**Version Control**

| **Name of the Doc** | **Version** | **Date** | **Remarks** |
| --- | --- | --- | --- |
| **Reqrmt\_ProcessFlow** | **V0.1** | **9th Oct 24** | 1. **New Inspection Area to Physically verify the container, E-Waybill, invoice etc added as per suggestion by Swetha** |

**Requirement Analysis & Process Flow**

Stacamatics- Terminal Operating System (TOS) designed for managing and providing solution to the major issues related to,

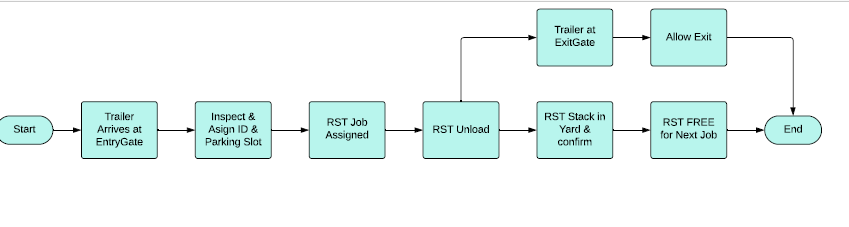
* Monitor the movement of “Reach Stackers”.
* Container movement handling and monitoring.
* Reducing unnecessary handling of containers
* Availability of stack locations.
* Trailers or vehicle movement.
* Safety and security of particular containers.

Stacamatics -Container Yard Management System ( CYMS) will have different modules to track, monitor movements of resources in the yard , optimize utilization and efficient process flow.

Major modules of the CYMS are

1. Role & Access Management Module
2. Gate Management Module
3. Yard Configuration & Management Module
4. Container management Module
5. Asset Management Module
6. Reports Module

Stack Flow at a glance:-

1. 
2. **Role & Access Management Module(RAMM)-**

**Sub Module of RAMM-**

**Create Users-**

* 1. This module will **create** SuperAdmin with full control.
  2. Based on role or requirement, superadmin can create role Vs access matrix
  3. Superadmin can Update the access by providing more access or setting an duration
  4. Superadmin can delete the given access
  5. System admin can delete the given access
  6. **Create User List**- By System Admin with Role & Access for

1. Owner of the company

2. Digital head of the company

3. Project Head

4. Yard/Sight In charge

5. Entry/Exit gate Operator

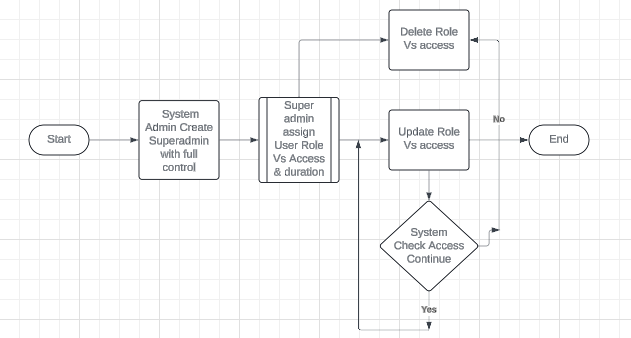
6. System Operator

7. RST operator

8. Trailers Driver

9. Sender/Receiver Authority

10. Transporter

* 1. **ProcessFlow** 

1. **Gate Management Module(GMM)-** helps terminal operators coordinate and monitor all the incoming and outgoing vehicles and

* Allows Check in/Check out of the trailers
* Security checks
* Navigation to the parking slot and exit
* Inform site Manager and Team

2.1 **Vendor Booking Module**- already registered users/trailers are allowed to choose a convenient appointment slot as well as enter vehicle, driver, and freight details. So, upon arrival, all the required information is already available in the system and the verification process is easy & fast. Details to be entered in the booking form by Vendor are ,

2.1.1 Sender/Receiver Details-

* Company Name
* Company address
* Transporter name
* Source Location
* Purpose (stack or de-stack)

2.1.2 Trailer Details

* Trailer Registration Number
* Driver Name
* Driver License Number(optional)
* Driver Aadhar Number

2.1.3 Train Details

* Train Name/Number
* Estimated Arrival Time( EAT)
* Estimated Departure Time ( EDT)
* Number of container capacity( for stacking)
* Number of Containers to be picked up

2.1.4 Container Details

* No. of Containers
* Size of container
* Material in Container
* Custom cleared/Not cleared
* Digi Lock required/Not Required
* Container UID
* Reloading Required/Not Required
* Value of goods( INR wise- whatever is inside the container)
* Invoice number
* E-Waybill( for each container or for total number of containers)- Enter invoice bills details as PDF
* SJS Doc

2.1.5 Destination Details

* Domestic /EXIM
* Destination Location
* Pickup schedule(date/Time)
* Pickup details- Driver, Trailer etc
* Pickup Full/Partial

2.1.6 Booking Confirmation - Once all the details are correctly entered , a booking confirmation reference ID will be generated & the same would be messaged to the Sendor/Driver/Transporter/Train driver with an option for taking a printout. Pre-Booked Vehicles may need to present the Booking Reference ID to the gate before being allowed inside the Yard**.** Entry Gate Inspector will verify the Booking Ref ID in the TAB and allow the vehicle enter the Yard and wait in Inspection Zone

2.1.7 If not authorized to book online, the sender may need to register at the booking site first following few details as required then login to the site using user-id and pwd.

2.2. EntryGate Inspection Module- The complete process flow of this module would include manual intervention and automated process,

Step 1- Container **Trailer** **Arrival at** Entry point of the **Entry Gate** of the Yard.

Step 2- Entry Gate Inspection officer ( GIO) checks if pre-booked, if yes , go to Step3

Step3- GIO checksBooking Ref ID, verify with System operator or in his own device 9 a tab) at entry gate location

Step3.1 - If booking ref ID matches with the arrived trailer details, GIO allows the trailer to check-in to the Yard and go to the Inspection Zone.

Step 3.2- Physical Verification of the trailer/Container happens in this zone ensuring less congestion at the gate and proper verification of the containers before accepting the booking.

Step4- Once verification is completed and confirmed , System Operator confirms “Booking Accepted” in the system.

Step5- On clicking “Booking Accepted”,

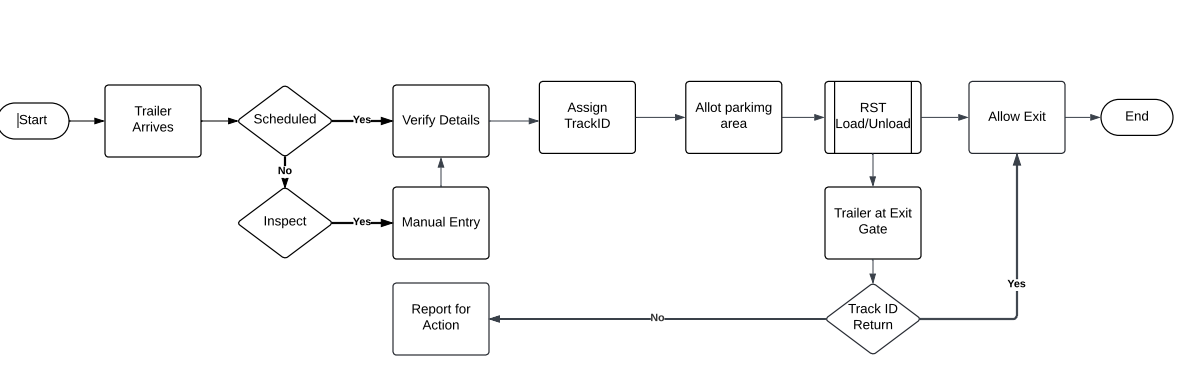
* an automated SMS would be sent to the Sender, trailer’s driver confirming the container arrival and accepted in the yard( may be billing for the container estimated time of parking ( ETP) starts from that moment)
* Current status of the booking would be available on the app or website
* Nearest RST would be located
* RST Job would be assigned & Posted to the RST job module
* Available parking bay would be assigned and flashed in the system
* System would identify the correct Yard location for the container to be stacked based on pre-booked information
* ExitGate system operator (?) or GIO would receive the notification about the acceptance details additionally estimated exit time of the trailer.

Step6- System operator would handover physical paper Map to the GIO for trailer driver to locate and follow direction to the allotted parking bay area along with a paper or digital(?)tagging token with entry timestamp and estimated exit time

The Gate Security will open the entry gate and allow the trailer to move forward to the parking area.

Step7- Post Step12- Trailer moves to ExitGate. ExitGate GIO collects paper Map & paper tagging token and allow trailer to exit

Step8- System operator confirms Container Stacked & StackFlow completed. SMS sent to sender.



1. **Yard Configuration & Management Module(YCMM)**- Functionality of this module will include

* Movement of container in the specified area
* Handling equipment
* Vehicles and stuff in the Yard warehouse, terminal, distribution centre
* Defining all type of Movement of cargo
* Allocating and scheduling staff (by creating convenient to-do lists) & equipment (including ARMG, ASC, forklifts, etc.) for all types of operations;
* monitoring equipment location (due to a so-called real-time locating system or RTLS,es of cargo and operations( loading/unloading, transshipment , storage etc)

**YCMM module will have**

* 1. Mapping- considering location, latitude, longitude yard area will be fenced in the GMap
* Plotting Zone wise plotting of the designated yard area so that containers can be stacked or de-stacked as per schedule or plan for easy container life cycle management
* Plotting for trailer wait are in the parking zone
* Plotting area for RSTs at idle/wait state
* Potting area for damage containers temporary stacking
* Plotting area for repair of RSTs
* Plotting for custom clearance
* Inspection Zone plotting

3.2 Numbering Yard location- Every zone and each bay in zone will be uniquely identified with a number and code for ease of container movement. ( Same coding Ids also need to be added to the system)

3.3 Load planning – this functionality helps configure the yard areas and arrange containers in the most efficient way with optimal space usage, considering load constraints and further operations

* 1. Real-time view –Real Time view of all yard processes allows terminal operators to immediately react to any disruptions.

1. **Container Management Module-** This module will manage the lifecycle movement of the containers inside the yard.

4.1 Container Categorization- there will be categorization of each container in the yard by size, cargo or goods that it's carrying, delivery destination if domestic or international, custom cleared or need clearance, cargo to be rearranged in the yard, container fully or half loaded etc. This module will categorise the containers so that placement of the container location can be determined logically

4.2 Assign Storage Space- This module will determine the availability of the storage space in the Yard based on scheduled arrival or departure of the containers and assign the yard location for RST to stake/destack

4.3 Designate Area allotment- Containers need repairs, customer clearance, cargo consolidation may be allotted to those designated places

4.4 Container location tracking- Container location would be tracked by assigning some Digital lock with GPS inbuilt for tracking the movement of the container. In case of any unwanted move

4.4 RST job Module- this module will assign the jobs to the RSTs

Flow of the RST job assignment would be as follows

Step 9- RST will “Accept “ the assigned job , System shows container details with from which parking bay and to which yard location.

Step 10- RST reach the parking bay area to pick up the container

Step 11- RST operator clicks pic before picking up the container from trailer(?)

Step12- RST picks up the container

Step13- RST moves with container and stacks it to the assigned slot

Step14- Once all containers are picked from trailer , RST confirms Trailers free

Step15- Once all containers are stacked , RST clicks pic & confirms “Job Done”

Step16-System makes RST free and show available for the next job

4.5 Container Destacking- RST will pick up the container from Yard location and place it to the trailer

4.6 Container Maintenance- Containers will be assigned Digital lock for security and IOT device for location tracking. Also containers would be physically managed externally.

1. **Asset Management Module** - Yard assets would be managed by listing them , providing them with unique ID for tracking and with IOT interfaces whenever necessary. Asset health check and repair or idle status can also be tracked through this module
2. **Reports Module** - Reports for

6.1 RST billing- How many pickup can be reported for billing and amount can be calculated and verified

6.2 Containers Stacking report

6.3 Container de-stacking report

6.4 Duration of the container in the yard

6.5 Repair cost of container

6.6 Repair cost of RSTs

6.7 Reloading cargo in the container



**OUT OF SCOPE:-**

* 1. Managing Trucks/trailers entering the Yard will not be managed by YMS
  2. Containers before entering and after leaving the Yard premises will not be managed by YMS

**Assumptions:**

1. All RSTs will be provided user interface device and required training, however RST operators will handle the device and required action as provided
2. Job module will assign the job to the nearest RSTs based on distance/available status; RSTs operates accept the assignment without any delay
3. Yard perimeter data will be provided in advance
4. All Stakeholders needs reports – details needed will be provided by the Yard manager

**Entity Relation Diagram**

Entities: -

1. Yard Area
2. RSTs (Reach Stackers)
3. Containers
4. Truck/Trailers
5. Site Operator
6. Report
7. Trackers

Attributes:-

1. Yard- GMAP, Lattitude, Longitude, 3D view, Trailer parking area, RST wait area, RST Repair area, Stack/De-stack Area, Pathway Marking
2. RST- RST ID, RST operator Name, RST Operator ID, No. of RST stack Job, No.of RST de-stack Job, RST Idle Time
3. Container - size, container UID, Container Type, Container contents, Container Condition External, Container condition Internal, Container Pic

Relationship

1. Yard has many containers, Many RSTs
2. One RST stack/ de-stack one container at a time

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**Flow of a Container life Cycle in a YMS**

Step1- Container **Truck / Trailor** **Arrival at** Entry point of the **Entry Gate** of the Yard.

**Entry Gate Inspection personnel (GIP**) have two options

**Step2 -Option 1** Details of Truck/Trailer is **pre-scheduled** and feed in the system, so **GIP** **Verify** the details of below parameters, if found no discrepancy, proceed with Step 3.

1. Sender/Receiver Details-

* Company Name,
* Company number
* Transporter name,
* Source Location,
* Purpose (stack or de-stack)

1. Truck /Trailor Details

* Truck/Trailor Registration Number
* Driver Name
* Driver License Number(optional)

1. Container Details

* No. of Containers
* Size of container
* Cargo in Container
* Custom cleared/Not cleared

1. Destination Details

* Destination Type – domestic /International
* Destination Location
* Pickup schedule(date/Time)
* Pickup details- Driver, Truck etc
* Pickup Full/Partial

**Step2 -Option 2-** Truck/Trailor reach Entry Gate with container to stack/de-stack **without a**ny prior information or plan, in this case all the required details parameter as defined in the point 1 to 4 are **collected** and **entered** by GIP correctly in the system and proceed with Step3

**Step2- Option 1 & 2** can be applicable for de-stacking.

**Step3-**

1. Truck/Tailors **manually** **assigned a Tab and IOT device**, or an **ID card Tracker**
2. Assigned device details manually **entered (input**) in the system by GIP
3. System checks the **available** bay in parking area
4. **Assign the parking slot** to the truck/ trailer, reflects in the tab
5. **Instruct** the Truck to proceed and **wait** the parking assigned bay

**Step4**-

1. Check & Confirm System **tracks the truck/ tailor movement** in the Yard
2. Following the direction in the Tab, Truck/Tailors **Reach** Staging (parking) area
3. Backend system **creates a Job** based on the purpose(stack/de-stack) & destination location, pickup schedule
4. Backend system logically decide **the stacking location( zone, bay)** in the Yard

**Step5-**

1. System checks nearest available free RST
2. Assign Job to RST confirming loading/Unloading of container

**Step6-**

1. RST Accepts Job
2. System assign RST details to the Job

* RST Number
* RST Operator

**Step7-**

RST reach the Parking area, confirms

**Step8-**

RST Start the assigned job

**Step9-**

RST Clicks pic and confirm the loading/unloading

**Step10-**

RST Picks the container

**Step11-**

Proceed towards Yard area

**Step 12-**

Locate specific Yard location

Stack/De-stack the container

**Step13-**

1. Click a Pic
2. Confirm Job done

**Step14**

1. Based on Job Done confirmation, System closed the assigned active job
2. Update RST free and available status
3. updates required billing data of the RST & Container in the system
4. last containers picked up then Instruct the truck/trailer to proceed to **Exit Gate**

**Step15-**

1. GIP- Exit manually **collect back** the tab or IOT or ID tracker device as assigned at the entry
2. GIP- Exit Update **return** in the system

That confirms one Trip

**Actors list:**

1. Entry Gate Inspector
2. System Operator
3. RST operator
4. Site Operator
5. Site Manager
6. Exit Gate Inspector
7. Trailer Driver
8. Vendor
9. Receiver
10. Transporter contact Person
11. Maintenance crews or external repair companies
12. Concor CEO
13. Project Manager

Not for review, questions

A container enters the yard, what happens? Physical tagging?

Q1. What is the purpose of physical tagging? Yes- Some IOT to be connected to the Truck entering

Data we need at the time entry( physical device like tab , some designated person will collect the date and enter at the time of entry, sender details( company name, transporter name, source/destination location details, containers details( cargo material inside, size, duration of stay, pick up date/time), driver details(name, ph number)Truck or Tailer registration number.

\*Destination and pick up date will decide stacking algorithm

Based on Destination and pick up date confirmation, System will decide which Zone and bay the container will be stacked in the Yard.

Q2. Who tells the truck carrying the container to go and where? , say parking area?

Q3. How the truck carrying the containers knows the exact place where it is to go and wait?

Assume some tagging is done and place is also specified and now the container is waiting in the parking slot.

Q4. Is the container first unloaded on the ground by RST from Truck?

Q5. If any Damage happens to the container while unloading, how it is tracked?

Q6. One RST Vs One Container- is it how it works always in the Yard?

Q8-Is the truck carried the container leaves the Yard when RST unload the container or when RST completes Stacking?

Q9-What are the possibilities RST rejects container unloading?

1.Owner of the company

2. Digital head of the company

3. Project Head

4. Yard/Sight In charge

5. Entry/Exit gate Operator

6. System Operator

7. RST operator