

TRANSPARENT ONLINE TRACKING AND PLANNING IN MATERIALS HANDLING PLANTS¹

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Abstract

Customer expectations of the quality/grade of the products in the Mining- and Metals Industry are constantly growing. The only way to meet the demand is material delivery on-time in the required quantity and specified grade. This is only possible if all process and material data related to quality/grade are available online.

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The Siemens System SIMINE^{CIS} MAQ allows for easy quality planning and material mixing. A comprehensive material monitoring system from the incoming system like ship or train to the storage area delivers a precise 3-D visualization of the stockpile and its composition – which is a basis for simple material dispatch based on graphical linking between stockpile areas. The operator is kept informed of the current flow of material and the current material qualities/grades in the stockyard at all times. User friendly HMI design based on graphical screens, 2D- and 3D pile models make the material dispatch really easy.

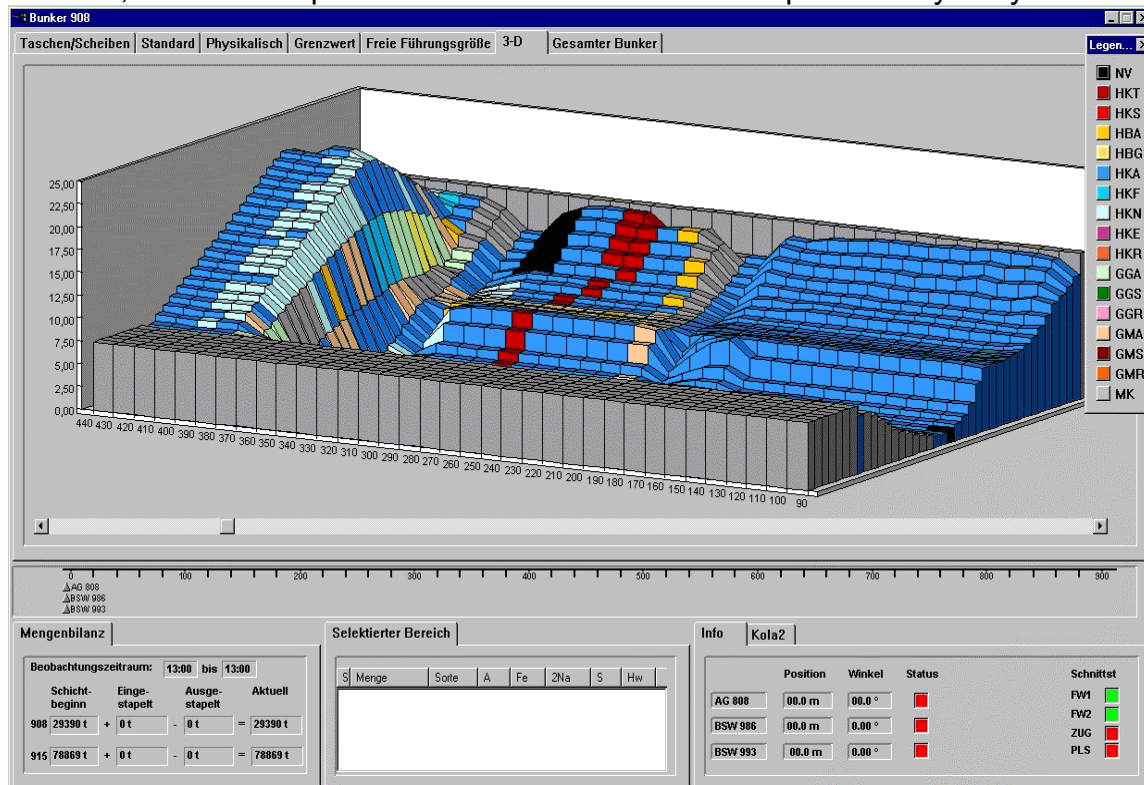


Figure 1: High resolution 3D pile model

System structure

The modular structure of SIMINE MAQ means that it can be flexibly adapted to the plant conditions and the conveying process. Depending on plant configuration modules with different functions can be installed.

The following standard modules are available:

- Data Import Interface (e.g. for material received from ship/train)
- Configurable material tracking with online link to the control system
- 3D pile management
- Data Export Interface (e.g. for material going to iron making plant)

Material tracking

Material tracking is the central module of SIMINE^{CIS} MAQ. Using this module the entire material flow from material input to the delivery side is mapped.

Structure of the material data

Depending on the requirements of the process, the material data held in the system will be adapted to the specific requirements. All the relevant data are listed in a configurable material data record. In addition to the quality data, a material data record also contains quantity information and date.

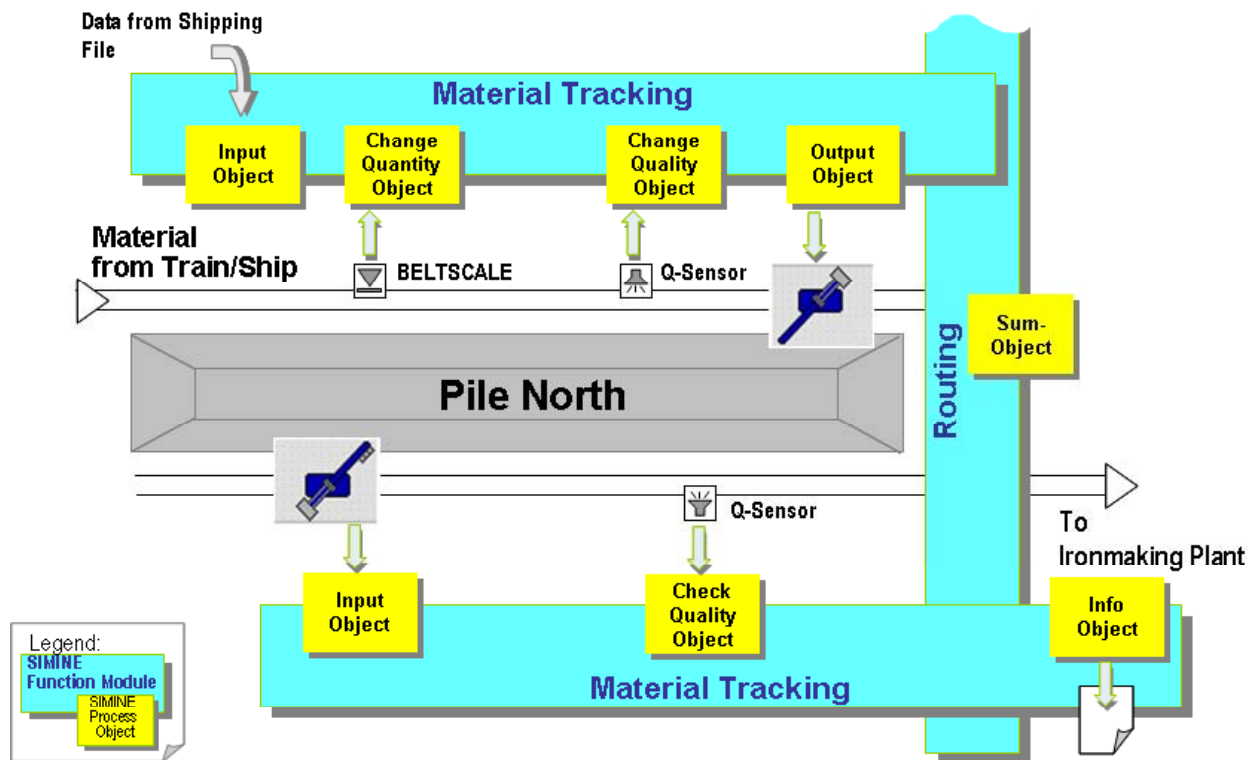


Figure 2: Material tracking – Exemplary plant configuration

Description of the process

Starting at the material source, e.g. ship or train, material data records are continually fed to the first belt line. In the belt objects, these material data records are passed on to the subsequent belts depending on the belt speed. The measured values from a belt scale are stored in the material data records that are just passing through the related belt section. As a result, the material data records are updated for the entire material flow by the online process values (quantity/quality parameters). Results from the laboratory can also be assigned to the material data records that have passed through the sampling point since the sample was taken. For this purpose, all the material data records from the sampling time onward are assigned a unique code to allow to assign laboratory data automatically later.

3D pile management

The function of the pile management module is the integration of stockpiles and bins into the material flow. Its central function is the representation of the pile contour and grade/quality based on the online process values. The derived pile structure is stored in the database with a resolution of cubic meters for quantity and gtrade/quality data and is updated online each time the pile is changed.

Pile visualization

The latest pile contour and material data stored in the database can be visualized in different forms. Next to the 3D model of the pile (see Figure 1), there is also the compressed 2D pile model (see Figure 3) available. In addition to mapping the surface contour different material classes or material types are displayed in different colors.

Blending function

A central function of quality planning support is the early planning of blend qualities. Using the virtual grid it is possible to select zones for which the system then directly calculates the resulting blend quality. So the resulting quality parameters of the material are already available before it is actually removed from the pile.

To define a blending job, the relevant zone has to be selected in each pile/bin. The calculated resulting quality and the total quantity of both zones are immediately displayed in the lower area of the display in tabular form. The required blend result for the quantity and quality can be optimized by moving the relevant virtual grids.

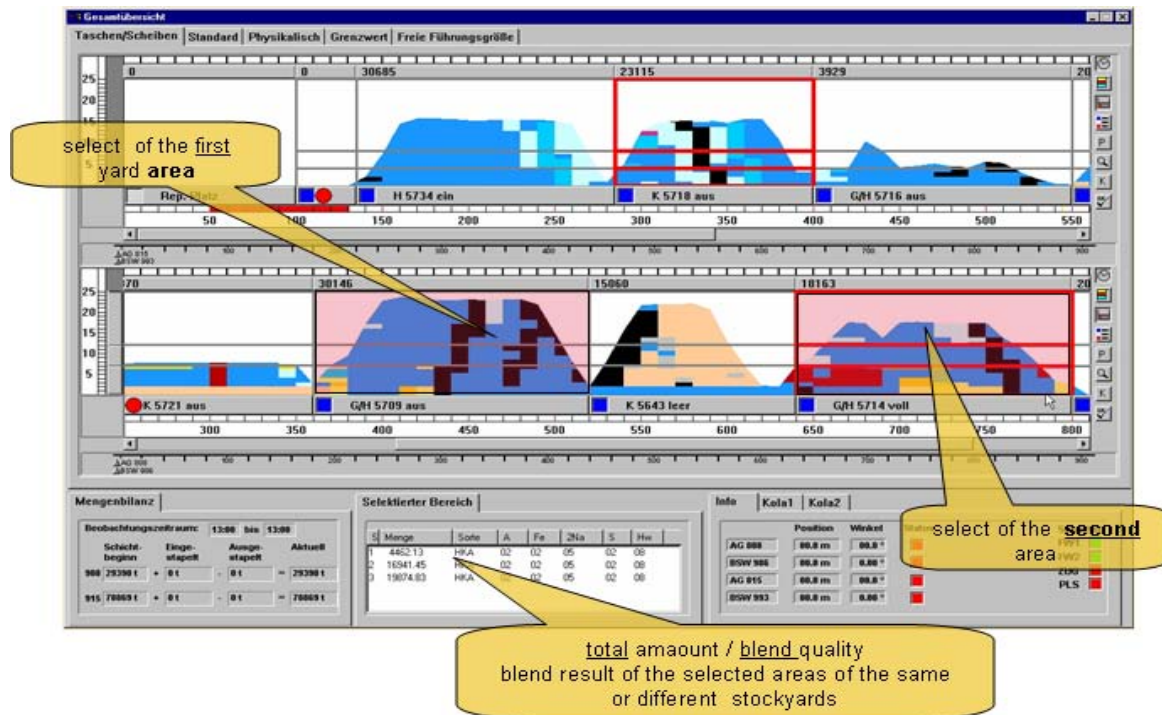


Figure 3: Pile management – blending function

Implementation

The described SIMINE^{CIS} MAQ system ensures simplified material quality management in bulk handling facilities. All quality parameters and the calculated material classification are tracked and are available for each segment throughout the plant. Standardized interfaces enable fast, easy data exchange with other systems.

Benefits

The modularity of the system allows to design the functionality specifically for the demand of our customers – seamless integration from the operations to the management level. All our solutions are ISA95 based which means, scalable up to a full size Manufacturing Execution System (MES). As an example some of the available standard functions:

- Production Order Management integrates the Planning and Scheduling functions. Both optimize interactively the transport and storage of raw materials to maximize the effectiveness of operations.
- Data Integration Service to link all relevant ERP data to the operating units and give feedback about status of the production back to the ERP system

- Product Tracking and Tracing follow up orders during storage and transport and trace the origin of raw materials up to the finished product (product genealogy).
- Process Information Management System to consolidate all process and production data on a real-time basis, over periods of years.