



Coil store at the SZFG cold rolling mill – real picture (courtesy of SZFG) and 3D visualization by the warehouse management system (courtesy of 3tn)

Integrated transport and warehouse management system for slabs and coils

Salzgitter Flachstahl GmbH, Germany, has awarded 3tn the order to supply a warehouse and transport management system for slabs. With the new system, the steel company is closing the existing gap in the material tracking system at its Salzgitter works, establishing a seamless system from the slab cut-to-length cutting downstream the process chain to the packed coils ready for shipment. While optimizing all transport and warehousing operations and supporting quality assurance, the system will also save energy and improve safety at work.

For several years, German steelmaker Salzgitter Flachstahl (SZFG) has been operating eight warehouse and transport management systems (TWMS/metals from 3tn) for coils in its hot strip and the

cold rolling mill. The now ordered system will optimize all slab logistics for the upstream processes – between the steelworks and the wide hot strip mill, specifically from the four continuous casting plants through to the reheating furnaces. The system will comprise material tracking on the roller tables of the respective production facilities as following:

- at the exit of the continuous casting plants,

- slab management at the outside slab yards,
- slab transport to the hot rolling mill,
- storage of the slabs in front of the reheating furnaces in the hot strip mill area and
- all slab movements until the furnace entry.

The scope of supply also includes a system for calculating the slab temperature, which will optimize hot charging.

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Tracking the internal material flow across various works areas

The system will provide efficient transport management of the slabs and make best use of the available storage space. It will optimize multi-layer stacking, taking into account product characteristics and all applicable specifications and restrictions. This will avoid unnecessary shifting operations and speed up the transport processes.

For the slab transport to the hot strip mill, the system will plan and coordinate the cross-plant logistics between the steelworks and the hot strip mill as well as the controlled loading of the slabs on different types of wagons. This will make communication by fax and telephone calls superfluous. Moreover, it will no longer be necessary to check the incoming material at the hot strip mill manually, i.e. on the basis of lists and forms.

Detlef Gedaschke, project manager "Slab Transport Processes" at Salzgitter Flachstahl GmbH, considers this project an important milestone on the route to Industry 4.0: "Once the new transport and warehouse management system is up and running, we will have closed the last gap to achieve seamless material tracking across various areas of the Salzgitter works. This applies to the horizontal coupling of data with upstream and downstream plants as well as to vertical data coupling with the higher-level material tracking system."

It is a very important aspect that the system can be swiftly adjusted at any time to changing conditions. Detlef Gedaschke: "We have decided in favour of a system from 3tn because the company will be implementing many innovative features, for example the rules editors which we can adapt ourselves. They guarantee that we can act extremely flexibly without having to call in support by a third party."

The warehouse management system will also be very important for product diversification. Salzgitter Flachstahl has been producing an increasing share of special steel grades. This makes it necessary to know exactly which slabs need special treatment, for example, which ones must not cool down below a certain temperature.

As it is not possible to reliably measure the current temperatures in all zones of each individual slab, 3tn is going to integrate a temperature model calculator from MEA Engineering GmbH into

the system. This calculator will compute for each slab the current temperature on the basis of parameters such as initial temperature, and storage and weather conditions. Thus it will be possible to optimize the storage of the slabs under temperature aspects and transfer them to the reheating furnaces just in time. This not only ensures that the special grades receive optimal treatment. It also optimizes hot charging of the slabs and will save a lot of energy.

Automating the operations and processes in the slab yard also enhances safety at work. In future, no employee will have to enter the slab yard, for example to search any slabs, read the marking on the slabs or attach markings to them.

The warehouse management system can be coupled with existing production, transport and planning systems to provide a continuous exchange of data. For example, for loading the slabs on trains, which are also managed by a 3tn system, a link will be implemented to the computers of the local haulage contractor. This avoids any wrong loading, mixing up or unnecessary restacking and shunting movements.

To guarantee reliable data acquisition, 3tn will also supply the measuring systems for the seven gripper-type and magnetic cranes in the slab yard. Laser scanners mounted to the load carrying devices of the cranes will measure the length and width of the slabs. 3tn will also integrate radar-sensing equipment for position detection and detection of load changes on the cranes. Commissioning of the system is scheduled to take place in three stages during 2017.

Sophisticated warehouse management technology provides basis for implementation of Industry 4.0

The TWMS/metals transport and warehouse management system of 3tn optimizes warehousing processes. All storage activities are target-oriented and in line with the requirements of the product. Most efficient use is made of the storage space available in various warehouses or even plant-wide. The system also optimizes crane movements, avoids unnecessary shifting operations and accelerates the transports. All processes become transparent because the system makes all information readily available and all activities intu-



Detlef Gedaschke is project manager slab logistics at Salzgitter Flachstahl (picture by courtesy of SZFG)

itively comprehensible while reducing the tracing effort to virtually zero.

3tn developed TWMS/metals specifically for the metals industry. The system is preconfigured for all products, means of transport and warehouse arrangements common in that industry. In one direction, it communicates with ERP and MES systems and, in the other direction, with the basic automation systems and the sensor equipment.

A central element of TWMS/metals is the visualization of warehouses in real time as near-reality 3D views. In the crane cabins, the current warehouse situation is displayed exactly as seen by the crane operators. Arrows guide the crane operators from one position to the next, while all information they need for processing an order is being displayed.

A three-dimensional view is implemented on the client terminals in the offices. The users may freely move about this display and view the warehouse from any perspective. If they wish to know the position of a certain coil, they can zoom in on it from the total view, as known from "Google Earth".

A characteristic feature of these systems are their extensive scaling and parameter-setting capacities. Custom rule books facilitate the installation and service of the systems. Integrated control editors enable the parameters to be modified during the software run time.

By means of the service-oriented architecture, 3tn achieves high scalability and serviceability. If required, processes can be handled by several servers, allowing the system to grow in line with customer requirements. This software architecture also allows updates and service activities for individual warehouses to be performed without affecting the overall system. ■