In order to load and unload more than 6,000 deliveries every month, warehouse technology must combine speed with safety and smooth communication. For this purpose, Becker Stahl uses two overhead traveling cranes that communicate directly with the warehouse management system and the safety system through wireless communication.

Becoming a part of the Klöckner Group, Becker Stahl-Service GmbH, based in Bönen, Germany, produces more than a million tons of hot-rolled and cold-rolled sheet steel each year with a wide variety of surface finishes. Part of the company’s added value includes customization of the sheets by splitting and cutting them to size. In order to optimize the material flow and combine locations, Becker Stahl has now built a new warehouse and processing center covering the entire process chain from goods receipt to finished goods storage.

Innovation in warehouse technology
The goods receipt warehouse consists of the loading area, a handover area, and interim storage for the delivered coils. Two automatically controlled overhead traveling cranes handle the material transport. One of the cranes can also be operated manually. Both are directly integrated into the warehouse management system and the machine control system. In collaboration with Demag Cranes & Components and Siemens, an innovative crane system with magnetic pickup – a technology that allows gentle loading processes and more compact packing of the coils – was created. To ensure smooth operation, reliable communication between the control of the crane and the warehouse management system had to be established and comprehensive safety guidelines needed to be fulfilled. In addition, it was important to make sure that the cranes could not collide with each other.

Automatic loading and unloading
Using one of the cranes, the coils are unloaded manually from the delivering trucks and placed in the handover area.

Requirements for wireless safety
- iPCF protocol as a requirement for real-time communication and the transmission of safety signals
- Profinet with Profisafe
- 5 GHz transmission rate to minimize interference
- Signal strength of at least 60 percent as a requirement for iPCF (This can be achieved with IWLAN and special antenna solutions such as RCoax.)
Based on the automatically measured coil weight, among other things, the warehouse management system determines the optimal storage location among the 6,000 positions. The fully automated crane then takes each coil and places it in the designated location. In this process, the crane control communicates with a number of safety systems. In order for the cutting and splitting machines to be continuously supplied with coils, the automated crane places the coils on a rotary table with four positions. This table serves as a material buffer for a smooth process flow; warehouse management and process control must be closely interlinked to make this possible.

Secure mobility through RCoax

The close integration of the cranes into the process control requires reliable wireless data communication. Industrial Wireless LAN (IWLAN) is perfect for this. Since the high quantity of metal components in a warehouse for steel coils can lead to interference and masking, Demag's project manager, Rolf Dechange, decided on a solution with RCoax cables as radiating cables: “With RCoax, we have a stable connection that so far has operated without a single shutdown.” The RCoax radiating cable runs next to the two rails for the overhead traveling cranes and is therefore always near the antenna of the crane. This ensures a secure IWLAN connection between the process control system and the crane control through the Profinet Industrial Ethernet standard and the transmission of safety-relevant data through ProfiSafe. With RCoax, all the requirements of the Machinery Directive can be fulfilled and the highest safety standards realized, combined with high plant availability.

Fast, strong, and fail-safe

The 5 GHz RCoax cabling has been divided into three segments, each of which is connected to a Scalance W786-1RR access point. Across from these points are two Scalance W747-1RR IWLAN clients, located on the two cranes. They are designed with roaming capabilities, thus allowing uninterrupted data flow even at the transition point between the segments. With IP65-type protection, all devices are perfectly suited for use in the rough operating conditions of the steel processing industry.

The entire crane control system operates with Safety Integrated and transmits all safety-relevant signals using Profinet and Profinet. The Profinet and Profibus interfaces enabling the communication between the two standards provide for fast and fail-safe communication throughout the entire transmission chain. The managing engineer at Becker Stahl, Michael Pöttger, says, “After the consistently positive experiences we’ve had with the system so far, it is certain that the future at Becker Stahl will be shaped together with Demag Cranes & Components and Siemens.”

IT security note

Suitable protective measures (including IT security, e.g., network segmentation) must be taken to ensure secure operation of the plant. Further information on industrial security can be found at www.siemens.com/industrialsecurity.

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