

Liebherr-International Deutschland GmbH, Germany

Perfectly optimized logistics

The Liebherr technology group has equipped its plant in Biberach, Germany, with a fully automated high-bay warehouse. The goal: to optimize this area of logistics and install a highly available and automated complete solution.

At its plant in Biberach, the Liebherr corporate group manufactures rotating tower cranes and mobile cranes that are used all over the world. The production plant is supplied from a high-bay parts warehouse that previously operated with forklifts but was converted by Siemens Stuttgart to a fully automated solution with four storage and retrieval machines in two project stages. The greatest benefit of this solution is the consistency of the drive technology achieved in the storage and retrieval machines and in the conveyor technology in the picking zones as well as in the shipping and receiving area. Siemens calls such perfectly coordinated drive solutions Integrated Drive Systems (IDS).

Consistency begins at the configuration stage

The solution reduces interfaces and thus significantly simplifies engineering – starting from the very first stage of the project, when all the drive technology is optimally configured with the Sizer software. The values thus obtained form the basis for commissioning with the Starter software, which is used as a parameterizing tool for the drives. Even safety-related considerations can already be put into practice at this stage because the Sinamics S120 frequency converters that have been incorporated into the storage and retrieval machines for hoisting, longitudinal, and fork movements have integrated safety functions that can be activated with the control system via Profisafe. In the event of an emergency stop, the fail-safe Simatic S7-315F control system transmits the corresponding command and the frequency converter stops the motor.



View into Liebherr's fully automated high-bay warehouse in Biberach

The buffer monitoring system is also operated by the fail-safe control system. If the storage and retrieval machine approaches its limit stop, the motor speed is automatically reduced. Both of the large drive motors for horizontal and vertical movement are equipped with position control and one incremental HTL speed encoder each. While the chassis is controlled with a laser using an SSI signal, the hoisting unit uses an absolute value sensor with Drive-Cliq that is driven with a toothed belt. For the asynchronous AC motors, the project team decided to use energy-efficient IE2 motors. It is also possible to feed energy back into the grid. Due to their integrated efficient infeed technology, the Sinamics S120 frequency converters feed the recovered energy back into the grid instead of into the intermediate circuit when the device is lowered.

Conveyor technology with compact drive motors

For the conveyor technology, approximately 180 Simogear drive motors are used for the horizontal and vertical movements. Here, a function rectifier

located in the terminal box rapidly activates the integrated drive brake and increases the stopping precision. Siemens project manager Klaus Pocesny recalls: "The space available for drive technology was extremely limited for this project, which is why we used Simogear drive motors with flat gearboxes." According to Arno Raisch, execution manager for logistics projects at Siemens, another advantage of the new series of motors is their compatibility: "Compatible flanges make it possible to quickly adapt the new drives to existing conveyor technology solutions." The motors are operated with Sinamics G120C frequency inverters. In their basic configuration, these compact inverters include everything that is needed to drive conveyor technologies – for example, an integrated interface. The possibility of encoderless speed control has proven to be yet another great advantage. All the inverters are connected to the plant's Simatic S7-319F control system via Profinet.

The hoisting devices of the conveyor technology show how a standardized control technology simplifies the system. Due to the heavy transportation loads of up to 1.5 t, it is necessary to

position the hoisting device with great precision. A Sinamics drive with position control is used here, a technology permitting the necessary accuracy for the varying weights.

Implementing a highly available logistics solution

This example of how a high-bay warehouse was converted from forklift operation to fully automated warehouse management with associated drive technology is proof that the consistency provided by IDS offers many advantages. To Raisch and Pocesny, the project's success is beyond any doubt. "Seamless drive technologies not only open up more possibilities but also increase the reliability of transportation and warehousing in logistics," says Pocesny. ■

INFO AND CONTACT

siemens.com/ids
joerg.raible@siemens.com



"Seamless drive technologies not only open up more possibilities but also increase the reliability of transportation and warehousing in logistics."

Klaus Pocesny, Project Manager, Siemens