Construction of a new logistics centre at

Warimex GmbH, Neuried

1. Warimex GmbH customer description

The family-owned enterprise, Warimex, has specialised in the worldwide import and export of commodities for over 28 years. The product range includes almost 12,000 household and gift items, in addition to free gifts for mail-order businesses and retailers. Warimex supplies large mail-order companies and well-known retailers worldwide.

The product portfolio includes kitchenware, utensils and cosmetics. New products are promoted on TV and advertised to our millions of end customers through partnerships with glossy magazine and brochure publishers.

2. Context

Before moving into the new logistics centre in Neuried (near Offenburg), the entire logistics were dealt with in a rented warehouse in Kehl. The existing warehouse spanned three floors which were connected by a lift. On the second floor, there was a shelving unit, and the rest of the goods were kept in bulk storage areas on the floor.

There was no warehouse management system in the old warehouse, meaning that everything had to be done manually. There was only the SAP, which was used to print picklists onto paper. These lists were used in the warehouse to create delivery notes, invoices and shipping labels. The same papers were also used in the warehouse for packaging and shipment preparation, which resulted in high levels of manual labour, paperwork and inefficiency.

3. Description of the facility

In conjunction with Jungheinrich AG, a new warehouse of 2700 sqm was built in order to meet the customers' needs more effectively. From the initial design brief to the point of start-up, Jungheinrich constructed a facility in two months which has optimised the entire goods transport system, making the process transparent for the customer at all times, and has reduced the error rate to zero.

The new facility consists of a narrow aisle warehouse which is controlled and managed by the company's own warehouse management system (Jungheinrich WMS).

The new facility is split into three zones. There are also areas for incoming and outgoing goods and for production.

a. Storage areas

The storage areas in all zones have designated barcodes which are identified by scanners and handheld terminals.

- Narrow aisle warehouse
  For the reserves area of the logistics centre, a narrow aisle warehouse was designed with 6 aisles / 12 rows of shelves, along which the goods of both clients can be stored uniformly on Euro-pallets. An EKX 515k order picker is used for the storage and retrieval of palletised goods. To avoid storage errors, the driver is assisted by a warehouse navigation system when working in the narrow aisles. The warehouse navigation system, which is a kind of GPS for high rack stackers, was designed to increase effectiveness, and was brought to market by Jungheinrich in 2009. The client can achieve up to 25% more throughput by using the warehouse navigation system.
  The narrow aisle warehouse is 8756 mm high and 49130 mm long, including cantilever transfer zones for the EKX 515. This results in a total capacity for over 2600 pallets over 4 or 5 levels. The different heights available for these levels are 1440 mm, 1830 mm and 2030 mm. At the end of each shelf there are 3 cantilever transfer zones for the storage and retrieval of whole pallets.
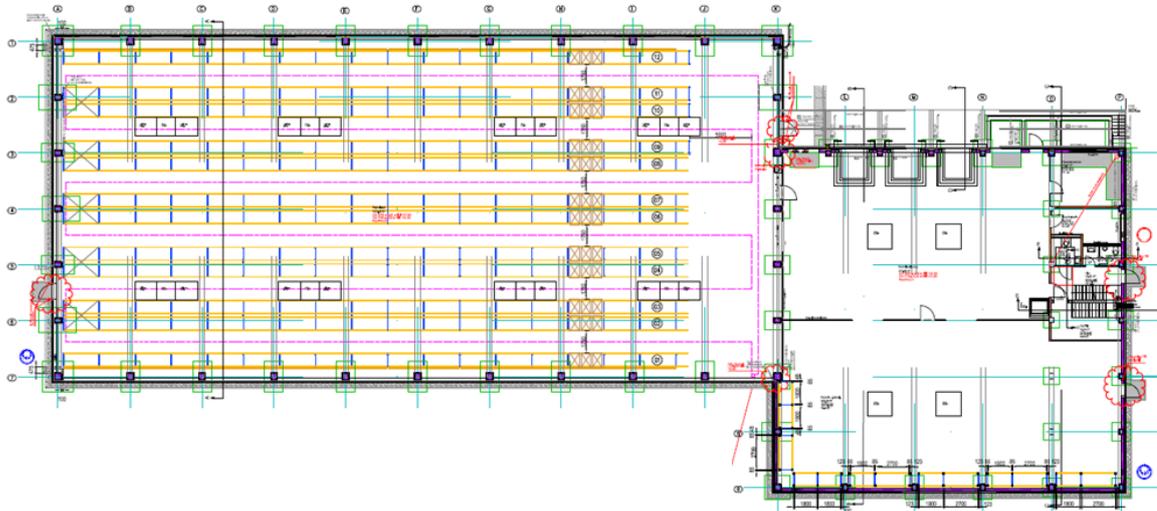- Picking area
  The picking area consists of a shelving unit with 252 spaces, a flow rail with 84 spaces, drawer shelving with up to 630 spaces and 10 spaces on the floor for whole pallets.
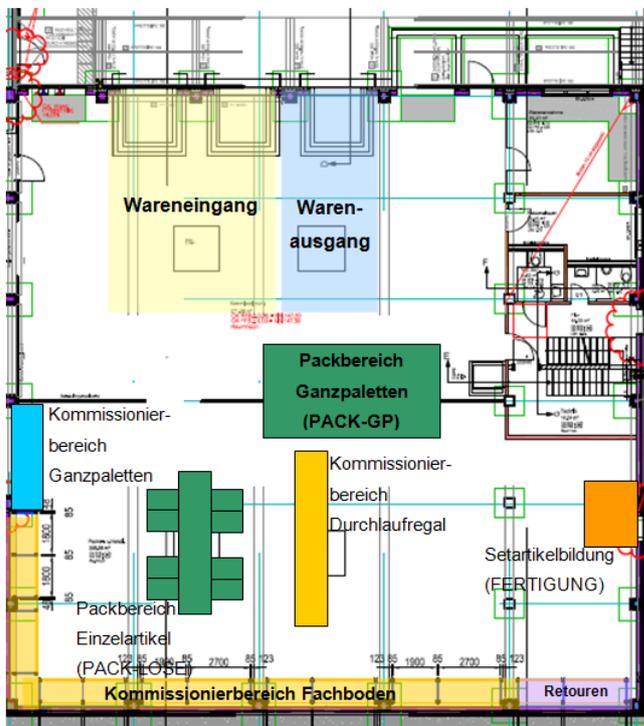- Packing areas
  6 packing areas were established for packing the goods into boxes, which are each equipped with a PC, Jungheinrich WMS and a wireless handheld scanner.

b. Layout

Plans for the logistics centre in Neuried:

Plans for the picking hall:

c. Forklift trucks

- EKX 515k turret truck
  An EXK 515k with a logistics interface (Middleware) and warehouse navigation system is used within the narrow aisle warehouse. The order picker is provided with a Jungheinrich forklift terminal and a handheld scanner.
- EFG 113 pre-zone forklift
  An EFG 113 equipped with a handheld terminal operates in the warehouse pre-zone.
- Electric pedestrian controlled truck EJC 110 and electric pedestrian pallet truck ERE 120
  Both of these devices are used primarily for goods receipt and during loading.

d. Hardware

- WLAN access points
  The entire WLAN planning for the new Warimex logistics centre was conducted and implemented by Jungheinrich. The Motorola access points were configured by Jungheinrich and the WLAN performance was tested by a final radio coverage measurement.
- Forklift terminal with handheld scanner
  The EKX515 has been equipped with a 2475 style forklift terminal by Jungheinrich, upon which the forklift driver can access the driving commands of the forklift control system and the operating procedures for restocking and order picking on the display. This device is also equipped with a hardwired handheld scanner to manually confirm the loading equipment or storage location.
- Handheld terminals
  The pre-zone forklift is equipped with a Motorola MC9190 handheld terminal, on which the driving commands of the forklift control system are also displayed. The order pickers also work with handheld terminals on which the selection commands for the shelf storage system are displayed. Even the packing of entire pallets is carried out by using the handheld terminal. There is also even the possibility to perform other functions with the handheld terminal, including production, stock transfers and stock taking. As a result of selecting such robust equipment with a long battery life, these devices will meet the highest requirements.
- Mobile workstations with notebooks, handheld scanners and label printers
  There are three mobile workstations in use, which are equipped with a notebook with WMS, a hardwired handheld scanner and a label printer. These workstations are primarily used for processing incoming goods and control room tasks. As the notebooks in the mobile workstations are networked and have a high battery life, they can be used throughout the logistics centre and can even, for example, be used for adjustment postings or for stock taking.
- Packing stations with PCs and handheld scanners
  On both sides of the incline roller conveyor, a total of 6 packing stations have been equipped with a PC with WMS and a wireless handheld scanner, where goods for retail orders are packed after selection and prepared for shipping. Laser printers are located at the packing

stations for printing shipping documents and invoices, although this is controlled by the SAP Business One host system.

The following equipment was obtained from Jungheinrich:

- 7 Motorola access points
- 1 forklift terminal
- 7 handheld terminals
- 3 mobile workstations
- 5 hardwired handheld scanners
- 6 wireless handheld scanners
- 3 label printers

The following hardware was provided by Warimex:

- server
- network switches
- 6 PCs at the packing stations
- 3 notebooks at the mobile workstations
- 4 laser printers at the packing stations
- 1 laser printer at one of the mobile workstations

e. SAP Business One host system

The WMS communicates with the SAP Business One host system via a file interface, which displays all Warimex commercial processes. The host system is the leading system and transfers a range of data to the Warehouse Management System:

- Item master data
- Set item data
- Incoming goods advice notes (purchase orders, production orders)
- Outgoing goods advice notes (commissions)

SAP data is sent to the WMS as different files, such as ASTxxxxxxxx.txt for item master data.

The following data is reported by the Warehouse Management System to SAP Business One:

- Commission status messages
- Inventory changes
- Inventory comparison
- Data summary of the packing process

4. Realisation of the project

Once the specifications were released, Jungheinrich began modelling and customising the WMS to meet the needs of Warimex on 2 July 2012. The interface for both sides was created at the same time. This phase was completed on 7 September 2012 with the software and interface testing.

The startup and training subsequently took place on site until 21 September 2012, followed by a week-long operational support service, during which the stocks were migrated from the old warehouse in Kehl and logged in the Warehouse Management System. The entire Warehouse Management System was also put into operation during this week and all processes were begun so that, for example, incoming and outgoing goods could be dealt with. After a further week of operational support, the project was taken over by the Client on 8 November 2012.

5. Illustrated processes

a. Goods receipt

Two different types of incoming goods are processed: Scheduled incoming goods provided with an advice slip in advance by the HOST-System and unscheduled incoming goods without an advice slip from the HOST-System.

All deliveries are recognised by default as scheduled goods receipt with an advice slip from the HOST-System. Both boxes and prepared pallets are delivered to goods receipt. After the collection, the boxes are stacked on pallets, then bound and labelled with a GS1 sticker on three sides. The GS1 label is printed by Jungheinrich WMS. In the event that boxes are delivered instead of pallets, the collection process is similar to that for boxes. The number of items are counted manually by the incoming goods staff and a GS1 label is generated. The collection is carried out using the PC client at a mobile workstation. For particular clients, such as QVC, there are plans to pack the pallets at the goods receipt area to the height at which they will be sent from the outgoing goods area. This means that repackaging will not be necessary at the outgoing goods area.

Each pallet collected can be allocated one of three vertical profiles. This is necessary to ensure that pallets are stored in the narrow aisles in the appropriate row at the appropriate height.

Unscheduled incoming goods are recognised as those to be collected without an advice slip from the host system. Collection for unscheduled incoming goods can be made with or without a GS1 label.

Over or under deliveries of an order are generally accepted by Jungheinrich WMS and the host system. An example of an under delivery occurs when the amount of items within a container is not the same as that which the host system sent to the Warehouse Management System. For

this reason, Jungheinrich WMS notifies the host system immediately of every goods receipt item for the purposes of stocktaking. If an entire container is collected, the order is manually set to completed in the Warehouse Management System and a record is sent to the ERP. This makes it possible for the host system to always display the most recent status of the incoming goods.

In the event that the label printer cannot be used, a roll of consecutively numbered loading equipment labels with the relevant barcodes is available in the goods receipt area. Items that are collected with these labels are given the same number as the pallet ID by the Warehouse Management System so that they can be clearly identified.

All deliveries in the goods receipt area, whether on pallets or in boxes, are single-product only, i.e. no mixed-content pallets are delivered. The batch is sent by the host system and printed on the GS1 label.

Pallets in the goods receipt area that have been registered by the Warehouse Management System are essentially released, and storage access can be generated. In the event that a pallet is damaged, this can be blocked by the Jungheinrich WMS and booked into a blocked storage area. Bookings can be made for incoming goods using either the PC client or the wireless terminal. The storage access can also be processed by the PC client or the handheld terminal.

Delivered goods which are to be resent on the same day or in the foreseeable future are left on their own storage block in the goods receipt area. In such circumstances, a separate profile for these goods receipts is set up using the wireless terminal or the PC client. The booked goods remain on the storage block in the incoming goods area under the BYPASS profile. If a commission is begun which requires these goods, they can be selected directly from this storage block in the incoming goods area and taken to the outgoing goods area.

b. Storage using the forklift control system

After collection of the goods in the goods receipt area, a storage access must be produced using the PC client or the handheld terminal, i.e. transport orders are produced for the collected pallets.

When using the Jungheinrich PC client, the loading equipment number or SSCC number is scanned into the PC client and the input or scan is confirmed by pressing 'Enter'. This process must be carried out separately for each pallet.

From the indicators logged in the item master file, the WMS can ascertain where the collected stock is to be stored and automatically provides the destination area. In the event that the pallet is to be stored in different area, other areas can be selected from the drop down menu. A storage location will be determined by WMS using on-file search strategies. The storage access will be generated by pressing the 'OK' button.

Within the Warehouse Management System is a storage strategy which aims to store pallets containing the same items as close together as possible. Measures have also been taken to

ensure that the EKX turret truck is not required to perform any unnecessary gear changes in the narrow aisle warehouse.

Goods are stored on the narrow aisle shelving unit using the storage control system (SLS). The storage control system initially requires the current location of the employee to be entered in order to assign the correct transport orders. If there are no storage place scanning labels within reach of the employee then this step can be bypassed. Consequently, no optimised allocation can occur due to the location, but rather the most important available transport is selected for the device by the system.

The employee is shown the next transport order on the wireless terminal screen. The employee then drives to the WE location and confirms the inputs required by the system. The indicated loading equipment does not necessarily have to be transported. If several pieces of loading equipment are available at the source (in this case, at the goods receipt area), which have already been collected and for which a storage access has been generated, the forklift driver may scan any desired loading equipment and receive the corresponding target instructions (for example the pallet selected by the system cannot be moved as another is in front of it). After scanning the loading equipment number, the pre-zone forklift is given a transfer zone in the reserve narrow aisle shelving units by Jungheinrich WMS. The target location is subsequently shown (a transfer zone next to the narrow aisle shelving units). Once the transfer zone has been confirmed, the employee is shown the next transport order. The transfer order sorting takes place according to several criteria (such as FIFO, priority, shortest path, duplication, etc.).

Storage in the narrow aisle warehouse is performed with an EKX turret truck equipped with a warehouse navigation system. The employee on the fork lift truck is aided by the forklift control system and is shown the driving instruction to the transfer zone. The coordinates of the transfer zone are simultaneously transferred to the vehicle control system via the Jungheinrich logistics interface, providing a semi-automatic drive to the transfer zone.

Storage in the narrow aisle warehouse is also aided by the Warehouse Navigation System. The turret truck does not need to scan the storage location during the commission or acceptance of a pallet, as this is conducted by the Warehouse Navigation System, or the logistics interface unit.

In the second step, the employee is shown the target location for the pallet delivery and can find it semi-automatically using the Warehouse Navigation System. The forkplay (pushing the pallet onto the shelf before lowering and retracting the fork) is also performed semi-automatically by the vehicle. Following storage, confirmation of the shelf location is sent to WMS via the logistics interface. Manual scanning of the shelving labels is not necessary.

c. Replenishment within the order picking area

Replenishment of fast-moving articles in the order picking area (on the shelving unit and flow rail) is defined according to organisational requirements and conducted between once and twice a day. The replenishment instructions are selected by the employee from a list (selection list) at the terminal. For every item in what is known as the item master file profile, a minimum and

maximum stock allowance for the order picking area is stored in the WMS. As soon as the stock allowance falls below this minimum level, a replenishment order is triggered within the WMS.

Supply orders are made with different priorities. When the quantities fall below the minimum acceptable level, a low-priority replenishment order is created. If a commission for this item is still active, the priority of the replenishment order is increased and becomes compulsory. This ensures that items with an active commission are prioritised.

To perform the replenishment, individual items are selected by the employee using the turret truck. For this purpose, the forklift driver manual selects a replenishment order from a picklist on the terminal. The employee subsequently selects the quantity required for the replenishment order as displayed on the terminal as part of a package and places this on the carrier pallet which was previously recorded. Several such packages may be selected consecutively and placed on the carrier pallet. This pallet is then placed at the end of a row of shelves in a replenishment buffer and brought into the picking area by a pre-zone forklift. An employee then uses a system to sort the material into the designated places on the shelving unit.

When replenishing entire pallet locations in the picking area, the packages are no longer used and the entire pallets are instead delivered to the replenishment buffer.

d. Order picking

Selection of individual items or slow-moving items from the narrow aisle

Slow-moving individual items can be selected from the narrow aisle warehouse using the EKX turret truck. Prior to the start of the selection process, a carrier pallet is taken, along with a packet for each selection order. A selection order is started at the forklift terminal by opening an approved removal instruction.

Once the EKX turret truck has been given a removal instruction, this instruction is sent to the vehicle via the logistics interface and the Warehouse Navigation System powers up.

The employee drives to the location shown and removes the number of items as displayed on the terminal, scans the barcode location and confirms the amount removed at the terminal. If an order is made with several locations, the system then jumps to the next location and sends the destination to the vehicle once again using the logistics interface - the Warehouse Navigation System is used to locate the next location. The processing of the individual items removed is thus optimised.

Once an order has been picked out, the outgoing goods or pack buffer area is shown as the target location which was sent previously by the host system via the interface. This must then be confirmed, and an appropriate barcode is attached to the turret truck.

Once the selection is complete, the next order can be selected from the picklist and processed.

Three transfer zones are planned next to every row of shelves in the pre-zone area. The goods are placed into the pre-scanned package which is placed on the carrier pallet of the EKX turret

truck once again. The carrier pallet is driven to the end of the shelving unit. The pre-zone forklift then brings the carrier pallet, including the packages, to the pack buffer area according to organisational requirements.

Selection of entire pallets from the narrow aisles

The removal of entire pallets from the narrow aisle shelving units is performed in two stages, i.e. the EKX turret truck drives from the source location in the narrow aisle shelving unit to the transfer area and the pre-zone forklift is used from the transfer area to the pack buffer area or outgoing goods area. The employee on the EKX turret truck receives the next instruction over the forklift control system.

The next removal order is then displayed on the wireless terminal and the source coordinates of the order are transferred to the vehicle control system via the logistics interface. The drive to the source location is performed semi-automatically using the Warehouse Navigation System. The confirmation required by the Warehouse Management System (such as the source location) is transferred automatically from the logistics interface to Jungheinrich WMS, meaning that scanning the shelf label manually is not necessary. The drive to the transfer area at the end of the row of shelves and the delivery of the pallets are also performed using the Warehouse Management System. Once the goods are positioned at the transfer area, confirmation of the destination is transferred from the logistics interface to Jungheinrich WMS. As a result of this confirmation, a transport instruction is then sent to the forklift in the pre-zone, requesting the pallet to be brought from the transfer area to the destination in the outgoing goods or packing areas. The pre-zone forklift also logs into the forklift control system dialogue, takes the pallet from the transfer area and scans the location barcode at this location. An outgoing goods or pack buffer area is then displayed on the terminal as the destination. Once the pre-zone stapler has taken the pallets to the required location, it scans the associated location barcode and the removal is complete. The removed goods can then be loaded and packed.

Selection of individual articles from the picking area

Fast-moving individual articles are selected directly from the shelving unit using a handheld terminal. An employee processes the orders with a handheld terminal and places the items from the shelving unit into a picking cart. The picking cart contains several packages (boxes) into which the orders can be placed. Every package has a unique number which is assigned to an order in the Jungheinrich WMS so that each package only contains items relating to that specific order. The selection of goods is carried out optimally, i.e. if an article is required for several orders, the employee takes the appropriate number and shares these - as specified by the WMS - between the pre-scanned packages. During the selection process, the storage location, the item and the number of items taken must be confirmed.

Combined selection from the narrow aisles and the picking area

If a commission is begun in which both entire pallets and individual articles are to be selected from the shelving unit, the WMS divides the order into entire pallet selection and individual article selection. The EKX turret truck performs the part of the selection order for the entire pallets and brings the pallets to the transfer area. The pre-zone forklifts transports the entire

pallets from the transfer area to the pack buffer area. The individual articles are selected from the shelving units by another employee and then also transferred to the pack buffer area.

A commission order on the Jungheinrich WMS in which entire pallets and slow-moving items are to be selected from the shelving units/flow rails is also split. The entire pallets are taken from the narrow aisle shelving unit in two steps using the forklift control system. The selection of slow-moving items from the narrow aisle warehouse is also performed by the EKX turret trucks using the picklist. This means that, the employee changes the picklist menu after the removal of the entire pallets, takes a carrier pallet with a package, selects the appropriate removal instruction and picks out the quantity of items displayed. The carrier pallets are then positioned at the end of the rows of shelves and then taken to the pack buffer area by the pre-zone forklift according to organisational requirements.

e. Packing commissioned goods

3 packing profiles have been established by Jungheinrich WMS. The host system sends an identifier for every commission over the interface unit to determine which packing profile is to be used. This allows the correct packing profile to be already selected following the commission and upon opening.

Packing profile: CEP shipping

Sending packages via CEP (courier express shipping service), e.g. DHL. The host system sends an appropriate identifier via the interface unit, along with the commission, to confirm that packing profile number 1 is to be used. No package unit numbers are generated in the Warehouse Management System and the package unit is not identified by a storage equipment number as no loading control is performed. Once the packaging process has been confirmed to the PC client, a response is sent to the host. The host system only prints all of the labels for the CEP shipping using the label printer at the packing area following this response. Invoices and delivery notes are printed by the host system on the laser printer (provided by Warimex). An employee affixes the labels, includes a delivery note where appropriate, and places the package in a cage pallet which has been provided specifically for this shipping method.

Packing profile: entire pallets without repacking

This profile is used for pallets which do not require repacking as they were selected with the same dimensions and quantities per pallet as those in which they were originally stored. The GS1 label which was attached at the goods receipt area can remain on the pallet and must not be removed. The SSCC is considered thereafter as the package number by Jungheinrich WMS and can be used for loading control.

Packing profile: entire pallets with repacking

This profile is used for goods whose pallets must be repacked at the packing area. For example, it may be that goods which were stored in the Warimex warehouse on 6 pallets must be repacked onto 7 pallets for the client. The new quantity for each pallet is entered into the Jungheinrich

WMS packing mode and the item number is confirmed. The old GS1 label must be removed as the item quantity per pallet is no longer up to date. The employee attaches a new package item number to three sides of every pallet for loading control. This package item number is taken from the roll of labels found in the packing area.

The packing process can be completed using either the PC client or the handheld terminal.

When using the PC client to pack, the employee scans a package located on the incline roller conveyor next to the packing area onto the "Packing" screen. All package items relating to the order will be shown and the employee can work one item at a time, check the quantities and perform the packing process to completion. Once the packing is complete, a notification is sent to the host system which then prints the shipping documents, the invoice and the labels for CEP shipping.

At the same time as the packing using the PC client, the packing process can also be displayed on the handheld device. Even on this, the employee is shown the necessary information to be checked. Once all package items for an order are packed, checked and ready, the packing is considered complete.

f. Loading packed goods

Loading control is only used for entire pallets which have previously undergone the packing process, regardless of whether they were repacked or not. The loading equipment number is scanned for loading control purposes.

Essentially, all pallets should be loaded, i.e. every pallet which is loaded onto a lorry must be scanned by the wireless terminal. The only exception to this is for package items which are picked up and sent, for example by DHL, without pallets. For every commission, the host system sends information or an identifier of whether shipment is to be made.

The loading control ensures above all that pallets are not loaded incorrectly or overlooked. Commissions which are to be loaded together are assigned the same 'load' status.

Using the PC client, individual commissions can be combined into one load. Once the loading has been set up, it can be completed by entering the loading number into the handheld terminal, for which all associated loading equipment is to be scanned against the loading zone. Alternatively, the loading can be logged with the PC client.

g. Warehouse transfers

The transfer of entire pallets in the narrow aisle shelving units or using the pre-zone forklift can be carried out with the support of the forklift control system. This requires, however, the transfer to be triggered by the PC client. The confirmation of the shelving position or the operational processes is performed using the logistics interface in the same manner used for the

storage and retrieval of entire pallets. Transfers are possible for both entire pallets and loose items in the narrow aisles and the rest of the storage area. The employee can carry out an independent transfer at the terminal directly without there being an order.

h. Production of set items

Item sets are groups of items which, when combined in a particular way, form a new item - a set. A set can be packed and stored under its set article number. It can, however, also be formed from its individual parts during the order picking.

A production order can either be started manually using Jungheinrich WMS or triggered by the host-system.

For a production order to be triggered by the host system, a goods receipt advice slip with the item number and quantity of the item set must first be provided, along with an outgoing goods advice slip with the item number and number of individual items. The identifier "production order" must also be present on the goods receipt and outgoing goods advice slips. A further condition requires both advice slips to display the identical order number. By sending the goods receipt and outgoing goods advice slips via the host system, the planned withdrawal of individual items for the set and the planned entry of the set items is guaranteed.

Production orders first of all require the individual items to be commissioned and brought to the preparation area before the production order can be logged with the individual steps. The log can either be made using the PC client or the handheld terminal. The article set can then be either put into storage or commissioned directly.

Storage of the prepared article set is not strictly necessary. If the location of the production is commissionable, the produced article sets are commissioned directly for a customer order.

It is also possible for an article set to be broken back down into its individual parts during stock adjustment, for example in the case of a return.

i. Reports

The following administrative reports were produced by Jungheinrich WMS:

- Articles in the picking area without profiles: This report enables checks to be carried out for which articles in the packing area still do not have an item master file profile, so that the stock management can be updated for these items.
- Items with no fixed location: This report highlights all items found within the picking area which are in a different location to where they should be.
- Storage locations per area: In this report, the warehouse manager is given an overview of how many storage locations in each area are occupied, free, blocked or defined as a fixed location.

- Last access to the storage area: This report provides an overview of the last time an occupied storage area was accessed in order to establish old stock and take appropriate action.
- Packages per day: This is a date-based evaluation of how many packages are delivered through the packing areas for CEP shipping and entire pallets.
- Item turnover: Here, the number of times accessed and the quantities ordered of each item in the picking area is presented to identify slowly-moving items.
- Access frequency per storage compartment: This report demonstrates how often and in what quantities a storage compartment in the picking area is accessed, so as to distribute fixed locations equally across the picking area and to optimise the positioning of items around the storage area.

6. Customer benefits

- Error prevention during order picking by confirming the storage location, item number and the quantity removed
- Increased logistics performance as a result of uniform and system-based processes
- Optimised management of the order picker in the shelving area
- Optimal utilisation of the EKX by using the forklift control system
- Structured processes in a new warehouse
- Assistance from the support provided as part of the maintenance agreement
- Error prevention in the narrow aisles thanks to automatic confirmation of the storage location using the logistics interface and the semi-automatic driving within the storage location using the Warehouse Navigation System.
- Orientation of the logistics towards the future growth of the company as a result of the parameterability of the Jungheinrich WMS.
- Controlling the logistics processes based on existing and future reports which can be produced quickly and easily.
- Reliable data on stock and immediate availability of the actual stock count in the warehouse using the ERP system through constant communication via the interface.
- Use of the permanent stock taking and zero net inventory to ensure constant monitoring of stocks
- Transparency in the logistic processes thanks to online information regarding all stock movements without delay
- Overview of the warehouse layout by the warehouse editor.
- Separation of the two clients, Warimex and Chiara Ambra using the client module
- Reliable Wi-Fi coverage throughout the entire logistics centre as a result of the planning, simulation and measurements made by Jungheinrich and the use of a virtual controller.

7. Innovation

In order to be able to use the Warehouse Navigation System effectively within the narrow aisles, the vehicle control system requires information regarding the next order from the Warehouse Management System. Jungheinrich has provided its own middleware solution, the Jungheinrich logistics interface, to facilitate information forwarding. The purpose of the software is to establish a connection between the vehicle and the Warehouse Management System with minimal effort. All other Warehouse Management Systems are supported alongside the Jungheinrich WMS and the client's IT integration costs have been significantly reduced as a result of the choice between several different connectivity options.

Why does the client need the Jungheinrich logistics interface?

If a client wishes to benefit from the process advantages through the WMS, it does not make sense for the driver to read the orders from the WMS client programme at the wireless terminal and then enter them into the vehicle operating panel. The time saved by this optimised driving process would subsequently be lost by the lack of continuity as a result of manually entering the information. The orders are instead communicated directly from the WMS to the vehicle control system.

The outlay for a WMS to send the information in the correct format from the wireless terminal to the vehicle control system would be large. A WMS is specialised in database operations and process control. Communication with individual hardware devices is usually not possible. It is often impossible because the WMS simply does not have a client programme installed onto the wireless terminal, but rather uses a web browser or telnet client to make the screens generated by the server accessible to the user at the wireless terminal. By using the Jungheinrich logistics interface, the connection will be made significantly easier for the WMS, as it can now transfer the data to the middleware application running on the wireless terminal in its preferred format.

Alongside the simplified connection there are also further benefits: Additional services, including necessary storage space conversions, are made possible. This is particularly relevant when the storage area numbering of the WMS is complex and cannot be served directly by the vehicle control system. In such circumstances, the logistics interface converts the formats in the background and thus connects both systems.

A further example of additional functionality is the support provided to stock transfers. Individual operations, such as storage, removal or commissions are always relevant to the vehicle control system. If the restorage of a pallet is the smallest logistical process for the WMS, it is mediated by the Jungheinrich logistics interface. In such circumstances the WMS sends, for example, the instructions to move a pallet from location A to location B to the logistics interface. A removal request is then sent to the vehicle control system from location A, and the second phase, the storage in location B, is transmitted only once this is complete. The WMS is not affected by splitting the restorage into two logistical phases and can work without adjustment.

The drivers are also relieved of the scanning processes. In the event of the completed storage of a pallet, a WMS requires confirmation that the goods have been placed on the shelving unit at the correct location. It is usually necessary for the driver to make such checks by scanning a

barcode affixed to the shelving unit. If the Jungheinrich EKX or ETX vehicles then drive to the storage location using the Warehouse Navigation System and places the pallets there, it is ensured that the pallets have been positioned at the location stipulated by the WMS. For this reason, the Jungheinrich logistics interface has taken over the scanning process and confirms the appropriate storage for the driver. The scanning process can thereby by omitted.

The integration of a Warehouse Navigation System can go beyond usual expectations with Jungheinrich WMS. The Jungheinrich internal interface allows current vehicle conditions to be exchanged with the WMS client. The drivers are generally quick to adapt to the technology, whereby notifications such as described come from the logistics interface rather than from the scanner. If the Warehouse Navigation System is suspended by the driver due to unforeseen circumstances, such as obstacles in the aisle, the notifications cannot be made automatically. The logistics interface reports this to the WMS, which can then change the colour coding of the input field. This provides the driver with a visual reminder that the necessary notification has to be made using the scanner following the manual deactivation of the Warehouse Navigation System. A particularly close relationship between the Jungheinrich WMS and the logistics interface makes the installation of the Warehouse Navigation System an extremely well thought out solution for Warimex.

The logistics interface is even used by Jungheinrich in client projects which are far beyond warehouse navigation. If more extensive integration is required, an automatic scanner can be attached to the EKX to read the pallet barcodes automatically. Thus yet more scanning processes can be taken away from the driver and the speed and process security are thereby improved even further. This solution has already been implemented by Jungheinrich for several clients across Germany.

8. Sustainability

Due to the wide variety of parameters which can be performed by the Jungheinrich WMS, it is possible to incorporate any group changes into the Jungheinrich WMS without the need for programming. A warehouse extension is just as easily incorporated as the inclusion of an additional turret truck or further hardware, such as handheld terminals, or further packing areas. Additions to the existing two clients can be made, just as the expansion of the product range.

The use of the Jungheinrich WMS enables a paperless warehouse management style without the need to use any picklists in paper form. By affixing the loading equipment labels to the pallet feet, such costs are also kept to a minimum, as the label can be used down to the last item on each pallet. The possibility to use existing labels in the warehouse for shipping also saves further on the costs of printing additional shipping labels.

By using the bypass function, it is possible for pallets which will be needed shortly after they are processed at the goods receipt area to bypass the storage requirement and instead be used directly for new orders. Unnecessary journeys are thereby avoided.

By using high-quality hardware, such as the Motorola MC9190 handheld devices, the long life of these robust devices can be guaranteed.

By using the forklift control system, the routes are optimised for the EKX and the pre-zone forklifts, in that double cycles are driven and aisle changes are largely kept to a minimum in the narrow aisles.

With the help of the handheld terminals, the order picking leads to an optimal route through the picking area and enables the combination of several orders so that the order picker can find optimal conditions.

By using electrically-powered industrial trucks and installing solar panels on the roof with a peak output of 120 kWp, Warimex is able to keep CO_2 emissions as low as possible.

By conforming to the GS1 standards, a worldwide, valid standard was introduced, which will have long-term validity and can define all extensions to the WMS.

Short-term changes, such as the quantities of a particular item in the context of actions, can be easily intercepted via the settings on the item master area profile. Here, the fixed locations and the minimum and maximum quantities for the picking area can be maintained, amongst other settings, so that the stock replenishment can be adjusted according to a higher volume of sales.

Using the existing reports, the warehouse manager will have the opportunity to continually optimise the warehouse, for example moving slow-moving articles from the picking area to the narrow aisle warehouse, or storing frequently-used items at an ergonomically optimal height.

9. Marketability

Essentially, the marketability of this special solution, as it has been used for Warimex, cannot be generalised. However, the variety of Jungheinrich AG products which were used by Warimex (shelving units, industrial trucks, wireless data, software) results in a broad market for system solutions. Through this broad spectrum and additional products such as APM, it is possible to provide optimal, sustainable solutions for all client requirements and problems. This great potential offers clients worldwide the opportunity to work on even the most complex demands of a vendor and to obtain solutions and support from a single source.