# Rail Operation Guide

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# Rail Operation Efficiency and Safety Checklist

**Before applying changes to batch data,**

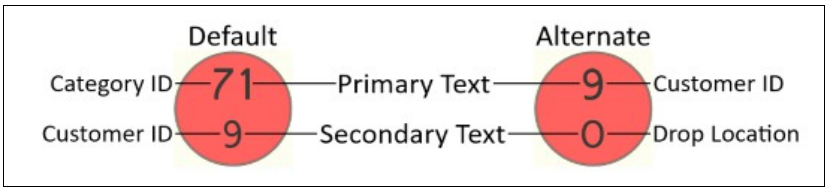
- ✔ Is the storage location optimal? (see Storage Lines, 3)
- ✔ Is the drop location acceptable? (see Quality Control, 6)
- ✔ Is the batch still in the same location? (see Warnings, 2)

**Before changing a sequence,**

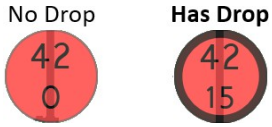
- ✔ Is the SQM stopped and coloured yellow? (see Warnings, 9)
- ✔ Is everything around the sensors safely stopped?
- ✔ Is it safe to make the change *(drop hazard, moving machinery during maintenance, etc)*?

# Batches (Bags)

- 1st (top) number is primary text
- 2nd (bottom) number is secondary text




- By default, batches with drops are **outlined in bold**



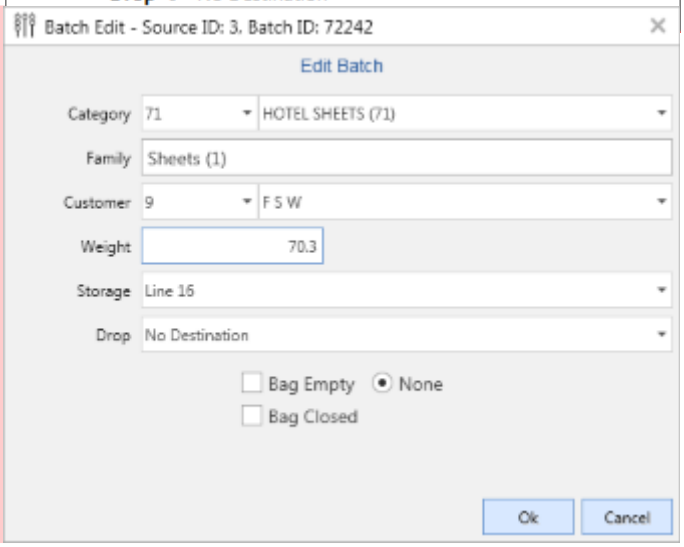

Colours indicate the category/product type. In general:

| | |
|---|---|
| Red | Sheets |
| Blue | Terries/Towels |
| Brown | Fitted Sheets/Pillowcases/Etc |
| White | Airline Products |
| Orange | Piping Linen/Duvet Covers |
| Purple | Tablecloths/Napkins |
| Yellow Text | Coloured Linen |
| White Text | Thick/Heavy Sheets |
| Red Text | Abnormally Wet/Dry Linen |


## *Viewing/Editing Batch Data*

**Hovering over a batch** will enlarge the batch and show additional details, such as the batch ID, the time of creation, the customer and category name, and storage and drop destinations.


**Clicking on a batch** will open the "Batch Edit" window, allowing changes to be made.

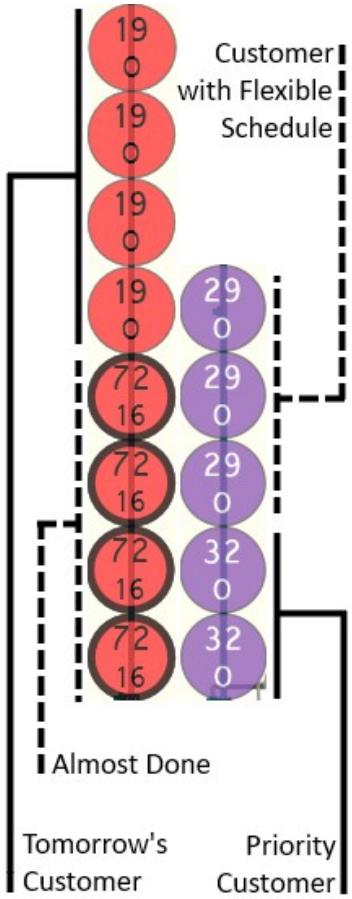



### *Warnings*

- **Never add/delete batches**, except in the case of a rare data transfer failure, batch data modification glitch, or ghost bag
- **Check if the batch is in the same location**. If the selected batch moves before changes are applied, the wrong batch may be modified *(Be sure to apply changes, before the batch data moves)*.
- **Ensure all data is correct**, before applying a change, as many changes *cannot* be undone

# Storage Lines

There are a total of 25 storage lines. Lines 1-10 hold 5 batches each, and 11-25 hold 10 batches each. In order to ensure the best possible storage lines are chosen, for each customer and category, several things must be considered.




## *Delivery Time Consideration*

Customers are delivered together in groups, and must be processed in groups, to ensure all customers can be delivered on time.

Customers being delivered earliest on the same day **must** be at the bottom of storage lines, so they have a way out, when needed.

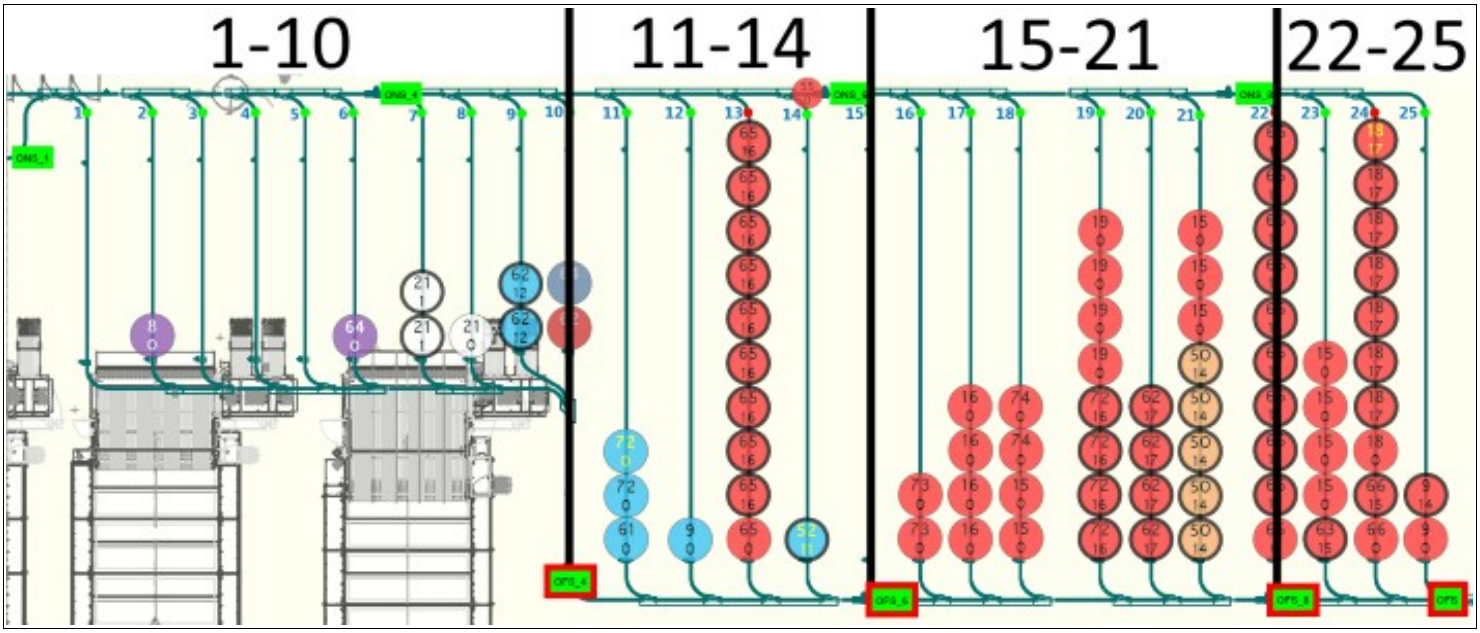
| Shifts | | Customer ID(s) | Delivery Time | |
|---|---|---|---|---|
| | Night Shift | 52-61 | 04:00 | 04:00 AM |
| | | 62-64 | 05:30 | 05:30 AM |
| | | 65-69 | 07:00 | 07:00 AM |
| | | 70, 72-73 | 07:30 | 07:30 AM |
| | | 71, 74-85 | 08:00 | 08:00 AM |
| | | 86-89 | 08:15 | 08:15 AM |
| | | 90 | 10:15 | 10:15 AM |
| Day Shift | | 1-16, 20 | 11:30 | 11:30 AM |
| | | 17-19 | 12:00 | 12:00 PM |
| | | 21 | 12:30 | 12:30 PM |
| | | 22-24 | 13:00 | 01:00 PM |
| | | 25 | 14:45 | 02:45 PM |
| | | 26, 39 | 15:00 | 03:00 PM |
| | | 27-29 | 16:00 | 04:00 PM |
| | | 33-36 | 17:00 | 05:00 PM |
| | | 37-38 | 17:30 | 05:30 PM |
| | | 40-44 | 18:00 | 06:00 PM |
| | | 45-46 | 19:00 | 07:00 PM |
| | | 47 | 21:00 | 09:00 PM |
| | | 48-51 | 22:00 | 10:00 PM |

- **Customers should be together** in storage lines, so they can be processed all at once, and at the same time
- **Customers delivered earlier should be at the bottom** of storage lines, so they can be processed as soon as possible *(see customer delivery schedule sheet, or ask a supervisor/manager).*
- **Keep different categories in separate storage lines**, because of their different processing times. This ensures all customers and categories can be processed, when needed.
- **Try to maintain 6 lines of sheets, and 5 lines of terries**, unless those storage lines are full, or many different customers are unloading. This ensures all active drops can work in parallel.

## *Travel Time Consideration*

Batches leave the storage rail *one-by-one*, and stop at every buffer for 3 seconds, before continuing, to prevent high speeds from causing damage. This causes increasing delays, when batches exit storage. Therefore, which storage lines are chosen affects total travel time.

| Storage Lines | Number of Buffers | Delay (approx.) |
|---|---|---|
| 1-10 | 4 | 60-90 s |
| 11-14 | 3 | 30-45 s |
| 15-21 | 2 | 15-25 s |
| 22-25 | 1 | 5-10 s |




## *Processing Time Consideration*

It is important to understand how long each type of linen takes to process, on average, and to store them in the appropriate lines, for optimal flow.

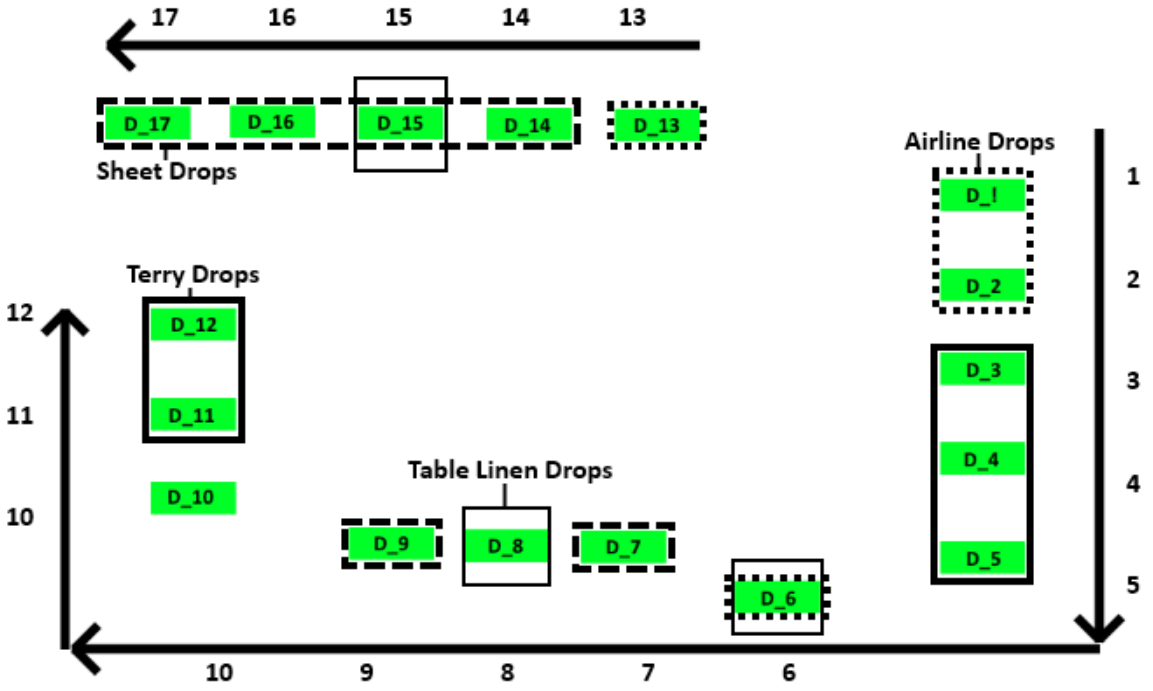
| Category | Processing Time (approx.) | Recommended Storage Lines | Min. Time Before Finished Unloading |
|---|---|---|---|
| Sheets | 10-15 min | **25-19** | 30 min |
| Heavy Sheets (100% Cotton) | 10-20 min | **25-19** | 30 min |
| Fitted Sheets / Duvet Covers | 20-30 min | **18-16** | 30 min |
| Terries | 30-45 min | **15-11** | 45-60 min |
| Table Linen | 40-60 min | **10-6** | 30 min |
| Airline | 45-90 min | **5-1*** | 45-60 min |

- **Line 1*** frequently has bags stuck when exiting, and should be avoided
- **Needed customers** must be at the bottom
- **Fastest-processing categories** must be at the bottom

# Ironers/Folders

The following drop points have machines or areas optimized for processing specific types of linen.

| Drop (D_#) | Machine | Linen to Process at Location |
|---|---|---|
| **1** | New [REDACTED] Folder | Airline Blankets |
| **2** | Old [REDACTED] Folders | Airline Facecloths |
| **3** | Small Piece Folder 9 | Terries/Towels **(Only one folder; very slow)** |
| **4** | Small Piece Folders 7, 8 | Terries/Towels |
| **5** | Small Piece Folders 5, 6 | |
| **6** | Ironers 5, 6 | Airline Tablecloths/Pillowcases/Duvets, Other Tablecloths |
| **7** | Ironer 2 | Light Sheets |
| **8** | Ironer 3 | Table Linen, Fitted Sheets |
| **9** | Ironer 4 | Light Sheets, Fitted Sheets |
| **10** | Ironer 1 | Non-Airline Pillowcases |
| **11** | Small Piece Folders 1, 2 | Terries/Towels |
| **12** | Small Piece Folders 3, 4 | |
| **13** | | Airline Duvets, Bathrobes/Bath Rugs/Etc |
| **14** | Ironer 10 | All Sheets, **Fitted Sheets, Duvet covers** |
| **15** | Ironer 9 | All Sheets (High Quality) |
| **16** | Ironer 8 | All Sheets **(No King Folder: no [REDACTED] etc)** |
| **17** | Ironer 7 | All Sheets (High Quality) |



# Quality Control

Certain ironers have formulae for specific customers, and have inherent processing qualities. To ensure the best quality for needed customers, it is best to follow this table. Customers not on this table may be done on any appropriate machine.

## *Priority Customer Drop Table*

- **Use drops listed on the left first**, unless they are occupied
- **Starred* Customers** have large volume, and should be processed ASAP (aside from AIC)
- **Bold Customers** are top priorities, and *must* be processed ASAP
- Most customers not on this list have small volume, and may be done after priority customers

| Customer ID | Customer Abbr. | Sheet Drop # | Terry Drop # | Table Linen Drop # |
|---|---|---|---|---|
| **5** | [REDACTED] | 17, 16, 15 ,14 | Any | 8, 6 |
| **8** | [REDACTED] | | | 16, 8, 6 |
| **9** | [REDACTED] | 14, 16, 15, 17 | Any | |
| **17** | **[REDACTED]** | 17, 15, 7, 9, 14 | 12, 11 | 16, 8, 6 |
| **18** | **[REDACTED]** | 17, 15, 7, 9, 14 | 12, 11 | |
| **19** | **[REDACTED]** | 17, 15, 7, 9, 14 | 12, 11 | |
| **20** | [REDACTED] | 14, 16, 15, 17 | Any | 16, 8, 6 |
| **21** | [REDACTED] | Sheets: 6<br>Pillowcases: 6 | Facecloths: 2, 13<br>Blankets: 1 | 6 |
| **25** | **[REDACTED]** | 17, 15, 14 | 12, 11 | |
| **26** | [REDACTED] | 17, 15, 14, 16 | Any | 16, 8, 6 |
| **27** | [REDACTED] | 17, 15, 14, 16 | Any | 16, 8, 6 |
| **28** | [REDACTED] | 14, 15, 17 | Any | 16, 8, 6 |
| **30** | **[REDACTED]** | 17, 15, 7, 9, 14 | 12, 11 | |
| **31** | **[REDACTED]** | 17, 15, 7, 9, 14 | 12, 11 | |
| **32** | **[REDACTED]** | 17, 15, 7, 9, 14 | 12, 11 | |
| **36** | **[REDACTED]** | 17, 15, 7, 9, 14 | 12, 11 | |
| **37** | [REDACTED] | 14, 15, 17 | Any | 16, 8, 6 |
| **38** | [REDACTED] | 14, 15, 17 | Any | 16, 8, 6 |
| **40** | [REDACTED] | | | 15 |
| **41** | [REDACTED] | | | 15 |
| **42** | [REDACTED] | 17, 15, 14, 16 | Any | 16, 8, 6 |

| Customer ID | Customer Abbr. | Sheet Drop # | Terry Drop # | Table Linen Drop # |
|---|---|---|---|---|
| **43** | [REDACTED] | 17, 15, 14, 16 | Any | 16, 8, 6 |
| **44** | [REDACTED] | 17, 15, 14, 16 | Any | 16, 8, 6 |
| **45** | [REDACTED] | 17, 15, 14, 16 | Any | 16, 8, 6 |
| **46** | [REDACTED] | 17, 15, 14, 16 | Any | 16, 8, 6 |
| **47** | **[REDACTED]** | 17, 15, 14 | 12, 11 | 16, 8, 6 |
| **48** | [REDACTED] | 14, 15, 17 | Any | 16, 8, 6 |
| **50** | [REDACTED] | 14, 15, 17 | Any | 16, 8, 6 |
| **51** | [REDACTED] | 17, 15, 14 | Any | 16, 8, 6 |
| **52** | [REDACTED] | 17, 15, 14 | Any | 16, 8, 6 |
| **62** | [REDACTED] | 17, 15, 14, 16 | Any | 16, 8, 6 |
| **63** | [REDACTED] | 17, 15, 14, 16 | Any | 16, 8, 6 |
| **64** | [REDACTED] | 16 | Any | 16, 8, 6 |
| **68** | [REDACTED] | | Duvet: 13, 6 | |
| **69** | **[REDACTED]** | | Blanket: 1 | |
| **71** | [REDACTED] | | | 15 |
| **72** | [REDACTED] | Not 9 | Not 12 | 16, 8, 6 |

## *Machine Quality Considerations*

There are also several other quality factors to keep in mind, when setting drop destinations:

| Customer/Category | Recommended Drop | Reason |
|---|---|---|
| Duvet Covers/Piping Linen | 14 | Good quality; four feeders |
| Fitted Sheets | 9, 14 | Not many customers can be done on drop 9; when one arrives, best to do it there. |
| Airline Tablecloths/Pillowcases | 6 | Near airline department; easily transferred |
| Customers with mixed sheets, fitted sheets, duvet covers | 15 | Beside drop 14 which can process them with good quality |

## *Additional Considerations*

**Process one customer continuously at one drop**, for optimal flow. If a previously finished customer arrives again, ensure it is processed at the same drop as before (see *Reports*).

**Customers with large volume (>15 batches)** may be processed on two adjacent machines.

**[REDACTED] companies** are [REDACTED] (8, 40, 41, 71), and are usually priorities.

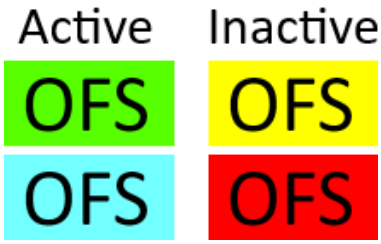
# Rail Manipulation (Switches/Buffers/Etc)

Switches, buffers, and dischargers are controlled via the same method: **sequence manipulators (SQMs)**.

## *Sequence Manipulators (SQMs)*

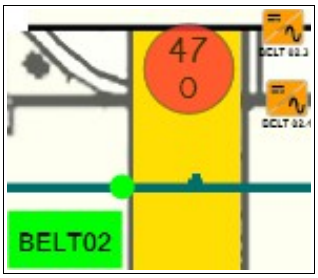
Sequence manipulators (SQMs) are sensors with four colours which indicate their states:

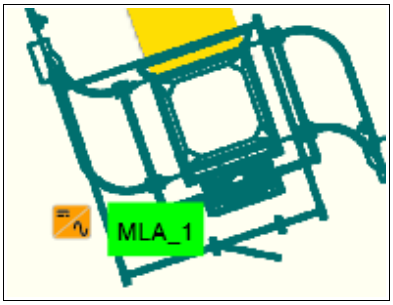
| | |
|---|---|
| Green | Enabled/In Operation |
| Light Blue | Finishing Current Operation |
| Yellow | Stopped/Manual |
| Red | Disabled |

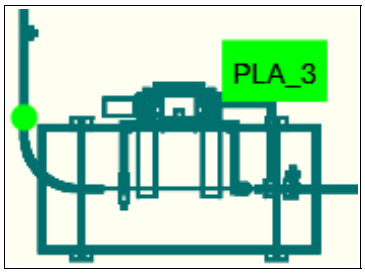


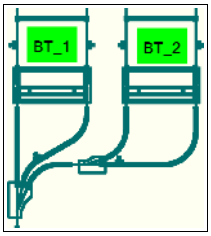

There are several types of SQMs which control different systems on the rail.

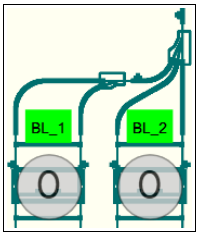
| | |
|---|---|
| BELT | Conveyor belts receive batches from the dryers, press, or from dropped loads, and transfer them to where they need to go. |
| MLA | Mechanical lifts align to different levels to receive empty bags, load them, and release them to the main rail. |
| ONS | Controls all switches leading to the storage lines.<br>**Note:** MLA_4 also does this, for storage lines 1-6. |
| OFS | Calls batches from storage lines, and controls the main switch between each half of the rail system (D1-12 and D13-17). |
| PLA | Because the rail is gravity-powered, pneumatic lifts raise batches, when they get too low off the ceiling. |
| BD | Intermediate buffers on the rail stop batches for 3 seconds, preventing high speeds from damaging parts. |
| D | Dischargers receive drop signals from buttons beside ironers, but also may be overridden by a sequence change. |
| CL | Closer stations ensure bags are pulled closed and locked, before entering empty bag storage. |
| BT | Bag tilters tilt down the top front frames of bags, so they can be stored more space-efficiently. |
| BL | Bag lifters lift up the top front frames of bags, so they can properly receive batches. |

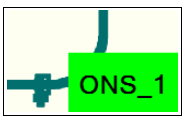


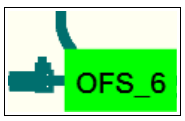



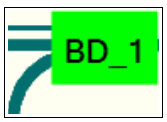



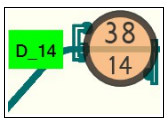



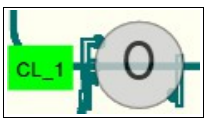



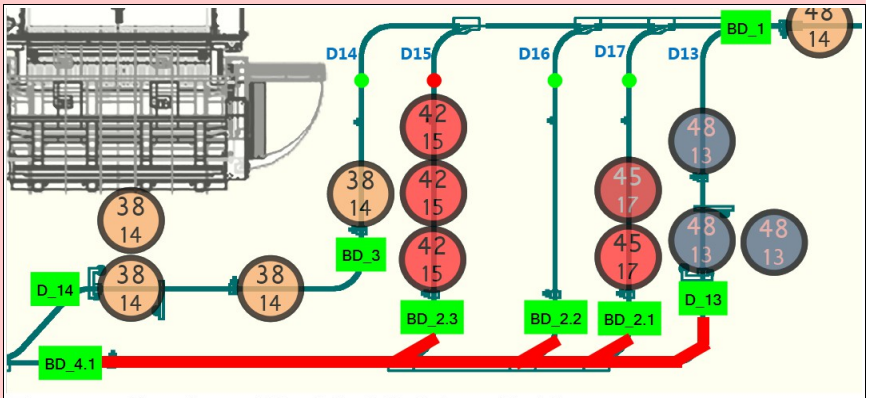
### *Warnings*

**Do not alter SQMs**, when an operation is in progress (green/blue colour). Changing an active SQM will bypass the safety protocols, and potentially results in delays, damage, and/or casualties.

It is always safest to stop *(not disable)* the SQM, as well as all other SQMs which can affect the same zone, and wait until they turn yellow, before changing the sequence, then start it again. *(Remember, disable is a forced sequence change, not a stop request, and can be dangerous)*.

**Always physically check the rail**, to make sure no batches are moving or stuck between sensors, before changing any sequence at any SQM.

**Understand the delay** in the rail software, as it updates (3-5s).




To manually release BDs 2.3, 2.2, 2.1, or D_13, ensure **none of them is already releasing a bag**

# Tools


There are various features of the [REDACTED] software that are very useful for managing statistics such as when and where batches were created, where they were dropped, and how many of each customer/category has been processed.

## *Reports*

The statistics displayed in the reports menu can be very useful to show which, and how much of each, customers were processed at any location.

After selecting a time range (upper-left) and group, click **"Generate Results"** on the bottom left of the window, to display the statistics.

Selecting an entry will show additional details such as categories, customers, and weight.

| Group | Displays |
|---|---|
| Entry, Category | Lists all MLA loading stations and which **categories** have come from them |
| Entry, Customer | Lists all MLA loading stations and which **customers** have come from them |
| Category | Lists all **categories** created within the selected time range |
| Customer | Lists all **customers** created within the selected time range |
| Drop, Category | Lists all drops and which **categories** were dropped at each location |

| Group | Displays |
|---|---|
| Drop, Customer | Lists all drops and which **customers** were dropped at each location |
| Alarm History | Lists all error messages which have occurred within the selected time range |
| User Event History | Lists all modifications made, by any user, to batches or SQMs |

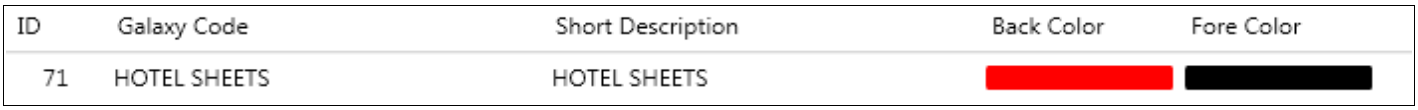
## *Clean System Options*

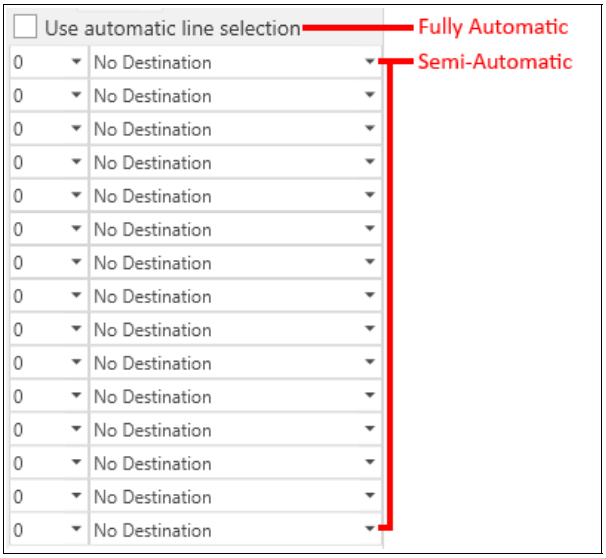
The settings shown here are useful for a variety of purposes, such as setting call patterns, enabling automatic sorting and drop assignment, etc.


### *Customers, Customer Patterns, Families, and System Doctor Manager (SDM)*

These sections are largely unneeded, but may display helpful information about customer IDs and colours, as well as other various details.

### *Sorting Categories*




The settings here allow for several things:

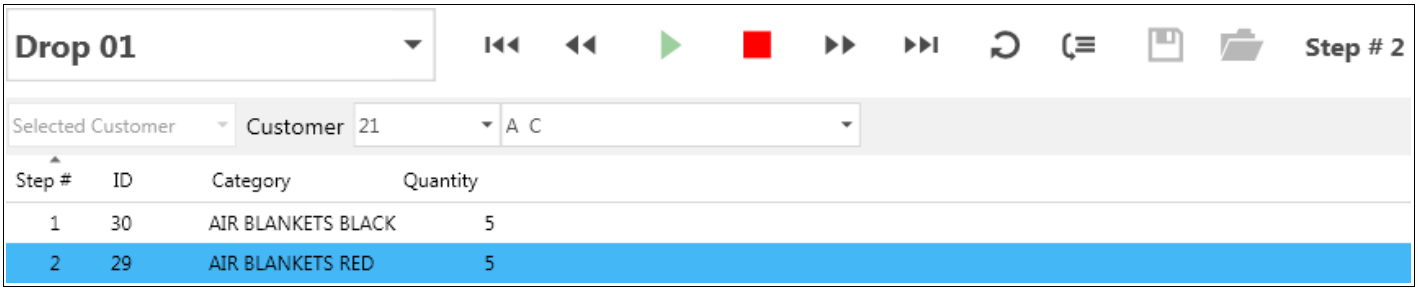
- Change of customer/category descriptions
- Change of customer/category colours
- Semi-automatic line sorting
  - ➢ Sorts categories by line (priority: top-down)
- Fully automatic line sorting
  - ➢ Sorts categories and customers by script

**Warning:** The semi-automatic system does not take into account customers, and **will mix them together**.

Also, neither automated system considers customer schedules, travel times, or processing times. They will keep together batches of the same customer, but **will order them incorrectly**; this problem becomes more severe with less storage space.

As long as these issues exist, manual sorting is the preferred method, as a disorganized rail causes a significant bottleneck, increases worker stress, and prevents customers from being processed and delivered on time.

### *Call Off*




This section contains options to **automate drop assignment**. If the call off is running, the listed customers and categories will automatically be assigned to the selected drop, until the selected number of occurrences has been reached. If repeat is enabled, the automation will repeat all steps, until manually stopped.

### *Call Patterns*

The settings here allow for Call Off presets to be activated when certain customers and categories require specific timing to be processed.

# Alarms and Error Messages

Alarms, error messages, or faults happen frequently, and knowing how to fix them is essential for maintaining production efficiency.

## *Alarm Format and Display*

Error messages are displayed at the bottom of the screen, in the current alarms window.

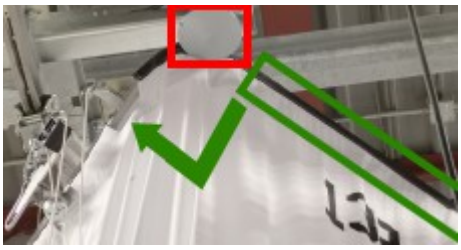
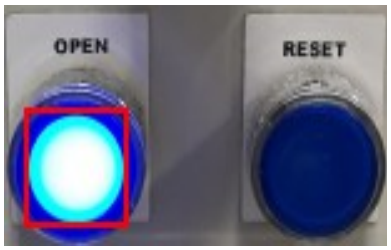
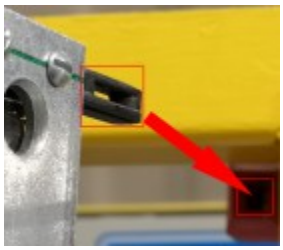

Most alarms use the same format: **error ID, location (SQM), then description**. Several alarms may display the location after the description.

The clean system alarms are the ones which cause problems, as the soiled system is not properly connected to the clean system, and the soiled rail is made from a different manufacturer.

## *Common Alarms*

Below is an alphabetical list of the most frequent error messages, and their most-likely causes and fixes.

| Alarm / Cause | Fix |
|---|---|
| Bag failed to open<br>(except D11/D12)<br><br>Plunger not long enough to press unlocking mechanism on top left of bag | Push bag, so top frame is level, or so unlocking mechanism presses against plunger |

| Alarm / Cause | Fix |
|---|---|
| Bag failed to reach destination/discharger<br>  <br>*Top frame of bag collides with rail or discharger plunger, blocking entry and data transfer* |  <br>*Push bottom of bag, ensuring top frame goes underneath rail, and guide bag forward* |
| Bag over height<br>  <br>*Linen stuck between belt and MLA funnel* |  <br><br>*Press open, clear linen*<br>  <br>*tightly close door and lock*<br>  <br><br>*press reset* |
| Linen failed to transfer<br>  <br>*Linen stuck at bottom flap of conveyor belt, blocking sensor* |  <br>*Push linen off flap onto belt* |

| Alarm / Cause | Fix |
|---|---|
| Move failed from buffer/storage line<br>  <br>*Bag frame hitting rails, or wheels getting stuck in rail, stopping bag* |  <br>*Push bag, ensuring it reaches the next buffer* |
| Data transfer from dryer outfeed belt failed<br>MLA_1 belt failed to transfer load into bag | Step on foot-pedal to the bottom-left of computer, to move belt |

## *Uncommon Alarms*

There are several alarms whose fixes require more advanced knowledge of the rail's safety systems. These fixes should not be attempted without supervision or absolute certainty in what is being done.

**Serious consequences may occur**, if proper care and consideration is not taken, regarding the rail.

| Alarm | Cause | Fix |
|---|---|---|
| Bag at lift has no data, or data at stop with no bag | Ghost bag (physical bag detected with no data in computer, or data in computer with no physical bag detected) | Physically check if bag is ahead of or behind buffer, or if no bag is present, then add/delete data accordingly |
| Data transfer from press failed | (1) Leftover linen blocking sensor at end of conveyor belt<br>(2) Press failed to unload and clear data | (1) Clear linen, and set BELT SQM sequence to step 10<br>(2) On press control panel, clear error  , switch to manual,  hold unload conveyor belt until data (top right) clears, then switch back to automatic  |