

SattStore WMS™

System Overview, Version 9





Version 9

SattStore WMS – System Overview

The SattStore Warehouse Management System provides all functions needed to build an efficient warehouse operation.

This specification is an overview of the contents of SattStore WMS. You will find a more detailed description in the SattStore WMS Functional Description.

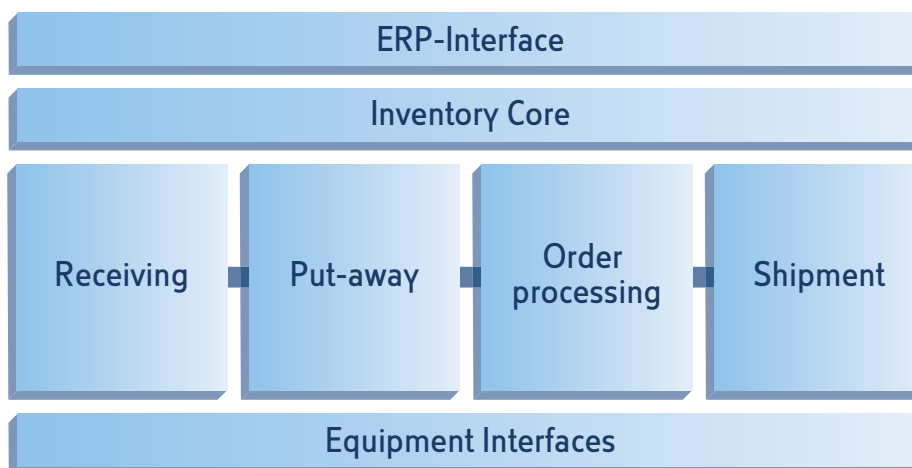
With SattStore WMS you get a software package for warehouse administration and control of all activities in the warehouse, whether they are performed by automatic equipment or by human operators.

SattStore WMS is a tool that allows warehouse managers to control and monitor their warehouse, and helps operators to work efficiently and accurately. SattStore WMS is a well-proven, complete package for all types of warehouses. It takes advantage of the dynamics in a fully real-time driven process so that all personnel are optimally working with tasks that are most important for the business. Real time operation also means that tracking information is automatically captured and statistics generated as the goods are handled.

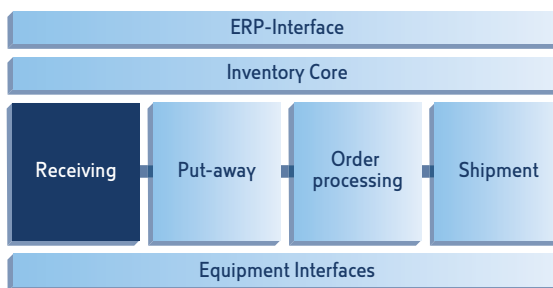
SattStore WMS supports the following warehouse processes; Receiving, Put-away, Order processing and Shipment. The system also includes support modules: The Inventory Core module, ERP-Interface modules and Equipment Interface modules.

With its modular design SattStore WMS easily connects to either automatic handling equipment such as high-bay cranes, STVs, conveyors or manual equipment such as radio data terminals, label printers or bar code scanners. The design features simplify the integration of new equipment without extensive reprogramming as your business demands change.

SattStore WMS is available on both UNIX/AIX, and MS Windows platforms. Oracle is used as the database handler.



Receiving



SattStore WMS captures receipts immediately as the goods arrive. The system fully supports receiving despatch advices and reading and decoding EAN128 labels as well as entering data manually into the system. At this point relevant tracking information such as supplier id, supplier batch number, purchase order and production date is



entered. From this moment, the goods are visible and tracked through the warehouse and out to the customer e.g. giving a full overview of what supplier batches have been delivered to which customer.

Upon receipt the operator is alerted for potential item shortages. This makes it possible to prioritise the handling of certain products.

Products that must be put on hold for quality check or other reasons are stored as normal but are blocked for output. Products that must be held for quarantine reasons are automatically blocked for a number of days after the production day. The number of quarantine days is then a parameter in the part database.

When registering goods the operator may record quality issues on the whole delivery or individual items such as product and load marking, packing note, packing quantity, packing marking etc., thus building a vendor statistics file where all relevant issues are logged per day.

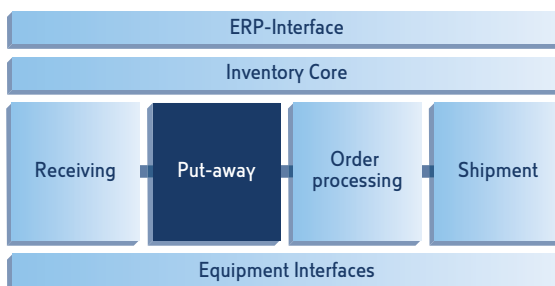
At goods reception, SattStore WMS can cross dock the input quantities to output orders with shortage without passing storage.

As each individual storage operation is completed, the SattStore WMS inventory is updated in real time and the host system notified with all relevant data, including quality remarks.

Advantages of the receiving process:

- Quick and accurate process → short lead time for received goods
- Full use of despatch advice and EAN128 labels
- Cross docking
- Vendor statistics

Put-away



Before storing goods, SattStore WMS automatically selects a suitable location using the dimensions of the goods and product characteristics. An advanced zoning system supports several levels with alternatives allowing for frequency zones, block-stacking zones or picking zones. SattStore WMS supports all store types: High-bay racking, low level racking, or floor level storage, etc.

Put-away is done using radio data terminals where full loads may be put-away by forklift trucks, and smaller amounts by using a "reverse" picking



method. Different areas of the warehouse may use different methods and equipment by default, some areas can also use paper lists for input.

Put-away may also be directed to an order assembly area in case of a cross docking operation or to the picking location if this is empty or nearly empty. Put-away tasks can be performed in one step or in multiple steps e.g. with a forklift truck from receiving area to the narrow-aisle store, then by narrow-aisle truck to the final store location.

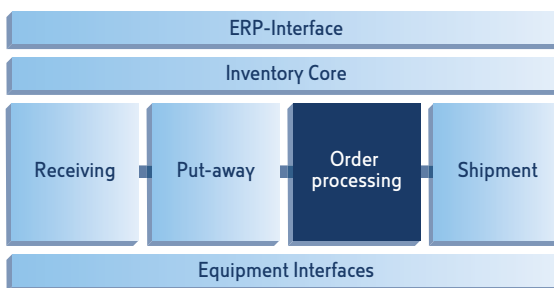
As each individual storage operation is completed, the inventory level is updated in real time.

Advantages in put-away:

- Quick and accurate process → no misplaced goods
- Advanced zoning system
- Real time update of inventory levels



Order processing



Order Planning

Picking orders in the warehouse office are planned using a variety of criteria: Delivery date, order type, order weight, order volume, shipment, consignee etc. All criteria may be combined to form a specific search condition. Specific order types e.g. express orders can be set up to automatically run through the planning procedure.

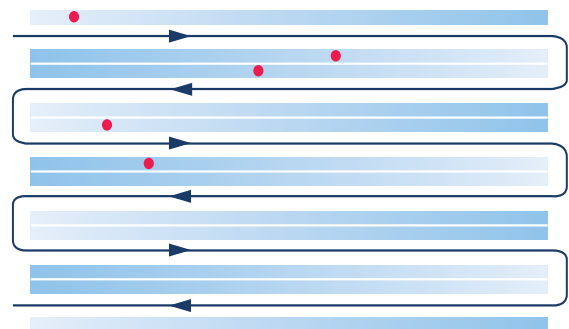
During the order planning process the planner can visualise the result of planning in terms of weight, volume, expected expedition time and product shortages. Orders are then put into an order batch by the system. At the same time picking routes and retrievals of full loads are created.

The planning process also involves planning the use of output areas. SattStore WMS supports the planner in deciding which areas to use with respect to size and departure times by giving a full overview of all output areas and their use during the day.

Pick route creation uses a number of system parameters. The weight or volume may be limited to fit a practical size in each area of the warehouse and the number of customers in each pick route may be set for each area. It is possible to set whether picking is done by document or by radio data terminal for each pick area. All these system parameters are defaults and may be varied for each order batch during the planning process.

Pick routes may be created per pick area or as Super pick routes that cover several areas depending on the type of area or handling in each area.

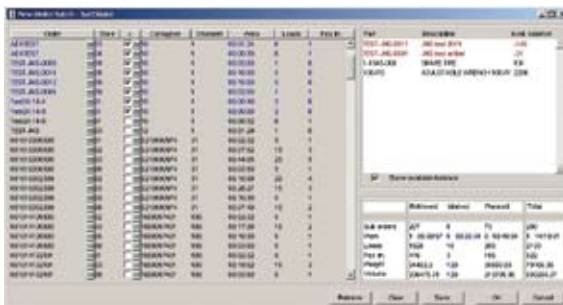
Pick routes are created in a pre-defined picking order. Each individual pick location may be given a sorting order to minimise picker travel. Additionally, each product can be given a prioritised picking order to ensure that heavy products are picked before fragile products.



Furthermore, picking and full load retrieval may be generated as batch picking routes either per consignee, per shipment or per part in the order batch.

Normally goods are selected in FIFO order (best-before date order) but exceptions are possible. For instance, products belonging to a certain supplier batch can be reserved for a specific customer.

Every part has a default shelf life parameter that guarantees that the goods leaving the warehouse have a certain shelf life left until best-before date. The shelf life can be superseded by a parameter defined on the order line. If this parameter is set, it is used to calculate the remaining shelf life of the delivered products. In this way it is possible to guarantee a longer shelf life for consignees with a long transport time or to sell out a batch of goods with a short shelf life.



The screenshot shows a software interface with a table of goods. The table has columns for 'ITEM', 'UNIT', 'QUANTITY', 'DATE', 'STATUS', 'PICK', 'STOCK', 'PICK BY', 'PICK DATE', 'PICK TIME', 'PICK LOCATION', 'PICK METHOD', 'PICK STATUS', 'PICK REASON', 'PICK COMMENT', 'PICK ACTION', 'PICK RESULT', 'PICK MESSAGE', 'PICK HISTORY', 'PICK LOG', 'PICK REPORT', 'PICK SUMMARY', 'PICK ANALYSIS', 'PICK OPTIMIZATION', 'PICK SCHEDULING', 'PICK ASSIGNMENT', 'PICK EXECUTION', 'PICK MONITORING', 'PICK EVALUATION', 'PICK IMPROVEMENT', 'PICK INNOVATION', 'PICK RESEARCH', 'PICK DEVELOPMENT', 'PICK TESTING', 'PICK DEPLOYMENT', 'PICK SUPPORT', 'PICK TRAINING', 'PICK DOCUMENTATION', 'PICK COMMUNICATION', 'PICK COOPERATION', 'PICK COLLABORATION', 'PICK INTEGRATION', 'PICK SYNERGY', 'PICK INNOVATION', 'PICK RESEARCH', 'PICK DEVELOPMENT', 'PICK TESTING', 'PICK DEPLOYMENT', 'PICK SUPPORT', 'PICK TRAINING', 'PICK DOCUMENTATION', 'PICK COMMUNICATION', 'PICK COOPERATION', 'PICK COLLABORATION', 'PICK INTEGRATION', 'PICK SYNERGY'.

Loading order

Each consignee is given a loading order and SattStore WMS controls the order expedition to ensure that loads are put in the output area in the order they will be loaded onto the vehicle.

Order Picking

Pick routes are given to the pickers. Depending on the system parameter set-up, orders to several customers may be picked at one time and/or several pickers can pick the same orders. As picking commences, the weight and volume of orders to each customer are estimated and a unique label is

printed. By selecting a suitable box, the picker can pick and pack at the same time. Picking may be done to totes, pallets or any other type of pick-to-load. If one pick-to-load is not enough, the picker may continue with a new one and retrieve a new unique label.

It is possible to set up the sequence in which different areas should be picked. E.g. pick area one must be finished before other pick areas may start and when all picking is completed the retrieval of full loads may start. This enables pre-picking in certain areas, with automatic release of connected pick lists in other areas.

The picker scans the pick location or enters a check-digit to confirm correct pick operation.

As part of the picking procedure each pick-to-load can be marked with a unique address label containing consignee information and a unique identity to help identify the goods at a later stage.

Every pick line is presented to the picker in pieces and in packages. The package weight may also be registered for certain products since they are invoiced in weight. Serial numbers may be registered for certain products on every picked product. The tracking database and the statistics database is updated automatically.

During picking, operators may request replenishment and count the pick location. A replenishment request can also be issued automatically when the quantity on the pick location falls below a pre-defined level.

The picker can also select pick routes according to his/her ability to perform them. If, for instance, the equipment does not allow picking above level two the selection of routes may be limited to routes with level two as maximum. It is also possible to split a pick line between several pick-to-loads in order to distribute large pick lines of heavy goods between several pick-to-loads.

As picking continues, the content of each pick-to-load is automatically updated. At the end of the pick route the content of each individual pick-to-load is known in detail. This ensures that the information on packing lists, data sent to host systems and data sent to EDI systems are accurate. The tracking database is also updated in real time.

Picking in power columns

SattStore WMS includes an interface that enables connection of several types of power columns. One or several power columns can be connected and controlled via SattStore WMS. The principle is that a batch pick route is made in the power columns. One picker can easily operate 3-6 power columns, while one is changing pick location, the picker continues with the next. In this way you can achieve 3-5 times more efficient picking as with normal shelf picking.

Picking in power columns can be performed in two alternative ways:

1. With a label, where the label is both the pick line information and part labelling.
2. With the help of PC and scanner, where each pick line is acknowledged by scanning the pick location bar code and the pick-to-load label.

Full Load Retrievals

Full load retrievals are given to fork-lift trucks as individual tasks, which allow several fork-lifts to simultaneously process output loads for a certain



order. As with put-away, a full load retrieval may be performed in several steps. Full load retrieval follows the same principle as full load put-away. When picking up a load, the load ID is scanned and when the load is deposited the location is scanned or the check-digit is entered. Each output load can, be marked with an address label as part of the full load retrieval.

Batch Picking

If batch picking was generated per shipment or per part, the picked goods or the full load retrievals must be split between the different consignees before the goods can be shipped.

Replenishment

A replenish operation is activated manually by the picker pressing a button on the pick terminal or automatically by the quantity on the pick location.

Replenishment tasks may be organized as full load replenishments, as part load replenishments or as picking from the buffer locations.

When replenishments are performed as a full load movement they are normally given a high priority. The priorities are individually set per type of assignment.

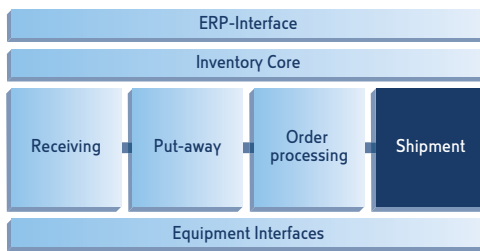
Part load replenishment means that a load is retrieved for replenishment, the operator tells the system how it has been replenished and gets a return assignment for the load to buffer.

When the replenishment tasks are performed as a pick route, the pick route is automatically transformed to a reverse picking for input on the pick locations.

Advantages with real time order processing:

- Quick and accurate process → less pick errors and correct balances
- Tracking and statistics information is captured automatically

Shipment



The shipment procedure involves several activities; order assembly, packing, vehicle loading, document retrieval and shipping.

All goods belonging to a customer are assembled at the order assembly area. Full loads are brought by fork-lift trucks, whilst pick-to-loads from different pick areas are delivered by the pickers.

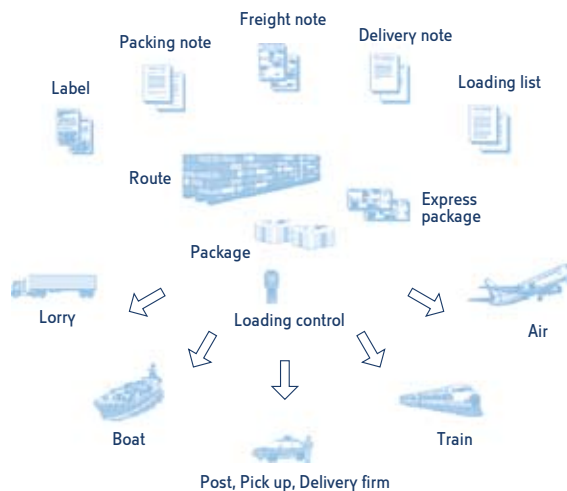
Before shipping, it is possible to rearrange the goods into different loads. Goods from different pick areas can be packed together as one load or one load can be split into several loads with a simple drag and drop function.

The principle is that the physical and logical content of each load correspond with each other. Each load is identified with an address label with a unique ID, preferably an SSCC number. The label also contains consignee address information.

The following packing documents may be printed:

- Packing list, stating the exact content of each load.
- Delivery note with the exact result of the order picking.
- Consignment note (freight note) with the content of the delivery in numbers of different package types.
- Shipment report, a summary with address, weight and number of loads for all consignments in a shipment.

It is possible to split one consignment note into several if, for instance, a portion of the goods has been sent by express delivery.



All documentation may be printed on laser printers saving substantial money on carbon copy paper. Several types of delivery and consignment notes are available.

Load check

When loading the goods the system may be set-up to require a check scanning of all loads being put into a lorry.

This action ensures that no mistakes are made when loading the lorry and that the correct goods are delivered to the customer.

Top loading

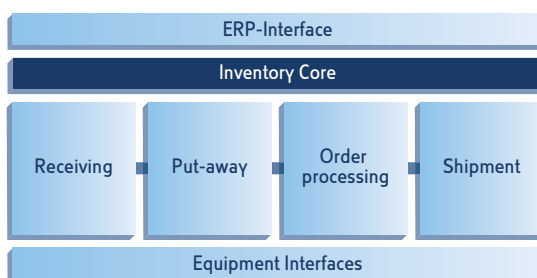
Top-loading is used to fill up a lorry with more goods than ordered to make the best use of the lorry's volume. Top-loading requires that the customer can accept extra deliveries of specific products. This means all available transport volume is used and transport costs are minimized.

Advantages with the shipment procedure:

- Correct content on all delivered loads on lists, EDI-messages or data sent to host
- Load check ensures that the correct goods are loaded on a vehicle



Inventory Core



The inventory core contains the basic inventory control functions. All location data, load data and product data belong to this module.

A large number of administration functions exist within SattStore WMS to assist with the efficient management of the warehouse.

Shortages

If an order requests a larger quantity of a part than what is available, SattStore WMS saves the missing quantity as a shortage record. When the part arrives the top priority is to fulfil the shortages directly from the goods reception area.

Cycle Counting Functions

SattStore WMS can recommend cycle counting for those locations that have not been counted in a certain period. In addition certain areas or certain parts may be selected for cycle counting. Furthermore, if picking is performed with a mobile

terminal, cycle counting can be performed during normal production hours reducing specific counting operations to a minimum.

Resource Management and Equipment Utilisation

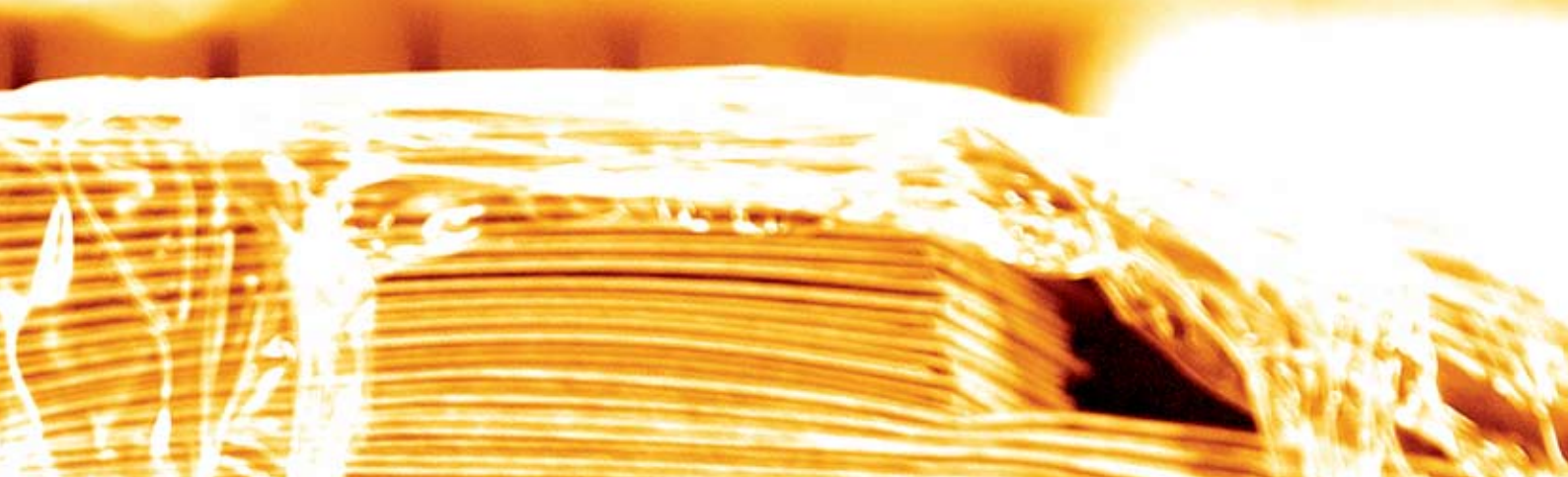
SattStore WMS collects data each time a pick line or a full load transport is finished. The actual time for the operation is logged per product, per operator and per store. This gives the warehouse manager an excellent tool for analyzing the operation and predicting the resource needs for today, tomorrow and the future.

Space Utilisation

Advanced ABC analysis functions advise where to store a product by considering the past expedition history. The analysis is performed for full part load storage on one hand and for pick locations on the other. The information can be used to analyze the current situation or to predict the next peak season. The analysis may be performed as either a frequency analysis or a cost analysis.

Capacity Utilisation

The current workload is monitored at all times in real-time. The workload is split into different input and output areas, and into different working proce-



dures such as item pick, reversed picking, full part load pick replenishments and full part load input. The data is presented in terms of lines, weight, volume and time.

The workload data can be used by the warehouse manager to organize the work and to control the operation. A bottleneck is spotted immediately and can be dealt with before it becomes a problem.

Multi-Site

SattStore WMS supports several different warehouses (sites) running in the same computer. It can be valid for both permanent and temporary sites that could be run by the same system.

Operator Statistics

As work commences the system logs the number of completed operations together with the time spent by each individual operator.

Traceability

All stock movements; full load inputs, full load outputs, replenishments, picks and balance corrections are logged. On the input side this includes information about the production batch and delivery note the goods arrived on. On the output side it includes which output order the goods were shipped to. With this feature it is possible to track which customer

received goods belonging to a particular product batch or delivery note.

Activity Based Costing

All activities in the warehouse are given a cost. The total cost for all activities is summarised per product, activity and day. With this information it is very easy to measure costs per product or product family specifically connected to different activities. It is also possible to summarise all activities for a certain 3PL customer if the warehouse is a certain 3PL provider. The information is used as a basis for invoicing the activities and the utilised storage space per 3PL customer.

Bill of Material

SattStore WMS supports product kitting from a set of other products. The host system orders bill-of-material products and SattStore WMS controls the retrieval of the individual products making up a bill-of-material product. SattStore WMS also controls the return of remaining products from the production area to storage. The finished bill-of-material product may also be stored as any normal product.

Value Added Logistics

SattStore WMS supports additional services performed by the warehouse, e.g. adding campaign



extras to a product before delivery. These services are sent as one or several text information lines connected to a consignee, an order or an order line. Each text line can be associated with a cost (Activity Based Costing) and is displayed to operators in all areas of the operation.

WEB-Interface

SattStore WMS has the option of a WEB-interface for easy access to accurate data through your whole organisation. Purchasing and sales personnel have access to real-time data about purchase orders, customer orders and stock figures.

SQL-queries

With SattStore WMS come the possibility to write data queries customized to your needs. The information can be displayed on the screen, printed on paper or easily exported to a text file, an Excel file, an XML file or an HTML file. All queries can be published for execution either on the WEB or in the normal Windows user interface and may also be set to run in the night work job.

Third Party Logistics

Owners of goods

SattStore WMS offers full support for third party logistics (3PL). The 3PL provider can communicate with several host systems, each one hosting a 3PL

customer. Each customer is the owner of his/her goods in the warehouse and communicates products, orders and consignees to the SattStore WMS. Each 3PL customer may use their own product coding, study their own goods and deliveries while other customer data is not visible. Conversely the warehouse may be used optimally as all locations can be used by all customers. It is not necessary to reserve a certain area for a specific customer.

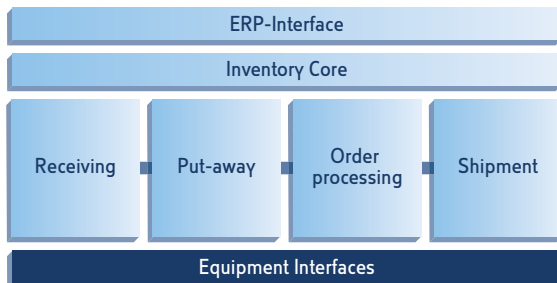
Activity calculations in a 3 PL warehouse

SattStore WMS offers lots of valuable information about all services that has been performed for a certain customer in a 3PL warehouse. Every goods registration, pallet movement, put-away, pick, stocktaking operation is logged by the system and forms a base for invoicing the performed services against the 3PL customer. The warehouse manager can retrieve the data in Excel-format or text file format and use it as a basis for invoicing and use the file as an appendix to the invoice. The information can also easily be transferred to XML format allowing host systems to easily import the data.

Advantages of 3PL functionality:

- Accommodates all 3 PL customers with their own products, orders, consignees etc
- Communicate to several 3PL customer hosts
- Invoice 3 PL customers based on activities calculated in the SattStore WMS
- Optimal use of warehouse locations

Equipment Interfaces



SattStore WMS can be equipped with a combination of modules for the control of automatic and manual equipment in order to fulfil the needs of each installation. The following modules are available:

Dispatcher – The module administrates and ensures that all transports are performed in a secure and failsafe way.

Mobile – When radio data terminals are used for load movements the load identity is scanned upon pick-up and the location check digit entered or scanned on delivery. This ensures that no loads are misplaced.

The mobile system has an advanced prioritisation and distance optimisation algorithm to minimise empty time for forklift trucks. A large number of parameters for the control and efficiency of the transports exists. SattStore WMS always directs operators to carry out the most important task with regard to distance to pick-up location, pick-up location priority, waiting time, customer order, despatch time etc. The mobile system also includes maximising the number of forklifts in certain areas thus avoiding “traffic jams”.

Crane – High-bay crane module for different automatic crane makes and models such as box cranes and pallet cranes.

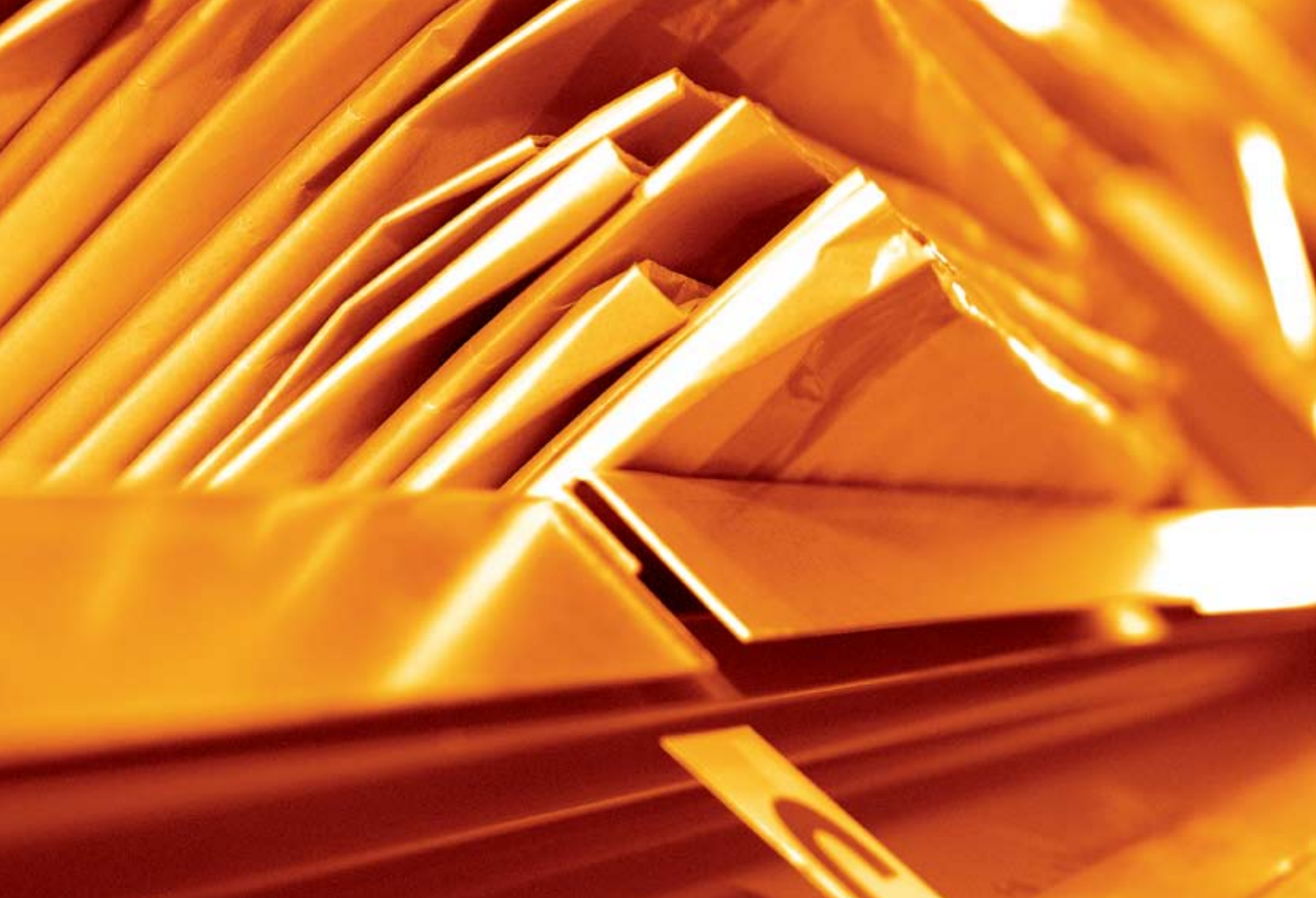
Conveyor – module. Different control systems may be used for physical conveyor control. In SattStore WMS software exists for communication with different PLC makes such as ABB protocol, Siemens protocol and OPC protocol. Specifically the conveyor module has sub-modules for the handling of format stations and pick stations in conveyor systems.

AGV – AGV (Automatic Guided Vehicle) module. The module optimises the transports in connected external AGV-systems.

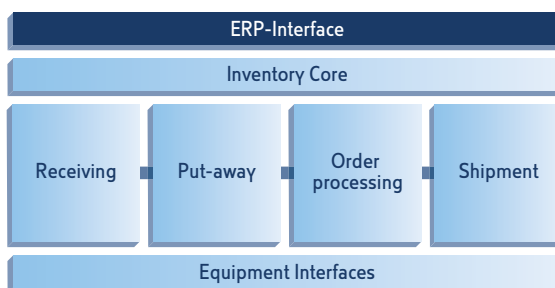
STV – STV (Sorting Transfer Vehicle) module. The module optimises the transports in connected external Daifuku STV-systems.

Power column/paternoster – Extensive space savings are possible with this module whilst maintaining very effective picking. The module includes protocols for communication with a number of different equipment makes.

Others – A large number of protocols exist for communication with bar-code readers, label printers, workstations, card readers, etc.



ERP Interface



SattStore WMS is designed for connection to one or more host systems although it may also operate as a stand-alone unit. This can either be done with an easily implemented file transfer protocol, an XML-interface using the SattStore WMS Collaboration

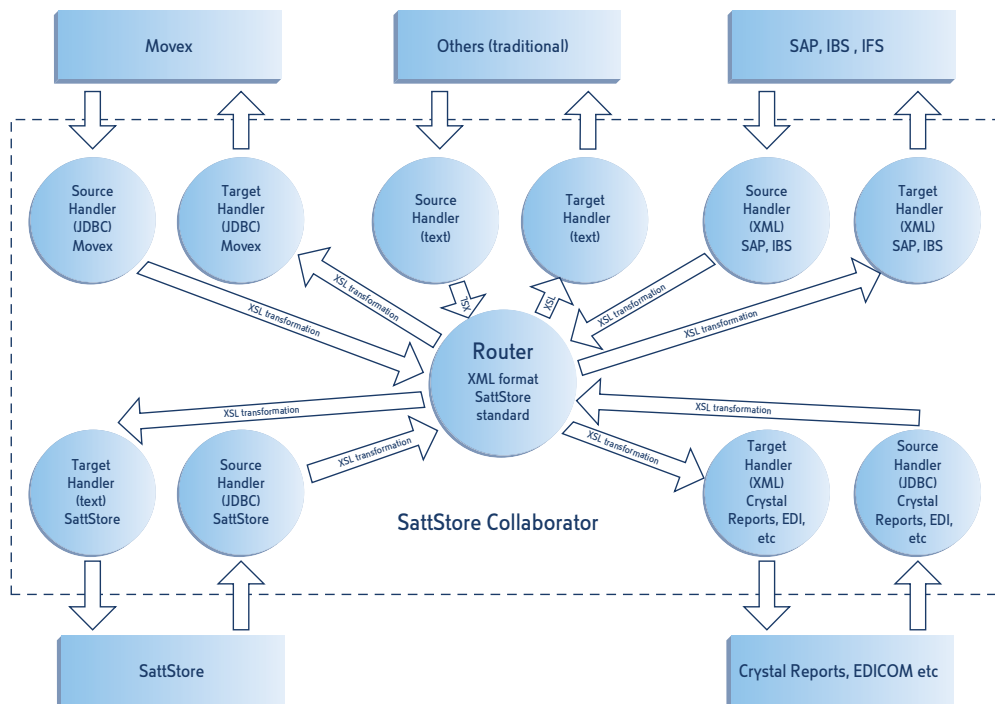
Manager software or using more advanced message broker systems.

The simple file transfer protocol is preferable when just one connection is needed. The file transfer protocol specifies a number of transactions where each transaction is a line in a transaction file. The host system sends both more or less static data such as part definitions, shipments and consignees, and dynamic data such as input orders (purchase orders, production orders etc.) and output orders (customer orders).

SattStore WMS sends dynamic data, input and output order results and balance corrections.

The SattStore WMS Collaboration Manager is a more general interface, using XML as a common denominator, which retrieves and delivers data from a number of different systems. With the flexibility of the SattStore WMS Collaboration Manager the interface and maintenance work in the connect-

ed systems is minimised. The content in the data exchange is the same as for file transfer. In addition there are more possibilities to communicate easily with other systems such as document handling systems, EDI systems etc.



Summary

With SattStore WMS you purchase a tool for your warehouse business both now and for the future. New equipment is easily integrated and processes are easily adapted to new demands.

Accurate control of balances and the physical warehouse enables a smooth operation where all processes works against the same goal – that which is the best for your business. Substantial savings are made in more efficient handling, accurate balances, less errors and customer complaints, and more efficient administration.

Your partner today and tomorrow

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