

w3/max

System Description

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Warehouse Management without tradeoffs

w³logistics

enabling technologies for logistics

Contents

1. Master data.....	3
1.1 Warehouses and warehouse topology.....	3
1.2 Storage areas.....	3
1.3 Storage locations.....	4
1.4 Inventory.....	4
1.5 Article master data.....	4
1.6 Lots and batches.....	5
1.7 Packaging of items.....	5
1.8 Company master data.....	5
1.9 Means of transportation.....	5
2. Warehouse documents.....	6
2.1 Supplier Orders.....	6
2.2 Customer Orders.....	6
2.3 Reservations.....	6
2.4 Returns.....	6
3. Receiving.....	7
3.1 Receiving from outside.....	7
3.2 Receiving from production.....	7
3.3 Storing.....	7
4. Shipments/Shipping.....	8
4.1 Automatic shipment.....	8
4.2 Manual shipment.....	8
4.3 Picking.....	8
5. Warehouse operations: Transport orders, stock transfers, and stocktaking.....	8
5.1 Transport orders.....	8
5.2 Stock transfers.....	8
5.3 Stocktaking.....	8
6. Other system functions.....	9
6.1 Reports and statistics.....	9
6.2 Locking.....	9
6.3 Quality management.....	9
6.4 Radio Terminals.....	9
6.5 System administration.....	9
6.6 System requirements and features.....	9

1. Master data

1.1 Warehouses and warehouse topology

- ❑ Any number of warehouses is manageable; In principle, the number depends only on the limitations imposed by the employed data-base (Oracle8, Oracle 8i, Oracle 9)
- ❑ Hierarchical warehouse topology with these structures:
 - Warehouse
A warehouse consists of an arbitrary number of storage areas
 - Storage area
Classification of storage areas into storage area classes, every storage area is assigned to a class
 - Storage locations
Classification of storage locations into storage classes, every storage location is assigned to a class
- ❑ Management of inventory in structures as follows:
 - Load unit
Classified into load unit types; load unit types are arbitrary definable
 - Content
A load unit can have arbitrary contents
- ❑ Graphical representation of the warehouse topology in a warehouse explorer
- ❑ Overview of the warehouse content, including storage places, load units and their contents; Optional output to a printer
- ❑ Printing of pallet labels, where parts of data can be barcoded (usability of barcodes depends on installed printers)
- ❑ For all managed objects, dedicated locking mechanisms exist.
- ❑ Search mechanisms per object type (warehouse, storage area, load unit, content) with a system of filters exist, which allow to narrow the search area for example to a single area or a single group of goods; usage of wild card characters is possible.

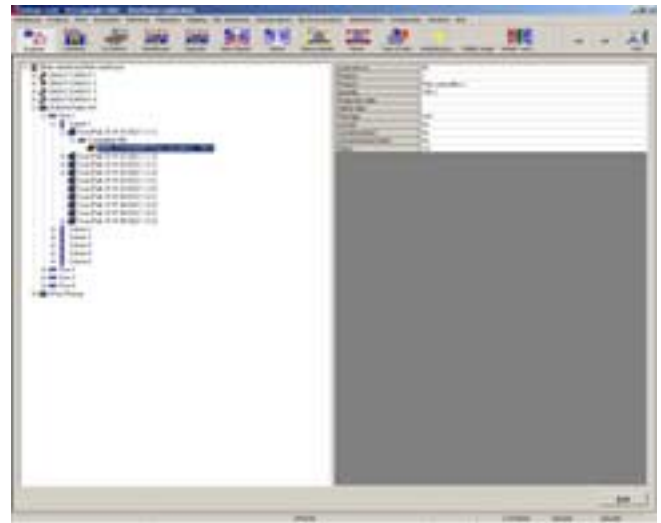


Figure 1: Warehouse Explorer

1.2 Storage areas

- ❑ The number of storage areas per warehouse is arbitrary
- ❑ Differentiation of storage areas into storage area classes
- ❑ The use of storage area classes (e. g. storing, picking, block storage, receiving / shipment of goods) allows a highly flexible mapping of a real warehouse; with these attributes, storage areas for receiving, shipping or other purposes are arbitrarily definable
- ❑ Possibility to lock an area (e. g. for stock taking)
- ❑ Storage zones are defined as parts of a storage area, and allow to define a flexible storage strategy

1.3 Storage locations

- The number of storage locations per storage area is arbitrary
- Storage location numbers are freely definable
- Free structure of storage locations
- Identification of storage locations via the unique storage location number or its unique co-ordinates (row, column, level, place)
- Differentiation of storage locations into storage location classes
- Management of arbitrary, freely definable store area classes
- Storage area classes embrace storage locations of an area with same attributes
- Attributes of storage area classes:
 - Geometrical dimensions (length, width, height)
 - Minimal and maximal load
- Partial picking; Allows quick handling of partial orders at the storage location
- Automatic generation of storage locations for storage areas consisting of simple modules (e.g. shelves) based upon the number of shelves, rows, levels and places within a level
- Possibility to lock a storage location
- Label printout for storage locations (possibly with barcode)

Figure 2: Warehouse contents as list

1.4 Inventory

- Overview of the current inventory as a list
- Printout of inventory in different formats
- Wide possibilities of searching and filtering, use of wild card characters possible
- Many possibilities of inventory check in the graphical warehouse explorer

1.5 Article master data

- Every article is identified internally by a unique code (25 characters); change of article numbers is possible
- Management of external codes per article (every article is identified by a pair of attributes: company and external article code)
- Freely configurable model of identification of articles
- Any number of additional codes can be handled (for every customer, his respective codes can be used)
- Management of articles by EAN-codes
- Code SWW (System of goods identification)
- Basic inventory unit (in which the item in inventory will be kept track of)
- Rounding mechanism for stock levels
- Minimal and maximal stock levels, minimal order size
- Differentiation of articles into article classes and article groups (both freely definable)
- Storage group – together with the storage zones and the priority determines the order of filling the storage locations with a given storage group
- Investigation time – maximal time of locking the items for quality control
- Assignment of items, classes/types or groups to storage locations
- Information about the stock levels of given items
- Possibility to lock items
- Trigger level for replenishment
- Minimal and maximal level of storage
- Maximal time of storage (in percent of the expiration time)

1.6 Lots and batches

- Management of expiration date and durability, different options:
 - Manufacturing date given on receiving, expiration date calculated
 - Arrival date given on receiving, expiration date calculated
 - Expiration date read from packaging and entered
- Any number of batches possible
- Every batch can have its own expiration date
- Batches are defined in the master data and are selected on receiving or are entered on receiving
- Unique serial numbers possible
- Possibility to lock batches

1.7 Packaging of items

- The packaging structure of an article is built strictly hierarchical
- An arbitrary number of packaging levels within a packaging structure is possible
- Attributes of a packaging level:
 - Number of basic units
 - Number of lower level units
 - Geometrical dimensions: Length, width, height

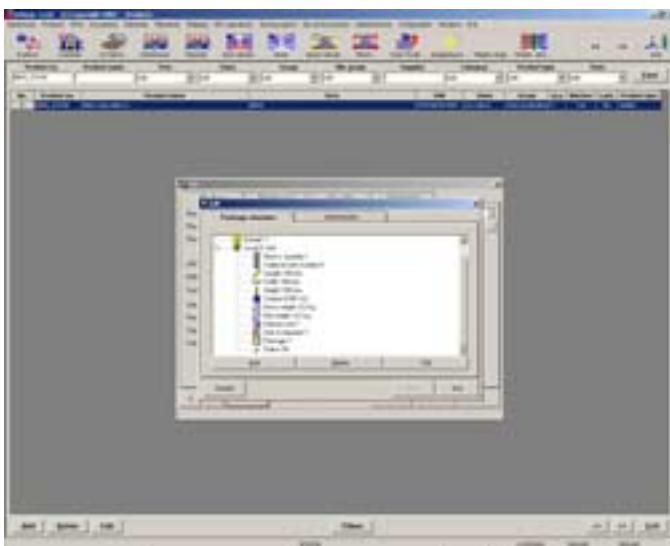


Figure 3: Packaging structure of an article

- Volume
- Gross and net weight
- Storage unit
- Receiving unit
- Shipping unit
- Automatic recalculation of a given level of package into basic units
- Definition of packaging structure is article independent: Possibility of copying the structure of packaging between items
- Status of the packaging structure

1.8 Company master data

- Company master data can be maintained manually or imported from an ERP host
- Differentiation into suppliers, customers and carriers/haulage companies
- Assignment of a company to a company group and a company type
- Assignment of items to business partners
- Assignment of ordered article groups for customers
- Addresses: Delivery address, billing address
- Data of contact person and substitute
- Special texts on delivery notes
- Definition of the load unit restrictions for a given business partner: maximal weight or dimension of a pallet, minimal percentage of durability time left, or the possibility to place different items on a single pallet
- Possibility of locking

1.9 Means of transportation

- Definition of vehicle types: Length, width, height, payload
- Assignment of every vehicle to a vehicle class
- Registry numbers
- Maximal number of load units
- Driver name
- Phone number of driver
- Number of seals
- Height of vehicle tailboard

2. Warehouse documents

2.1 Supplier Orders

- Supplier orders can be entered manually or imported from an ERP host
- Orders can also be used as notification of dispatch
- Attributes of an order:
 - Order number
 - Suppliers order number
 - Delivery address
 - Additional information
 - Activation and deactivation
 - Follow-up of orders
- Activation of an order
- Print out of the order
- Attributes of an order line:
 - Article
 - Amount/quantity
 - Minimal amount to be delivered
 - Requested time of delivery
 - Way of delivery (partial delivery allowed?)
 - Way of closing (manually, automatically)
 - Delivery address for an item (if different from main delivery address)
- Possibility of locking

2.2 Customer Orders

- Customer orders can be entered manually or imported from an ERP host
- Attributes of a customer order:
 - Free own order numbering
 - Customers order number
 - Priority (normal, express)
 - Requested date of delivery
 - Type of order
 - Way of delivery (partial delivery allowed?)
 - Way of closing (manually, automatically)
 - Delivery address
 - Additional information
 - Activation and deactivation
- Possibility of locking

- Attributes of an order line:
 - Article
 - Amount/quantity
 - Limited amount(if order line cannot be shipped completely)
 - Minimal amount to be shipped
 - Requested time of delivering and closing
 - Way of delivery
 - Way of closing (manually, automatically)
 - Delivery address for an item (if different from main delivery address)
- Possibility of locking
- Print out of the order

2.3 Reservations

- Every load unit can be reserved for a customer
- Reservation contains the identification number and a description
- Reserved pallets are delivered with highest priority on shipment for the respective customer

2.4 Returns

- Possibility to accept returns of delivered goods
- Attributes of a return:
 - Return number
 - Additional information
 - Reason for return
 - Reference to delivery note
 - Return date
- Attributes of a return position:
 - Article
 - Quantity
 - Batch/lot
- Receipt for returns

3. Receiving

3.1 Receiving from outside

- Automatic numbering of goods received
- Registration of carrier
- Vehicle data is registered
- Buffer area is assigned
- Receiving of goods with known supplier order or without reference
- Generation of load units for big single material consignments
- Automatic numbering of new load units
- Registration of lots/batches and expiration dates
- Different schemes of delivering (whole order or items)
 - One order, many deliveries
 - One order, one delivery
 - Many orders, one delivery
- Warning on exceeding of order volume
- Warning on exceeding of delivery date
- Automatic cancellation of exceeding quantity (if desired)
- Print out of the delivery receipt
- Print out of load unit labels
- Print out of load unit contents

3.2 Receiving from production

- Manufacturing line and machine data
- Extremely optimised handling – only two fields to be entered to complete receiving
- Automatic print out of load unit labels
- Automatic assignment of storage locations

3.3 Storing

- Computer assisted assignment of storage locations for all storable pallets
- Possibility of manual receiving to a user selected storage location
- Factors for the storing strategy:
 - Load unit weight
 - Geometrical dimensions of the load unit
 - Physical parameters of storage locations (as defined in the storage location class)
 - Assignment of articles to warehouses
 - Assignment of articles to storage groups and thus to storage zones
 - Priority of storage zones
 - Minimal and maximal storage level for an article as defined by the article master data
- Flexibility through customisability of storage strategies to meet arbitrary customer specific search algorithms
- Automatic generation of transport orders for the operators of the fork trucks
- Generation of transport orders – connection to mobile radio or handheld terminals
- Locking of load unit until positive transport order acknowledgement

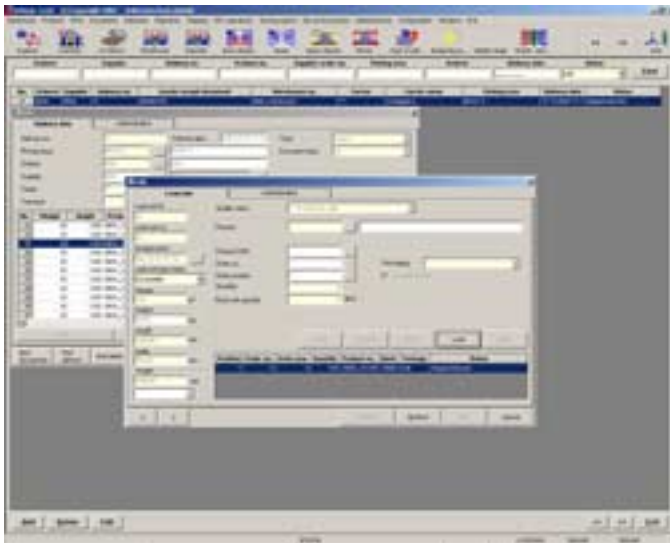


Figure 4: Receiving from outside

4. Shipments/Shipping

4.1 Automatic shipment

- Shipment data are generated automatically on activation of a customer order
- Carrier, vehicle and buffer area data are registered
- Automatic generation of transport orders and picking lists

4.2 Manual shipment

- Carrier, vehicle and buffer area data are registered
- Order lines to be carried out are selected manually from a list
- Selection of load units can be carried out either manually or automatically

4.3 Picking

- Logistics of stock picking:
 - Support for different retrieval methods (FIFO, LIFO, expiration date, date of delivery)
 - Generation of load units
- Print out of picking list or transmission of picking data to mobile radio terminals
- Label printing for single load units
- Picked load units can be confirmed manually or (with radio terminals) automatically
- For every picked load unit the complete information about worker and operation time is available
- Tracing of shipment status from activation
- Automatic replenishment for picking places configurable through article main data

5. Warehouse operations: Transport orders, stock transfers, and stocktaking

5.1 Transport orders

- Different transport order types: supply, picking, replenishment, shipping
- Printout of transport orders per worker
- Transmission of transport orders to hand-held or radio terminals
- Manual confirmation of transport orders aided by use of check numbers
- Automatic confirmation of transport orders in case of radio terminals

5.2 Stock transfers

- Company internal stock transfers from one warehouse to another warehouses
- Stock transfers within a warehouse
- Stock transfer of whole load units

- Re-packaging or stock transfer of parts of a pallet
- Tracing of the stock transfer status
- Automatically generated stock transfers for warehouse optimisation purposes

5.3 Stocktaking

- Stocktaking for a whole warehouse, a storage area, part of a storage area, or a storage location
- Stocktaking for an article
- Stocktaking based on the date of the last stocktaking
- Automatic locking of stocktaking inventory
- Print out of stocktaking lists and the list of differences (after end of stocktaking)

6. Other system functions

6.1 Reports and statistics

- List of articles
- List of customers and suppliers
- List of storage locations
- List of users
- Overview of the supplier orders
- Journal of deliveries
- Overview of the customer orders
- Journal of shipments
- Picking lists
- Inventory in many different formats
- Occupancy of locations
- Stocktaking lists
- Articles per supplier or customer order
- Other reports can be prepared individually during the initial operation

6.2 Locking

- Objects that can be locked:
 - Warehouse
 - Storage area
 - Storage location
 - Load unit
 - Content
 - Article
 - Batch/Lot
 - Delivery
 - Company
 - Supplier orders
 - Customer orders
 - Order line
- Locking-/Unlocking reasons (freely defined)
- History of locking – unlocking

6.3 Quality management

- Arbitrary number of quality status values can be defined (3 predefined values)
- Change of quality status per load unit or batch possible

6.4 Radio Terminals

- These operations can be carried out on radio terminals:
 - Transport order acknowledgement: Check of receiving, stock transfer and shipping
 - Stocktaking and zero sock check
 - Picking of load units

6.5 System administration

- Users and user groups
- Access permissions for user groups definable up to every menu item
- Customising of system parameters possible (only for advanced users)
- System classes (classes, types of classes)
- Standard interface to external systems (text file transfer)

6.6 System requirements and features

- Different operating system for the data base server possible (Unix, Windows NT)
- Database: Oracle 8, Oracle 9
- Client Workstations Windows NT/2000, min. 64 MB RAM
- Visual Basic user interface
- Crystal Reports as report tool
- Background processes on a Unix terminal server for connection to radio terminals

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