

logOS MFS

Material Flow Control (MFS) module



Product information

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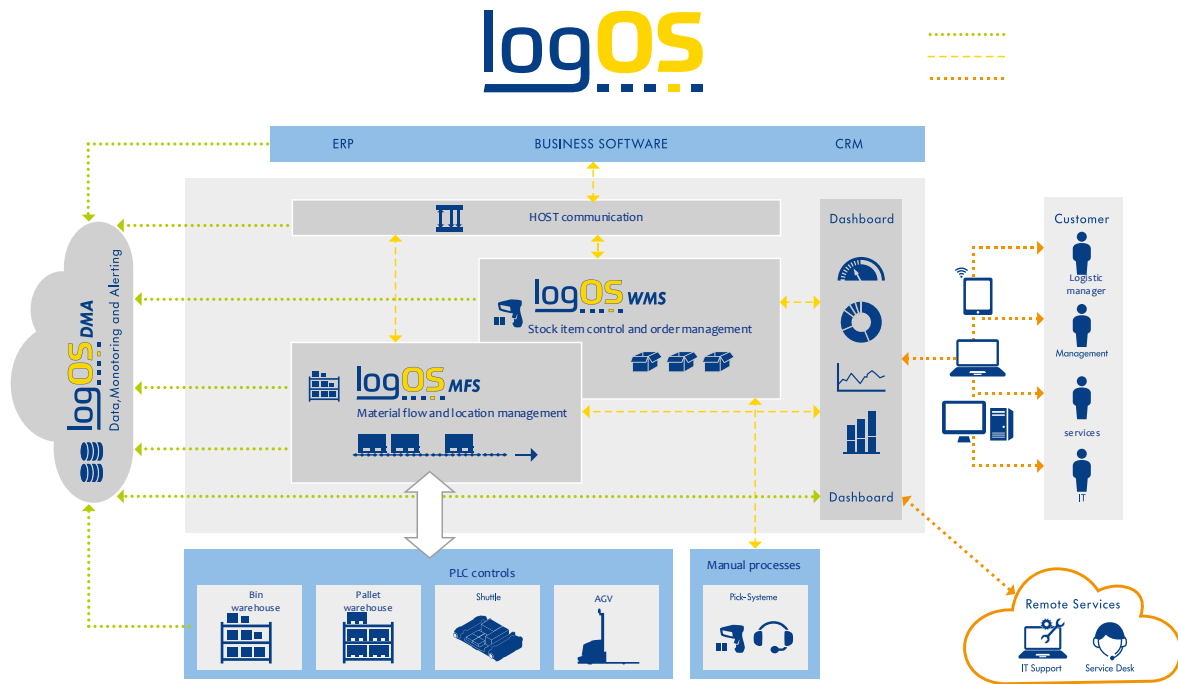
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1 Overview of the Stöcklin Software Suite

The Stöcklin Software Suite consists of the main modules logOS WMS, logOS MFS and logOS DMA.



The **logOS WMS**, a warehouse and order management system, controls all intralogistics processes from goods receipt to goods out gates. In doing so, it managed inventories, also depending on batches, expiration date, serial number, etc. within the managed storages and workstations. It executes retrieval orders sent by the host system. This depends on the best choice of material and the specified provision time. All retrieval processes such as picking, order consolidation, packing and ramp management are supported.

The **logOS MFS**, a storage location management and material flow module for automated warehouses can be controlled by the logOS WMS or directly from an external host system (e.g. ERP, MES, customer WMS) via transport orders.

In doing so, the system can manage all types of storage bins, depending on the required system delineation, and use intelligent goods in, relocation and retrieval strategies to optimize throughput and ensure necessary storage restrictions.

The logOS MFS also contains a material flow control with control station. The material flow control, equipped with a visualization of the plant, executes transport orders and optimizes them depending on sequencing, failed routes, etc.

logOS DMA, the web-based statistics and monitoring tool, provides an in-depth view of business processes and plant stability and is also used for predictive maintenance. As a result, downtimes can be avoided and thus the availability of machines and plants can be increased. Relevant key figures can be retrieved - also mobile - via different end devices and evaluated in freely definable time periods.

2 Field of application and benefit

The **logOS MFS**, a storage location management and material flow module for automated warehouses can be controlled by the logOS WMS or directly from an external host system (e.g. ERP, MES, customer WMS) via transport orders.

In doing so, the system can manage all types of storage bins, depending on the required system delineation, and use intelligent goods in, relocation and retrieval strategies to optimize throughput and ensure necessary storage restrictions.

The logOS MFS also contains a material flow control with control station. The material flow control, equipped with a visualization of the plant, executes transport orders and optimizes them depending on sequencing, failed routes, etc.

2.1 Languages

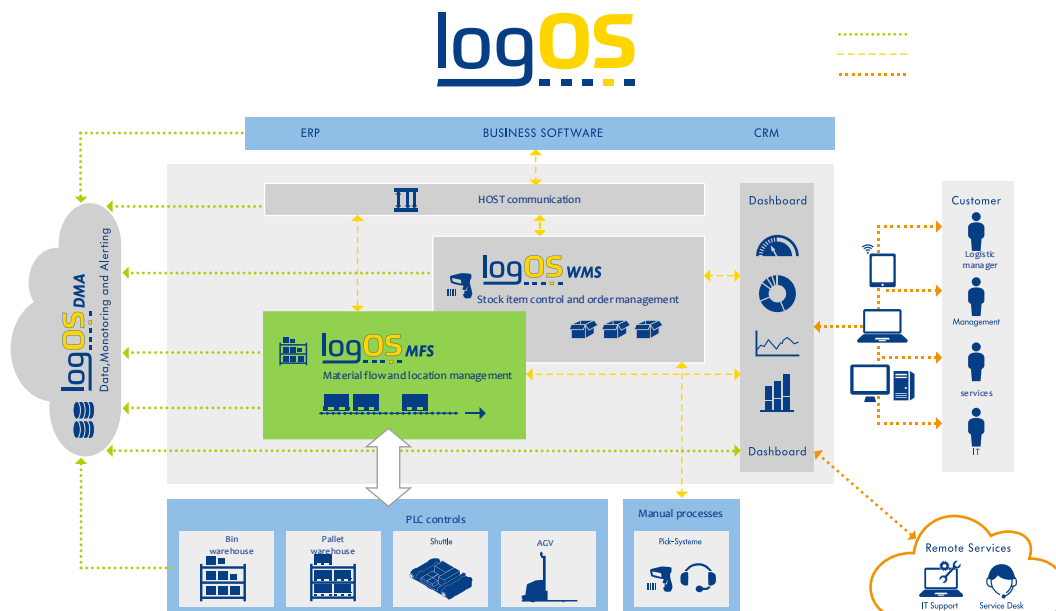
The standard system languages

- German
- English
- Spanish
- French

are available. Other languages can also be implemented on request.

3 System structure

The logOS MFS can be operated as a stand-alone system, independent of the logOS WMS. It is built as a client-server architecture. The server processes (business logic) are executed together with the database on the server. They include storage location management and material flow control. The server processes communicate with the higher-level host (warehouse management system) via the host communication, which is also executed on the server.

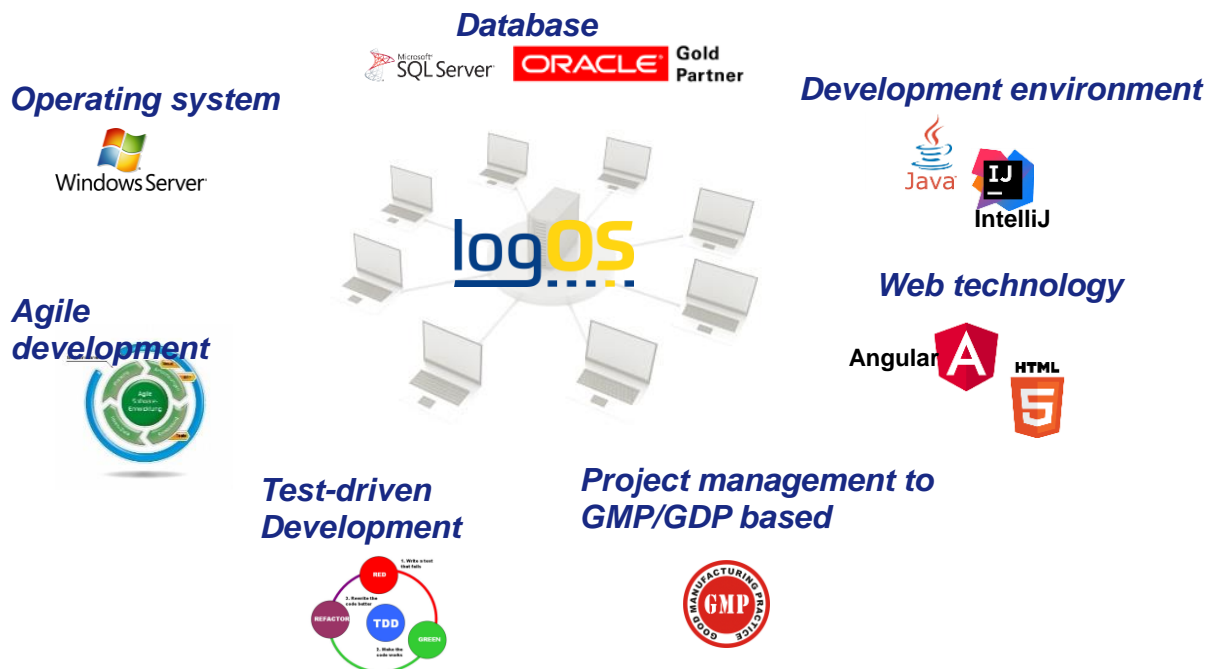


The clients (control station and workstations) of logOS MFS are connected to the server processes via a data network. The clients do not have their own logic. However, they provide the user interface of logOS MFS.

Furthermore, the subsystems are networked to the logOS MFS via a data network. These systems communicate with each other mostly via TCPIP telegrams.

4 Technologies and methods used

The logOS MFS is developed and commissioned with widely used technologies and methods. The following figure shows the tools and methods used

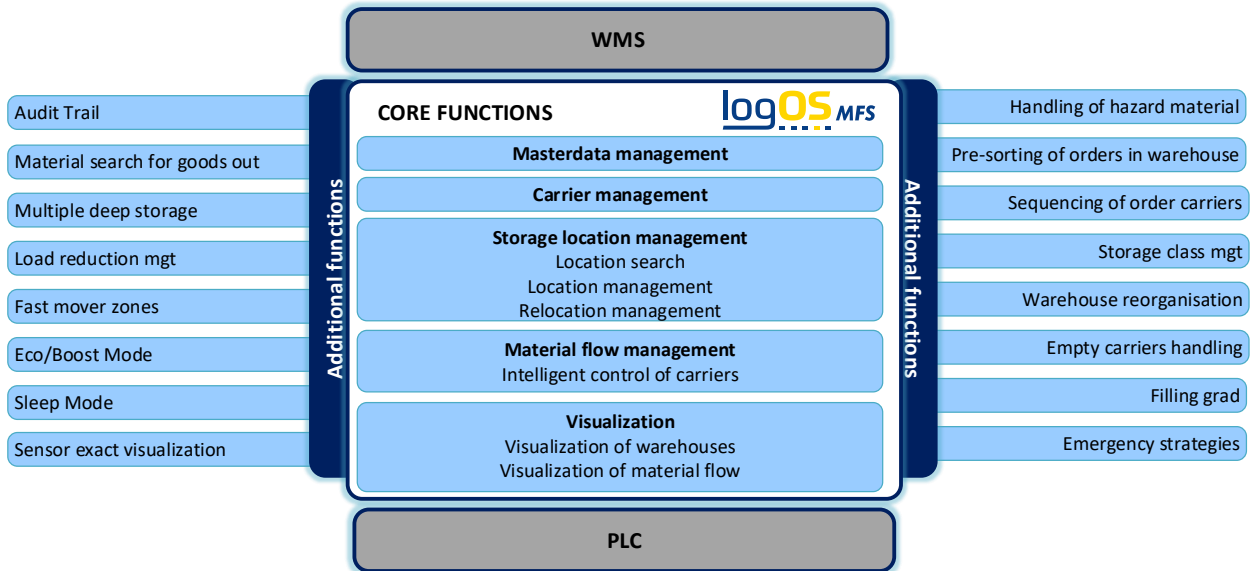


The advantages of the technologies and methods used can be seen in:

- High system stability
- Scalability
- Extensibility for future requirements
- easy maintenance
- intuitive operability of the overall system

5 Main functions

The following figure shows an overview of the core functions as well as the possible additional functions available in logOS MFS.



For the individual main functions, screen views are available for their monitoring and analyses.

6 Storage location management

The storage location management includes the management of all storage locations available in the managed warehouses, the carriers and their links. If the logOS MFS is provided with data of the carrier contents (e.g. article number, quantities, batch, best before date), these are also managed and can be queried accordingly.



6.1 Storage types

The logOS can manage almost all automatic warehouses with extended handling. By default, it is harmonized with Stöcklin warehouse technology. But also other systems can be managed by logOS without major obstacles.

The following strategies of location characteristics are available by default in logOS MFS:

6.1.1 Single depth storage aisles in general



Single-deep storage is when only one carrier can be stored in the depth of a shelf.

6.1.2 Multiple depth storage aisles in general



In the case of multiple-deep storage in a storage location, several carriers can be stored one after the other.

If possible, the goods in strategy uses item characteristics to determine how a carrier can be placed in a multiple-deep storage location.

Usually, the minimum is to try to store the same items and batches in the same storage location.

In most cases, multi-deep stores are double-deep, but it can also mean a channel store, where up to well over 10 carriers can be stored one behind the other.

6.1.3 Handling with satellite vehicle



A satellite vehicle, which rides on an crane, then moves independently and battery-driven into a storage channel.

This requires special storage strategies such as:

- Dynamic division of the channels based on the pallet dimensions (optimum utilization of the channels)
- Preventing the simultaneous use of a channel by 2 vehicles

6.1.4 Handling with carton gripper system



A carton gripper has the feature that different widths and lengths of cartons/packages and up to 4-bay deep storage can be handled (prerequisite in the standard is that only the same type can be stored within one storage bay at the same time) The combination of possible simultaneous movements and storage location accesses of different carton dimensions requires special handling.

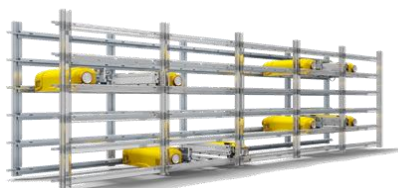
6.1.5 Handling with multilevel shuttle



The Multi Level Shuttle can serve totes and cartons single or multiple deep, in one aisle several units can run on top of each other.

This requires a special utilization strategy for storage and retrieval

6.1.6 Handling with Multi-Shuttle



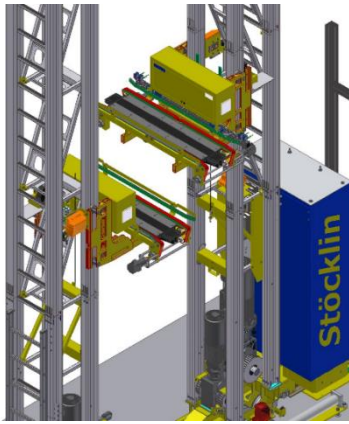
A multi-shuttle warehouse is subject to its own storage and retrieval strategies. Failure strategies are also handled differently than in other warehouses

6.1.7 Handling with double and triple load handling devices



In the case of double and triple load handling devices, the storage strategies must be provided in such a way that the storage locations for goods in and retrieval are searched for in such a way that the carriers can handled in each way (e.g. if the carrier is to be placed on the right side of the load handling device and has to go to a location on the left side, then this way must be free)

6.1.8 Handling with quadruple load handling device



Due to the fact that 2 double-deep load handling devices travel independently in height but are dependent in the travel axis, very special storage and retrieval strategies must be run in order to achieve maximum performance.

6.1.9 Handling Flexible Storage

Flexible storage allows an increase in the reliability of channel storage.

When multiple lanes are adjacent, shuttles can serve the same continuous channel from both sides.

Normally, each device is assigned its own area per channel, which it serves. If, for example, one stacker crane is defective, the other stacker crane can operate the entire channel with its shuttle under various restrictions.

This requires complex strategies, what which device or shuttle is now allowed to process, which stock transfers now have to be rerun, etc.

6.1.10 Handling with transverse crane

If automatic storage and retrieval machines are to serve several aisles, they are moved to another aisle with a cross shifter.

This requires for a storage and retrieval strategies own logic to operate the warehouse efficiently.

6.2 Location definition

A warehouse can be divided into different substructures in logOS, which influence the strategies for goods in and relocations

6.2.1 Location

The warehouse is a logical unit for storing carriers. The next lower-level of physical management unit is represented by storage locations.

6.2.2 Storage zones

Different logical zones can be distinguished in a warehouse. They are used to allocate items in certain zones. The storage zone assigned to the article is decisive when placing the article in storage and searching for the storage bin.

Fast-moving zones

If the articles can be classified according to fast-moving zones (ABC), the warehouse is logically divided so that the storage locations in the A zone can be reached quickly. The B and C zones, on the other hand, contain the locations that are associated with longer travel times for storage and retrieval machine. The access frequency to the articles can be used to classify articles accordingly. This allows the storage and retrieval performance to be significantly increased.

In logOS MFS, it is assumed that the fast-moving item classification is calculated and transmitted by the higher-level warehouse management system.

Storage class zone

If an article has further characteristics, which should limit a storage location search, then storage classes can be created.

Thus, a storage class can be assigned to each article (or carrier). The storage classes then point to one or more storage zones.

It is also possible to assign several zones to a storage class in a sequence to be prioritized.

Example:

- Chocolate may only be stored in the climate zone +15°C (Strict zone selection "+15°C")
- Wafers are preferably stored in the normal warehouse, but may also be stored in the climate zone +15°C if no more suitable space is available in the normal warehouse. (Prioritized zone "normal storage", alternative zone "+15°C")

Examples of storage class usage:

- Divide climate zones
- Divide hazardous material zones

6.2.3 Storage location type

So-called storage location types can be created. These combine properties such as location dimensions and the permissible weight of the locations. It is then mandatory to assign a storage location type to each storage location.

6.2.4 Storage locations

The storage locations designate the physical locations for the carriers, which are given a unique address.

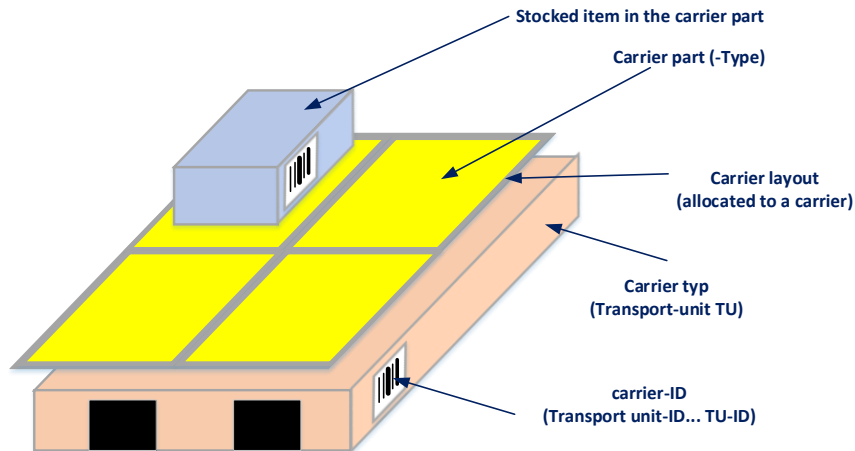
Each storage location is assigned a storage location type, a fast-moving zone and a storage class zone.

Furthermore, the storage location is also dynamically stored whether it is locked and occupied

6.3 Carrier definitions

A carrier defines a load carrier onto which goods can be booked and stored in a warehouse. With a division of a carrier into several parts, different goods per carrier can be managed on one carrier in logOS.

The following structure is used to form a carrier.



6.3.1 Carrier type

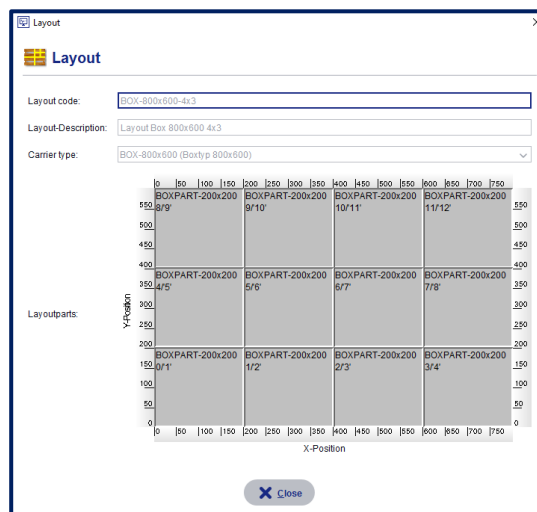
The carrier type designates a storable physical carrier. The carrier dimensions and the carrier weight (without payload) can be stored in this.

6.3.2 Carrier location type

The carrier location type designates a logical dimension, which can then be used to create a carrier layout.

6.3.3 Carrier layout

The carrier layout can be created from one or more carrier location types. The basic dimension of the carrier layout corresponds to a carrier type, which can be equipped with different carrier part types.



The picture shows a pack layout for a carrier 400x600mm, equipped with 4 pack locations 300x200mm.

6.4 Storage strategies

6.4.1 Storage orders

The logOS MFS basically only manages and moves at the carrier level. The higher-level warehouse management system is responsible for managing the contents of the goods in the carrier.

However, in order to implement an intelligent putaway strategy, logOG MFS requires various attributes of the article in the carrier.

Which attributes are necessary is defined in the project.

6.4.2 Location location search

Storage strategies are used to find the most suitable aisle or storage location. For each putaway, the system determines and assigns the optimal aisle and the most suitable storage location at the current time.

Conditions in the warehouse, such as the permissible weights in the different zones or the inclusion of the access speed to the stored carriers, are taken into account.

Overview standard location location search

Strategy	Description
Uniform pack distribution across the aisles	In order to be able to make a balanced planning for the stock removal, it is tried to distribute an article/batch into several independent storage aisles already during the putaway.
Same item/batch in storage location	Depending on the customer's article structure, it makes sense to store the same articles/batch in multi-deep storage racks.
Binding dimension	First priority is given to finding the most suitable storage location for the carrier dimension. If no optimum storage location is found, the next optimum storage location is searched for.
Mixing pallets on the shelf	Is it possible to place different sizes of carriers in one shelf. For example, 3 small carriers can be placed next to each other in one shelf, but alternatively 2 large carriers. This possibility requires a special strategy when searching for a location location
Load reduction	In many cases, the storage rack is not designed for full load. This means, for example, that storage locations that are stacked one above the other must not be completely filled with full-weight carriers. This function influences the bin search.
Fast-moving zones	Description see chapter Storage zones
Storage class zones	Description see chapter Storage zones
Warehouse-specific storage strategies	Depending on the storage technology and its characteristics, the storage location search is further influenced. Description see chapter Location types

The priorities and combination of emplacement strategies to be used will be determined in the project during the specification phase.

6.5 Rearrangement strategies

6.5.1 Rearrangements for double- and multiple-deep storage

In order to be able to remove packs from rear positions in double- and multiple-deep storage, the packs in front of them must be moved beforehand.

The destination bin for the transfer is determined according to the valid storage strategies.

6.5.2 Stock transfers for warehouse optimization (option)

With the help of (optional) storage optimization, carriers that are not currently in an optimal storage location can be automatically relocated in automatic storage sections. This results in better utilization of the warehouse and improved performance when accessing the carriers. The following criteria can be used to determine which carriers are not optimally stored:

- Carrier type in relation to storage location type
- Fast-moving zone of a carrier in relation to the fast-moving zone of the storage location
- Article purity within a storage location (for multiple-deep warehouses)

The timing for a warehouse optimization can be automatic or manual. The generation and activation of optimization orders takes place independently in the case of automatic optimization.

Any time schedules can be stored. Optimizations take place automatically during the periods defined in these schedules.

Warehouse optimization management

TimeSlots (3)

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Start time	End time
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8:00:00 AM	10:00:00 AM
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8:00:00 AM	12:00:00 PM
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	10:00:00 PM	11:59:00 PM

Warehouse optimization enabling

Activate Windows
Go to Settings to activate Windows.

New... Edit... Delete...

6.6 Outsourcing strategies

6.6.1 Stock removal orders

Stock removal orders are transmitted from the higher-level warehouse management system. The logOS MFS expects exactly the information from the warehouse management system which carrier is to be retrieved on the basis of the carrier ID number.

The orders thus require, as a minimum, the information as to which carrier (carrier ID number) is to be driven to which destination.

6.6.2 Outsourcing strategies

Several retrieval orders with the corresponding order items can be transmitted to logOS MFS at the same time.

The positions must contain at least the carrier ID number and the target area/destination.

If there are no restrictions, the logOS tries to control the orders in such a way that the storage aisles are utilized as evenly as possible.

Via extended job information, the logOS MFS can also execute the following strategies:

- **Scheduled jobs**With a time specification given in the job, logOS MFS can start jobs time-controlled
- **Sequence formation**With a sequence specified in the order, the logOS carrier can be retrieved in a sequenced manner

6.6.3 Special strategy item selection

In certain cases, it is useful if the logOS can make the decision which carrier exactly should be taken for an order item now, in order to get the best stock removal performance (to perform as few stock transfers as possible).

This is especially true in cases where a multiple-deep warehouse is to be served and the higher-level system does not know the exact warehouse level.

The following two variants are possible for this purpose:

1. The higher-level warehouse management system queries the logOS MFS for the best placed carrier, the logOS returns the result and the warehouse management system instructs the logOS to retrieve exactly this carrier
2. The higher-level warehouse management system directly gives an order with the item attributes, the logOS searches for the best carrier and then reports which carrier was selected when the transport order was started or completed.

The following parameters can be provided by the warehouse management system so that logOS can make a carrier selection:

- Item number
- Charge
- Quantity
- Best before date

The logOS MFS can then use the following strategies to select the best carrier within the parameters provided:

- Best placed carrier within the warehouse
- FIFO (oldest stored carrier)
- FEFO (oldest expiration date)

6.6.4 Special strategy order presorting

If orders can be outsourced very efficiently at one point in time, it is possible to pre-sort this order.

In this case, the warehouse management system sends a special order (stock transfer order) at an early stage.

The logOS stores the required carriers within the storage aisle in a special storage zone near the retrieval section.

If the warehouse management system now sends the effective retrieval orders at a later point in time, then the carriers can be accessed very quickly, as the stacker crane only has to perform short travel distances.

The following circumstances must be taken into account:

- This function is only useful if orders are known hours in advance.
- Storage bins must be "sacrificed" for this zone. These are not used as normal storage bins
- The interface to the higher-level warehouse management system becomes more complex

6.6.5 Special strategy empties management

Normally, the higher-level warehouse management system also issues normal storage and retrieval orders for the empty carriers.

If the higher-level warehouse management system does not support this, empty carriers can be managed locally in logOS MFS.

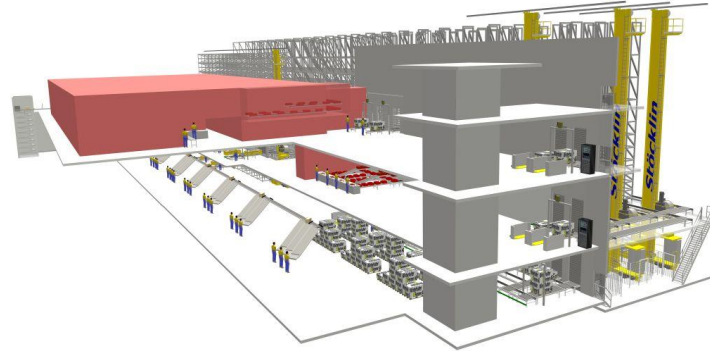
In this way, it would be possible, for example, to monitor buffer lines for empty carriers on the conveyor system in order to replenish empty carriers if the lines are not full.

The following circumstances must be taken into account:

- It must be defined how an empty carrier is detected by logOS MFS during storage
- Depending on the requirements (e.g. empty carrier replenishment triggered by the warehouse management system), the interface to the warehouse management system must be extended.

7 Material flow control

In the automated warehouse, the material flow control system is responsible for controlling and optimizing all systems and equipment intended for automatic warehouse operation.



7.1 Trade types

Each trade that is to be controlled by a material flow system has its own characteristics and strategies.

The logOS can control the following types of trades by default:

- stacker cranes (for pallets, totes, cartons)
- Shuttle systems (multishuttle, multilevel shuttle)
- Carrier conveyor systems
- Carton conveyor systems
- Pallet conveyor systems
- Electric monorail systems
- Driverless transport systems
- Picking robot systems
- Paternoster systems

7.2 Strategies

Each plant has individual material flow requirements, which must be designed specifically for each project.

Some examples, which controls the flow of materials:

Retrieval strategies

With logOS MFS, the retrieval orders are specified by the higher-level warehouse management system on the basis of the carrier ID. The logOS MFS merely executes them. Nevertheless, it can carry out optimizations by optimizing the order triggering depending on the aisle utilization in such a way that the rack vehicles are evenly utilized.

Utilization strategies

depending on the utilization of the plant, the optimal path is selected, provided that the plant layout offers this possibility

Emergency strategies

Depending on the failure of individual plant components, another route is selected, provided that the plant layout offers this possibility. Depending on the possibility, plant sections are even automatically reused in order to set up an emergency route (e.g. reversing operation).

Sequences

Depending on the requirements, sequences must be adhered to when removing the packs from storage. The material flow control system monitors and controls compliance with the sequence.

Filling level

The material flow monitors the filling level of various system parts, as in certain situations this can otherwise lead to a situation that significantly slows down the system or even blocks certain system parts without a way out (deadlock).

Profile checks of the packs

The material flow checks dimensions, load carriers and weights of the packs and, depending on the evaluation, different strategies are pursued (such as ejecting non-conforming or unknown packs)

System filling with empty carriers

Especially in carrier warehouses, various conveyor lines are used to provide employees with empty carriers on a continuous basis. These lines are dynamically monitored to determine whether there are still enough empty carriers on the line. If there are not enough empty carriers, they are automatically replenished.

The logOS MFS has the ideal tools to control the above strategies, but the control is always tuned to the specific plant.

7.3 Energy management

A material flow computer can also help save energy and reduce material wear with intelligent control.

7.3.1 Eco/boost switchover (option)

Stöcklin stacker cranes can be operated with two different travel dynamics (acceleration and speed).

The switching of these two driving dynamics is handled by the logOS MFS.

The logOS MFS calculates which mode is to be used for driving based on the currently pending driving jobs.

7.3.2 Sleep mode switching (option)

A stacker crane consumes energy even when it is at a standstill, which is mainly due to frequency converters and other electronic components.

In interaction with the storage and retrieval system controller, the logOS MFS now offers the possibility to disconnect almost all electronic components from the power supply via an intermediate power contactor.

Since a "wake-up" of a device takes about half a minute, a shutdown is not suitable at any time. The logOS MFS controls the switch-off and switch-on according to certain rules.

8 Master data

8.1 User administration and authorization concept

The two-level user administration contains user groups and users.

The users can be assigned to a user group. The user administration also contains the login names and passwords without which access to logOS can be denied. The access permissions to logOS are defined on the user group level. This makes it easy to handle the access permissions even with a large number of users.

The user administration can also be linked to Active Directory of Windows Server. The authorizations for logOS can be taken over directly from there. A separate login at logOS is no longer necessary.

Description	Allow
About transport	✓
Activate inventory lists	✓
Activate pick lists	✓
Activate roller positions	✓
Alert properties	✓
Alert Rollernotfound Stockunblock	✓
Article viewer	✓
Book Carrier into storage location	✓
Carrier Layout Management	✓
Carrier Part Type Management	✓
Carrier Role Management	✓
Carrier Type Management	✓
Close carrier	✓
Compact carrier	✓
Configuration	✓
Confirm inventory positions	✓
Confirm pick positions	✓
Confirm storage positions	✓
Confirm storage positions for automatic warehouses	✓

8.2 Manage carrier

The carrier types and their dependencies can be created and modified in the system. See also the chapter [Definitions](#)

Carrier type code	Description of type	Length	Width	Tare weight	Height	Profile control value	Height check	Minimum height	Maximum height	gap
BOX-400x300	Boxtp 400x300	400	300	0	0	-1	16	0	0	0
BOX-500x400	Boxtp 500x400	500	400	0	0	-1	8	0	0	0
BOX-800x600	Boxtp 800x600	800	600	0	0	-1	4	0	0	0
E 1H0	EURO1 GEMESSEN	1200	800	0	0	150	1	0	0	0
E 1H1	EURO1 MAX 1000	1200	800	0	0	150	1	0	1000	0
E 1H2	EURO1 MAX 1500	1200	800	0	0	150	1	0	1500	0
E 1H3	EURO1 MAX 1800	1200	800	0	0	150	1	0	1800	0
E2H0	EURO2 GEMESSEN	1200	1000	0	0	150	2	0	0	0
E2H1	EURO2 MAX 1000	1200	1000	0	0	150	2	0	1000	0
E2H2	EURO2 MAX 1500	1200	1000	0	0	150	2	1001	1500	0
E2H3	EURO2 MAX 1800	1200	1000	0	0	150	2	1501	1800	0
EUR6	Euro6ASO0 Palette	800	600	0	0	150	0	0	0	0
USQMA	US QMA Palette 48x40 inch	1219	1016	0	0	0	0	0	0	0

8.3 Manage warehouse

The location types and their dependencies can be changed in the system. See also chapter [Location definition](#)

9 Information Tools

9.1 Order status

The order status shows the current orders and their states, which were transmitted by the warehouse management system.

Order overview

Search Criteria

Order header: Order position

Order code: * Requested delivery time Start: * Order date code: *
 Order group: * Requested delivery time to: * Order type code: *
 Customer order code: * Staging area: *

Order headers (29)

Order code	Order group	Shipping group	Order type code	Priority	Creation mode	Requested delivery time	Order state code	State time	Selected
00000000000000000013			INVENTORY (Inventory)		0 MANJAL		DONE (Done)	Nov 19, 2020 11:46:05.955	<input type="checkbox"/>
AA37	G1		NORMAL (Normal)		1 MANJAL	Mar 16, 2014 12:00:00 AM	RESERVED (Reserved)	Oct 21, 2020 16:05:12.743	<input type="checkbox"/>
AA38	G1		NORMAL (Normal)		1 MANJAL	Apr 14, 2014 12:00:00 AM	PENDING (Pending)	Oct 20, 2020 12:40:44.571	<input type="checkbox"/>
AA39	G1		NORMAL (Normal)		1 MANJAL	Apr 16, 2014 12:00:00 AM	ACTIVATED (Activated)	Oct 23, 2020 08:00:29.333	<input type="checkbox"/>
AA41	G3		NORMAL (Normal)		1 MANJAL	Mar 16, 2014 12:00:00 AM	PENDING (Pending)	Oct 20, 2020 12:40:44.571	<input type="checkbox"/>
AA42	G3		NORMAL (Normal)		1 MANJAL	Mar 17, 2014 12:00:00 AM	PENDING (Pending)	Oct 20, 2020 12:40:44.571	<input type="checkbox"/>

Order positions (2)

Order position	Article code	Owner code	Article description	Requested quantity	Open Quantity	Picked quantity	Missing quantity	State code	State time
1	A103	WMS	Schoggaschicht Matherhi, Yarni	333	0	0	1	0 ACTIVATED (Activated)	Oct 23, 2020 08:00:29.317
2	A104	WMS	Sackmesser	333	0	0	0	0 RESERVED (Reserved)	Oct 21, 2020 16:13:50.484

9.2 Carrier information

The carrier information shows the configuration of the carriers, the current storage location and their occupancy (also the carrier content, if available).

Information about Carriers

Search Criteria

Carrier code: * Warehouse code: * Location address: *
 Carrier type code: * On shelf: * Target location address: *
 Layout code: * Carrier role code: * Info code: *

Carrier (Output limited to 1,000 rows)

Carrier code	Speed code	Zone-strategy code	Carrier type code	Description of type	Carrier role code	Description of role	Warehouse code	Location address	Target location address	Layout code	Layout-Description	Last moved date	Text field 0
B0000101001	A		BOX-600x600	Boxtyp 600x600			RLD1	00.001.01.001			BOX-600x600-2x2	Layout Box 600x600...	
B0000102001	A		BOX-600x400	Boxtyp 600x400			RLD1	00.001.02.001			BOX-600x400-2x2	Layout Box 600x400...	
B0000103001	A		BOX-400x300	Boxtyp 400x300			RLD1	00.001.03.001			BOX-400x300-1x1	Layout Box 400x300...	
B0000104001	A		BOX-400x300	Boxtyp 400x300			RLD1	00.001.04.001			BOX-400x300-1x1	Layout Box 400x300...	
B0000201001	A		BOX-600x600	Boxtyp 600x600			RLD1	00.002.01.001			BOX-600x600-2x3	Layout Box 600x600...	
B0000202001	A		BOX-600x400	Boxtyp 600x400			RLD1	00.002.02.001			BOX-600x400-3x2	Layout Box 600x400...	
B0000203001	A		BOX-400x300	Boxtyp 400x300			RLD1	00.002.03.001			BOX-400x300-1x1	Layout Box 400x300...	

Stocked items (6)

Lot code	Stocked item code	Article code	Owner code	Article description	Quantity	Reserved quantity	Incoming quantity	Quantity unit	Arrival time	Expiration date	Inventory time	Last moved date	Variant code	Blocking code	Inventory blockingcode	Inventory requested	Carrier code	Carrier type code	Warehouse number	Location address	Position on carrier
10929	325139	SLD		ENTLIG/SFT...	1,00	0	0	STK						USABLE (Av...)	USABLE (Av... N (No))		B0000201001	BOX-6...	RLD1	00.002.01.001	1
10930	329135	SLD		BATT-TRAG...	1,00	0	0	STK						USABLE (Av...)	USABLE (Av... N (No))		B0000201001	BOX-6...	RLD1	00.002.01.001	2
10931	326747	SLD		HOCHHALT...	2,00	0	0	STK						USABLE (Av...)	USABLE (Av... N (No))		B0000201001	BOX-6...	RLD1	00.002.01.001	3
10932	327409	SLD		TEKTUR.ZU...	3,00	0	0	STK						USABLE (Av...)	USABLE (Av... N (No))		B0000201001	BOX-6...	RLD1	00.002.01.001	4
10933	334103	SLD		SPLINTROL...	4,00	0	0	STK						USABLE (Av...)	USABLE (Av... N (No))		B0000201001	BOX-6...	RLD1	00.002.01.001	5
10934	347809	SLD		ENDSCHAL...	5,00	0	0	STK						USABLE (Av...)	USABLE (Av... N (No))		B0000201001	BOX-6...	RLD1	00.002.01.001	6

9.3 Quant information

If available, the stocks can be displayed here. For example, you can see which articles/quantities are in which carriers.

Information about Stocked Items

Search Criteria

Article code: * Stocked item: *
 Owner code: * Blocking code: *
 Lot code: * Inventory bloc: *
 Article description: * Carrier code: *

Stocked items (Output limited to 1,000 rows)

Article code	Owner code	Lot code	Article description	Stocked item code
518486	SLD		KLEBER STOECKLIN... 21375	
518577	SLD		VERSCHLUSSZAFF... 21376	
518579	SLD		CLIP-ON GEGENSTL... 21377	
518788	SLD		KLEBER STOECKLIN... 21378	
518789	SLD		KLEBER STOECKLIN... 21379	
518790	SLD		KLEBER STOECKLIN... 21380	
518791	SLD		KLEBER STOECKLIN... 21381	
518793	SLD		KLEBER STOECKLIN... 21382	
518794	SLD		KLEBER STOECKLIN... 21383	
518795	SLD		KLEBER STOECKLIN... 21384	
518796	SLD		KLEBER STOECKLIN... 21385	
518262	SLD		HYDRAULIK-STEU... 21386	
518307	SLD		FAHRELEKTRONIK... 21387	
518308	SLD		SCHLÜTZ (Bremsc... 21388	
518317	SLD		GLEIT-ELEMENT D4... 21389	

Edit stocked item

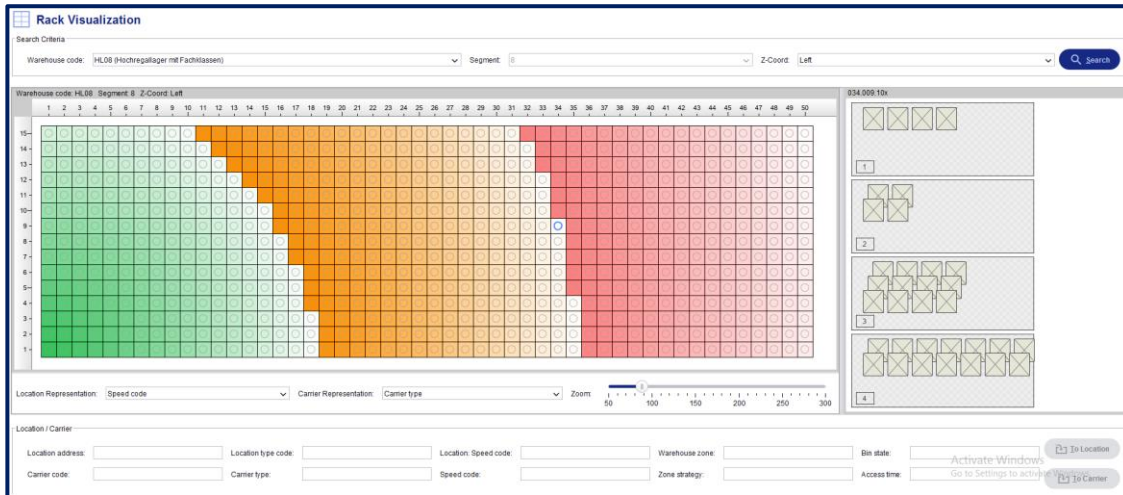
Stocked item code: 51379 Category: STORAGE (Storage)
 Lot code: * Blocking code: USABLE (Available)
 Article code: 518789 Inventory blockingcode: USABLE (Available)
 Article description: KLEBER STOECKLIN - EHS
 Owner code: SLD Arrival time: *
 Expiration date: * Inventory time: *
 Quantity: 1 Last moved date: *
 Incoming quantity: 0 Variant code: *
 Reserved quantity: 0 Quantity unit: STK

Warehouse number	Location address	Selected	
101	HL01	02.935.14.101	<input type="checkbox"/>
201	HL01	02.935.14.201	<input type="checkbox"/>
201	HL01	02.935.14.201	<input type="checkbox"/>
101	HL01	02.936.14.101	<input type="checkbox"/>
201	HL01	02.936.14.201	<input type="checkbox"/>
101	HL01	02.937.14.101	<input type="checkbox"/>
201	HL01	02.937.14.201	<input type="checkbox"/>
101	HL01	02.938.14.101	<input type="checkbox"/>
201	HL01	02.938.14.201	<input type="checkbox"/>
101	HL01	02.939.14.101	<input type="checkbox"/>
201	HL01	02.939.14.201	<input type="checkbox"/>
101	HL01	02.939.14.101	<input type="checkbox"/>
201	HL01	02.939.14.201	<input type="checkbox"/>

9.4 Warehouse visualization

The warehouse visualization provides a quick overview of the occupancy of individual shelves in the warehouse. Each individual storage location is displayed visually and can be queried with a mouse click. The query result contains information such as the storage location type, carrier type, the ABC zone and the access time. If there is a carrier in the storage location, you can switch to it to display the corresponding data in detail. Among other things, you can immediately see which article quantities are in the carrier, provided that article data are managed in logOS MFS.

The fill level as well as the zone and occupancy characteristics of the shelf row in question can be viewed at a glance.



9.5 Storage locations with incorrect occupancy

Here, all storage locations are displayed which have been marked by an incorrect allocation and thus blocked. These storage locations must then be checked in a timely manner and, if necessary, corrected.

9.6 Journal information

Important information is collected and archived in the journal. Different journal views can be displayed.

Action type	Action time	Reason	Carrier code	Warehouse code	Location address	From warehouse	From location	Target warehouse	Target location	position	Last moved	Profile error	Total weight	height	Measured height	Measured length	Measured width	Measured weight	Speed code	Carrier type code	Carrier role code	Layout code	Numb. reboca	
Updated	Nov 19, 20	JOURNAL	C1100102	PF01	PP12	PF01	SC11				-1 Nov 19, 0	0	1000	0	0	0	0	0	0	E1H1		E1H1-2/2		
Updated	Nov 19, 20	JOURNAL	C1100102	PF01	PF01	PF01	SC11				-1 Nov 19, 20, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-2/2	
Updated	Nov 19, 20	JOURNAL	C1100102	PF01	HL11	HL11	11.001.02	PF01	PP12		-1 Nov 19, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-2/2	
Updated	Nov 19, 20	JOURNAL	C1100102	PF01	SC11	SC11	11.001.0	PF01	PP12		-1 Nov 19, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-2/2	
Updated	Nov 19, 20	JOURNAL	C1100102	HL11	11.001.02	PF01	PP12				-1 Nov 19, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-2/2	
Updated	Oct 23, 20	JOURNAL	C0201902	HL01	02.041.03	PF01	AS02				-1 Oct 23, 2, 0	0	1000	0	1000	-1	-1	1234	A	E1H1		E1H1-2/2		
Updated	Oct 23, 20	JOURNAL	C0201902	HL01	02.041.0	PF01	AS02				-1 Oct 23, 20, 0	0	1000	0	1000	-1	-1	1234	A	E1H1		E1H1-2/2		
Updated	Oct 23, 20	JOURNAL	C0201902	PF01	AS02	PF01	PC05	HL01	02.041.03		-1 Oct 23, 20, 0	0	1000	0	1000	-1	-1	1234	A	E1H1		E1H1-2/2		
Updated	Oct 23, 20	JOURNAL	C0201304	PF01	FL01	PF01	SC02	PF01	PP01		-1 Oct 23, 2, 0	0	1000	0	0	0	0	0	0	E2H1		E2H1-2/1		
Updated	Oct 23, 20	JOURNAL	C0201902	PF01	AS02	PF01	PC05	HL01	02.041.0		-1 Oct 23, 20, 0	0	1000	0	1000	-1	-1	1234	A	E1H1		E1H1-2/2		
Updated	Oct 23, 20	JOURNAL	C0201902	PF01	AS02	PF01	PC05				-1 Oct 23, 2, 0	0	1000	0	1000	-1	-1	1234	A	E1H1		E1H1-2/2		
Updated	Oct 23, 20	JOURNAL	C0201902	PF01	AS02	PF01	PC05				-1 Oct 23, 2, 0	0	1000	0	1000	-1	-1	1234	A	E1H1		E1H1-2/2		
Updated	Oct 23, 20	JOURNAL	C0201304	PF01	FL01	PF01	SC02	PF01	PP01		-1 Oct 23, 2, 0	0	1000	0	0	0	0	0	0	E2H1		E2H1-2/1		
Updated	Oct 23, 20	JOURNAL	C0201902	PF01	PC05	PF01	PC05	PF01	AS02		-1 Oct 23, 20, 0	0	1000	0	1000	-1	-1	1234	A	E1H1		E1H1-2/2		
Updated	Oct 23, 20	JOURNAL	C0201902	PF01	PC05	PF01	PC05	PF01	AS03		-1 Oct 23, 20, 0	0	1000	0	1000	-1	-1	1234	A	E1H1		E1H1-2/2		
Updated	Oct 23, 20	JOURNAL	C0201902	PF01	PC05	PF01	PC05	PF01	AS03		-1 Oct 23, 2, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-2/2	
Updated	Oct 23, 20	JOURNAL	C0201902	PF01	PC05	PF01	PC05	PF01	AS03		-1 Oct 23, 2, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-2/2	
Updated	Oct 23, 20	JOURNAL	C0201902	PF01	PC05	PF01	PC05	PF01	AS03		-1 Oct 23, 2, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-2/2	
Updated	Oct 23, 20	JOURNAL	C0303202	PF01	PP01	PF01	PL01				-1 Oct 23, 2, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-4/4	
Updated	Oct 23, 20	JOURNAL	C0303202	PF01	PP01	PF01	PL01				-1 Oct 21, 20, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-4/4	
Updated	Oct 23, 20	JOURNAL	C0303202	PF01	PL01	PF01	SC03	PF01	PP01		-1 Oct 21, 20, 0	0	1000	0	0	0	0	0	0	0	E1H1		E1H1-4/4	

9.7 Audit trail (option)

An audit trail records all GMP-relevant changes and deletions. All changes must be provided with a reason for change. Normally, such changes are made by authorized users, who in these cases receive a screen display where they can enter the reason for the change. In addition, it is ensured, among other things, that the audit trail data cannot be changed or deleted subsequently.

Data acquisition

What constitutes GMP-relevant changes in the respective customer environment may vary from customer to customer. If necessary, the customer requirements must be expanded.

In the audit trail of logOS the following changes (create, change, delete) are logged by default:

- basic WMS parameters
- User configuration changes
- Item master data changes

For these changes, the corresponding authorized user must enter a reason for change in an input field. The audit trail logs this change including user information and reason for change.

Journaling /Archiving

Normally, data is not kept longer than one year in the logOS journal database. A recurring automatic job in logOS thus archives the audit trail journal data into an export format (csv) so that it can be archived by the customer into a secure system.

9.8 Quick Query Reports

With Quick Query, queries can be defined to any extent and stored in the system under a name. A query can contain any valid SQL statement that refers to the tables and table fields of logOS MFS.

The queries can be provided with query parameters, which limit the query result like filters. The list with the query result produced in this way can be sorted by columns and optionally exported to a file. The exported data can be further processed with MS-Excel.

The screenshot shows the 'QuickQuery' application window. At the top, there is a search bar with the text 'LocationPreference by CarrierType'. Below this is a table with 73 results. The table has columns: CarrierType, CarrierType Description, Priority, LocationType, and Carrier max Height. A 'Save' dialog box is open over the table, showing the 'Documents' folder as the save location. The dialog includes fields for 'File Name' and 'Files of Type' (set to 'CSV').

CarrierType	CarrierType Description	Priority	LocationType	Carrier max Height
BOI-400x300	Bottp 400x300		1 RF02	0
BOI-400x300	Bottp 400x300		2 RF01	0
BOI-400x300	Bottp 400x300		3 BF00	0
BOI-600x400	Bottp 600x400		1 RF02	0
BOI-600x400	Bottp 600x400		2 RF01	0
BOI-600x400	Bottp 600x400		3 BF00	0
BOI-800x600	Bottp 800x600		1 RF01	0
BOI-800x600	Bottp 800x600		2 BF00	0
BOI-800x600	Bottp 800x600		3 OF00	0
E1H0	EURO1 GEMESSEN		Fachtp Kanalager Höhe 2	1001
E1H0	EURO1 GEMESSEN		Fachtp Hochregallager EURO1 Höhe 3	1501
E1H0	EURO1 GEMESSEN		Fachtp Hochregallager EURO1 Höhe 1	1000
E1H0	EURO1 GEMESSEN		Fachtp Kanalager Höhe 3	1501
E1H0	EURO1 GEMESSEN		Fachtp Kanalager Höhe 1	1000
E1H0	EURO1 GEMESSEN		Fachtp Hochregallager EURO1 Höhe 2	1001
E1H0	EURO1 GEMESSEN		Fachtp Hochregallager EURO1 Höhe 2	0
E1H0	EURO1 GEMESSEN		Fachtp Kanalager Höhe 2	1000
E1H0	EURO1 GEMESSEN		Fachtp Kanalager Höhe 3	1001
E1H0	EURO1 GEMESSEN		Fachtp Hochregallager EURO1 Höhe 3	1001
E1H0	EURO1 GEMESSEN		Fachtp Kanalager Höhe 3	0
E1H0	EURO1 GEMESSEN		Fachtp Hochregallager EURO1 Höhe 3	1000

9.9 Reporting

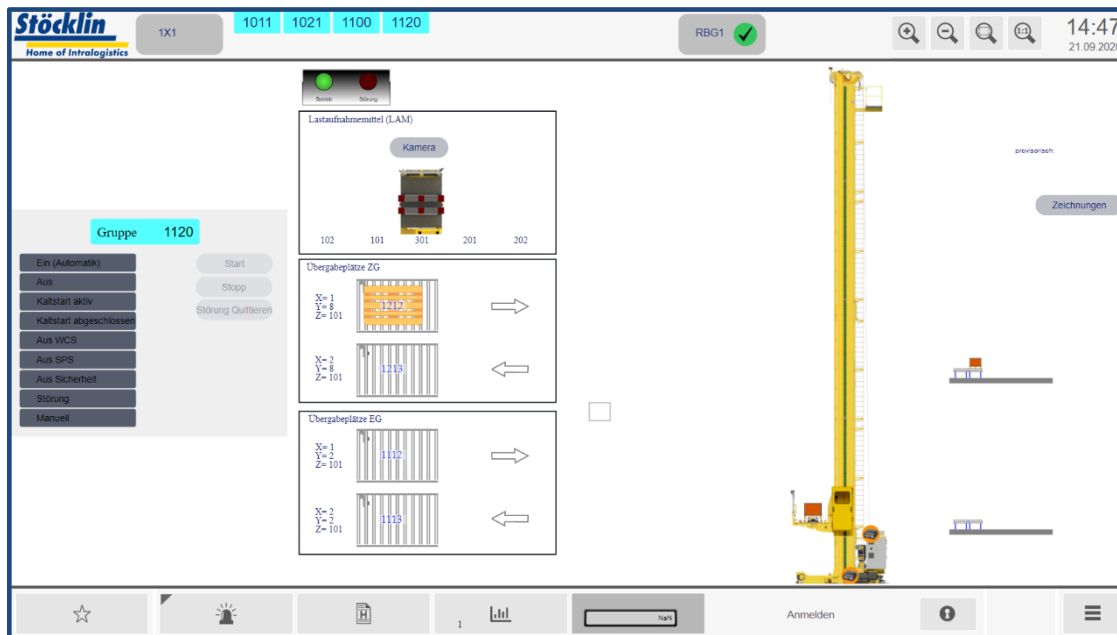
A reporting system is available as a component of logOS. Any reports can be created with it, for example about the lane utilization. They can be filtered according to various criteria, displayed on the system, printed out, saved under a name and reused later. To filter the results of a report, parameters are available as in the query system.

The screenshot shows the 'Generate reports' application window. The main area displays a report titled 'Locations' with a table of location properties. The table has columns: ADDRESS, HOSTADDRESS, MADDRESS, and SPEEDCODE. A 'Print' dialog box is open over the report, showing the printer 'Microsoft Print to PDF' and options for page range and number of copies.

ADDRESS	HOSTADDRESS	MADDRESS	SPEEDCODE
01.009.04.201	0100904201	0041.AW01.0001.0001.0009.0004.0002.0001.0000.0000	A
01.009.05.101	0100905101	0041.AW01.0001.0001.0009.0005.0001.0001.0000.0000	A
01.009.05.201	0100905201	0041.AW01.0001.0001.0009.0005.0002.0001.0000.0000	A
01.010.01.101	0101001101	0041.AW01.0001.0001.0010.0001.0001.0001.0000.0000	A
01.010.01.201	0101001201	0041.AW01.0001.0001.0010.0001.0002.0001.0000.0000	A
01.010.02.101	0101002101	0041.AW01.0001.0001.0010.0002.0001.0001.0000.0000	A

9.10 Material flow visualization

The visualization contains the dynamic representation of occupancy and states of the individual subsystems.



The position data of the packs on the conveyors and storage devices are cyclically recorded by the system at short intervals and converted into a dynamic motion-animated display.

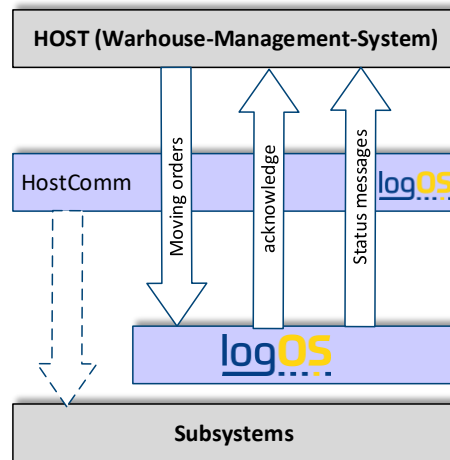
Operators of extensive and thus difficult-to-understand material flow systems in particular benefit noticeably from the high information content of the control station equipped with visualization.

The status animation of the carriers and stations on the plant is done by color change. The color display enables very fast identification of any disturbed plant components, which are colored red on the screen. This enables employees at the control station to make appropriate decisions quickly in problematic situations in order to restore trouble-free continued operation without delay.

Optionally, the actuators and sensors can be animated. This means that the visualization shows the current occupancy states of the sensors as well as the controlled motors and other actuators.

11 System integration and host communication

The HostComm is the configurable interface module for communication between the logOS MFS and any higher-level warehouse management system.



The transmission of storage and retrieval orders from the higher-level warehouse management system to logOS is based on the carrier ID or on article quantities to be stored or retrieved. The warehouse management system is the leading system for the article master and the stock levels in the carriers. Confirmation of executed orders is sent back to the warehouse management system.

11.1 Possible forms of communication

Host communication (HostComm) offers the following interface types by default:

11.1.1 SAP Link

- Exchange of host data via tRFC IDOC link or web services
- Exchange data: Storage and retrieval orders based on the carrier ID, reconfirmation of completed orders.

11.1.2 DB-DB Link

- Exchange of host data via direct database link
- Host database Oracle / SQL Server / ODBC
- Exchange data: Storage and retrieval orders based on carrier ID, reconfirmation of completed orders, warehouse info, order statuses, confirmations.

11.1.3 File transfer

- Exchange of host data via files
- Files in fix / csv / xml format
- Exchange data: Storage and retrieval orders based on carrier ID, reconfirmation of completed orders, warehouse info, order statuses, confirmations.

11.1.4 TCPIP

- Exchange of host data and subsystem communication via telegrams
- Exchange data: Storage and retrieval orders based on carrier ID, reconfirmation of completed orders, warehouse info, order statuses, confirmations.

11.1.5 Web services

- Exchange of host data via web services
- Format with xml / html / json
- Exchange data: Storage and retrieval orders based on carrier ID, reconfirmation of completed orders, warehouse info, order statuses, confirmations.

11.2 Connection of subsystems

The HostComm is also responsible for the communication to the subsystems. This is operated almost exclusively via TCP/IP telegrams.

Standardized interfaces are available for Stöcklin's storage technologies.

Stöcklin external systems can also be integrated, the interfaces to these must be worked out individually.

12 IT environment

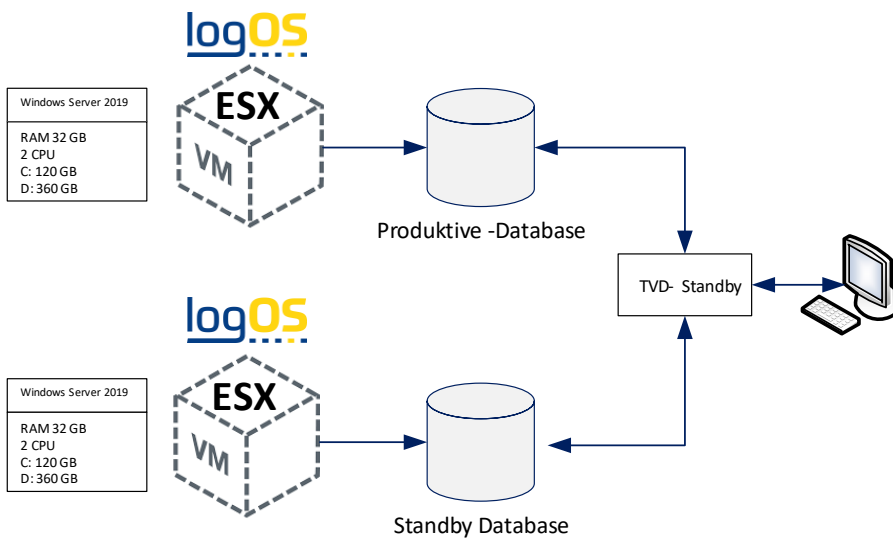
The logOS MFS (server and control station) is integrated into a customer-supplied data network. This is to guarantee the connection to a higher-level warehouse management system.

The subsystems are also connected via a data network. Since this network requires high performance and stability, it may make sense to set up a separate technical network for it.

12.1 System installation in virtual environment

The logOS MFS can be installed and operated in a virtual environment. Please note that Stöcklin requires a minimum configuration of the partition. Basically, Stöcklin also recommends a productive standby environment in the virtual environment.

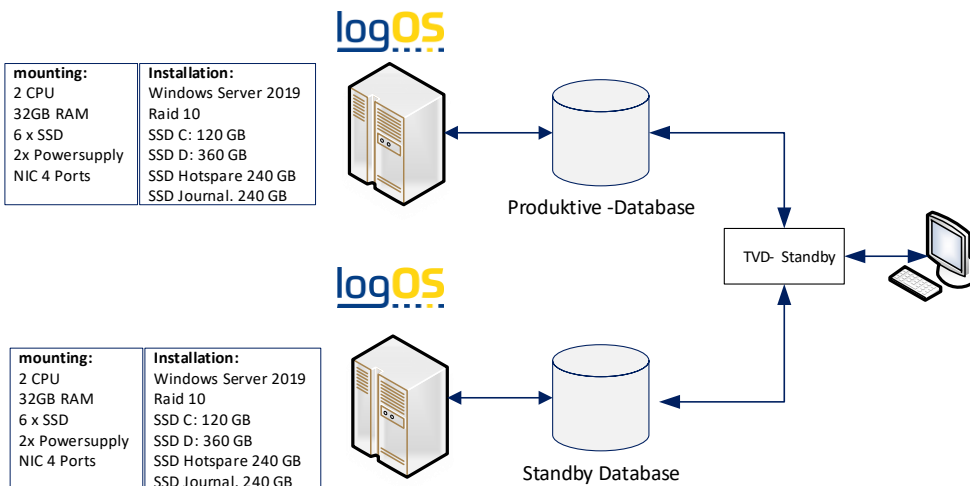
Standard solution from Stöcklin:



12.2 System installation on physical server

The logOS MFS can be installed and operated on physical servers. It should be noted that Stöcklin requires a minimum configuration of the servers. Basically, Stöcklin recommends a productive standby environment.

Standard solution from Stöcklin:



12.3 Standby solution

In a highly available warehouse, the system's reliability is of great importance. Stöcklin therefore offers a standardized standby server environment.

On two identically set up servers under the Windows operating system, a database is operated productively on one server (productive). On the other server (standby), the database runs as a standby database in recovery mode.

The standby tool ensures that with a short delay the standby database is continuously updated with the changed data of the productive system. It can be activated if necessary and takes over the productive function. The original productive computer can be made the new standby computer at a later time and is then ready again, after activation, to take over the function as productive computer.

12.4 Backup solution

Stöcklin offers a backup solution with a professional tool.

Backups are created on demand thanks to intelligent control, based on defined policies in the central repository. Based on the policies and the current situation on the database server, the scheduler decides which actions are to be executed decentrally by the agent. When restoring a database, the interactive tool provides support through simple handling.

12.5 Workstations / client computers

Ideally, computers of the latest generation should be used for the workstations. No special requirements are placed on the client computers.

A Windows operating system is required as a basic prerequisite.

Data is stored exclusively on the server.

13 Licensing

The logOS MFS is subject to a one-time license for unlimited use.

The following modules determine these license costs:

- Installation main license
- Additional functions subject to license
- Standby Server
- Test server
- User license

The license costs are calculated in the course of a project quotation.