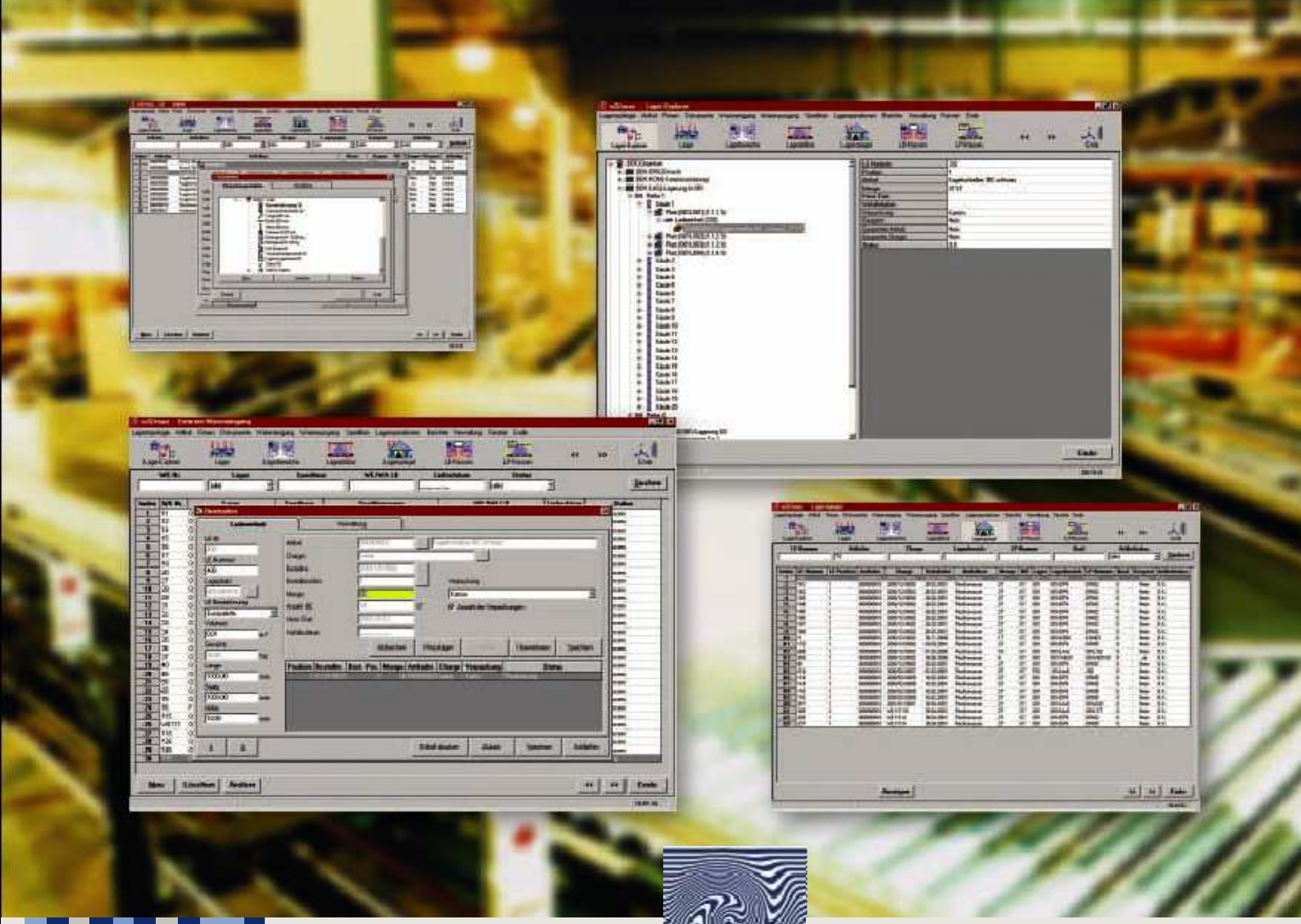


w3/max

System Specification
w3/max

Warehouse Management without tradeoffs

w³logistics
enabling technologies for logistics

Contents

Abstract

The functionality of many modern information systems is focused on supporting the management processes, yet it cannot always be said that they focus on precise monitoring of logistic processes occurring in the company. The necessity of additional monitoring of elementary processes is dictated by the pressure of competitiveness and requires the use of precise instruments. Support of the work in the area of warehousing logistics and transport is a domain of the most modern systems that appeared on the market only recently. Contrary to other tools, they are capable of meeting the requirements posed by modern targets set by logistics.

Booming tele-information media and techniques, such as the Internet, Intranet, mobile phones, remote data transfer via radio, notebooks, as well as new techniques for software generation, require a new view of the distribution. Modern logistic systems use modern tele-information techniques to an increasingly greater extent. More and more often companies need an insight in the warehouse stocks, or supervision over the progress of work carried out in warehouses, using the Internet. Meeting such requirements was the main objective of the creators of the w3/max.

Presently, w3/max ensures full service of distribution processes, from delivery management, high storage warehouse work, order generation to optimization of forwarding. This is further furnished with tools for remote warehouse management using the Internet, and also allows for using advanced instruments for automatic identification of goods, or wireless information exchange via radio. The system structure is aimed at reflecting the existing functional division of the logistic processes occurring in the majority of companies. Particular system modules may operate separately, or form one uniform system supporting the distribution logistics.

1. w3/max

The w3/max WMS is a specialized, modern and efficient instrument for management and monitoring of movements of each position of goods, considering all its features.

Goods management is based on the specific structure of storing and human resources.

In order to achieve such purpose, w3/max gathers detailed information about the hierarchic storing structure, as well as data on the subject of storing and management, that is about the goods.

Such data collected allow for system performed optimization of processes in the logistic chain.

This means the exclusion of redundant actions in warehouse management and distribution, and decrease in the number of such activities.

Thus the result of systemic management is the more effective and faster performance of logistic processes, as well as elimination of errors.

1.1 Warehousing structure

The flexible warehousing structure of w3/max creates opportunities for full management of the chain of logistic processes in one (central) warehouse, as well as in the distribution network with external (distribution) warehouses.

The foundation of the storage structure in the system is formed by the hierarchic relation of its elements:

- *warehouse* as the highest element in the hierarchy,
- *area* in the warehouse,
- *place* in the storage area with the defined coordinates

Unique numbers (IDs) unambiguously define the above elements. Such legible, transparent presentation of the storage structure allows for efficient and effective work in the warehouse.

1.1.1 Warehouse

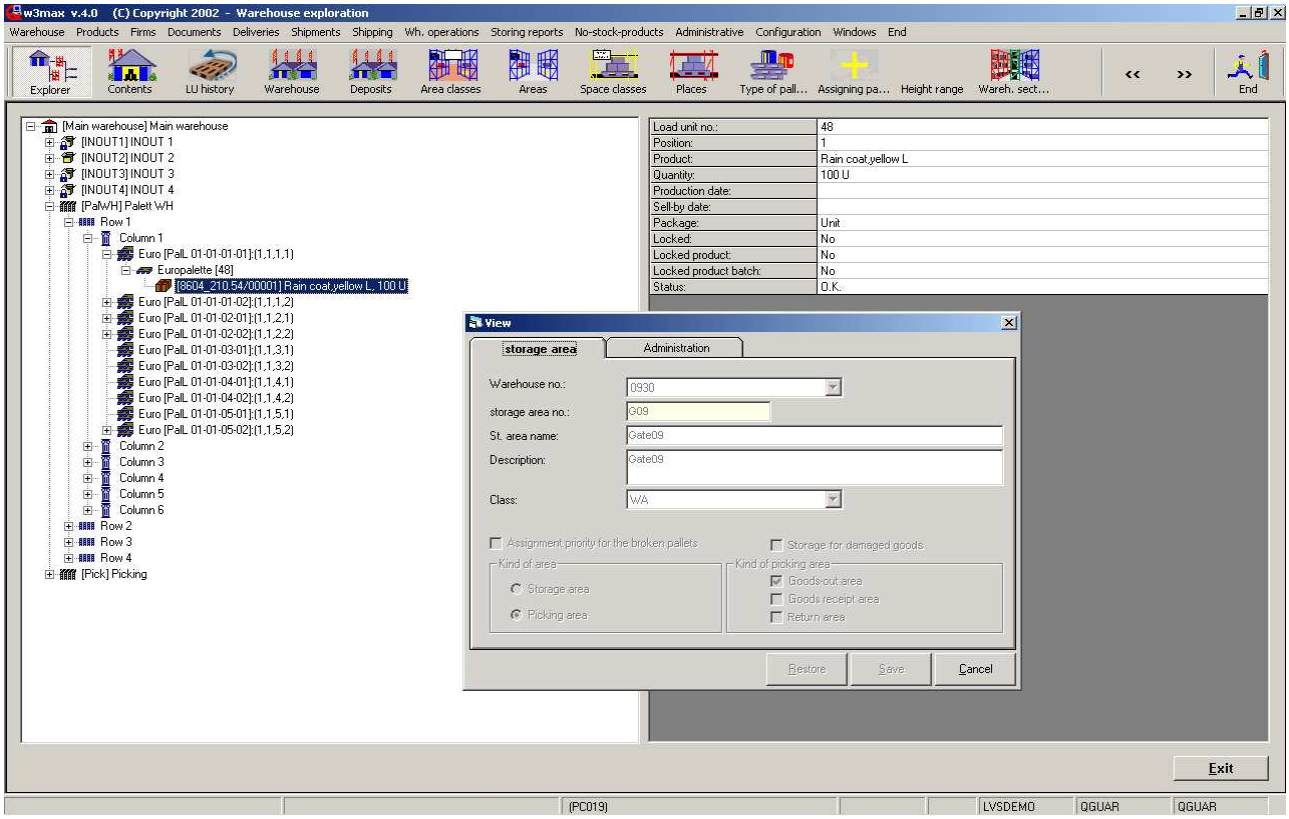
The warehouse is the highest element in the structure of storing and distribution. w3/max allows for warehouse classification due to the function performed in the structure. There are following classes of warehouses:

Main warehouse – a warehouse of this class is the place taking over the principle weight of logistic operations related to distribution of goods. Logistic operations may be divided into three groups:

- to the warehouse
  an example of operations of this type may be: external goods-in (external deliveries, also returns), goods-in from production
- within the warehouse
  an example of operations of this type may be: transport orders within the warehouse for transport of a load unit from goods-in gate to the storing area (delivery), from storing area to goods-out gate (shipment), from storing area to picking area, from one storing area to another (shifts of load units within the warehouse), as well as stocktaking, change of status of any load unit, unpacking, etc.
- from the warehouse
  an example of operations of this type may be: goods-out (shipment, inter-warehouse movements)

Internal warehouse - a warehouse of this class functionally is not different from the main warehouse, the class simply stresses its subjectivity in the structure of storing and distribution.

Production warehouse - a warehouse of this class is the place where load units with product manufactured are registered. Moreover, it is possible to provide the production with raw materials and packaging necessary for particular sections in the production process. All logistic operations characteristic of the main or external warehouse may also apply to this warehouse class.



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1.1.2 Warehouse areas

Warehouse areas are also classified according to the function they have in the warehouse – hierarchically they are on lower levels than the warehouses. There are following classes of warehouse areas:

- ❑ storage area

  the area is related to storage of trading goods, goods from returns, as well as raw materials and packaging. The area is the place of logistic processes related to goods movement (e.g. location assignment to load units acquired by the warehouse during delivery, indication of place and load unit from which picking for shipment is to be done, …)

- ❑ picking area

  the area is related to the goods-in or goods-out processes. Here, location assignment occurs to load units acquired by the warehouse during delivery (external, from return), as well as loading of completed and picked load units onto the means of transport.

1.1.3 Storage places

Storage places (*warehouse locations*) form the lowest level of the hierarchy in the storage structure. On labeling storage places, two elements play an important role: place ordinates and number.

Equally important as the precision in labeling warehouse locations, which prevents chaos, is the information about places (class, type, dimensions of the storage) necessary for the system for correct management.

Labeling of storage places

Storage places are identified by w3/max and users with four ordinates. An example of ordinates locating the place may be digits *1-1-1-1,* where:

- ❑ first indicates the *row*
- ❑ second - *column* in the row
- ❑ third - *level* in the column
- ❑ fourth - *place* in the level

Regardless of location of storage places, when using these ordinates, we also have features unique and clear to the warehouse operator:

- number of warehouse location
  number of storage place formed of a series of letters and digits, where each of the characters carries information for warehouse operator, helping to locate the storage place
- control number of the warehouse location
  control number serves for checking the correctness of operation performed in the warehouse
- ordinate number of the warehouse location
  ordinate number serves for optimization of picking route in the warehouse

The above-described precision and legibility of labeling of storage places (locations) ensures quick access to the place and error-free performance of operations.

Classes, types and dimensions of warehouse locations

Place classification according to the function performed:

- storage place for full load units
- picking place (for picking, commissioning, mixing)

Place dimensions:

- maximum and minimum length
- Width
- height
- weight (max)

Types of storage places:

- classic cases
- drive-through
- drive-in
- floor

1.1.4 Warehouse zones, warehouse groups and their priorities

On the basis of a hierarchic warehouse structure it is possible for the system user to define *warehouse zones*. A warehouse zone may consist of any number of storage places. The defined warehouse zone may be assigned to a warehouse group (for goods, products). Such assignment may be awarded a priority indicating the importance of this assignment.

A simple example presents the use of warehouse zones:

We create a zone 'Zone-01', where we intend to store goods with high rotation from the group 'Products-class-A' and we assign it the highest priority '0'. We can create zone 'Zone-02' for the group 'Products-class -A' and assign it a lower priority, that is '1', etc. This means that: if for the group 'Products-class -A' there is no place in the zone 'Zone-01', the system will assign a place for the product from this group in the zone 'Zone-02'.

1.2 Basic data

The range of information, basic data, gathered by w3/max is both broad and detailed. The data also allow the system for individual and precise management of logistic processes. Therefore system user does not have to think how to complete a load unit, where the goods of appropriate features is located (batch, date, etc.). On the basis of such broad basic data and algorithms set, the system will often make individual decisions and give commands to the user.

In line with the system's division into specialized modules, a part of basic data is common to the entire system, while some of the data related e.g. with the Storing module is defined in this particular module.

1.2.1 Types of load units

Load units are defined by the system user, with defining which of the defined load units is to be default, and which of the defined load units are to be registered and settled. The load unit definition may contain:

- load unit name (e.g. European pallet, barrel, pallet-container, carton, box, etc.),
- load unit dimensions: weight, volume, length, width, height
- parameters of maximum weight and height of load unit when it is a load unit for picking

1.2.2 Assignment of load unit type to place class

Definition of assignment of a load unit type to place classes is aimed at:

- definition whether it is possible to store the load unit in a particular class of load units

EXAMPLE: barrels can only be stored on the warehouse floor and not in a classic case, unless they are placed in some load unit (e.g. European pallet)

- ❑ definition of filling factor of a load unit class with the particular type of load unit

  EXAMPLE: let's say that the length of the pallet socket in a classic case is 270 cm, this means that one European pallet fills this place class in 33%

1.2.3 Load unit assignment to a product

Assignment of product to a load unit is aimed at definition of the type of load unit in which a product is to be stored.

1.2.4 Assignment of storage places to companies

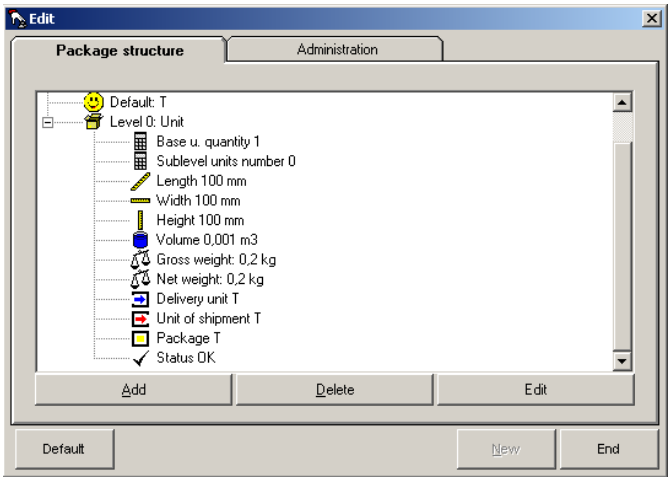
Assignment of storage places to companies is one of the methods for optimal use of the warehouse area in relation to the company that produces or owns the product. Such systematization makes the warehouse more transparent and organized.

EXAMPLE: let us say that our company is a logistic operator, then the described functionality gives us the opportunity to divide our warehouse area among owners of goods stored for them

1.2.5 Product assignment to warehouse and storage place

Due to warehouse organization and their own properties, products can have limitations as to the warehouse in which they can be stored. There is also an opportunity of defining the picking route.

EXAMPLE: some products may require storage in specific conditions, e.g. in lower temperature, decreased humidity, the defined functionality allows us for automatic ensuring that within the warehouse (e.g. cooler) or places (e.g. in the picking area – partial picking) products were stored correctly.



1.3 Delivery of goods to the warehouse

For warehouse stock replenishment in w3/max, several operations can be used:

- ❑ external good-in with purchase order for supplier
- ❑ return of goods from the recipient
- ❑ production registration with goods-in from production

Moreover, increase in warehouse stock is also impacted by stocktaking and inter-warehouse shifts. These operations are described further.

1.3.1 Purchase order for supplier

The process of product acquisition to the warehouse may begin with entering the purchase order for supplier, on the basis of which quantitative and qualitative assessment of goods and reporting of degree of order realization will be possible.

Purchase order consists of:

- ❑ header containing the following data:
  - order number,
  - supplier,
  - supplier's order number,
  - priority,
  - order placement date,
  - required delivery date,
  - payment date
- ❑ order lines and their quantity with a possibility to state the batch of the product ordered

1.3.2 External delivery

The process of external delivery acquisition begins with entering the header data which contains the following data:

- ❑ delivery number,
- ❑ delivery type,
- ❑ document type,
- ❑ delivery date,
- ❑ carrier and transport,
- ❑ picking area (goods-in gate)

The next activity involves generation of delivery positions (load units) on the basis of an order, or load unit generation without reference to the order. Generated load units are marked with labels containing: unique load unit number, product number, batch number, expiry date.

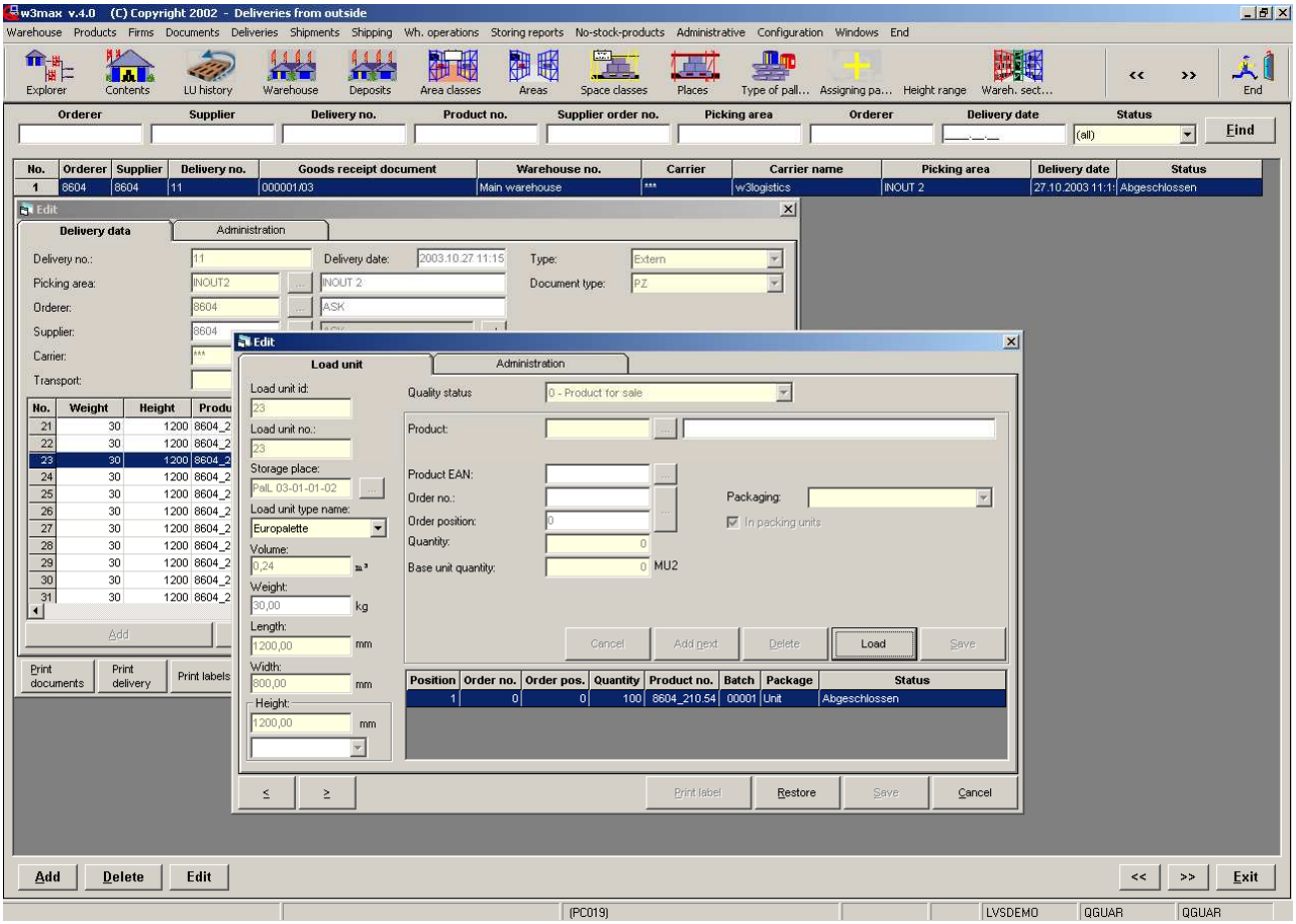
EXAMPLE: process of load units generation occurs on the basis of a defined structure of goods packaging, hence if we acquire 10 000 kg goods (e.g. that is what the purchase order for supplier states) the system knows the number of load units which should come to the warehouse; the number thus generated can be corrected

Labeled load units from delivery at the goods-in gate are (physically or logically) assigned quality statuses and new warehouse locations (manually or automatically), or the existing load units with identical product are filled.

A result of location assignment is the generation of transport orders for load units from delivery (from goods-in gate to the storage place) with or without the necessity to confirm the performance of such order.

EXAMPLE: the generated load unit with ID '95625842' is manually or automatically assigned a warehouse location, as a result a transport order no '5628' is created for transporting this load unit from the place where it is at the moment (source) to the place assigned to that unit (target); such created transport order may be "open" (requires assignment and confirmation of performance) or closed (it is assumed that the warehouse operator will do it correctly).

Delivery acquired and stored in this manner can be closed, which results in automatic generation of documents compatible with the physically acquired goods.



1.3.3 Production – product registration

Production lines

Registration of production requires definition of production lines where the registration process (labeling) will occur. Definition of a production line includes:

- production warehouse number,
- production place number,
- production line number,
- quantity of production machines,
- quantity of load unit label printouts,
- prefix and suffix of load unit number

Product assignment to production line and production registration

Products are assigned to the defined production lines. The assignment involves: selection of the production line, machines, products, production date and batch.

EXAMPLE: shift foreman defines which goods and with which date and batch is to be registered on the production line and machine; such assignment is aimed at correct production registration by system users working directly at the production (labeling the incoming load units).

After such assignment and opening of production, it is possible to begin the registration process of load units. A load unit registered and labeled is awarded an appropriate quality status. The unit is automatically or manually assigned a warehouse location. As a result of location assignment transport order is generated for load unit from the production place to storage place, with or without the necessity to confirm the performance of such order.

EXAMPLE: the generated load unit with ID '95625842' is manually or automatically assigned a warehouse location, as a result a transport order no '5628' is created for transporting this load unit from the place where it is at the moment (source) to the place assigned to that unit (target); such created transport order may be "open" (requires assignment and confirmation of performance) or closed (it is assumed that the warehouse operator will do it correctly).

Production

The process of production registration is preceded by the opening of production (operation, "document"), to which the registered positions (load units) will be added. The opening process requires completion and saving of the production header data, consisting of: production number, production warehouse number, document type.

Closing the production will cause automatic generation of documents where the quantities are compatible with the physically registered goods.

1.3.4 Return

The process of return acquisition begins with the entry of header data, which consist of:

- return number and date,
- warehouse area where the return is to be made,
- reason for return,
- goods-out document number.

Return positions are load units with the data on their contents (product, batch, production date, quantity) and quality status of the product returned.

Load units forming return positions are marked with labels containing: unique number of load unit, product number, product batch number, expiry date.

Labeled load units from return at the goods-in gate (physically) are assigned new warehouse locations or existing load units with identical product are filled.

Return acquired and stored in this manner can be closed, which results in automatic generation of documents compatible with the physically acquired goods.

1.4 Goods-out

To decrease the level of warehouse stock in w3/max, several operations can be used:

- automatic shipment with sales order from customer
- standard shipment with sales order from customer
- simple shipment

Moreover, decrease in warehouse stock is also impacted by stocktaking and inter-warehouse shifts. These operations are described further.

1.4.1 Sales orders from customer

Goods-out process begins with entry of sales order from customer. Header of such order consists of the following data:

- order number,
- customer and customer's order number,
- priority and required delivery date,
- order placement date,
- delivery date and delivery time,
- delivery address number,
- quality status of goods-out.

After saving the above-defined header, the following order positions are filled:

- product number,
- product batch,
- quantity in any unit of the packaging structure.

Activation of such completed order causes "physical" checking of the warehouse stock and then proceeding onto the process of shipment planning and realization in the warehouse. As a result of activation, there may occur a necessity to limit the positions and their quantity. The system allows for reporting the lost sales.

Automatic shipment planning

After completion of header data (header: carrier, means of transport, picking area) and possible correction of shipment positions relevant to the positions of sales order from customer, the system proceeds with automatic planning of the picking process. Opening of picking realization causes planning the picking of a product from specific warehouse locations and load units (labeled with unique IDs) considering the defined goods-out strategy.

This means that apart from the main goods-out principles (FIFO, FEFO, reservation for particular customers, for specific purposes), there is a number of parameters with impact on planning of which goods are to be picked from which location. The entire process of automatic picking planning (goods-out) is agreed in detail with the prospect user, which is aimed at such selection of parameters to ensure optimal process operation, in line with the specificity of the industry represented by the customer and their work organization.

1.4.2 Automatic shipment realization

The process of realization of automatically planned shipment usually occurs in two modes:

- on the basis of packaging structure, the system defines which load units in shipment are full (uniform) and generates transport orders for transferring a load unit from the storage area to the picking area (for loading),
- from quantities smaller than a full load unit, the system creates mixed load units. Mixed load units are built on the basis of the product packaging structure, as forming the mixed units, as well as parameters like maximum height or weight of the picked mixed load unit, etc.
- positions at a load unit picking card are formed into commands which form the shortest route for picking, in order to complete the load unit for shipment. Such commands consist of the following data:
  - number of place to go
  - number of load unit stored there
  - number of product, batch, expiry date and quantity to be picked.

Correctness of load unit loading on a vehicle may be controlled by the system. Loading on a vehicle and closure of picking realization causes generation of goods-out document and a report for driver, compatible with the actual state.

Standard shipment

After completion of header data (header: carrier, means of transport, picking area) and possible correction of shipment positions relevant to the positions of sales order from customer, the user proceeds with manual planning of the picking process – manual planning of product picking from

particular warehouse locations and load units (labeled with unique IDs). The process results in creation of a picking list. The process can also be semi-automatic.

This means that on using the appropriate button, the user will edit the main goods-out principles and acquires a simulation (system proposal), which may be fully modified. In the very process of picking realization, however, the system user, using a pickling list, can individually decide how and on how many load units products for shipment are to be placed. The actual picking result is manually entered to the system.

Simple shipment

The goods-out process in special situations can be simplified. After completion of simple shipment's header data (header: carrier, means of transport, picking area) shipment positions are added manually. Shipment positions involve indication by the operator of particular load units and quantities for picking. For such prepared simple shipment printout of picking list may be made. Picking list are the commands consisting of the following data: number of place to go; number of load unit stored there; number of product, batch, expiry date and quantity to be picked. Shipment completion causes generation of an appropriate document.

1.5 Other warehouse operations

1.5.1 Inter-warehouse movements

Movement header consists of the following data: movement number, document type, movement type, movement direction (from-to warehouse). Movement positions are formed of load units selected by the operator. Movement printout is possible after selection of load units.

1.5.2 Transport orders within the warehouse

List of transport orders

Movement of each load unit within a warehouse is recorded and contains the following information: transport order number, load unit number, source place number, order type (delivery, shipment, picking, movement), target place number.

Printout of transport orders

Particular types of transport orders may be assigned to warehouse operators in the quantities defined by the user. Printouts contain the following data: transport order number, load unit number, source place number, target place number.

Transport order confirmation

Assigned (printed) orders require verification of correct performance. For this purpose, the system requires stating the following data: number of user (warehouse operator) assigned the transport order, transport order number, load unit number, target place control number.

It is possible to shorten the process of internal transport consisting in closing the transport order created manually or automatically by the system, without printing the transport order and confirmation of transport order.

1.5.3 Unpacking

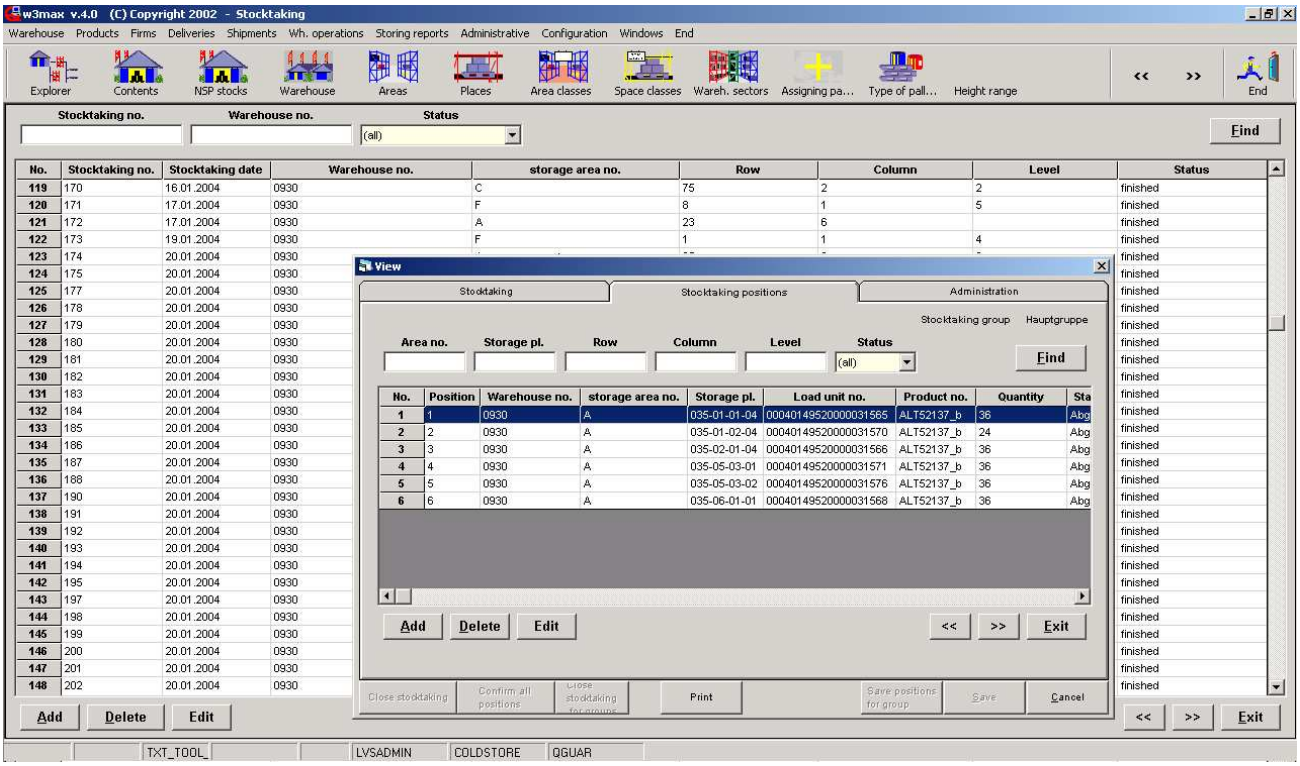
The operation allows for shifting products between load units. For this purpose, the system requires the following data: warehouse number, load unit number and load unit position to be shifted, target load unit number.

1.5.4 Returnable load units

The operation allows for registering the movement of returnable load units (e.g. European pallets). The balance of returnable load units is maintained per company with division into load unit types. Registry involves acquisition and distribution in relation with goods-in and goods-out. It is based on specific documents (e.g. goods-in and goods-out).

1.5.5 Stocktaking

Stocktaking criteria in w3/max-Storing system are very broad: warehouse name, storage area, parameters of storage places, and product, product class and group. Stocktaking positions are formed by load units compatible with stocktaking criteria. Especially, stocktaking may refer to one load unit, one storage place, or a small part of the warehouse structure. Stocktaking in such form may be conducted without the necessity to withhold warehouse operations, as well as in a systematic way (e.g. stocktaking plan – progressing stocktaking: today – row one, tomorrow – row two, etc.) Moreover, WMS class system may be classified as performing own stocktaking, as it operates at particular places, particular lad units and quantities on these load units. Therefore, even if there is any discrepancy, it occurs in the micro scale and can be noticed by an employee on the occasion of performing warehouse operations at a particular storage place.



1.5.6 Quality status management

The operation allows for awarding and changing quality statuses to load units with a unique (number). Each load unit has a quality status. Therefore, the user while making a change to the quality status, knows what the quality status is before the change. The user also defines the quality status after the change, stating the reason for quality status change, and has an opportunity to provide a detailed description of quality status change. The feature results in unrestricted quality management and offers broad possibilities to report the warehouse stock divided into the broad range of quality statuses.

1.5.7 Locking logistic items

The operation allows for locking of the following items:

- ❑ warehouse, storage area, storage place, load unit, contents of a load unit,
- ❑ firm, delivery address, means of transport
- ❑ product, product batch,
- ❑ purchase order for supplier, sales order for customer, or order lines stating locking reason and description.

Locked items do not take part in logistic processes.

1.5.8 Management of storage places (warehouse locations)

- ❑ viewing percentage of filling storage places,
  use of storage area (particular locations) by percentage
- ❑ block consolidation,
  optimization of storage area use in drive-in cases or storing in blocks on the floor. In order to optimize the storage space, the system searches for identical goods in various warehouse locations (of block type) and tries to minimize the quantity of blocks in which they are stored
- ❑ transport orders generation,
  creation of transport orders within a warehouse for transferring a group of load units from one warehouse location (of block type) to another, as indicated by the user
- ❑ picking filling,
  manual filling of picking on the basis of percentage parameter of picking place filling. The user may begin the process of picking filling manually despite the fact that the process occurs dynamically in the background of picking process

1.6 Load unit history

w3/max allows for monitoring the history of a load unit. This means that the user may at any time define:

- when and how the load unit appeared in the warehouse,
- when it moved within the warehouse and within which places,
- when it participated in inter-warehouse movements
- in which shipments it was the source of picking.

History of a load unit, linked with registry of events, allows for detailed monitoring of the load unit's and person's participation in all sections of the logistic chain.

1.7 Registry of events

The vast majority of described operations in the logistic chain is registered to a great degree of detail. Owing to this, it is known:

- who and when created e.g. a transport order,
- who and when activated it,
- who and when indicated whom as the performer of the order
- when such an order was completed.

At each of these stages, such operations have a status informing about the progress in order performance.

EXAMPLE:

- *goods-out order with 'OK' status is the one which has not yet left the sales dept.,*
- *status 'Active' indicates the order which has come to the warehouse,*
- *status 'In progress' indicates the order which is being picked by warehouse operators,*
- *status 'Completed' indicates the order which has left the warehouse*

Certainly, we have the data on who participated in particular stages of performance of such an order, as well as on the duration of particular stages. On the basis of such detailed register of events, we can define without any problem, who performed how many and what warehouse operations in what time, as well as who could cause any micro discrepancies (warehouse location, load unit).

1.8 Data exchange interface

Data exchange through the interface usually occurs both ways, and may involve a smaller or a larger range of processes in both systems.

The exchange involves two basic elements:

- Basic data. An important element is the coherence of the basic data (e.g. catalogue of companies, products) in both systems. In order to ensure such coherence, the external system is defined as master. Modification of data in the master system is generated by files with information for the slave system (w3/max), owing to which the coherence is ensured. The slave system is usually excluded from any modifications.
- Operations on warehouse stock – inter-system data exchange.
  Every operation with impact on the warehouse stock (e.g. delivery, shipment, stock-taking) is reflected in the mechanism of appropriate file generation

Warehouse stock is maintained coherently in both systems, with the difference that the external system operates on the collective stock of the product in the warehouse, while w3/max additionally divides the stock to the pallet and the place where the pallet is stored.

The external system deals with financial and accounting services, HR ad payroll, fixed assets and production planning and management, while w3/max performs detailed control over the logistic processes occurring in storage and distribution. Hence, we have a clear division of documents between the systems.

Completion of particular processes in one of the systems generates data exchange file. The process occurs automatically, without any participation of the user. The whole is secured with access rights system with passwords and a transparent reporting of the data exchange process.

Experiences, the core of which is formed by the implemented and operating data exchange interfaces between w3/max and external systems, show that such joining of systems is not problematic. The practice also reveals that such solution allows for full control over the correct flow of goods.

1.8.1 Range of data exchange

From the external system to w3/max:

- Products
- Firms
- Purchase orders for suppliers
- Sale orders from customers

From w3/max to the external system:

- External goods-in
- External goods-out
- Stocktaking
- Internal goods-out
- Goods-in from production
- Inter-warehouse movements
- Accounting decrees

1.9 System administration

1.9.1 Access rights

Access rights in the system are closely related to user groups. For example: completely different access rights refer to the employees of the sales dept., production workers, warehouse operators, and managers supervising work of these user groups in w3/max.

Definition of access rights within a particular functionality of w3/max involves:

- viewing
- adding
- modification
- deletion

Moreover, there is a possibility of limiting access to catalogues of products, companies and warehouses. This means that a user, while viewing a list of products, companies and warehouses can see only the ones he or she has the right to view. Such defined access rights also limit the possibilities of performing logistic operations with the use of products, companies and warehouses to which the user has no access rights.

1.9.2 Document printouts

The system allows for assigning user groups to documents, defining which printer is to be used for document printing. Furthermore, the definition contains the number of copies of the documents, and whether the document is to be viewed before printing.

EXAMPLE: after shipment completion a goods-out document is generated and driver report, while the printing of the document may occur not on the printer in the warehouse, but in the sales administration dept. The warehouse operator may then view the documents on the screen.

1.9.3 Customization of list settings

By standard, a list in w3/max consists of:

- fields for list filtering,
- columns
- buttons with various functions

Customization of list settings indicates the possibility of:

- column configuration – hiding redundant columns, change of column width
- filter configuration - hiding redundant filters
- sorting list contents – sorting list contents according to the column selected

Additionally, w3/max allows for:

- export of the list to Microsoft Excel
- list printout

2. Radio terminals

Undoubtedly, radio terminals are the most advanced tools facilitating work and improving its standard. Information is sent via a sending-receiving device. There is no need for participation of hard copy documentation in the processes occurring in the warehouse management, there is ready access to updated information and complete elimination of errors, e.g. during goods picking – these are just a few advantages of using radio terminals. w3/max cooperates with radio terminals ONLINE, as described below.

2.1 Delivery goods-in

Order of the operations performed is the following:

- ❑ Operator establishes delivery on the basis of the order and generates delivery positions
- ❑ Operator enters delivery number at the terminal
- ❑ Operator scans EAN code of the product
- ❑ Operator enters the quantity and the expiry date of the goods at the load unit accepted
- ❑ System informs the operator about: lack of product in the system and delivery, discrepancies between the quantity entered and ordered, too short validity period
- ❑ If the operations were correct, then: the pallet is confirmed, location is assigned, load unit label is printed
- ❑ Operator begins the acceptance of another load unit
- ❑ Operator completes the delivery on acceptance of the last load unit

2.2 Transport orders realization

w3/max differentiates among the following types transport orders: shipment, picking, movement, delivery, filling. Each of the order types requires a different handling method. Due to the method of order generation and handling method, two modes of work will apply to transport orders realization:

- ❑ Passive:
  Operator reports his readiness to work and awaits for order assignment. In this mode shipment and picking type orders will be executed, in line with the existing order queue.
- ❑ Active:
  Operator initiates order execution by scanning load unit number. In this mode delivery and filling type orders will be executed.

Orders of the *movement* type can be executed in the passive or active mode. In the active mode, the function will be available to a user with the appropriate rights (e.g. to the user belonging to the group *Warehouse Manager*). It will allow for generation of *movement* for free load units. *Movement* can also be performed by the operator working in the passive mode if such order is added to the order queue. Filling picking areas with whole pallets (passive mode).

Forklift truck operator, on notifying the readiness to work may receive at the terminal an order of transporting an entire pallet from the storage area to the picking area assigned to the particular product (*Picking* order type). Here is the order of the operations performed:

- ❑ System displays at the terminal the number of place (location), from where the load unit is to be picked
- ❑ Operator goes to the place indicated by the system
- ❑ After picking, the operator scans load unit number from the label
- ❑ System informs the operator if the pallet picked is the wrong one
- ❑ Operator transports the load unit to the place indicated by the system
- ❑ Operator scans the target place number, as displayed on the bar
- ❑ System informs the operator if the target place is wrong
- ❑ If scanned place was correct, load unit is confirmed by the system at the target place
- ❑ Operator reports readiness to perform other orders

2.2.1 Whole pallet goods-out (passive mode)

Forklift truck on notifying the readiness to work may receive at the terminal an order of transporting an entire pallet from the storage area to one of the goods-out areas (*shipment* order type). Here is the order of the operations performed:

- ❑ System displays at the terminal the number of place (location), from where the load unit is to be transported

- ❑ Operator goes to the place indicated by the system
- ❑ After picking, the operator scans load unit number from the label
- ❑ System informs the operator if the pallet picked is the wrong one
- ❑ Operator goes with the load unit to pallet card printing station
- ❑ Using the terminal, the operator starts the printing of load unit card
- ❑ Operator transports the load unit to the indicated goods-out area
- ❑ Operator scans gate number or load unit number previously confirmed at the gate
- ❑ System informs the operator if the target place (gate) is wrong
- ❑ If gate is correct, load unit is confirmed by the system
- ❑ Operator reports readiness to perform other orders

2.2.2 Placement of entire pallets in storage place (active mode)

Transport orders of *delivery* type will be realized by the operator working in the active mode. Operator will distribute pallets accepted in delivery with assigned storage places. Here is the order of the operations performed:

- ❑ Operator scans load unit number from the label
- ❑ System at the terminal informs of target storage place
- ❑ Operator transports the load unit to the place indicated by the system
- ❑ Operator scans the target place number, as displayed on the bar
- ❑ System informs the operator if the target place is wrong
- ❑ If scanned place was correct, load unit is confirmed by the system at the indicated place

2.3 Load units loading onto a vehicle

Shipment process ends with loading of the prepared load units onto a vehicle. Using a scanner, the driver will confirm load units loaded.. Here is the order of the operations performed:

- ❑ Driver scans bar code of the vehicle or transport bar code
- ❑ Then the driver scans the bar code of each pallet as stated on the pallet card

2.3.1 Stocktaking

Performing stocktaking using a radio terminal will form part of a larger stocktaking process as initiated by system operator. Radio-terminal replaces here the *stocktaking record sheet*. Here is the order of the operations performed:

- ❑ Operator enters stocktaking number at the terminal
- ❑ Operator goes to the area indicated
- ❑ Operator scans the number of storage place where stocktaking takes place
- ❑ Operator scans the number of the load unit covered by stocktaking, or enters information ‘place empty’.
- ❑ System checks whether the load unit entered is covered with stocktaking
- ❑ Then, the operator enters load unit positions, stating: quantity in base units and expiry date (for products with expiry date)
- ❑ In the event of discrepancies between the data in the system and the actual stock system displays appropriate information
- ❑ Operator’s confirmation of the data entered results in appearance of the position checked in the system in the stocktaking list

2.3.2 Quality control

The process of quality control will allow for control of load unit contents and possible change in its quality status. Here is the order of the operations performed:

- ❑ Operator scans load unit number from the label
- ❑ System will display at the terminal the information on load unit status: present location, status – whether the load unit is locked and for what reason
- ❑ Then, on further terminal screens, the system displays information on load unit contents
- ❑ Quality status change function will be available

2.3.3 Picking

on notifying the readiness to work may receive at his terminal numbers of load units for picking (in line with the queue). Then a window appears with the data on positions of the load unit for picking. Here is the order of the operations performed:

- System displays at the terminal the number of the picking area for load unit position
- Warehouse operator goes to the place indicated
- Operator scans EAN code of the product from the picking area label or from packaging
- Terminal screen displays information: product data, quantity for picking in particular levels of the packaging structure
- Operator enters the quantity in base units if it differs from planned, and confirms the positions
- If it is the last position of a load unit for picking, the operator goes to the printer and after pressing the appropriate button at the terminal – prints load unit card

Order of the positions displayed will be in line with configuration of the picking area.

2.3.4 Data encoding – logistic labels

During work with radio terminals for data identification, e.g.: product, location, bar codes will be used. Labels used in the system:

- Storage place label – will contain place number
- Picking area label - will contain product data
- Load unit label - will contain information on load unit contents

3. Docking terminals

Docking terminals, also called data collectors, are a much cheaper, thus more popular solution than radio terminals. Devices of this type are usually integrated with scanners. They allow for performing selected operations in the warehouse, and then, after connecting the terminal to the base device connected to a computer, for transfer of such information to w3/max. All operations using docking terminals are used OFF-LINE.

3.1 Support of automatic shipment for full load units

After the automatic shipment planning, the order of the operations performed is as follows:

- ❑ Loading of load units for picking to the docking terminal together with substitution list (substitutes only if warehouse locations are of block type and access to load units is limited)
- ❑ Warehouse operator goes to the place indicated
- ❑ Operator scans the number of the load unit label (scanning ends successfully when the load unit is correct)
- ❑ Operator performs order in reference to further load units for shipment
- ❑ If this is the last load unit for shipment, the operator returns to computer and loads the operations performed
- ❑ System confirms picking of the scanned load units and places them in the picking area (load units are ready for loading onto a means of transport)
- ❑ Operator performs unit loading, closes the shipment, which results in document generation

3.2 Support of simple shipment for full load units

After operator's planning, which load units will be distributed from the warehouse, the order of the operations performed is as follows:

- ❑ Warehouse operator goes to the place indicated
- ❑ Operator scans the number of the load unit label selected
- ❑ If this is the last load unit for shipment, the operator returns to computer and loads the operations performed
- ❑ Operator closes the shipment, which results in document generation

3.3 Inter-warehouse movements of full load units

After operator's planning, which load units will be moved z from the warehouse, the order of the operations performed is as follows:

- ❑ Warehouse operator goes to the place indicated
- ❑ Operator scans the number of the load unit label selected
- ❑ If this is the last load unit for shipment, the operator returns to computer and loads the operations performed
- ❑ Operator closes the shipment, which results in document generation

3.4 Stocktaking of full load units

After operator's planning, which part of the warehouse will undergo stocktaking, the order of the operations performed is as follows:

- ❑ Warehouse operator goes to the place of stocktaking
- ❑ Operator scans the number of the load unit label
- ❑ If this is the last load unit for stocktaking area, the operator returns to computer and loads the operations performed
- ❑ Operator closes the stocktaking, which results in document generation

4. Reports

4.1 Basic data

Reporting of basic data covers: list of products, list of contractors, list of storage places, list of users and their rights.

4.2 Goods-in

Reporting of goods-in covers: overview of orders for suppliers (with definition of realization degree), delivery journal, delivery printout.

4.3 Goods-out

Reporting of goods-out covers: overview of orders from customers (with definition of realization degree – lost sales), shipment journal, shipment printout, transport list, shipments acc. to routes.

4.4 Warehouse management

Reporting of warehouse management covers: total stock list (according to criteria: product, warehouse; warehouse, product; warehouse, product, batch; warehouse, area, product quality status; warehouse, product, area, place, load unit), filling of storage places, stocktaking record sheet, products in purchase/sale orders, products in orders and warehouse stock, overview of goods according to quality statuses, products checked, products with exceeded expiry date, delivery after delivery date, inter-warehouse movements, returnable load units, assignment of storage places to companies.

4.5 Warehouse documents

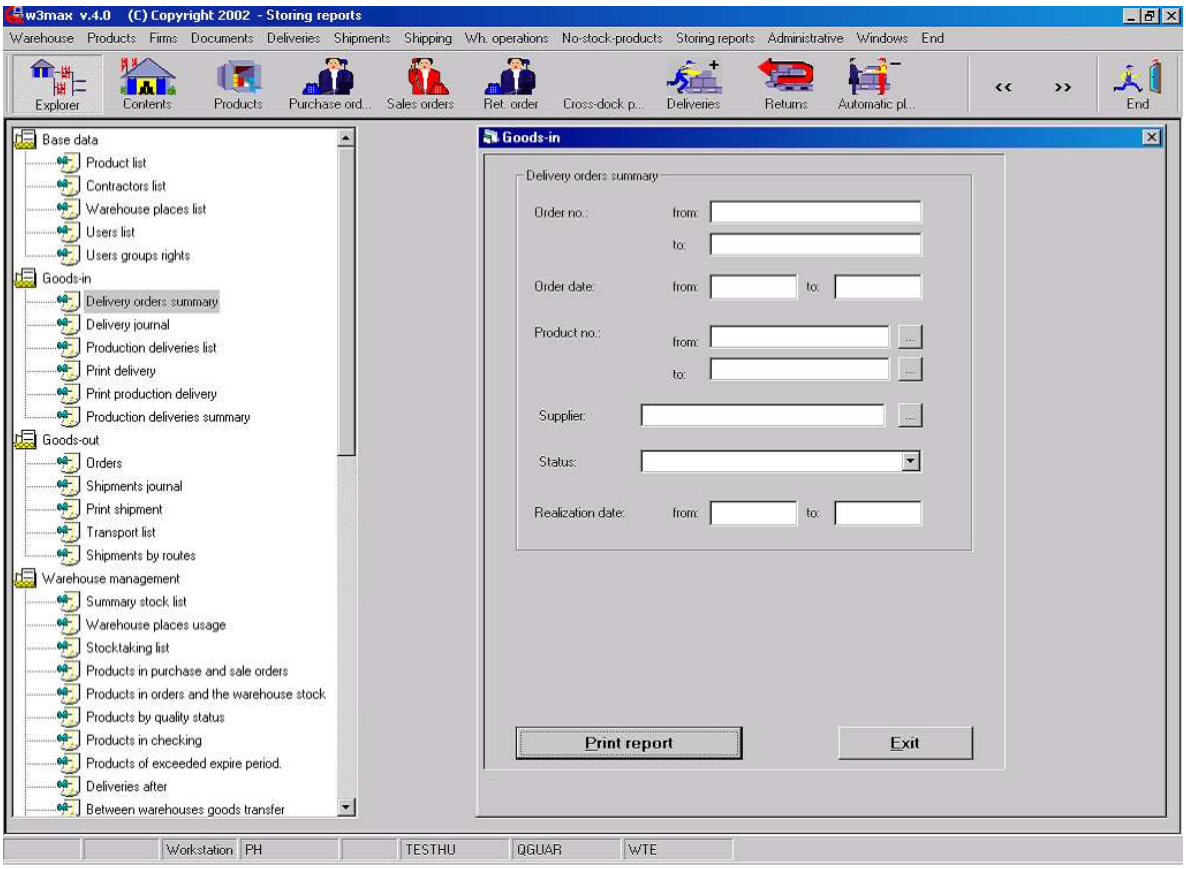
Warehouse documents report group covers: external goods-in, internal goods-in, return, internal goods-out, movement, stocktaking.

4.6 Operations documents

Operations report group covers: purchase orders for suppliers, sale orders from customers, picking list, printout of load unit for picking, transport orders, load unit card, stocktaking discrepancies, inter-warehouse movements.

4.7 Statistics

Reporting of warehouse statistics covers: product flow through the warehouse, stock per day, document flow, daily goods-out, settlement of logistic services.



5. Hardware and software requirements

System platform

The operating system required for the database server of w3/max is Windows NT/2000 or Unix.

Correct and safe work with the data is ensured by an Oracle database system.

All workstations where users use the system may work under control of Windows NT or Windows 2000/XP.

Hardware requirements

- Database server:
  - Computer with Windows NT/2000 or Unix
  - Hardware parameters depend on the installation size.
- Workstation:
  - Any class of computer with Windows NT or Windows 2000/XP
  - Min. 128 MB RAM recommended

6. Basic system data

The main task of this program block is the opportunity to introduce to the database all the data necessary for performing the trading and storing operations. Here we hold all the catalogues of firms and product, containing a broad choice of data describing our contractors and products we deal with. We define the warehouses, branches and representatives, as well as price lists, set the grouping types and we group items according to the criteria needed, such as products or companies.

The range of information, basic data, gathered by w3/max is both broad and detailed. The data also allow the system for individual and precise management of logistic processes. Therefore system user does not have to think how to complete a load unit, where the goods of appropriate features are located (batch, date, etc.). On the basis of such broad basic data and algorithms set, the system will often make individual decisions and manage the user's work

Basic data specified below are the data common to all modules of w3/max.

Grouping

For the purposes of flexible and easy systematizing the catalogues of items such as products or companies, the grouping mechanism has been created in w3/max.

Some groups exist in the system always, others can be generated by the user.

w3/max features hierarchic grouping.

- ❑ It allows for generation of many grouping categories
- ❑ Each generated grouping category may contain already existing categories
- ❑ (hierarchy)
- ❑ Many groups can be created within each category
- ❑ system elements (companies, products, etc.) may belong to many grouping categories

EXAMPLE:

Grouping categories:

- *county*
- *type*

Groups in category "county":

- *Sussex*
- *Norfolk*

Groups in category "type":

- *retailer*
- *wholesaler*
- *producer*

After such categorization, it is possible to assign an appropriate group from each category to each company. The number of categories and the number of groups within a category is limited only by the user requirements.

Features

w3/max is also furnished with features mechanism. Contrary to grouping, a feature is not defined through selection from the list, but through manual statement of its value. This allows for describing uncountable properties of products or companies.

EXAMPLE:

Feature: Turnover

Each company can be assigned the turnover value for the previous year.

The value of the feature entered may e limited by a format (e.g. digits only), which allows for elimination of errors.

Attributes

w3/max features a mechanism of attributes. It has been constructed so as to allow for registration of products for which:

- ❑ one goods index if convenient (one warehouse stock, one mechanism for demand calculation)
- ❑ there are some minor differences in properties, yet such that should be controlled at the stage of storage and analysis

Example of use:

Product: ball pen

Available colors: red, black, blue

Deliveries without color definition, stock for the ball pens, without color differentiation.

If a product has certain attributes, then:

- each goods-in requires stating the attribute
- on goods-out, the system may select the attribute using which the product will be presented
- opportunity to define the current stock for particular attribute.

The above requirements can be met by special selection of product indices, and then through proficient use of appropriate totaling of several indices. The system of attributes, however, facilitates the work.

Statuses

Economic events are recorded in the system through documents.
Each document may have one of the following statuses:

- generated – means that the document has just been generated
- confirmed – means that the document content has been approved
- activated – means that the document can proceed to the implementation stage
- in progress – means that the document is being implemented
- completed – means that the document has completed the implementation phase
- closed – means that the document is closed
- deleted – means that the document has been removed

As not all the statuses are always necessary, there is a possibility to define which of them are to be used in the system for each document type.

6.1 Warehouses

Flexible storage structure in w3/max allows for full management of the chain of logistic processes both in one (central) warehouse, and in the dispersed distribution network with external (distribution) warehouses.

The foundation of the storage structure in the system is formed by the hierarchic relation of its elements:

- *warehouse* as the highest element in the hierarchy,
- *area* in the warehouse,
- *place* in the storage area with the defined ordinates

Unique numbers (IDs) unambiguously define the above elements. Such legible, transparent presentation of the storage structure allows for efficient and effective work in the warehouse.

Catalogue of company warehouses contains general characteristics of warehouses managed by the system. The following functions are defined separately for each warehouse:

- maintenance of warehouse stock
- storage
- procurement
- sale
- internal goods-in
- internal goods-out
- automatic picking
- picking
- production warehouse
- external warehouse

6.2 Products

This section of the program contains catalogues of all products that can be managed by the company. Product catalogues contain a number of logistic data, such as:

- ***Product type –*** this may be product – individual material goods; set – several products sold in a set, or a service
- ***Product number -*** unique index, mnemonic abbreviation or number assigned acc. to a convention agreed
- ***PKWIU, SWW, EAN***
- ***Unit*** **-** base unit in which the register of a particular product in the warehouse is held. Simultaneously, it is the lowest level in the packaging structure.
- ***Product group*** – allows for connecting all products in a particular group with a customer

- ***Warehouse group –*** goods are assigned to a warehouse group, thus it will be stored in an appropriate warehouse zone
- Price list group, accounting group
- ***Batches –*** allows for management of product batches
- ***Attributes –*** allows for differentiation of various attributes in product batches
- ***With stock –*** maintenance of warehouse stock
- ***Automatically new –*** a new batch is created for each goods-in
- ***Print batch No***– batch number appears on printed documents
- ***Expiry date –*** number of days after which period the validity of goods expires
- ***Amount rounding –*** accuracy with which the product quantity is calculated
- ***Price format*** - format of price listing for a specific product
- ***Minimum order*** – definition of the smallest number of base units to be ordered
- ***Minimum stock*** – defines minimum product quantity to be stored in the warehouse
- ***Maximum stock*** – defines maximum product quantity to be stored in the warehouse
- ***Maximum storage time*** – period in which the product may be stored in the warehouse without damage to its selling potential
- ***Maximum weight*** – maximum weight of the pallet
- ***Lowest storing level*** – the lowest level in the case where the particular product can be stored
- ***Highest storing level*** - the highest level in the case where the particular product can be stored
- ***Check date*** – number of days after which period the goods should be checked
- ***Threshold*** – number of pieces (base units) in the pallet, at the achievement of which the system automatically generates the order of replenishing the stock in the picking area
- ***ABC class*** – rotation class of a particular product in the warehouse, defined on the basis of the ABC analysis, i.e. flow dynamics of the goods in the warehouse
- ***External codes*** – relation of product codes used by contractors to a particular product and documents where the codes are used
- ***Packaging structure*** – any defined packaging structure. It contains an exact description of product packaging method on a load unit. A classic example thereof is: piece, package, layer, pallet. For each level of the packaging structure we state the length, width, height, volume, net and gross weight, as well as the number of units in the lower level (e.g. number of pieces in the package, number of packages in the layer, number of layers in the pallet). The defined structure is presented in the graphic form. The lowest, zero level in the packaging structure is defined automatically – the packaging unit is the base unit for the specific product.
- ***Locking*** – allows for exclusion and later inclusion of the product in all operations

6.2.1 Products in the warehouse

Due to various properties and requirements of products as concerns storage type, the system uses mechanisms responsible for their appropriate assignment. Some products may require storage in specific conditions, e.g. lower temperature, decreased humidity. The defined functionality allows for automatic ensuring that within the warehouse (e.g. cooler) or places (e.g. in dry area) the products are stored in an appropriate manner.

Information referring to a product assigned to a particular warehouse includes the data on stock-taking group, valuation methods, FEFO, minimum and maximum quantities, reserve stock, average stock, and storage costs.

Order generation

In order to allow for an analysis of demand, basic data of products and suppliers must be defined. Global demand can be generated – for all warehouses, or on the level of a particular warehouse (Product in the warehouse).

Generation type - generation types define the type of data used for generating a demand. "Forecast" indicates data collection from the plan of sales. "Approximated" indicates minimum stock and aims at maintaining the stock in the defined period of maintained sales, while "Current" appears when the stock achieves minimum level and triggers the order for the quantity necessary to achieve the maximum stock. In the above analyses, warehouse stocks are considered together with the current reservations for the period set.

Minimum SMP – minimum sales maintenance period

Maximum SMP - maximum sales maintenance period

Triggering type - defines the method of triggering the demand generation.

6.2.2 Product classes and groups

The applied division of products into classes and groups allows for their systematization. Product classes and groups may form independent sets or may form sets contained in one another. Additionally, the system contains a division into product prices groups, which allows for defining price lists for entire product groups.

6.2.3 Product batches

This is a programm block where product batches can be defined. Apart from such information as product number, name, batch number, durability and description, the product can have attributes assigned, as defined beforehand.

6.2.4 Sets

The mechanism used in this section of the system allows for joining any number of products into sets. The term of a Set is understood either as a set of several products, e.g. a promotion set with a “free element”, or we apply a special price; or it is a total of products which for one whole as a final effect, e.g. door, hinges, shelves forming a wardrobe.

6.3 Firms

Catalogues of firms contain a number of basic data, which include:

- Company number (unique index, mnemonic abbreviation or number assigned acc. To a convention agreed), name, address
- NIP and REGON numbers
- Ordering features: groups, classes, types (carrier, orderer, recipient, supplier, producer)
- Minimum percentage of validity period for the supplier
  (on goods-in, the system controls whether the requirement of minimum validity period was met by the supplier)
- Part of the product validity period for recipient
  (during automatic picking planning, the system selects products in such a way that they meet the recipient’s requirements referring to the minimum validity period)
- inform when there is less than...% storage period
- products ordered for recipients
  (limits of products that can be ordered by recipients in our warehouse)
- products delivered for suppliers
  (limitation of product list that suppliers can supply to our warehouse)
- types of documents and special goods-out documents for recipient
- logistic parameters of load units sent to particular recipients

6.3.1 Order generation

Here, we have an opportunity to automatically generate purchase orders for suppliers. In order to create a purchase order, we must enter data in the system referring to the means of transport, delivery time, and additional costs. The system requires confirmation of the order, which is necessary for order activation.

Apart from the data stated above, in order to generate purchase order, it is also necessary to provide accounting data, such as number of the company proposed by standard as the payer in financial documents, bank account data, currency, exchange rate, group of prices, number of bookkeeping account of the customer and payment terms.

6.3.2 Company profiles

Here, we can find logistic information on the supplier, such as delivery dates, minimum number of load units, minimum order value. Such information is visible in the form of a comment during order generation, after entering the supplier number.

6.3.3 Branches

This program block serves for definition of branches of our company. It contains detailed address data and bank data of each branch. Apart from basic data, we can also find here e.g. road distance between company seat and branches, and the option for the branches with accounting dept.

6.3.4 Suppliers, recipients

Part of company catalogue containing our suppliers and the part containing our recipients.

6.3.5 Company price groups

The function of price-related grouping of companies allows for holding a varied pricing policy toward defined contractor groups. Defining the company codes allows for assigning a particular firm to a particular group, and generation of price lists for such groups.

6.3.6 Addresses

It is a functionality allowing to generate tables of additional addresses of companies, branches and representatives, other than principle addresses, and used when addressing documents and delivery positions.

6.3.7 Representatives

In this program section we can create catalogues of representatives, as well as assign them to entire company groups. For each agent we must define the amount of commission, total pool of discounts for the agent and maximum discount to be granted by the agent, as well as its address and contact data.

There is also a possibility of default assignment of a representative to a group.

6.4 Grouping

Owing to the Grouping block we can systematize various items dispersed in various catalogues of the system, such as companies or products. Grouping allows for joining items characterized with some common features. Owing to this, specific operations may be performed on the entire previously created groups.

Grouping can be made with differentiation into:

- Accounting groups

  Allows for goods division according to accounting specifics.

- Stocktaking groups

  The function allows for stocktaking according to created stocktaking groups, after assigning particular products in the warehouse.

- Product warehouse groups

  Part of the system allowing to systematize products into groups, owing to which storage occurs in the planned manner from the point of view of product properties enforcing such storing conditions.

- Groups and features defined by the user

  This solution allows for joining various items (products, firms, warehouses) with assigning them particular features.

  This part of the system contains a table with all types of grouping. The user can profit from grouping products, firms, warehouses and products in warehouses. Types of grouping allow for classifying items (firms, products, warehouses and products in warehouses) and joining them in groups according to their common parameters. The function Attributes contained here allows for defining and registering particular product batches.

6.5 External transport

This program block entitled "External transport" is a catalogue of the means of transport supporting the deliveries and shipments of goods in the warehouses. The data entered, of own of carrier vehicles, entered when shipment planning, allow for easy definition of the size of shipment, so that it does not exceed the capacity of the vehicle we have.

- Means of transport

  Data of the means of transport gathered in the system include: registration number, name of the means of transport, number of the transport type - predefined transport type appropriate for the particular means of transport, firm – owner of the means of transport; number of load units that can enter the vehicle

- Types of the means of transport

  The option serves to enter the transport types. This is aimed at facilitating the addition of further means of transport belonging to the same class of vehicles, considering their parameters, such as capacity.

7. Usage Models

The dynamically developing distribution market requires very flexible information tools that will allow for support of the specific character of the industry and will meet the requirements of the new trends in trade.

w3/max was designed in a way to satisfy such requirements. The system thus allows for distribution of any kind, but is also capable of adjusting to the existing model of work in the company.

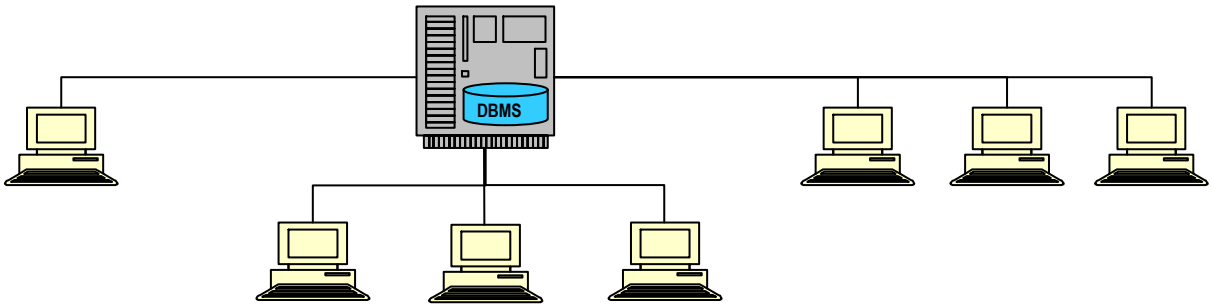
The dedicated usefulness for a particular industry depends on the appropriate choice of modules, their parameters and the course of the implementation process itself.

7.1 Logical Installation Models

Below are the descriptions and graphic representations of three logical models of installation used in companies, starting from the simplest, and ending with the most complex one.

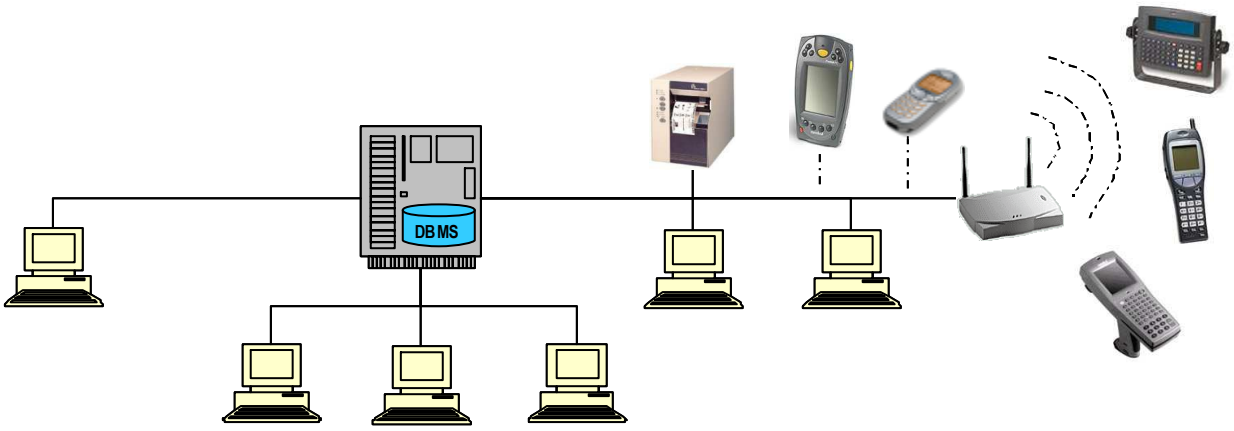
7.1.1 Installation within one location

The operation of the system whole in one location is the simplest of the models possible. All workstations operate in a local network, communicating with a central database.



This model of system installation in a particular location also involves all kinds of methods and devices for remote communication – in particular the so-called data collectors.

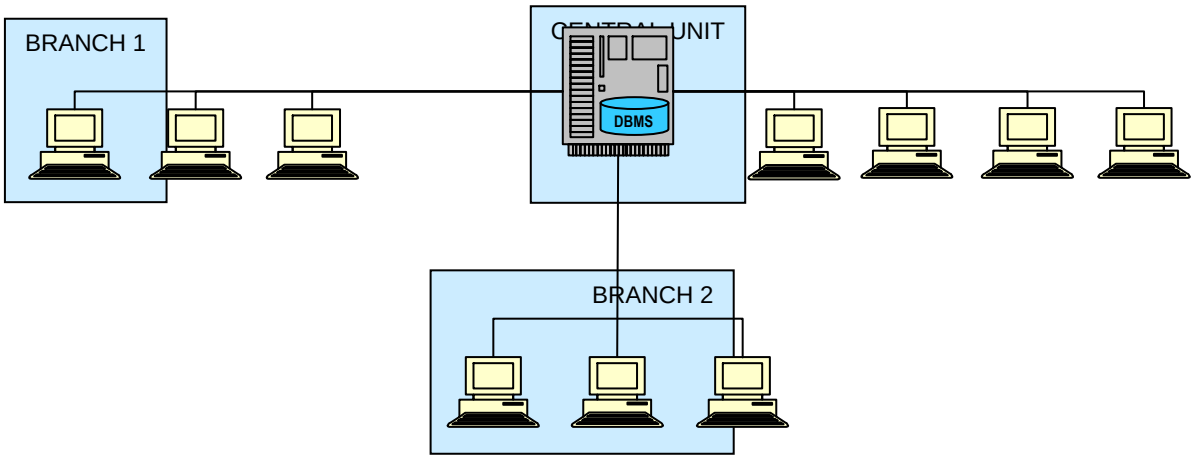
w3/max can cooperate with scanners, docking and radio terminals, PalmTop or iPac computers, using various communication techniques (radio, GSM, GPRS, Internet).



7.1.2 Distributed installation with a central database

In this model of operation, the w3/max workstations can be distributed over different locations. The whole system operates with one central database, which can be located anywhere.

Particular locations must be connected with lines of appropriate capacity, depending on the requirements of the particular installation. This model requires fixed connections.

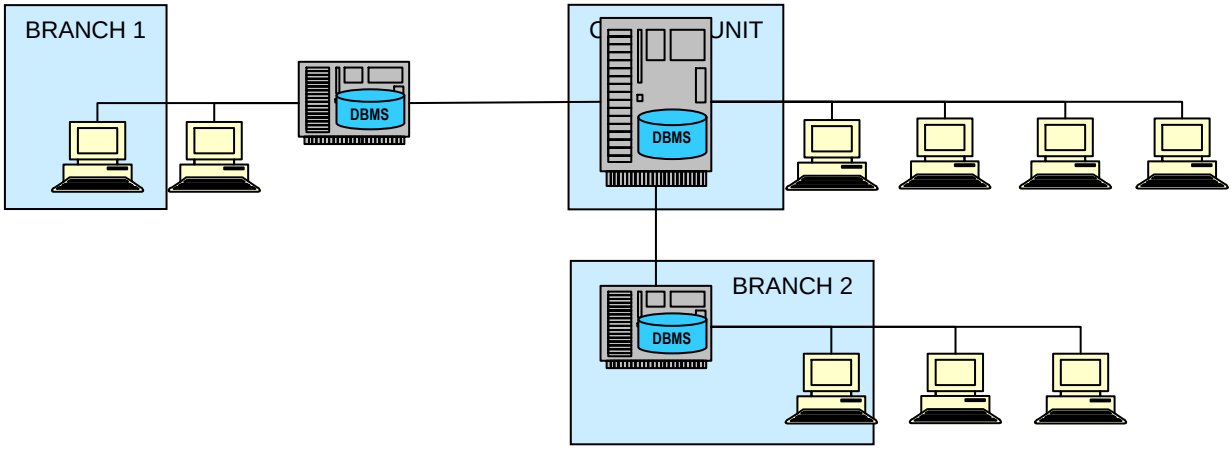


Particular locations must be connected with lines of appropriate capacity, depending on the requirements of the particular installation. In this model, these may be fixed or commuted connections.

7.1.3 Distributed installation with many databases

This model is similar to the previous one, with the difference that in some locations there may be separate, local databases, which are to be updated at predefined periods of time according to the database defined as the central one. The central database can be located anywhere.

The scope and methods of data exchange between local databases and the central database depends on the particular model of company's operation.



8. Definitions

Delivery address– place of goods delivery (differentiation often used in the case of commercial networks)

Automatic location assignment – system performed assignment of particular warehouse locations (places) to load units in delivery. Such assignment is based on individual strategies adjusted to the requirements of logistic organization of the warehouse operation.

feature/attribute – additional information about the product, connected with the product index

record feature - agreed, predefined product price, according to which the product value in the warehouse is defined

delivery – process of physical acquisition of goods in the warehouse (return from customer, delivery from external supplier, delivery from production)

supplier – contractor executing the delivery and issuing the purchase invoice

EAN/UCC – set of standards allowing for effective management of global delivery chains for many industries through unique identification of products, shipment units, locations and services. It allows for improvement of processes in electronic economy, together with a possibility to fully monitor the materials flow. EAN.UCC symbol originated from linking the symbols of two organizations: EAN – European Article Numbering and UCC – Uniform Code Council.

EAN/UPC – globally common definition of symbols used by standard in retail outlets. These include symbols: EAN-13, UPC-A; EAN-8; UPC-E; (EAN – *European Article Numbering*, UPC – *Universal Product Code*).

EAN-128/UCC – code definition of variable length, depending on the number of data encoded and their type. Each data in the code is preceded by standard usage identifier (IZ) unambiguously defining the designed usage.

Load unit label – printout from bar code printer, usually on adhesive paper, containing individually configured information (usually: load unit number, product name, number and batch, load unit labeling date and time, and other information)

Stocktaking group – product group subject to uniform stocktaking procedures defined for the group

Product warehouse group - product group with the same status in the warehouse and subject to uniform procedures defined for the group, customer group, product group, firm, product, etc.

stocktaking – warehouse process consisting in comparing the actual stock with the accuracy of warehouse location and the reflection thereof in w3/max

load unit card – printout with information of the number and contents of the load unit

Load unit picking card – printout with information of positions (contents, stock) of picked load unit planned by the system, stating: picked load unit number, picking positions and their quantity, and indicating warehouse place where the picking is to occur

drive in case column - drive in case column with defined volume (e.g. 6 levels, 8 places at a level, which gives 48 pallet places in a column in total)

Automatic picking – automatic indications of unique location and load unit ID, from where the picking of goods is to occur

Partial picking – process of physical generation of a load unit consisting of various products forming the shipment, on the basis of load unit picking card or the picking list

Load unit picking – process of building (forming) a (non-uniform) load unit that is picked in the shipment process

Control of warehouse place volume - system controls the volume on the basis of minimum and maximum parameters (weight, length, height, width, volume) and the filling factor

Purchase control – process of introducing purchase documents to the system, stating the value of particular deliveries

Warehouse location – warehouse place unambiguously identified by the system and user due to specific ordinates and unique number. Possible location labeling with bar codes.

Block place – warehouse place where the system can store infinite number of load units

Picking area - warehouse place designed for partial picking of a given product (in quantities smaller than a full load unit)

Uniform load unit – load unit with the same goods, from the same batch and with the same expiry date

Warehouse load unit – object where the goods are located and which is shifted together with the goods. A classic example thereof is the European

pallet. These may also be barrels, pallet-containers, cartons, boxes, etc. Load unit is defined by the system user and is an object of unique identification.

Incomplete load unit – load unit with the quantity of goods smaller than maximum

Full load unit – load unit with maximum quantity of goods (with the same batch number and expiry date), set forth in the structure of product packaging.

Virtual load unit – load unit that physically does not exist – logical, generated in w3/max

Picked load unit – load unit created during partial picking

Control number of warehouse location – warehouse locations, apart from unique numbers, are also assigned random control numbers. The numbers are used for confirmation of correctness of the operation performed, which is always linked to the particular warehouse location.

Picking area – warehouse place at the in and out gates, which performs the function of a put-aside place. At the same place, the control of quantity and quality of goods in delivery or shipment is often performed.

branch – internal organization unit having own address and a separate warehouse

return package – type of multiple-use package subject to the warehouse processes

load unit assignment – process consisting in placement of goods in the load unit according to the standards applying in the company

system parameter - parameter set during configuration of w3/max, having impact on its operation

batch – unique alpha-numerical code assigned to some quantity of products in an agreed manner, carrying additional information

load unit leveling – placement of load units directly one on top of the other in the warehouse location (usually floor) considering load unit capacity with the particular goods. Blocking of units in several levels is used (e.g. three pallets, one on top of the other)

put-aside place – assigned physical warehouse location where the load unit is taken in the process of executing the delivery (before location assignment) or shipment (before loading onto the vehicle)

system forecast – scheme of forecast sales of the particular product created by w3/max on the basis of history of sales in the base period

representative/agent – company employee in charge of sales in a particular region or to particular contractors

Internal goods-in – warehouse process consisting in acquisition of a certain quantity of products in the warehouse stock, with the definition of reasons for acquisition, e.g. product repacking

Warehouse location assignment – manual or automatic indication of the location where the load unit is to be transported

VAT register – list of all purchase and sale invoices and corrections, specifying net amounts, VAT amounts and gross amounts

Complaint – operation related to the delivery or shipment process, causing a change in the status of goods quality and preparation to another phase of return to the warehouse or to the supplier

Internal goods-out – warehouse process consisting in the removal of a defined quantity of products from the stock, stating the reasons for removal; operation increasing the costs of company's operation

Commercial network- group of contractors (recipients) identified by a common name, for which similar terms of sales are created

Docking terminal (data collector) – electronic device for data collection, usually integrated with a scanner. It allows to perform selected operations in the warehouse in off-line mode- picking for execution and transferring to w3/max after performance. Cooperation with w3/max takes place through the docking station connected to the computer.

Radio terminal – electronic device, usually integrated with a scanner, communicating via sending-and-receiving radio device. Cooperates with w3/max in the on-line mode.

scanning – reading the bar code using a scanner

SSCC – *Serial Shipping Container Code*. Abbreviated definition of globally unique code labeling of a logistic unit

Product packaging structure – definition of a method of product packaging (pallet assignment) in w3/max, stating all physical parameters (weight, length, height, width, volume) for particular structure levels (e.g. piece, carton, layer, pallet)

Means of transport – particular vehicles defined in w3/max

Trading goods – product designed for further resale

Non-trading goods – product not designed for further resale, subject to full warehousing process,

refers to raw materials, advertising materials, shop furnishing, protective clothing, etc.

Position types – definition of types of operations performed in the system, e.g. standard operation, promotion, sale

Means of transport types – types of vehicles, stating all technical parameters (e.g. capacity, width, length, height) to which particular vehicles are assigned (means of transport)

System user – person registered in the system by full name, who has assigned rights to perform particular operations in w3/max

shipment – process of handling goods-out from the warehouse to an external recipient

Purchase order - document on the basis of which the delivery will be made

load unit content – goods in the load unit together with particular features assigned to the goods

set – set of products created from separate products, stored under own index

transport order – order of transporting a particular load unit with a product from one warehouse location to another, within the same warehouse

return to supplier – operation related to physical goods-out from the warehouse to the supplier on the basis of e.g. a complaint

return to recipient - operation related to physical goods-in to the warehouse on the basis of e.g. a complaint

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w3logistics AG

Otto-Hahn-Straße 18
D-44227 Dortmund
Telefon: +49-231-22227-0
Telefax: +49-231-22227-11
Internet: w3logistics.com
E-Mail: info@w3logistics.de