



Material Correction / Work Order

Material

Mat-ID

Act. Place

Location

Field

Row

Place

Angle

Layer

Recommend Place:

Correction Type:

☐ Reverse stack

Work Order

TM

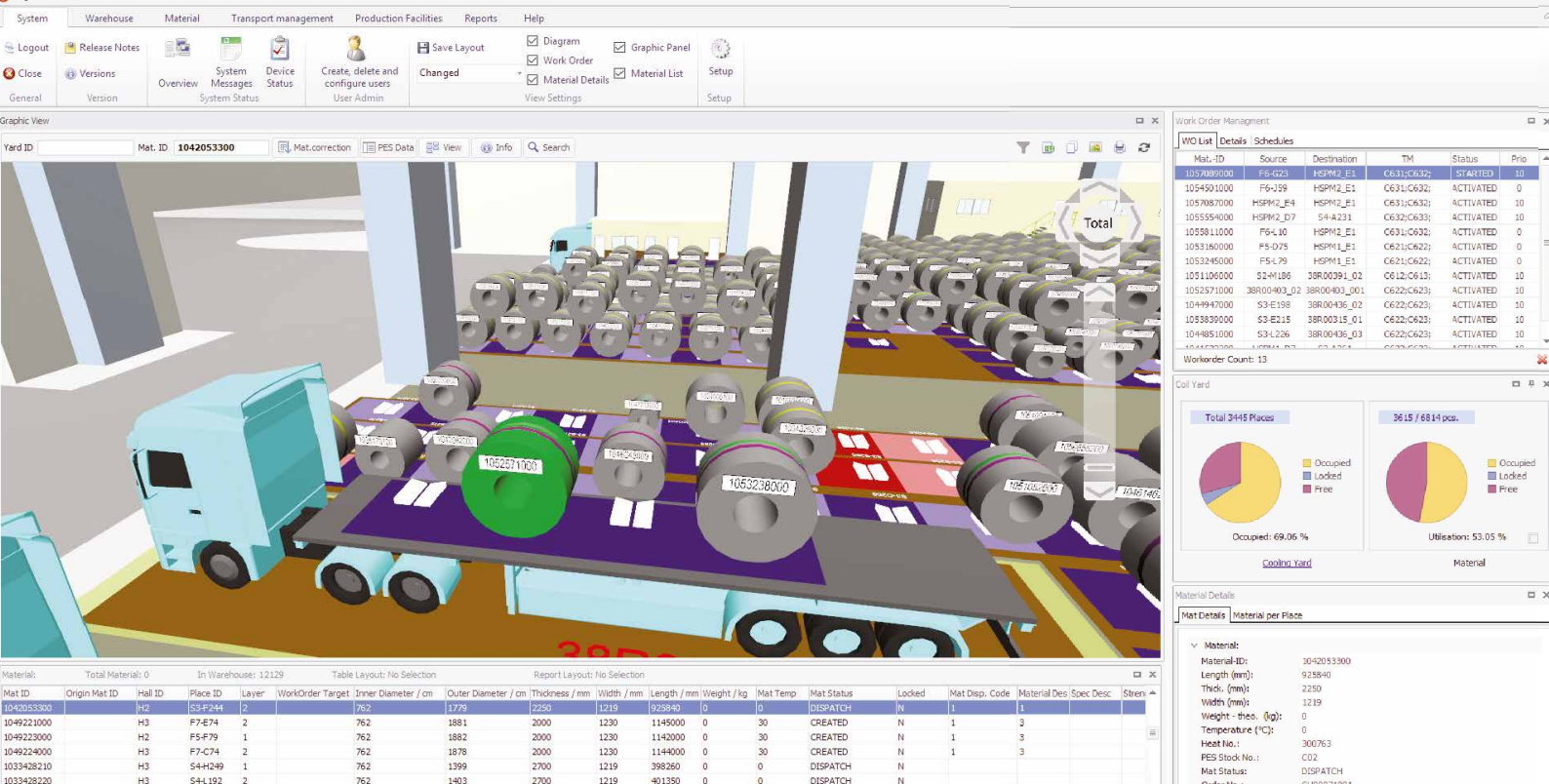
Priority

☒ Local Cranes

☐ Force Work Order

# LTWMS Warehouse Management

Warehouse Management System for the Steel Industry



# Warehouse Management for the Steel Industry

LogoTek warehouse management systems **LTWMS** are suitable for the material management in steel plants. These systems can be used in various areas of the factory, for example in coil yards, slab yards, heavy plate or billet yards. The main task is the administration of the storage yard contents.

At each time the operator can get data about material movements, storage yard occupation and crane operational status. Work orders for cranes and other means of transportation are generated on basis of production planning data. Statistical information of storage yard status is available.

A crane tracking system for transport monitoring, or a complete automation system can be integrated into the WMS. In this case the storage yard image is updated on basis of process data received from the cranes. The selection of storage yard locations is performed on basis of optimization rules and restrictions.

Key features of LTWMS are:

- Modular Client/Server-Architecture
- 3D-Visualization of the Warehouses
- Transport Management for cranes, trucks, wagons, transfer cars, pallets and others
- Configurable yard layout
- Multi-Lingual
- Integrated functions for fully automatic crane systems (routing and operation zones)
- Configurable storage rules and restrictions
- Customized reports with integrated report generator
- Clients for PC's, vehicles, cranes, mobile devices
- High Availability Solutions with Hot Standby / Cold Standby
- Turn key supply with hardware, software, engineering



Features



## Benefits

- always transparent material flow
- optimized storage yard occupation with minimal access time to material
- higher production throughput due to optimized transport management
- minimized drive way of cranes
- reduced maintenance cost due to integrated system monitoring

## Modules

LTWMS consists of following software modules:

### Database

The WMS database is the central storage for all information managed by the WMS. It contains material data, transport management information, communication queues, status data and much more. Stored procedures are used for fast response time under heavy load conditions.

### WMS-Processes / Services

Independent software processes and services are available for communication, transport management, system monitoring, temperature calculation. Server monitoring tools are provided to start/stop services and check the proper function of the WMS.

### WMS Client

PC client with high resolution 3D visualization and intuitive operation. User management and customization functions.

### Crane Client

Client program for the special needs of vehicle- and crane operators. 3D visualization of the warehouse, work order and status display.

### Mobile Client

Thin client with reduced functionality for yard operators. Functions for material inquiry, transport management, dispatch. Scanner and RFID support.

## Connectivity

A warehouse management system needs to be connected to various production facilities and Level 1..3 systems of the steel plant. Interfaces can be configured individually for each application area. Examples for WMS interfaces are:

- Level 3: PES, MES (TCP/IP, MQS)
- Level 2: Furnace Computers, Caster Computers, Rolling Mill Computers, Skin Pass Mills, Sampling Units
- Level 1: Vehicle Tracking System, Roller Table Control, Charging and Discharging Beds, Scanner systems, Identification systems (OCR, RFID, Barcode) (TCP/IP, OPC, SNMP)

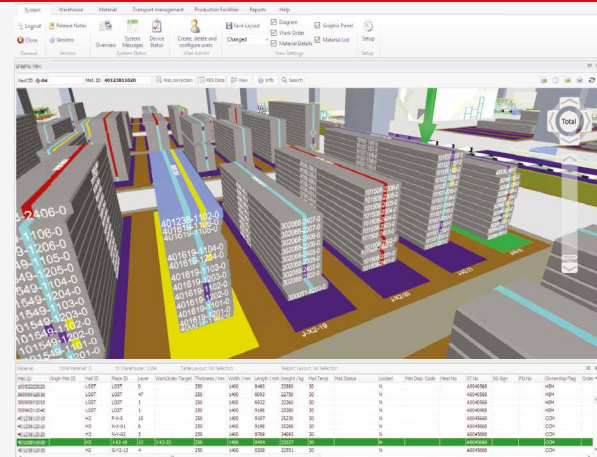
The LTWMS includes tools for configuration and monitoring of the communication.



# Components of the WMS

## WMS Client

The WMS Client is a powerful user interface for the operation of the warehouse. It combines a sophisticated 3D real time visualization with a comprehensive set of functions for warehouse management. Various configuration features allow simple customization and fast commissioning. The integrated role based user management provides different access levels to different user classes.



### Features

#### Dialogues

- 3D warehouse overview
- Material details including material history in table and detail view
- Transport management with automatic work orders
- Truck and train management, work order groups
- Production schedule management
- Reporting, including report generator
- System messages (operation messages, warnings, failure)
- Graphical communication overview
- Warehouse statistics (configurable charts)
- Telegram queues / Messages (tables with filter)

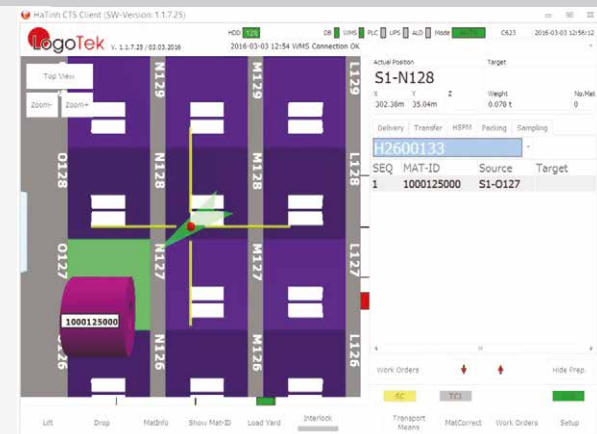
#### Settings / Configuration

- Warehouse layout
- Storage rules
- Restrictions
- Safety zones
- Working areas of cranes
- Storage strategies
- Language of the user interface
- User access rights / User management
- Color settings of material based on material properties

WMS Client

## Vehicle Tracking System CTS

LTWMS integrates a crane tracking system with an own client that is optimized for use at vehicles like overhead cranes, fork lifts or heavy load carriers. The tracking system is using positioning systems for the detection of the actual material location. Weighing systems and scanners can be integrated for accurate recognition of the material. A turn key solution incorporates sensor hardware, PLC's and software for the seamless tracking of steel products.



### Features

#### CTS Functions

- 3D warehouse overview with dynamic view control
- Work order list with filters
- Status information of CTS hardware and interfaces
- Status displays for work order status
- Material correction / manual input
- Material details
- Vehicle assignment and survey
- Load handling device selection (tong type)

#### CTS Hardware

- HMI display: Panel PC with Atom 4 core processor
- Siemens PLC's S7-300, S7-1500
- Wago PLC 750 controllers
- interfaces to crane control system via OPC/OPC-UA
- Analogue and digital interfaces to weighing units, magnetic systems, tong contacts etc.

#### Positioning Systems 1D

- Laser sensors of the LRF-series
- Symeo LPR 1D sensors (LPR 1D24, LPR 1D)
- RFID positioning systems
- Encoder positioning systems (absolute encoders)
- Barcode positioning systems

#### Positioning Systems 2D

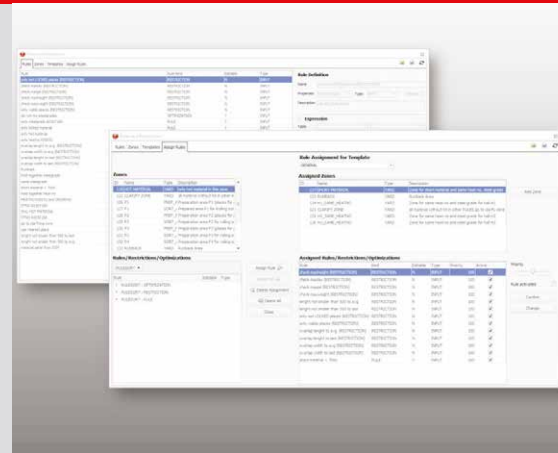
- Symeo LPR 2D systems
- Real Time Kinematic GPS

CTS

## Storage Rules and Restrictions

Work order are created automatically by the WMS based on storage rules and restrictions. Material properties of arriving material are checked by the WMS, a suitable storage location is selected, and the work order is created. Storage rules are defined in the WMS, and can be modified, activated and deactivated by the warehouse operator.

An example is the storage of hot rolled coils in a cooling yard. The work order process is permanently checking the coil temperature that is calculated by a temperature model. After the coil has cooled down to less than 100°C a work order is automatically created for the further processing of the coil.



### Storage Rules

- Sorting by rolling sequence (slab yards)
- Minimum drive way
- Minimum number of transports
- Customer ID (material of one customer stored together)
- Delivery plan
- Steel grade
- Packing type (coil yard)
- Diameter
- and more...

### Restrictions

- max. overlap width
- max. overlap length
- max. weight difference
- max. diameter difference of coils
- max. temperature for further processing
- Delivery plan number and date
- ready flag/quality flags
- and more...

Rules

## Functions for Fully Automatic Cranes

LTWMS includes functions for the control of automatic cranes in steel plant warehouses. Beside the typical warehouse management functionality such systems needs further sensor processing and routing functionality. Each work order need to be segmented into various drive jobs between geometric coordinates, which consider obstacles like machines and safety zones in the yard. Predefined auxiliary jobs like scanning of trains and detecting material position on transfer cars are controlled by the warehouse management system as part of the automatic working cycle.



### Software Function

- Routing: split work order into separate drive jobs
- Safety zone management
- Automatic control of 2D scanning processes (trains, trucks, piles)
- Crane selection

### Hardware Configuration for Fully Automatic Cranes

- Redundant positioning system / SIL 3 Positioning
- Frequency inverter control
- Anti sway systems
- Coil tong sensors (width, coil eye detection, coil presence)
- Slab tong sensors (width, gripper bit position)
- Load sensors / load pins
- 2D scanner systems for slab pile scans and wagon scan
- Safe access systems
- Remote control from operator room (control desk)
- Camera systems for operation monitoring

Automation



# For All Kinds of Material

LogoTek Warehouse Management Systems are available for the following application fields:

## **Coil Yards**

Functionality for schedule management of skin pass mills, packing lines, sampling lines and quality control. Delivery planning for truck and train dispatch is supported. Management of load handling devices (telescopic tongs, C-hooks).

## **Slab Yards**

Sorting of slabs for hot rolling, management of scarfing and cutting, sampling, internal transports by roller tables and transfer cars, delivery planning for train transport.

## **Billets/ Bloom Yards**

Management of billet groups, schedule management of long product mills, group handling by cranes with magnets and C-hooks, interfaces to OCR identification systems, delivery planning.

## **Plate Yards**

Tracking of plates on roller tables and cooling beds, plate handling by magnets, incl. position detection on magnetic cross beams, integration of OCR identification.

## **Roll Management**

Management of rolls for cold or hot rolling mills, including crane transport and identification by RFID.

## **About LogoTek GmbH**

LogoTek is supplier of automation solutions for the steel industry, with a special focus on material tracking, warehouse management and optical identification. With a network of technical offices and sales partners we supply turn key automation systems to customers around the world.

### **LogoTek GmbH**

An der Köhlerei 7  
97828 Marktheidenfeld, Germany  
Tel.: +49 9391 91823 0  
Fax: +49 9391 91823 30  
info@logotek-gmbh.de  
www.logotek-gmbh.de

