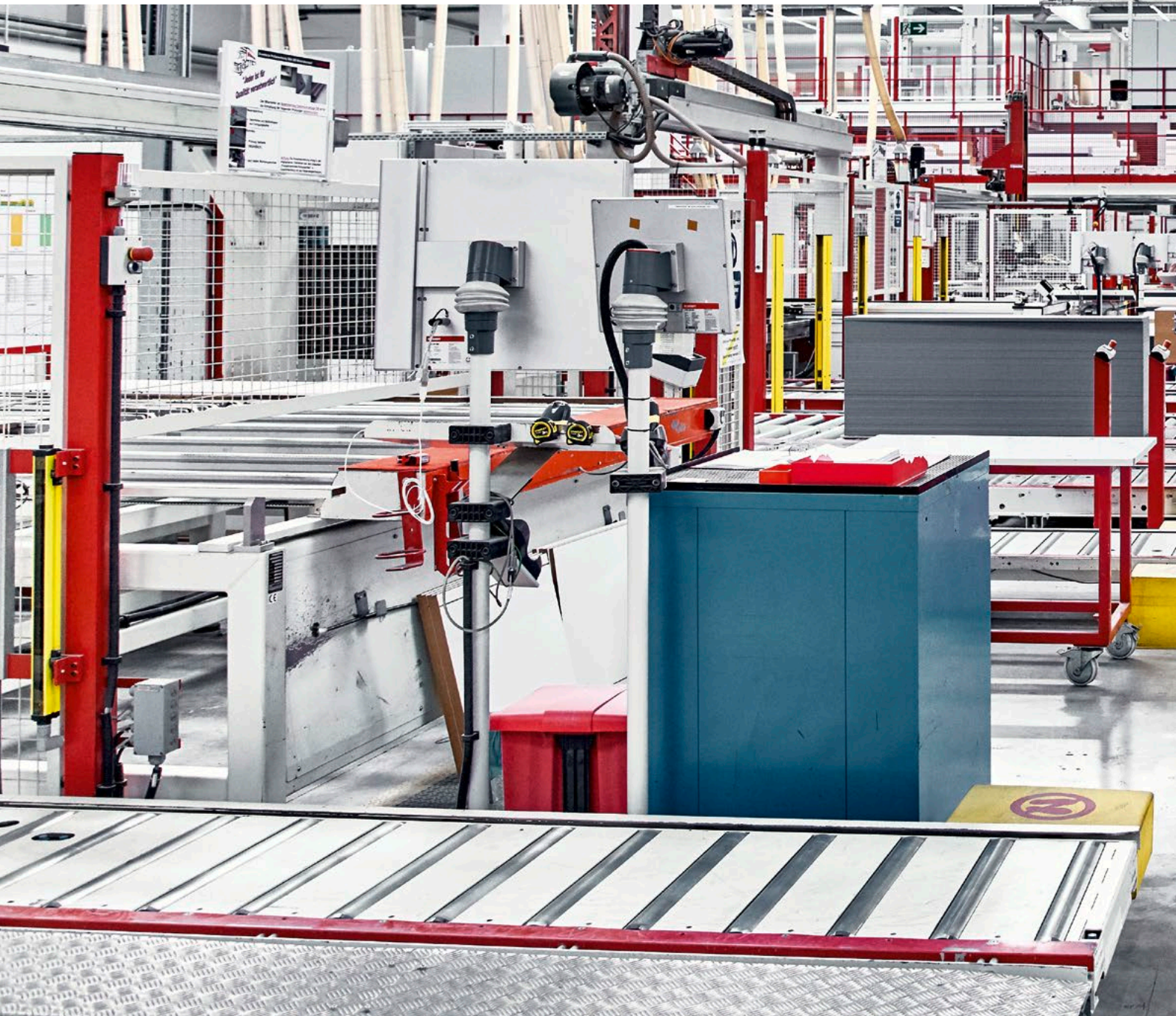


Traverse conveyor vehicles and roller conveyors from Horstkemper automate part transport operations in kitchen production

Nobilis: PC-based control increases efficiency in production logistics up to 15 percent

In 2017, Nobilia, Europe's largest kitchen manufacturer, based in Verl, Germany, delivered an astounding 675,000 individually assembled kitchens. The company's intelligent, highly efficient production logistics and consistent transparency in parts and production data make this possible. PC-based control from Beckhoff provides the optimum basis to achieve these goals, as shown by the newly automated parts transport system from Horstkemper with traverse conveyor vehicles and roller conveyors in production plant II.





In the order-picking warehouse, a traverse conveyor lift vehicle is used, whose lifting movements are additionally monitored via TwinSAFE, thus preventing the risk of injuries in the event of incorrect operation.



The sheer quantity of kitchen furniture parts – about 26,000 parts per day for front inspection alone – requires highly efficient transport logistics in manufacturing.

Nobilis has been using PC-based control from Beckhoff to automate machines and production facilities at its two Verl locations since 1989. Despite the heterogeneous machine fleet, Nobilia maintains a homogeneous inventory of orders and parts in the company's central database. This was the key to constant improvements in efficiency and flexibility in the kitchen manufacturer's production over the years and to the early implementation of the Industrie 4.0 concept.

The large number of roughly 3,100 kitchens that Nobilia produced every day over the past financial year places correspondingly high demands on production technology and logistics. In order to open up further growth potential in the production plant II covering a production area of 140,000 square meters, the parts transport process was automated using traverse conveyor vehicles and roller conveyors from Horstkemper Maschinenbau GmbH, based in Rietberg. Managing Director Norbert Horstkemper explains: "We offer Nobilia individually adapted logistics solutions, which is the case with the traverse conveyor vehicles, for the handling and transport of kitchen components. The focus is on high availability as well as short installation and maintenance times."

Automatic traverse conveyor vehicles replace manual roller trolleys

Among other things, automation was added to a transport area located at the outlet of several edging systems for front material within the parts production area. Previously, the finished stacked furniture parts were sorted using manual roller trolleys onto various buffer tracks, then manually distributed from the buffer store to front control stations for cleaning and inspection of the individual furniture parts, and finally transported to the high-bay warehouse using a separate conveyor system.

According to Norbert Horstkemper, the technical challenge was to automate the transport processes to send the stacks to their respective destinations in the correct sequence and evenly sorted via two traverse conveyor vehicles with the aid of automatic destination allocation. "In addition, the automated front inspection area was to remain open for worker and forklift traffic," Horstkemper says. "Project planning began in early 2017. Implementation started in May and could already be completed in October. In addition to the user-friendliness and reliability of the system, Nobilia benefits from fast integration of new functions – partly during ongoing operation – into the existing systems. Despite the revamp, production output has quickly returned to normal levels and has steadily increased ever since, as Nobilia continues to invest in automation of the individual transport areas."



The different traverse conveyor vehicles can travel at speeds of up to 85 meters per minute without endangering worker or forklift through traffic.

Significant performance increases in front inspection area

A total of 10 traverse conveyor vehicles automate eight transport areas with approximately 250 roller conveyors. Three of these areas are used for inspecting and finishing the furniture fronts. Lars Eberlei, Production and Plant Planner at Nobilia, explains: "In addition to upstream inspection systems, our staff performs a 100-percent inspection of the front panels. In shift operation, we currently achieve an output of almost 26,000 parts. Automation with traverse conveyor vehicles – with many material infeeds and outfeeds, overlapping areas and redundancy concepts – were major steps toward transporting the stacked parts to the right place at the right time as efficiently as possible. We have achieved a performance increase of up to 15 percent compared to the previous transport logistics, which was handled entirely manually, apart from a large cross-conveyor for large cabinet packages. In this way, the increased production output could be realized with the same number of staff."

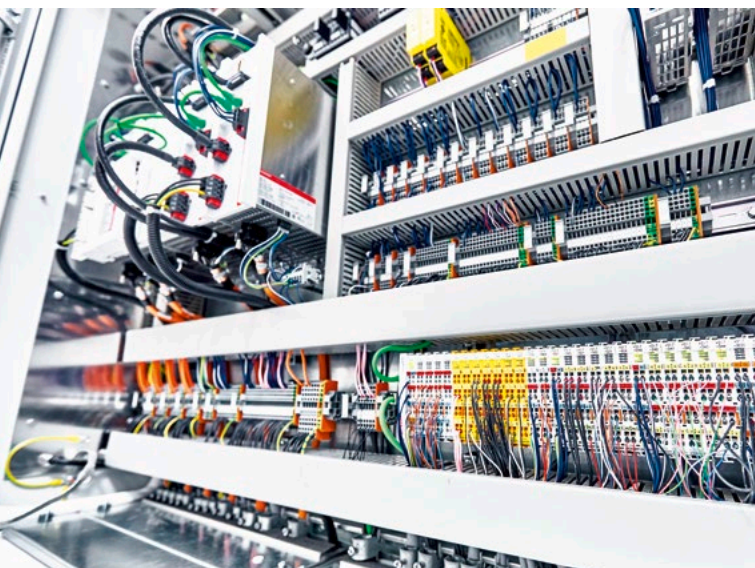
According to Eberlei, another important success factor is the new visualization system implemented on the 24-inch CP3924 multi-touch Control Panels from Beckhoff: "This increase in efficiency would not have been possible without the realistic representation of the transport area with all roller conveyors and

traverse conveyor vehicles on the HMI, which is equipped with a zoom function. While before inspection personnel often had to travel up to 14 km throughout a day to find all required materials, the desired pallets can now be easily found through the visualization interface. This enhancement is based on the smooth interaction of three components: Automation through PC-based control, visualization and the system used to control the material flow throughout the entire production. Only in this way could the data from all machines, as well as the transport and inspection areas, converge so closely and transparently that the access to parts can be optimally controlled and line congestion from accumulated parts can be avoided, for example."

Eberlei explains that the increase in efficiency through material handling technology actually goes far beyond central parts tracking: "Delivery prioritization has also been implemented to ensure the smoothest possible workflows. Employee workload and comfort is also taken into account. That's why the workers aren't simply allocated the next available parts package for inspection. Rather, the physical strain is deliberately varied by assigning furniture parts of different weights. Further functionalities, such as residual pallet recognition, are also included in the programming."



The visualization realistically shows the transport areas with roller conveyors and traverse conveyor vehicles; multi-touch functionality makes it easy to zoom in and out between a more detailed display and a full overview.



With EtherCAT Terminals, servo drives, Industrial PCs and control software, PC-based control offers the complete solution to automate even complex production processes such as those encountered at Nobilia.

Traverse conveyor vehicles offer high functionality and safety

The number of traverse conveyor vehicles the system manages varies between one and seven in the eight different transport areas. There is no limit on the maximum number. As a rule, one C6930 control cabinet PC is provided per transport area. Cross-sector transport has been designed so that operators do not have to accept any restrictions when manually assigning destinations. Automatic routing over several conveyors and transport areas enables the selection of remote transport destinations. Existing and additional transport sections and traverse conveyor vehicles can be flexibly factored in at any time via parameter tables. These are then automatically taken into account for destination selection, transport logistics and visual representation.

The traverse conveyor vehicles generally have a load capacity of 4 to 5 tons; in some areas only 2 tons are required. In order to transport as many parts stacks as possible in a single transport process, each vehicle can handle four to six stacks. Norbert Horstkemper adds: "The width of the traverse conveyor vehicles is between 2.5 and 4.5 meters, depending on the available space. Some have several roller conveyors, a lifting unit and protective baffles. A 19-inch multi-touch CP3219 Panel PC running TwinCAT NC PTP software handles all control processes, such as width measurement, which determines the parts stack positions on the conveyor. For motion control, in conjunction with the AM8000 servomotors, both the compact EL72xx EtherCAT servomotor terminals – e.g. for controlling the baffles – and the AX5000 servo drives with AX5805 TwinSAFE cards are used. The traverse conveyor vehicles receive the necessary energy via a non-contact power supply called Inductive Power Transfer (IPT). An absolute position feedback system, which is also contactless and installed in the floor, further contributes to trouble-free operation. Data transmission to the central transport area computer is WLAN-based. From this computer, each traverse conveyor vehicle receives the transport orders to pick up and deliver the material."

The traverse conveyor vehicles enable fast travel speeds as high as 85 meters per minute. Equally important is the TwinSAFE-based safety technology integrated in the system, since worker and forklift through traffic occurs at numerous points along the routes. Lars Eberlei explains: "Almost 90 percent of all the parts transport movements at Nobilia are automated. However, there are secondary areas or separate material flows where this is very difficult or impossible to achieve. Here the traverse conveyor vehicles and PC-based control give us the necessary flexibility to smoothly integrate these special processes."

Complex production fully automated with PC-based control

The transport area at the Nobilia production plant II alone is extremely complex, with about 1,500 roller conveyor motors. PC-based control from Beckhoff offers the optimum basis for automation technology with its openness and universality. The modular EtherCAT Terminal I/O system can be precisely adapted to each area's respective requirements and can easily adapt to allow system expansions or modernizations. In addition, the integrated control via TwinCAT software is able to use TwinSAFE to facilitate the merging of previously separate system areas, including the safety-relevant segments. Further advantages result from the powerful data communication. The ultra-fast EtherCAT protocol is indispensable for the safe operation of the traverse conveyor vehicles, and ADS communication in TwinCAT facilitates higher-level communication within the production, as well as connection to Nobilia's Ethernet-based company network. In this way, existing IT structures can be used to quickly extend the transport system as required.



Involved in the implementation of the transport automation were (from left) Christian Pankoke, Technical Documentation and Work Preparation at Beckhoff Systems Engineering, Arndt Tischler, Software Project Manager at Beckhoff, Lars Eberlei, Production Planning at Nobilia, Norbert Horstkemper, Managing Director of Horstkemper Maschinenbau, and Markus Laumeier, Project Management at Beckhoff Systems Engineering.

Norbert Horstkemper sees another advantage of PC-based control besides the technical aspects: "The cooperation between our company as the machine manufacturer, Beckhoff as control system supplier and Nobilia as end user already has a long and successful history. This, together with the geographical proximity of all three stakeholders, makes many things easier." Lars Eberlei agrees: "We benefit from the PC-based control technology as well as from the availability of our partners in the immediate vicinity. Accordingly, we also require PC-based control in our specifications."

The flexibility and excellent integration capability of PC-based control was already evident during the early days of the transport area automation. The control workstations were initially tested and optimized in semi-automatic mode with manually set transport targets, so that production was not interrupted. "Automation was implemented without any problems and without restrictions on the production processes," Eberlei says. "In addition to PC-based technology, the experience of our long-standing partners has also played a major role in the transition."

Opening up optimization potential for the future

The consistent extension of Industrie 4.0 concepts opens up additional optimization potential for Nobilia. For example, transparent parts tracking and automatic destination assignment will be implemented as far as possible with the connectivity and data throughput of all machine lines and manual workstations. The capacity utilization of the individual traverse conveyor vehicles and roller conveyors can be determined by logging important transport parameters. In the future, this information can serve as a basis for further optimization of the transport infrastructure. Lars Eberlei concludes: "An easy-to-use and easy-to-understand application and a corresponding HMI is essential for future production success and for the training of new operators."

Further information:

www.horstkemper.de/en

www.nobilia.de/en

www.beckhoff.com/wood