

Putway Algorithm Summary

Aptean Ltd
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1 Putway Algorithm Summary

This document describes the putaway algorithms that can be configured within CALIDUS WMS. Algorithm Y (related to High Bay/Narrow Aisle) putaway is described in summary as a sample.



2 Basic Putaway

Basic putaway search works very similarly for all algorithms - the difference in most cases is in the anchor point for the search.

All locations have a location type, which defines the pallet types that can be stored in that location. The system maintains a list of all locations in the system, whether they are empty, part-filled or full, listing the availability of each location to hold each pallet type. Additionally, each pallet type has a priority against it, indicating in which order the locations should be used for each pallet type.

Most searches use the following process to some degree:

1. CHECK_PICK_LOCATION - Searches pick face, which it will only use if there is no older stock in the warehouse (FIFO flag). Always defined against the stock code.
2. CHECK_PARTIAL_BULKS - Searches for part-filled bulk locations with the same stock for possible consolidation.
3. CHECK_REPLEN_LOCATIONS - Searches for defined replen locations.
4. CHECK_PLC - Searches for pre-assigned locations based on Product Class (PLC).
5. NORMAL_SEARCH - Searches for bulk locations from anchor point(s).

2.1 NORMAL_SEARCH

The normal search routines search for locations in priority order - first all priority 01, then 02 then 03.

1. The system looks for locations in the current aisle (ORIG) within a certain adjustable range (Opposite Aisle Parameter). If one is found, this location is suggested.
2. If one is not found, the system looks in the same range in the defined opposite aisle (OPP). If one is found, this location is suggested.
3. If one is not found, the system finds the best locations in these two aisles. If they are within another adjustable range (Next Aisle Parameter), the closest of these is suggested.
4. If they are not, the system checks the following locations:
 1. The next aisle of the ORIG aisle (NEXT1)
 2. The opposite aisle of the NEXT1 aisle (NEXT2)
 3. The next aisle of the OPP aisle (NEXT3)
 4. The opposite aisle of the NEXT3 aisle (NEXT4)
5. A location is attempted to be found in each of these aisles, within the Next Aisle Parameter. If some are found, the system compares each and suggests the closest.
6. If one is not found, the system loops out to the next aisles in the same way as 4 above and checks again as 5 above. This cycle continues, until no more locations can be linked to. This happens when there is no opposite or next aisle assigned to specific aisles (called a break point).

Notes:

- The algorithm described is for bulk locations only - multi-pallet locations (block stack, drive-in, etc) are suggested differently, as are aisles with P&D locations defined (high-bay or narrow aisle). Pick faces are only suggested through a) the pick face(s) being defined against the stock code or b) dynamic pick faces are set up and enabled. Marshalling and receipt locations are never suggested. Damages and Q/A locations/areas can only be defaulted (against the warehouse or owner settings)
- If locations are sequenced outside the aisles? maximum sequence, the locations will never be suggested.
- Zones (Areas) can be linked together by opposite and next aisle parameters (although commonly they are not). This means that the algorithm may search through multiple zones if you connect them - a search only ends when it reaches a break point.
- Locations can only be suggested if the pallet being put away conforms to the allowed criteria in the location. Commonly that would be
 - ◆ the pallets? pallet type (for palletised locations) must be the same as the locations available pallet type
 - ◆ the number of these pallets already in the location must be less than the total amount of pallets allowed in the location
 - ◆ no other pallet types are in the location



2.2 Algorithm Descriptions

The following descriptions are simplified for ease of description.

Checks for the nearest free location in the following order:

Algo Description

- A Checks Pick Fact, Replen Locations, Part-filled Bulk Locations and PLC. Then start a search from the first defined Stock bulk location.
- B As A, but starts the search from the first define Owner bulk location
- C As A, but starts the search from the first define Product Class bulk location
- D As A, but starts the search from the first define Warehouse bulk location
- E Searches Pick, then Last Receipt Location for Stock. Search from Last Receipt location, if found, then Stock Bulk Locations, then Owner Bulk Locations, then Product Class Locations, then Warehouse.
- F User input of stock type and location code. Location code used for search. (NOT RF)
- G As A, but the location searched for must be empty rather than just available.
- H As B, but the location searched for must be empty rather than just available.
- I As C, but the location searched for must be empty rather than just available.
- J As D, but the location searched for must be empty rather than just available.
- K Stock Pick Face only.
- L As A, but does not check pick face or replenishment locations.
- M Manual Entry.
- P As A, but utilising P&D locations and aisle availability, then searching all Stock bulk locations. (BESPOKE)
- R As P, but searching Owner bulk locations (BESPOKE)
- S As P, but searching Product Class bulk locations (BESPOKE)
- T As P, but searching Warehouse bulk locations (BESPOKE)
- V Warehouse default Marshalling Location only (BESPOKE)
- W Check Pick, then Last Receipt Location (same stock and Manufacture date), then nearest empty location.
- X Full multi-deep processing, followed by algorithm A
- Y Fully described below
- Z As A but only searches for Receipt locations

For RF operations, if no location is found, the system defaults BUILD_UP_LOCN3.

2.3 Narrow Aisle Putaway

The auto-putaway process has an algorithm dedicated to narrow aisles utilising P&D locations. This document describes the functionality of that algorithm.

Algorithm Y is optimised for use with the WCS. It also incorporates some searches that are not done in other algorithms, and also brings most search mechanisms together in one algorithm.

2.3.1 Putaway Algorithm Y

The algorithm is based on the stock locations entered (WARE_STOCK_LOC).

The algorithm does not search these locations in strict order, but in the sequence the locations are defined on the file.

So, if the locations are defined as:

1. Pick face
2. Bulk
3. Narrow Aisle

The pick face will be checked first.

If the locations are defined as:

1. Narrow Aisle



2. Bulk
3. Pick

The pick face will be checked last.

If set up to do so, the putaway algorithm will initially suggest a default putaway location (BUILD_UP_LOCN8).

The WCS will then request a location to be suggested at the point of scanning the pallet for putaway. If no location is found at that point, the WCS and WMS can be configured to leave the pallet for later.

The algorithm can search in the following manner:

- Pick face
- Product Location Class, then Normal Search Bulk
- Narrow Aisle (High Bay) search
- Multi-pallet Location search

Depending on the sequence of the locations that are the anchor points set for each stock code.

The first two searches above are as normal; the last two are new.

Advantages:

- Checks P&D utilisation (high bay)
- Checks aisle availability (high bay)
- Prioritises aisles if WCS/NADC in use
- Checks multi-pallet locations
- Does all the normal algorithm A checks, for compatibility
- Has integration with WCS that other algorithms don't have

Disadvantages:

- High Bay search is not location efficient
- Simplified multi-pallet location strategy

2.3.1.1 High Bay Narrow Aisle Search

Narrow aisle search is started if the stock item has an anchor point within a high-bay aisle (i.e. with P&Ds).

The system searches each bulk aisle with P&D locations (High Bay), in both directions, starting at the anchor point aisle, in Aisle Sequence.

For example, if there are 10 aisles in the warehouse and the anchor point aisle is aisle 5 but there are no available locations then the high bay narrow aisle search routine will search the other narrow aisles in Aisle Sequence sequence 6, 4, 7, 3, 8, 2, 9, 1 and 10 until an available location is suggested.

Note: Aisles in High Bay must be set up with no opposite and next locations.

All aisles at availability P are searched first. Status P is set by using the WCS as follows:

Whenever a truck is in a narrow aisle (defined in the WCS) using Dual Cycling options, the system can optionally send a message to UNISON, informing it that the aisle should be prioritised. When the truck leaves, the aisle is set back to status Y. This is configurable.

All aisles at availability Y are searched next.



Aisles with availability N are never searched.

The system will not search an aisle where the number of pallets being put away in that aisle equals (or exceeds) the number of slots available in the P&D location.

The anchor point is set at start of the chosen aisle, then the closest location found within that aisle only.

2.3.1.2 Multi-Pallet Location Search (Block Stack)

Find a multi-pallet location already containing that stock. The pallet to be put away is checked that it is compatible, based on the anchor point location validation rules:

- Same stock, batch number and owner batch. (Loc Validation ?4?)
- Same stock. (Loc Validation ?5?)
- Same stock and sell by date. (Loc Validation ?6?)
- Last receipt location for pallets containing the same GRN and stock. (Loc Validation ?7?)
- Same stock and manufacturing date. (Loc Validation ?8?)

If no location is found, the algorithm searches for an empty multi-pallet location (to start a new load).

