1. Functionalities HB

1.1. Pallets stored in HB should be storage evenly:

1.1.1. We expect the same article in the different aisles. If we have first pallet in aisle number one, the second pallet should be directed to next aisle. All of articles should be stored in different aisles evenly. We expect access to the articles in each aisle, as well as the even operation of the stacker cranes. All of cranes should be used in the same value of performance. Final destination is unknow at the time of label printing. Destination is assigned to pallet in the decision point (scanner in the installation). WMS sends final destination do MFC. We expect two strategies of storage. Options should be possible to change in WMS at warehouse settings level. In the first one all pallets are directed to HB. If pallets from HB to manual area are needed, replenishment settings in WMS direct expected units to manual area. Second strategy in first step is checking expected number of units in manual area compared to existing units. If defined number of expected pallets is higher than existing, pallets from inbound are directed to manual area, without touching HB warehouse. To be calculated, pallets should be included in open transports on the way to manual area, and transports inside the manual part of warehouse. Pallets from goods receive area are directed straight to manual area via the conveyors and lifts. Destinations are assigned to pallets in the decision point. Value of expected pallets in manual area are defined in replenishment settings in WMS.

1.1.2. Pallets should be located as near as possible to prezone. Route from HB to prezone should be short. The way of filling HB warehouse should be from prezone, deep in to the HB, with overriding guidelines like strategy for flammable articles or articles under pressure as well as all requirements and guidelines for loading of the baseplate, according to the information provided by Building Contractor. Pallets should be directed in first step vertically and in the second horizontally.

1.2. Housekeeping.

1.2.1. Housekeeping is a side process. Cranes can make additional moves for housekeeping in the event of a low load on the system. Level of availability should be set in MFS. Housekeeping can be carried out by one crane without impact to another. Cranes can make additional move for housekeeping. Process is automatic, but it should be possible to switch it manually. Base for this processes are out of storage logic. MFC should control how many free

Commented [AM1]: This comment does not take into account the strategy for initial loading of the baseplate. Such guidelines will undoubtedly be handed over by the construction part. I suggest (to be on the safe side), to add at least a mention, that the overall strategy needs to also consier construction guidelines.

Commented [KJ2R1]: Ok, please add it.

locations we have, and if it is possible should give the transport for pallet as is described in point 1.1.2 Housekeeping process should take into account replacing of the pallet by low high, and in high place to replace with low high. We expect special menu In MFC which can show how many moves is possible, with function how many moves can be released for operation by the installation. If we take manual option, housekeeping and standard process (storage and replenishment to manual/repacking) should continue alternating.

1.3. Automatic places control- empty/occupied. Process has two options, automatic and manual. MFC checks the places, and compares with WMS data.

1.3.1. Manual. Operator can start the process in a small part of HB. MFC directs the crane to selected place, and checks the status of the place. Occupied or free. After that MFC compare the status to WMS status, but system MFS should have included occupancy map. All moves should be updated to occupancy status in MFS. It's possible to have three cases:

a) MFC status is the same like WMS.
b) In MFC we have status occupied, in WMS we don't have any information about this location..
c) In MFS place is free, in WMS we have stock in this place.

1.3.2. Automatic. Process is the same, but it can be controlled in a free time. Crane can make additional moves of housekeeping in the event of a low load on the system. The level of availability should be set in MFS.

1.3.3. MFS should have dashboard, where we can check place without pallets for a long time. Time range should be defined by user. Location with quality codes. Locations with errors. All controlled places should have statistic with date of last control process.

1.3.4. MFS should have the possibility to switch off chosen place from process, with communication to WMS. It's not possible to unlock location from WMS side. Place should be locked in WMS too. It's a special function for maintenance. In this situation a locked place from MFS level has higher priority than WMS.

1.4. Flammables articles should be located in dispersion, and in a specified value in relation to the total volume of capacity of HB. All kind of flammable pallets should be controlled before pallet will be stored in the rack (what kind of flammable article/ pallet it is). What kind of articles it is, and where it can be located. Pallets can't be stored side by side. More details in tender document.

Commented [AM3]: This is very specific and I am wondering, if not too specific at this point. Would it make sense to shorten this paragraph, to only share key expectations, for MFC same as WMS, MFC occupied and no info for WMS, MFS free with stock in WMS.

Commented [KJ4R3]: Ok, we can change it, but please keep three possible cases. Your shorter version is ok for me.

1.5. Control station

1.5.1. Access to pallet from 3 sides.

1.5.2. We expect possibility to bring the pallet from HB, and after control process, we can send pallet to HB, NOK, designated stitch point. Operator can send pallet to all possible locations, or can send to HB. If operator chooses HB, pallet can be directed to the new location. Decision point (label scanner) in this part of installation.

1.5.3. The main task for control station is corrections of unit in WMS to assigned pallet by user. Operator after counting units can set right value of units to WMS. Differences of unit should be located in a dedicated place in WMS. Additional function of this place is registration of recipe assigned to article. Operator can check how the article is located in the box, and set most adequate recipe from the list. For this process should be separated menu in WMS. After this process pallet can be directed the same way like after control of units.

1.5.4. Recipe of repacking. It's part of repacking process, but can be handled in this part of installation. User can invoke pallet from HB by WMS, and set recipe for article

1.5.5. Control place should be equipped with computer with MFS and WMS access.

1.6. Removing orders from system

1.6.1. Removing orders from HB

a) Functionality should be in WMS with communication with MFS. Operators can remove transport by standard option until the crane takes the pallet from rack. After removing transport, WMS sends info to MFS. MFC should check the status of transport in installation.

b) Pallet in the rack – Transport are deleted from MFC with the sent information to WMS. Transport from WMS ale deleted also.

c) Pallet on the crane – Transport is not possible to delete. MFS sends info to WMS, that is not possible to delete this transport. WMS displays info to the operator, that it is not possible to do.

1.6.2. Removing transport to HB

a) Removing transport should be in WMS. Removing by standard option is possible before pallet is putt on the conveyor. Before removing transport from WMS sends info to MFS:
b) Pallet outside the installation – WMS sends info to MFS. If MFS has no info about this pallet, transport can be deleted in WMS. MFS sends info to WMS, that transport can be deleted.
c) Pallet in the installation – WMS send info to MFS. MFS sends answer to WMS, that pallet is on the installation, and removal is not possible.

1.6.3. Pallets without info in WMS/MFS

a) Pallet without destination in WMS, should be directed to NIO. The same case with error of barcode reading.

1.7. Orders with special prio

1.7.1. User with special access can change default prio assigned to transport. All transports have assigned prio in WMS. Default prio is always lower than prio which system WMS can give to MFS. User can manually change prio for special transport. System MFS after that, should bring this transport on the top of the list, for realization by cranes and conveyor. Transport should be done as soon as possible without impact for open transport that is already being carried out.

1.8. Counters

1.8.1. Destacking shipping totes station

a) Number of maximum pallets should be defined in MFS. System can send next pallet from HB, when the operator will send empty pallet to stacker. System can't send new pallet before removing empty. After the pallet is emptied, stock from pallet in WMS should be updated. All quantities should be moved to special place in WMS

1.8.2. Multi-functional fingers in existing warehouse

a) Exit point - Number of maximum pallet should be defined in MFS. System can direct pallets to finger point to maximum filling moment. All pallets with one destination should be added to value of counter assigned to destination point. If the counter is filled in 100%, automatic installation can't take new order to realize at this point. Pallets on the RGV vehicle, with destination to full finger should be looped on rgv. If operator take the pallet from exit point by forklift

from ground level, counter should be refresh, and next order from the list should be send to crane.

b) Input point – RGV vehicle can take pallet from conveyor without impact for replenishment. Replenishment for Repacking Area should be handled. System MFS should control how many pallets at one time can be taken from inbound, without impact for transport with Repacking destination

c) NOK – number of maximum places for pallet should be defined in MFS. If all places are occupied, the next pallet can't loop on the installation. All inbound processes should be stopped. Pallet with any error can't arrive further in the installation before error removing. Fulfillment of NOK should be controlled by MFS. If we have (maximum number of pallet -1) we expect special info for operator, to keep inbound process. All pallets with error should be removed as soon as possible.

d) Prezone of repacking – Number of maximum pallet should be defined in MFS. Counter should be separated to partial mode and full. If we don't' have space for pallet with partial assigned mode, pallet after defined looping should be directed to full mode repacking.

e) Control Station – Number of maximum pallets should be defined in MFS. System can't send more pallet than number of counter. If operator will send pallet after control, the next one can arrive to operator. All moves are created in WMS. Operator can send pallet to chosen point by the pressing button.

f) Exit point in Inbound area – Same work principle as in exit point in manual area.

g) Prezone of the crane - Number of maximum pallets should be defined in MFS. Maximum value can't be higher than it is possible to physically handle.

2. Description of process

2.1. Inbound – Employee can put the pallet by forklifts on the conveyor from ground level. All of the pallets before should have data in WMS, and defined destination without the address. Installation is checking all possible errors in the control gate. All errors should be checked before pallet arrives to NOK. If pallet has error, it is directed to NOK station. User can remove all errors in one step. After that, Employee

can send pallet, or remove pallet from the installation. In the decision point (scanner in the installation) system WMS will give to MFS destination address. Pallet can be send from this point to:

- HB
- Manual part of existing warehouse
- Repacking
- Control Station (by the button)
- Destacking station (in case of emergency)

In case of 100% fulfillment, pallets from inbound should be directed to outbound. WMS can't give the address for pallet, and pallet should be directed to outbound finger with info "No place". Height of pallet should be automatically corrected after control gate. Height from control gate is more important than height from WMS. If we have non-compliance, system should overwrite height of pallet from installation to WMS, and chose the right place in the rack. Overwriting is only down, never up.

2.2. Outbound – Two finger points. Employee can take pallets from installation by fork lift, from ground side. Fingers are controlled by counters. Empty finger is the signal for conveyor that next pallet can be directed to finger. If conveyor has only one pallet, installation is waiting for the second pallet. There should be adjustable timeout. If system didn't have second pallet, the first one should be moved individually. Pallet with destination to manual part should be paired if it's possible. There is a need to set up logic for RGV vehicles which will make it possible to pick up a pallet from HB based on final destination of pallet. If there are two pallets which have same final destination they should be sent to exit finger point in existing warehouse together, so two concurrent RGVs should at first take pallets with same destinations (aisle should not matter in such situation). Therefore, operator who is taking two pallets from finger point in one move can deliver them to final place in existing warehouse in the fastest way. MFS should control how many pallets can be removed and from which part.

2.3. Control Station – It's our side process. Top of the functionality is random control of units. Pallets from HB and Inbound will be directed by user.

2.4. Destacking – Two workers will be unfolding totes form pallet. If pallet is empty, user can send empty pallet to stacker by the button, and next can be called from HB. User can always send pallet to NIO on the Repacking Area.

3. MFS - The WMS system sends orders for realization by the MFS system. We expect logical management of transports in the HB area to make the best possible use of the installation's potential. If the MFC system sees a high level of traffic in a selected part of

Commented [AM5]: I suggest we stipulate exactly what is meant- I presume it is the single stitch in pre-zone at +6,5m. In this case, it has never been called „finger" and the only instalations which we refer to as fingers and the multi-functional ones in sequencer area.

Commented [KJ6R5]: Let's change this to "Manual part of existing warehouse". I meant palets from inbound to manual area

Commented [AM7R5]: Thanks for clarification.

Commented [AM8]: Is this correct?

Commented [KJ9R8]: This is our current solution. Label in printing moment doesn't have destination. User can put pallet on the conveyer, but this pallet are directed to outbound finger. Place are not assigned to pallet in printing time.

Commented [AM10]: Which finger point.

Commented [KJ11R10]: Exit finger point, in existing part of warehouse

the installation, it can execute other orders that do not affect this and are of lower priority. The MFS should know how many transports it can carry out in one without impact for the flow of the installation.