Essen RFID your window to the interconnected world

ESSEN

CASE STUDY

www.essenrfid.com

VESUVIUS

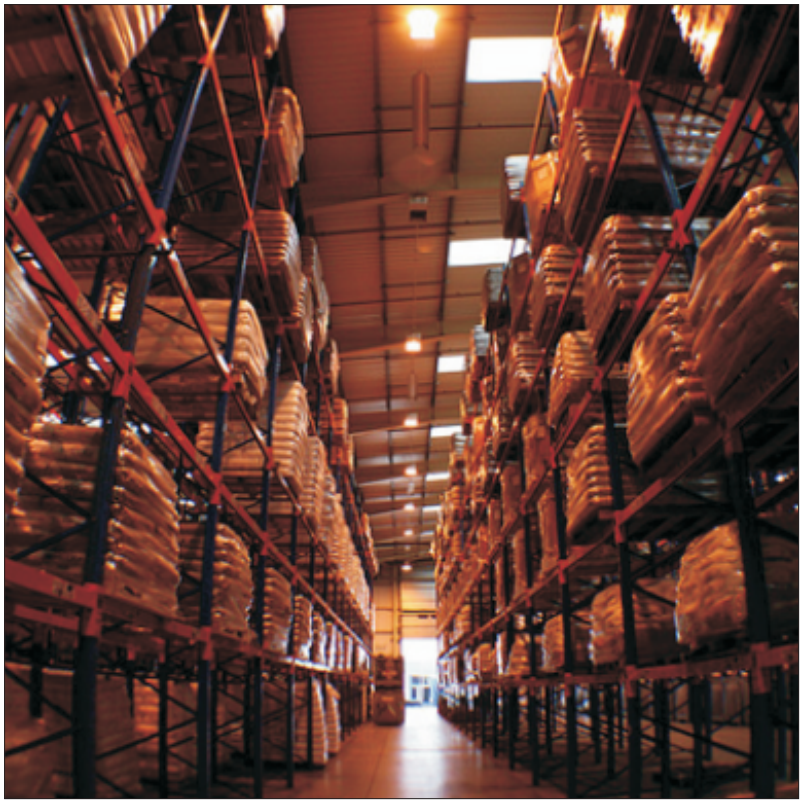
Specialist provider of refractory products adopts a RFID-enabled INVENTORY MANAGEMENT SYSTEM

RFID based pallet and forklift tracking system increases efficiency of the warehousing process

Automated identification and optimum rack management

Facilitates QC processes and efficient FIFO utilization

RFID enabled silo operation and PLC integration



INSIDE:

TECHNOLOGY

Solution:
EPC Gen2 compliant inventory tracking solution

Tag Type:
μMetallica™ UHF Passive
Metallica™ UHF Passive

Reader/Antenna:
Xtenna Proximity™
Xtenna Hybrid™
HandyScanna™

Method:
Multiple Tracking via Integrated Reader/Antenna modules
Single Tracking via hand-held

Integration Platform:
RFID Middleware:
Xtenna™ WebToolkit
Xtenna™ Studio
Application: Essen RFID's Inventory Management System
Database: SQL Server 2005 Exp. ed.
PLC Integration: SCADA

Tag Manufacturer/Supplier:
Essen RFID, with US based chip inlay

Reader/Antenna Manufacturer:
Essen RFID, with US based module

Systems Integrator:
Essen RFID

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Xtenna™ Integrated RFID Antenna/Reader

CASE STUDY

KEY REQUIREMENTS:

Vesuvius has a long experience in the supply of refractories for all areas of the cement production process. Cement material is packed in large bags. When a truck is unloaded, bags are placed on pallets. These pallets are carried by forklifts into the warehouse for storage. A small sample is taken from each bag in a laboratory test jar for quality testing. When an order is received, a forklift collects a pallet from the warehouse and takes it to the silo that currently needs the cement for mixing.

Main challenges in implementation:

- Difficulty in identifying which forklift is available for use at any particular moment.
- Requires efficient storage rack management in the placement of pallets inside the warehouse at a very hectic pace.
- Ensuring that the FIFO process is adhered to during material utilization.
- Difficulty in locating a particular pallet within the warehouse.
- Requires efficient forklift management when orders are received for pickup and delivery to a particular silo.

SOLUTION:

Essen RFID offered a solution for efficiently managing forklifts and accurately placing pallets in the warehouse. RFID tags are used for identification of bags, pallets and forklifts, which are assigned and located using HandyScanna™ antenna-readers. Test jars are tagged and grouped with the bag from which the sample is being taken. Tags are also affixed to each shelf in the warehouse so that their location can be identified through RFID. Using RFID based pallet and forklift tracking software allows Vesuvius to manage the placement of bags and pallets, as well as manage forklift operations and dispense material to the correct silo.

IMPLEMENTATION:

Essen RFID deployed its μMETALLICA™ tags for identifying each bag, pallet and forklift. A METALLICA™ tag is affixed to each location for its unique identification. Xtenna Proximity™ reader was used to register each bag and pallet, while a HandyScanna™ reader was used for reading the tags affixed to them. Xtenna Hybrid™ antenna-readers installed at the gate of the warehouse track forklifts leaving with the pallets. Forklifts are mounted with a Xtenna Hybrid™ and touchscreen for the operator. The solution uses SQL Server at the backend and a mobile based application is used on the HandyScanna™. When a tag is scanned, the updated details are sent by HandyScanna™ to the SQL Server via Wi-Fi connectivity.

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WORKING:

Essen RFID's tracking system Suchishastra™ consists of the following:

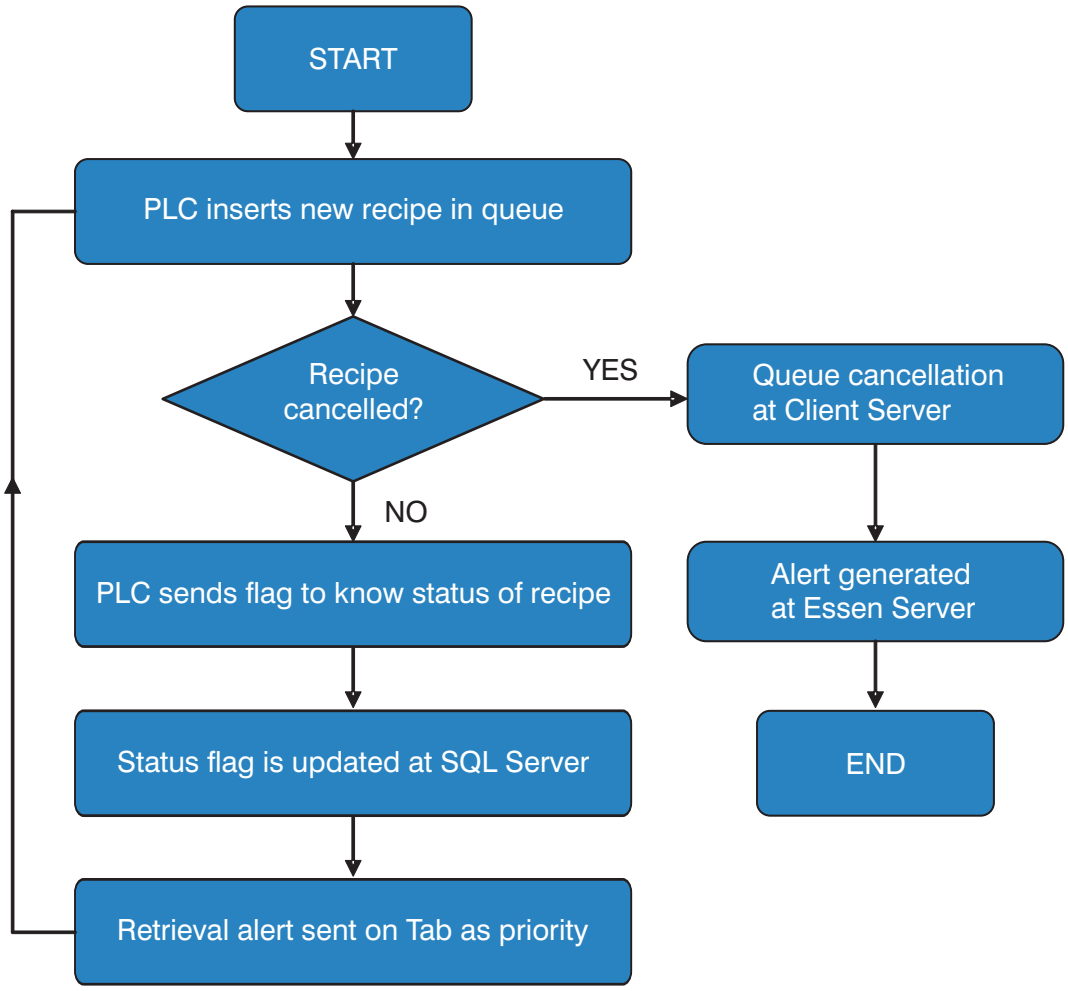
- Download GRN service
- Web application
- HandyScanna™ application
- Tablet application
- Download data from PLC

Download GRN Service:

The Download GRN service runs on the Essen Server. The service creates a connection between the Client Server and the Essen Server, and any new data found on the Client Server gets downloaded on to the Essen Server. The GRN service downloads material data, GRN (Goods Receipt Number) data and PO (Purchase Order) data into the SQL Server database.

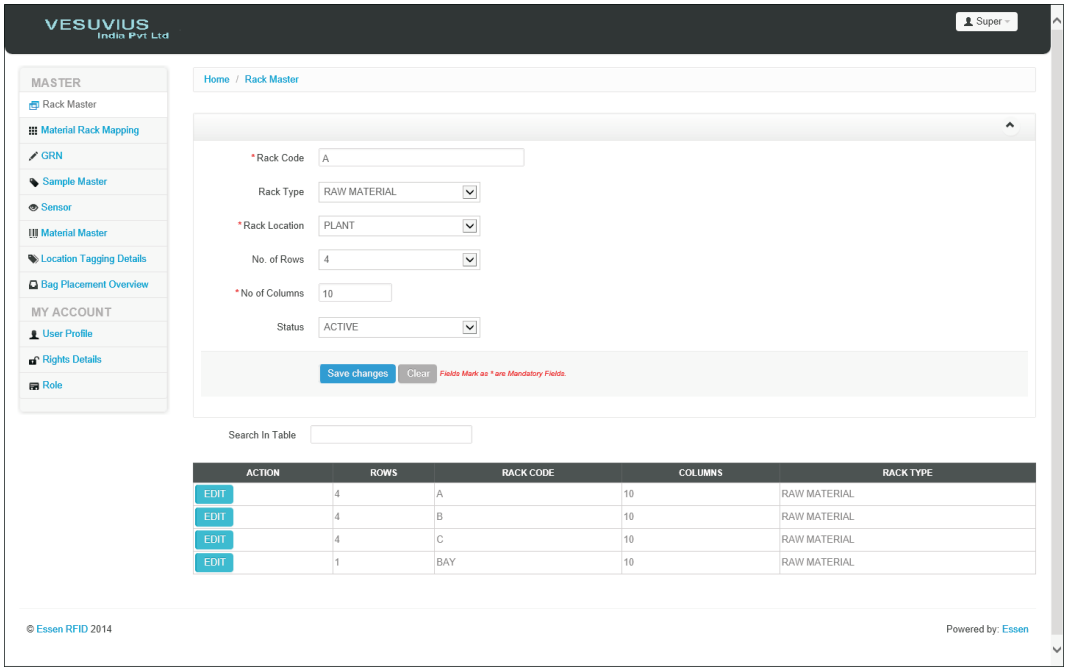
Download Data from PLC:

PLC programming is used by the client for managing the mixing recipe at silos. When a recipe transaction is created by the client, that data is downloaded into SQL Server using the Download Data from PLC service. Any new recipe transaction goes into the queue and the queue data is downloaded from the PLC. Once the data gets downloaded into SQL Server, the details of material retrieval are sent to the tablet and a retrieval alert is displayed on the tab screen. If a recipe transaction is cancelled through the PLC, the cancel information is provided by the PLC to the service and the data is updated at the SQL Server. Once data is updated, an alert message is sent to the tablet to stop the retrieval task of that recipe.

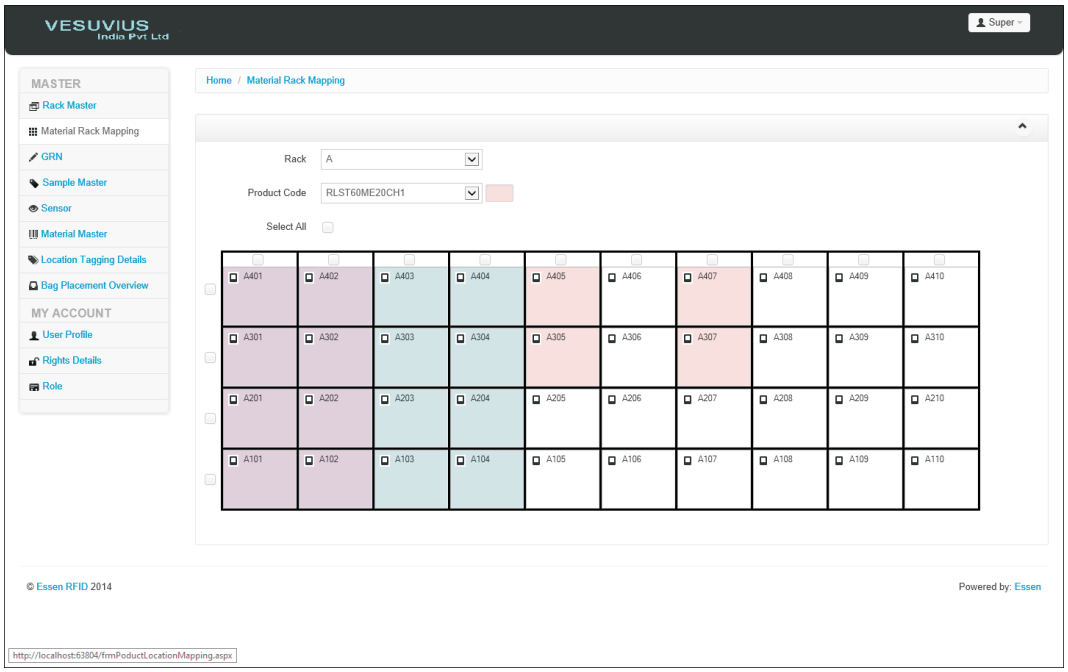


Web Application:

Rack Master: This is used for creating logical racks in the database. Raw material and discharge material bags are stored on these racks and the Rack Master creates a logical and pictorial representation of the racks in the system. The rack type is selected and columns and rows are used for creating the number of cells (racks) as per the physical racks.



Rack Mapping Details: The rack is displayed in rows and columns format. Once a rack is created and mapped, the user can assign materials to that particular rack and the rack is used for storing the assigned material.



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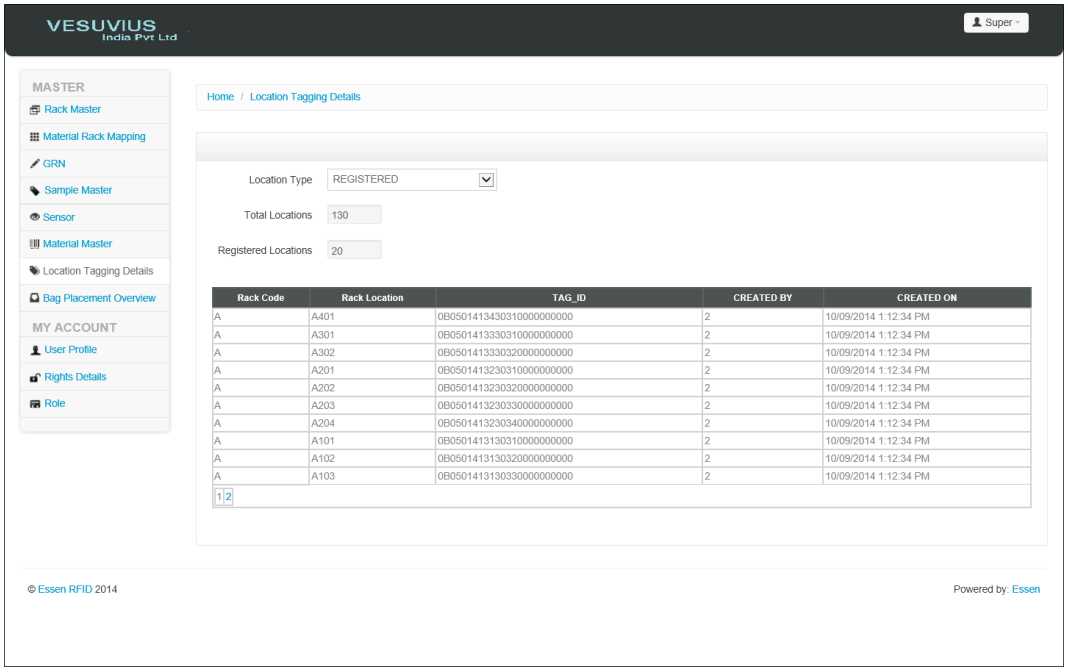
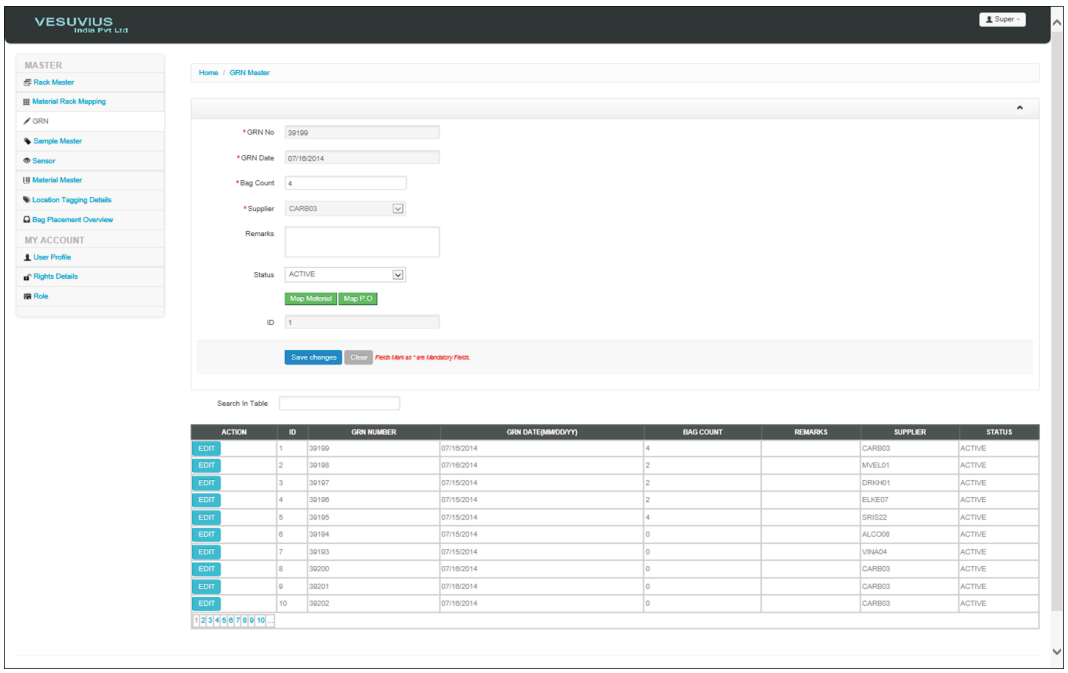
Location Tagging Details: A METALLICA™ RFID tag is affixed to each rack. The tag is assigned to its respective rack using the HandyScanna™ application, after which the user can view the registered location details on this screen along with the total count.



GRN Details: The GRN (Goods Receipt Number) is created at the Client Server. The Essen Server downloads the GRN details along with its respective mapping material and PO (Purchase Order). The user enters the bag count details against the GRN.



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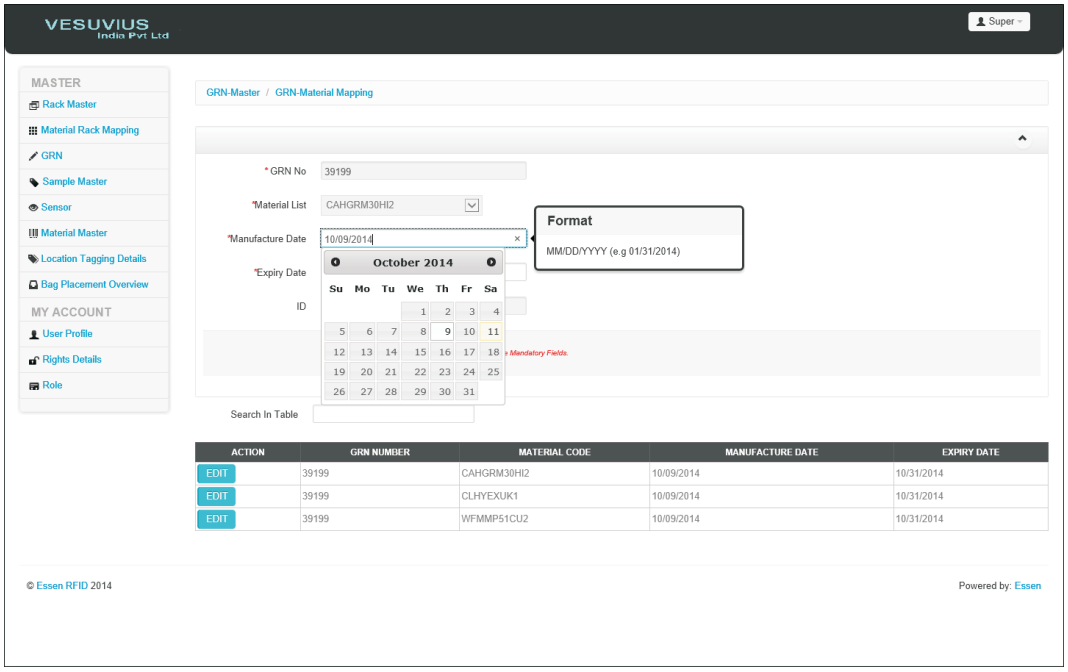
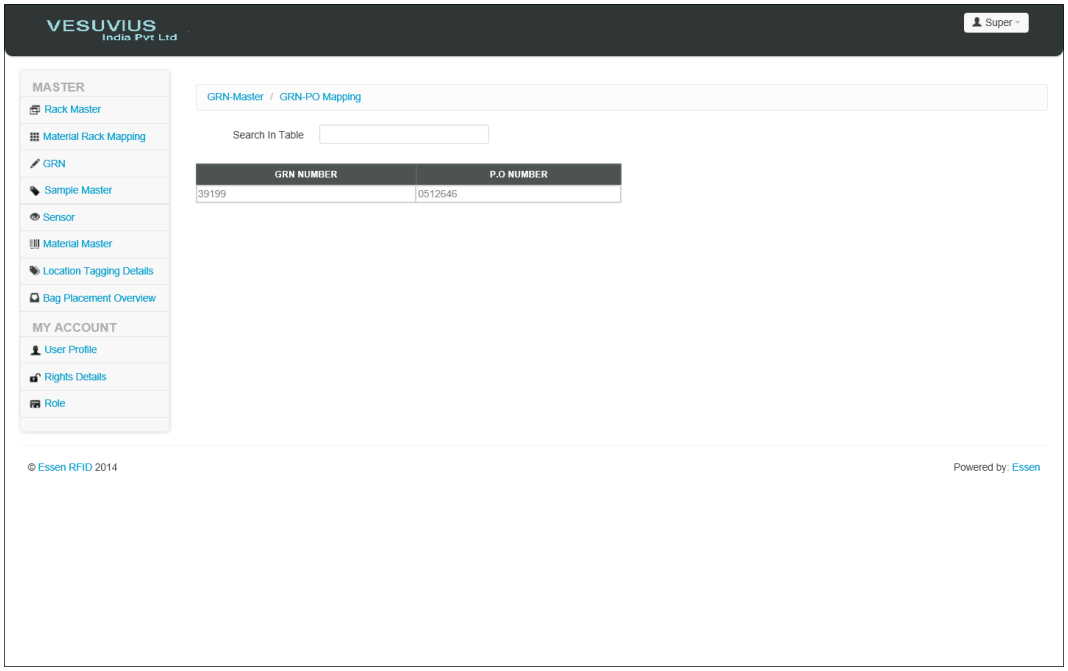
GRN Material Mapping: Here the user selects the GRN material and selects the manufacturing date and expiry date.



GRN PO Mapping: The PO details are downloaded from the Client Server into the Essen Server along with the GRN. This screen allows the user to view the PO details within GRN. One GRN can have multiple purchase orders.



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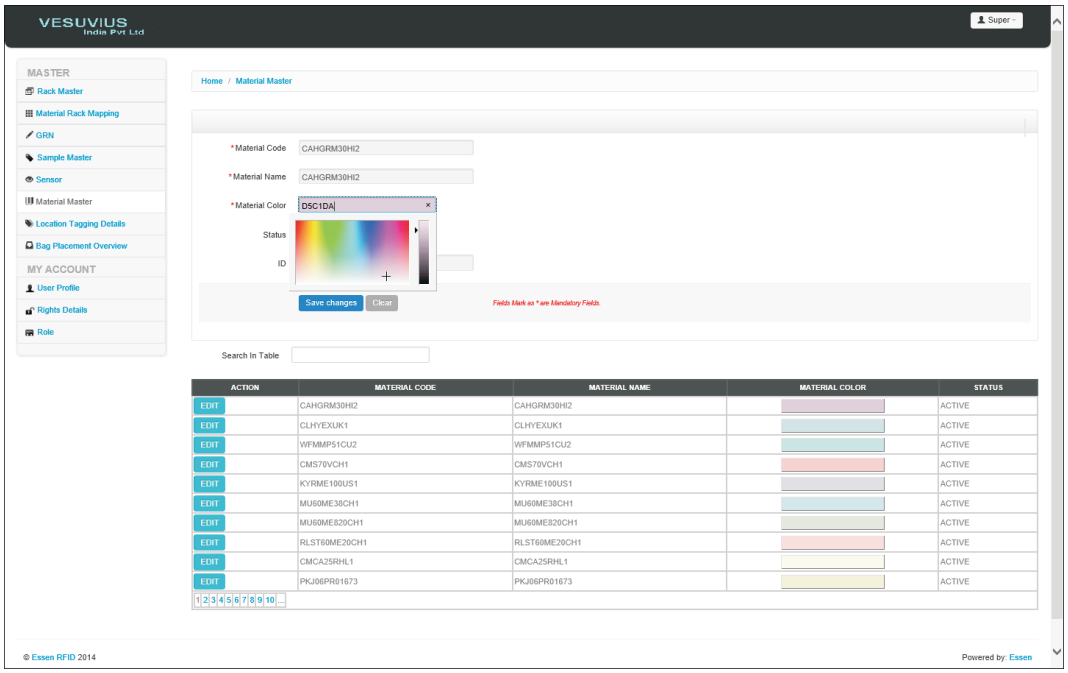
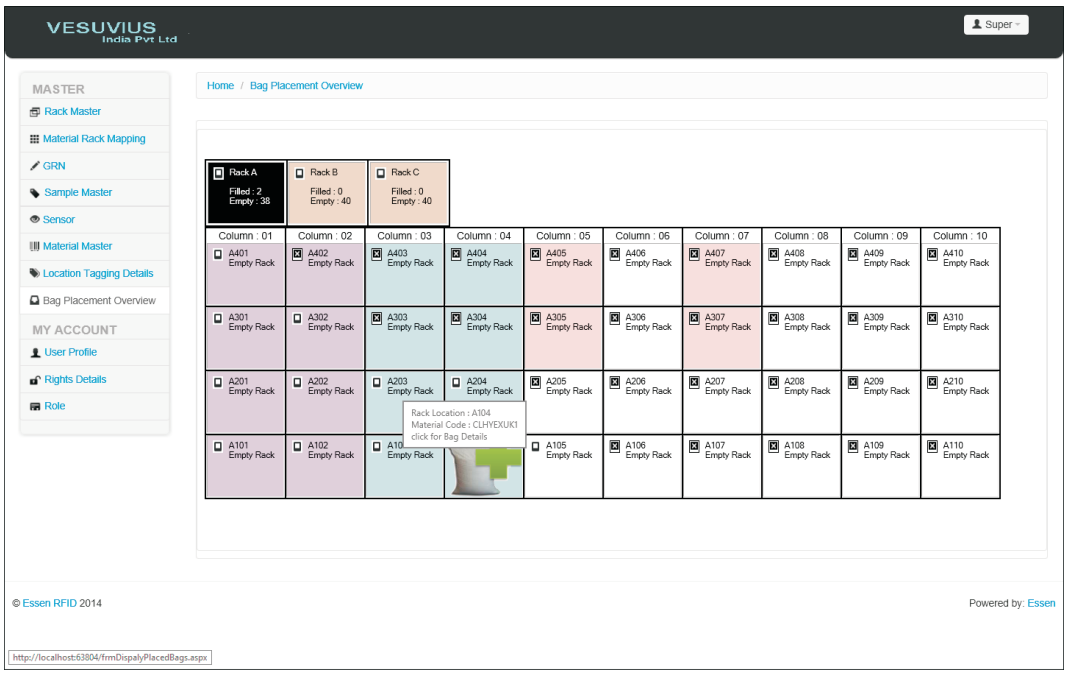
Material Master: In this screen, the user selects a display colour for a particular material. This colour is displayed on the rack when that particular material is assigned to that rack. This helps in easily identifying the location of materials on the racks.



Bag Placement: Bags are placed on the racks using forklifts and placement details are sent to the server through wi-fi connectivity. With this screen, the user can view the location of material without having to go to the actual warehouse storage room.



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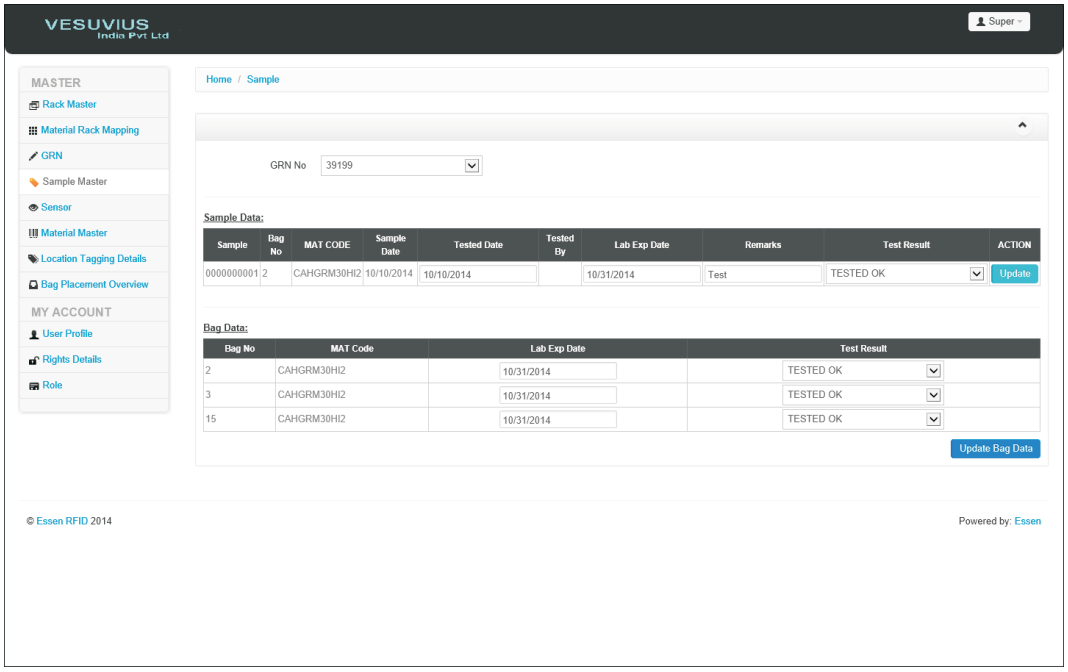
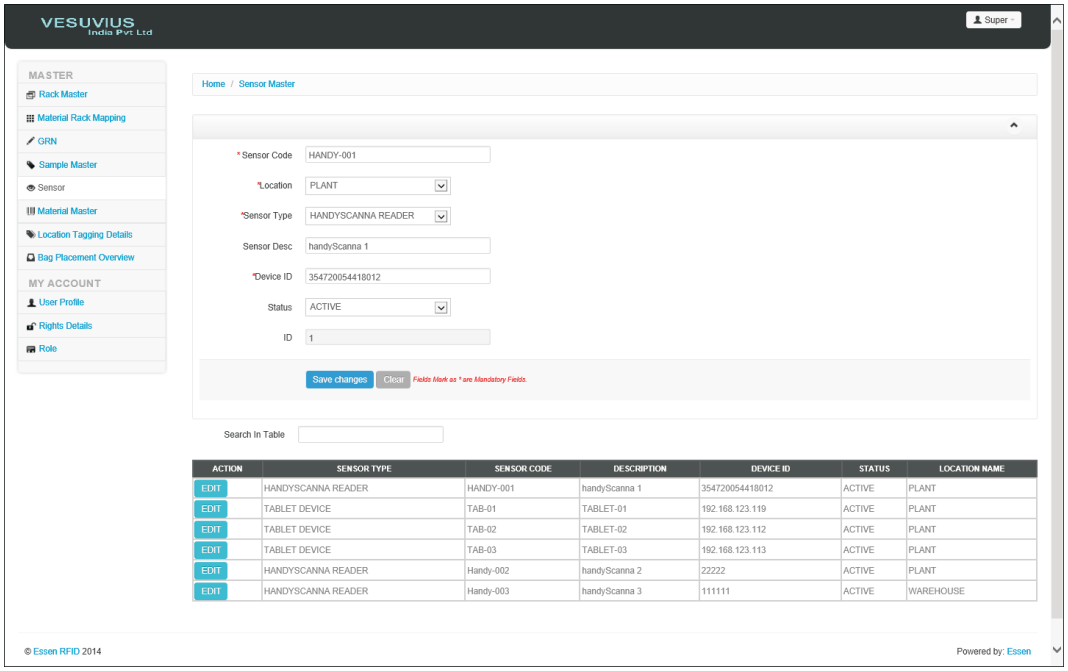
Sample Master: This is a very important process for quality checking. An authorized person retrieves a sample quantity from the bag for testing. When testing results arrive from the laboratory, its status is modified through the Sample Master. The GRN is selected and its sample details are displayed on screen. The user selects the sample and enters details such as test date and lab expiry date. When the result arrives, its status is updated as 'Tested OK' or 'Tested Not OK'. Only those bags are sent for retrieval whose test results status is marked 'Tested OK'.



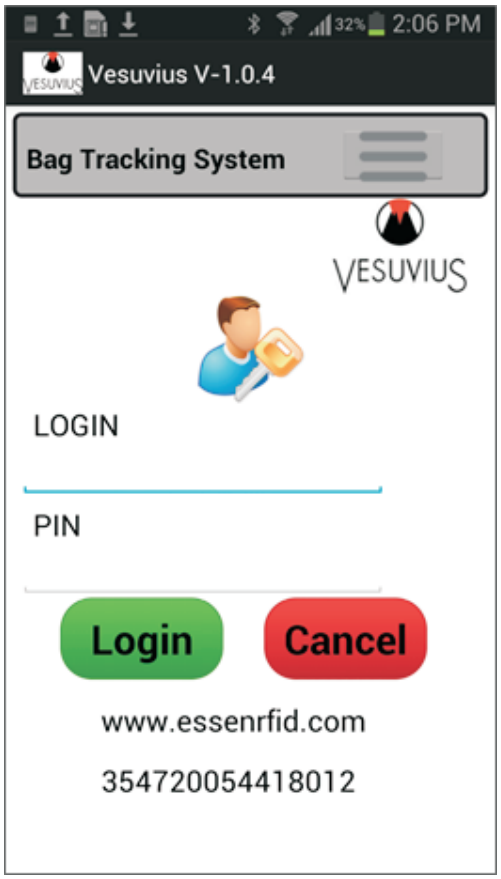
Sensor Master: All tablets and HandyScanna™ details are saved into the Sensor Master.

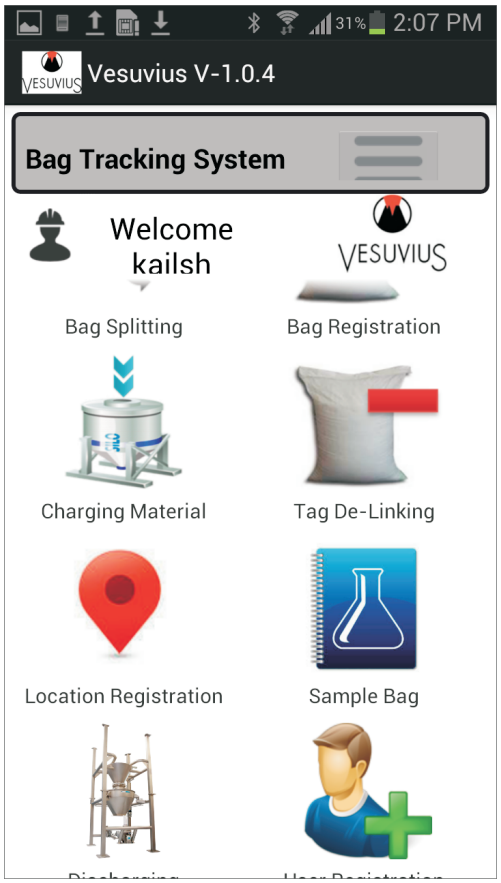


HandyScanna™ Application:

The HandyScanna™ hand-held device performs the following functionality:
- Location Registration
- Bag Registration
- Sampling
- Bag Splitting
- Charging
- Discharging
- Tag De-linking

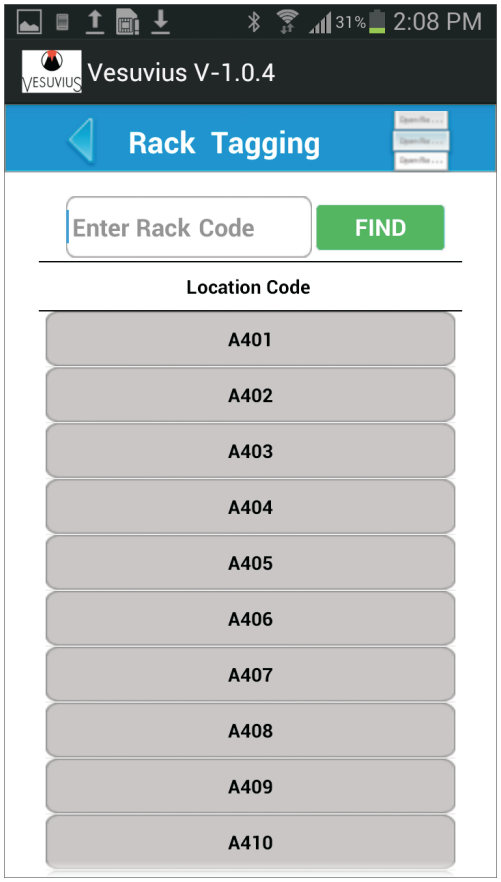
Login: Only an authorized user can log into the HandyScanna™ application.

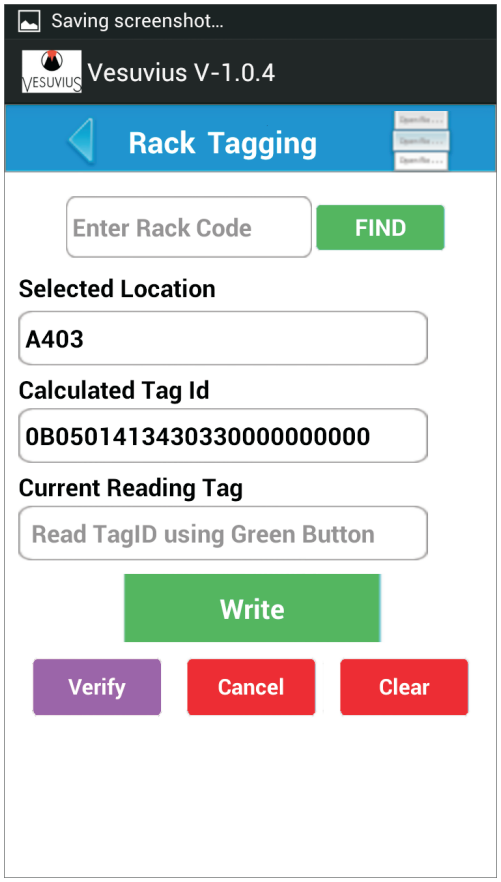




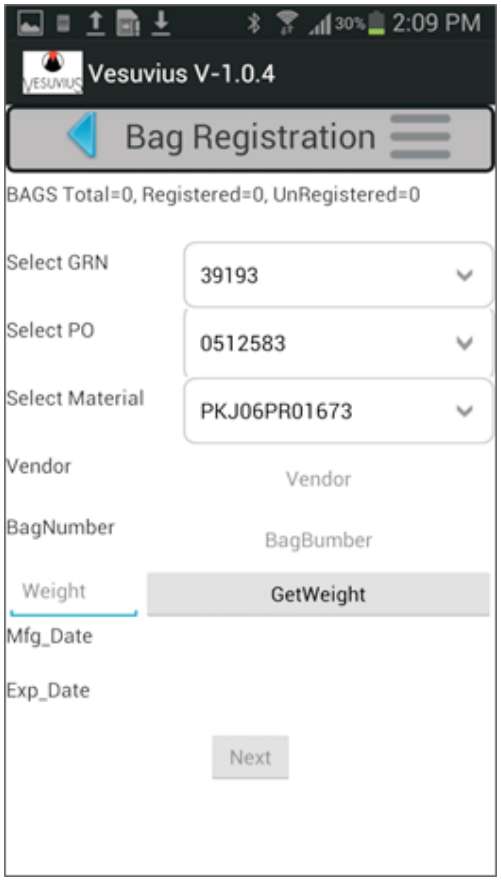
Location Registration (Rack Tagging): After the web application has created the racks, the data is downloaded into HandyScanna™ through wi-fi. The user searches the rack code and scans the RFID tag of each rack and saves the data, which is then sent back to the server via wi-fi connectivity.

CASE STUDY



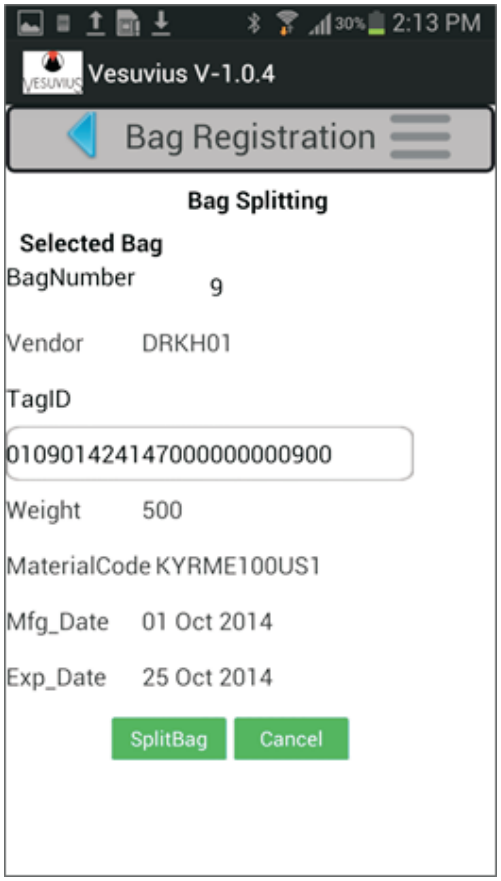


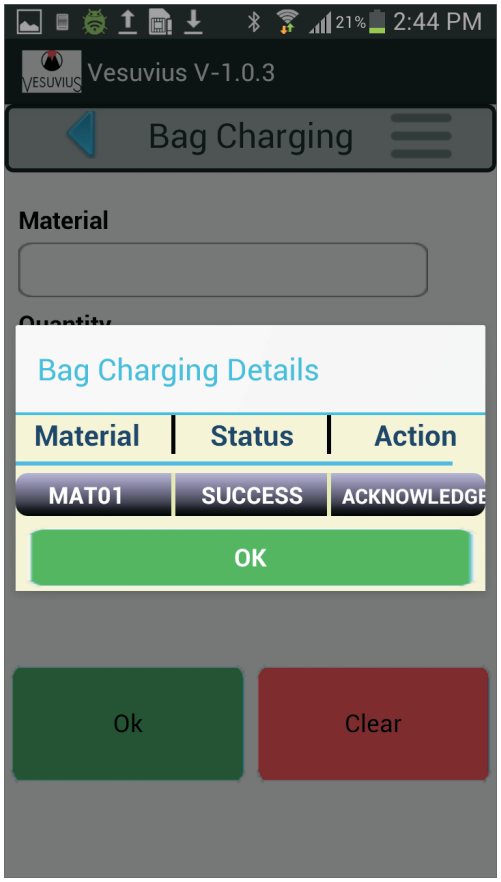
Bag Registration: The GRN and PO of the bag is selected and the bag weight is read from the weighing scale by HandyScanna™. The RFID tag is then assigned to the bag.



Sampling: When a GRN is created, some material is removed from the bag for sample testing. When the sample is created, this entry is logged by the HandyScanna™ and a printout is generated.

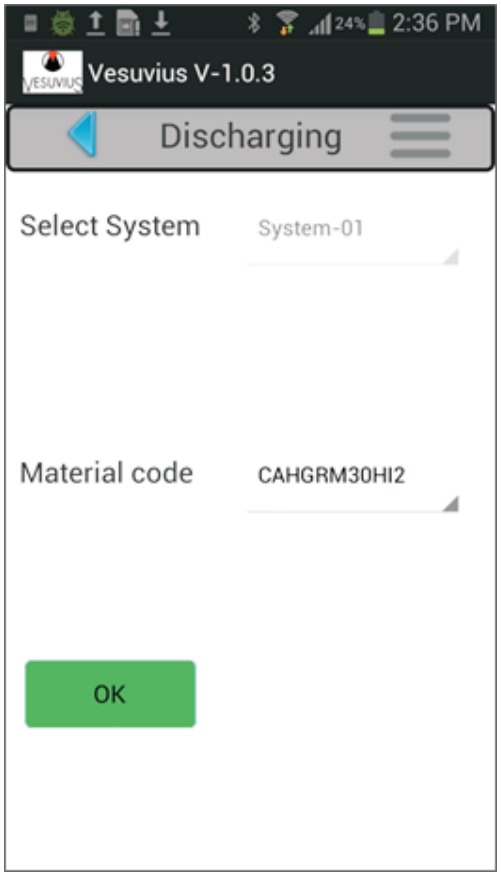
Split Bag Registration: If during retrieval a bag is required to be split, then the bag is taken to the splitting area and the required quantity is removed and placed into a new bag which is registered using the HandyScanna™ device.



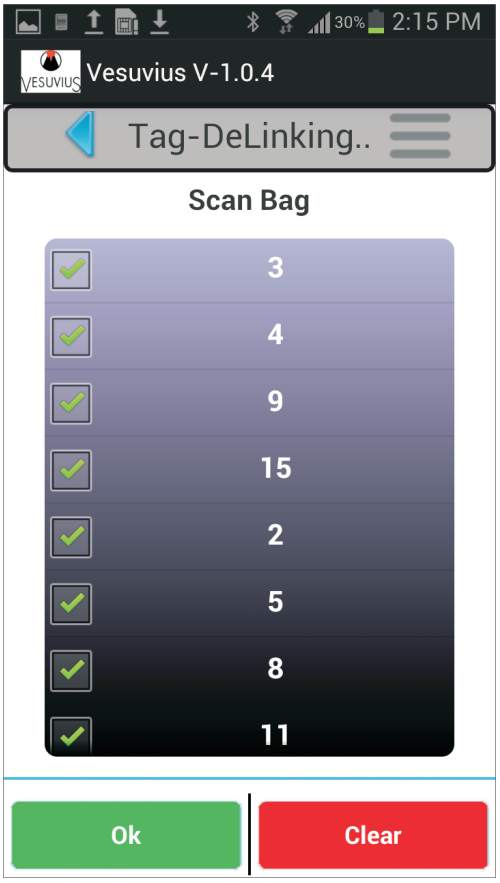


Charging Material: After material is retrieved from the warehouse, it is sent through the forklift for charging (preparing the mixing recipe). When the bag arrives for charging, the user scans the bags with the HandyScanna™ and sends this information to the Essen Server. The server validates the data and the charging material details, on which the user confirms that the material is successfully charged.

Discharging Material: If after the recipe is prepared, some raw material remains, then the raw material is put back into the bag and a discharging entry is made for that material by the HandyScanna™ into the Essen Server, after which the bag is sent back for placement.



Tag De-linking: When the bags are emptied after charging, the user scans each bag's RFID tag with the HandyScanna™ and de-links it from the bag in the server database. These tags can now be reused and reassigned to new bags.



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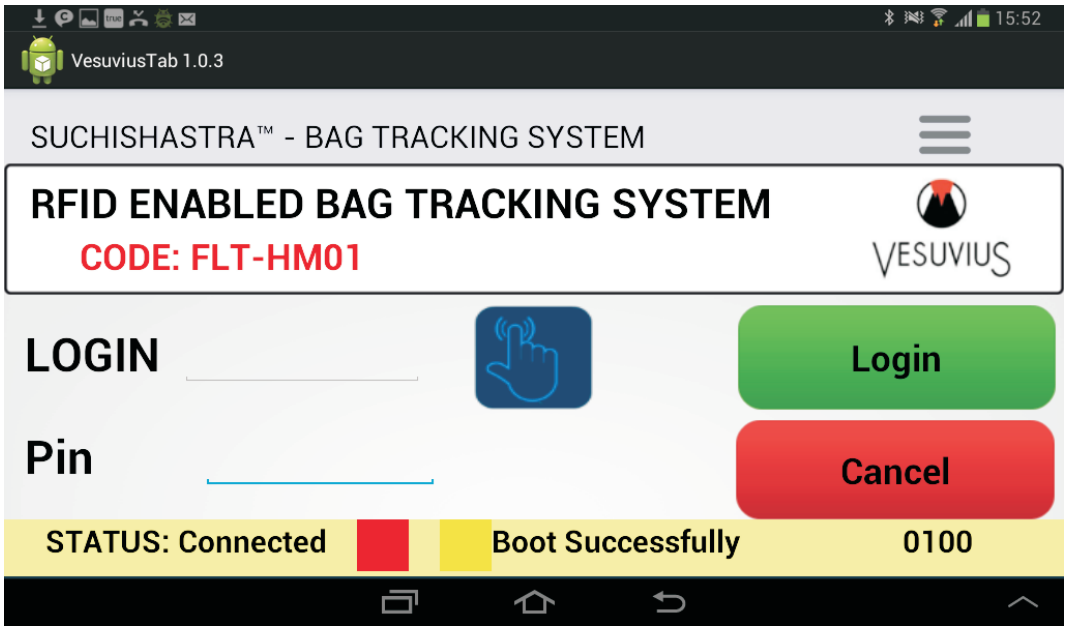
Tablet Application:

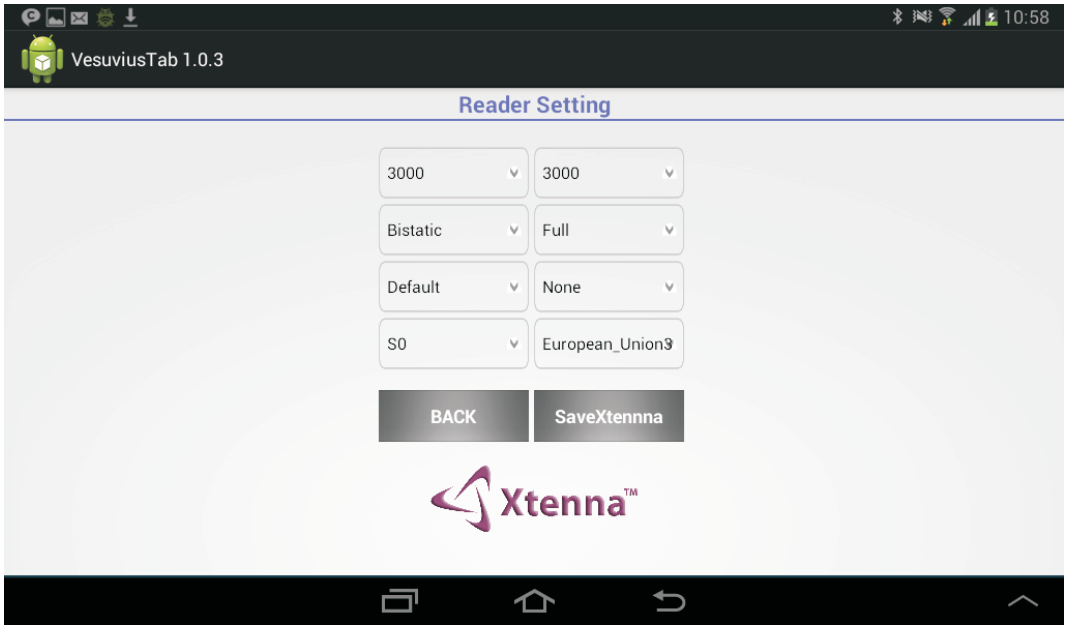
The tablet is affixed to the forklift to enable the forklift operator accomplish his tasks. The tab application performs the following tasks:

- Placement
- Re-shelving
- Retrieval

Tab Login: Before starting, the forklift operator shows the tag to the RFID reader, which reads the tag and displays the name. The operator enters the password, thus only an authorized person can log in to the tab application.

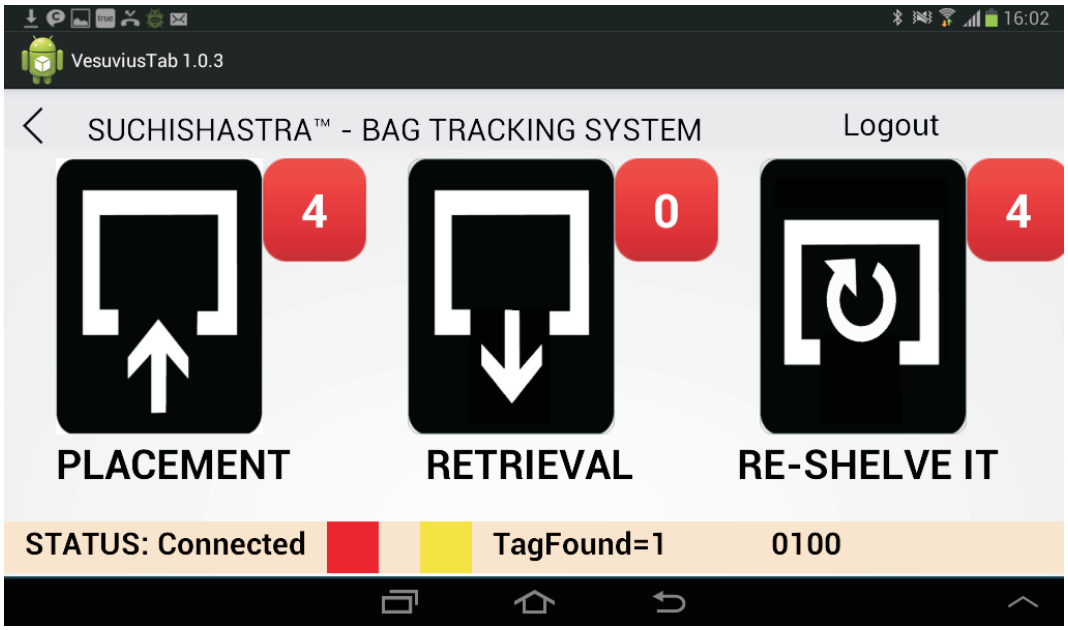


Reader Settings: The application lets the operator adjust the settings of the RFID reader mounted on the forklift.

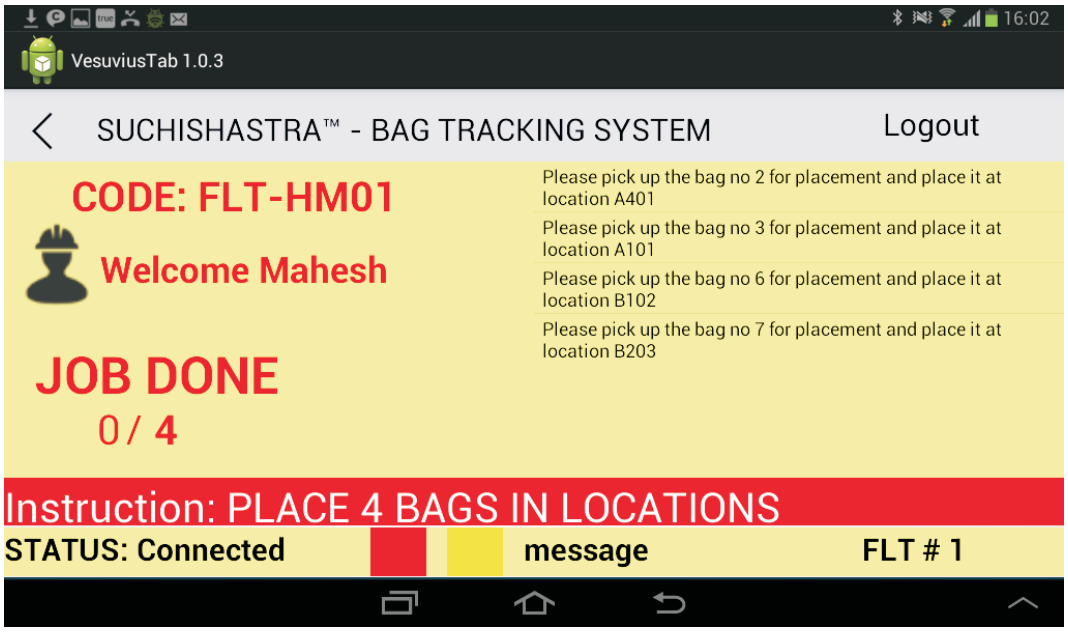


Synchronization: This allows the operator to download Essen Server data on to the tab and upload tab data back to the Essen Server.

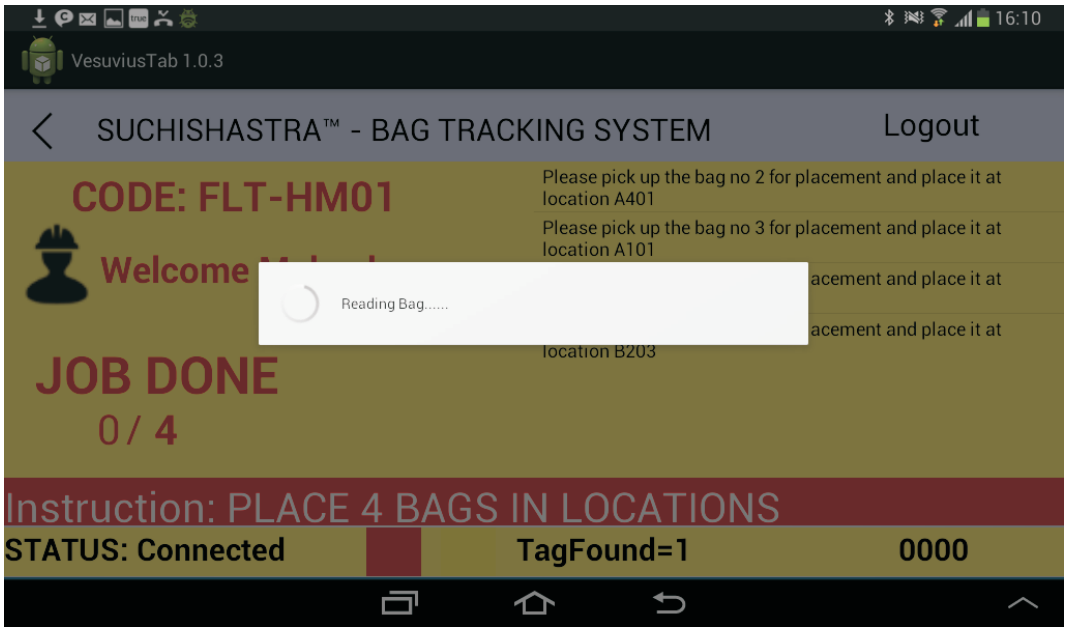
Home Page: After login, the tab displays the home page with all alerts displayed on the screen. When any placement, retrieval or re-shelving tasks are created by the Essen Server, the server sends alerts to the forklift tab application for completing these tasks.



Placement: When HandyScanna™ registers a bag it sends the information to the Essen Server. The server then sends an alert to the forklift tab application to place the bag at its proper location. The application also suggests the correct location for placing the bag.



The forklift reader then starts to read the bag tags.



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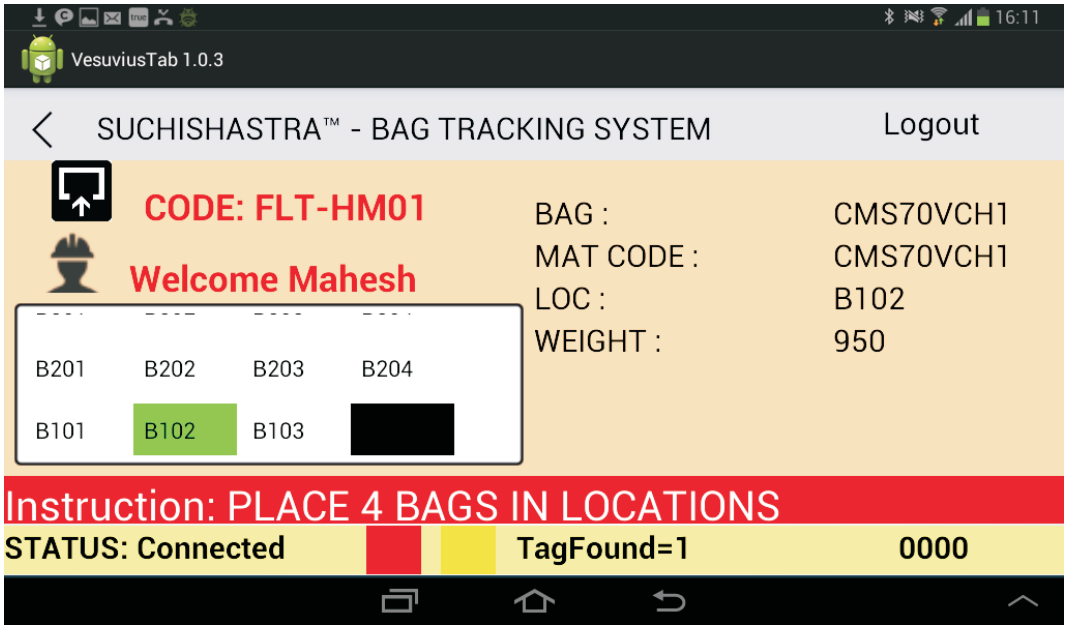
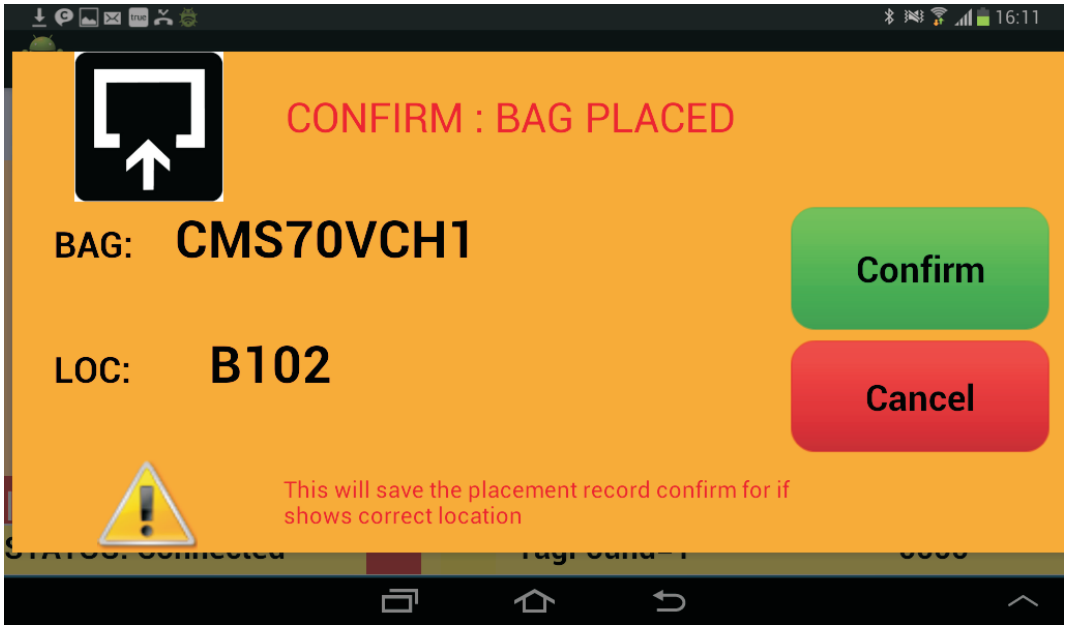
Once the bag is read by the forklift's RFID readers, its information is displayed on the tablet screen along with the rack available for placement of the bag. On screen, the black colour block indicates that this rack is occupied by other bags, while the green colour shows the suggested location for bag placement.



When the bag is placed at its location, the reader reads the location tag and a confirmation screen is displayed by the tab. The operator confirms on the screen that the placement is at the correct location. Once the bag placement has been confirmed, the placement alert count gets decreased.



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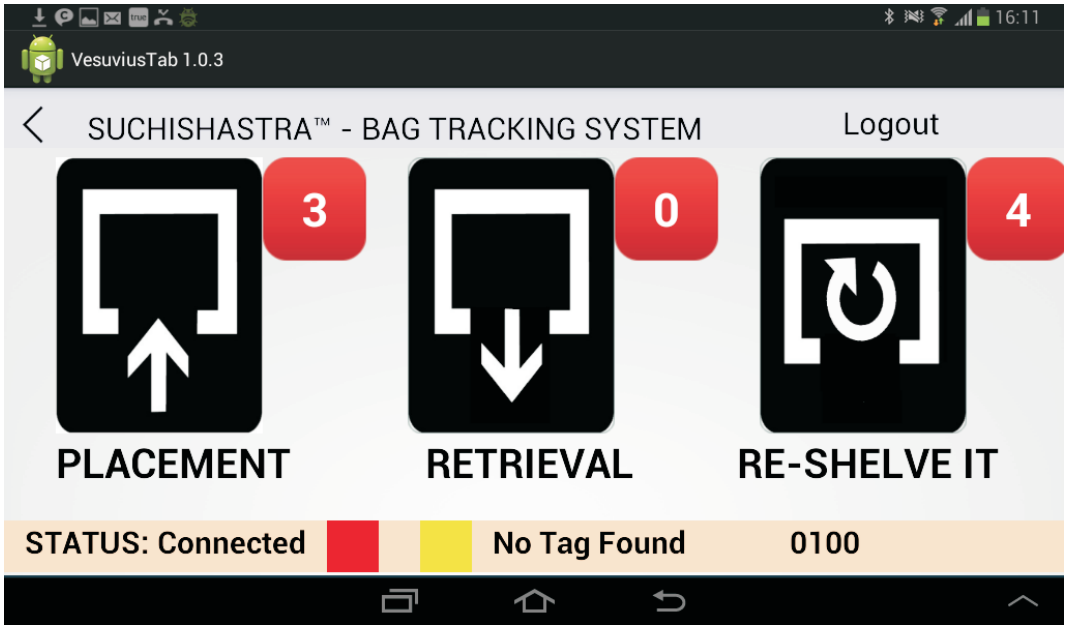
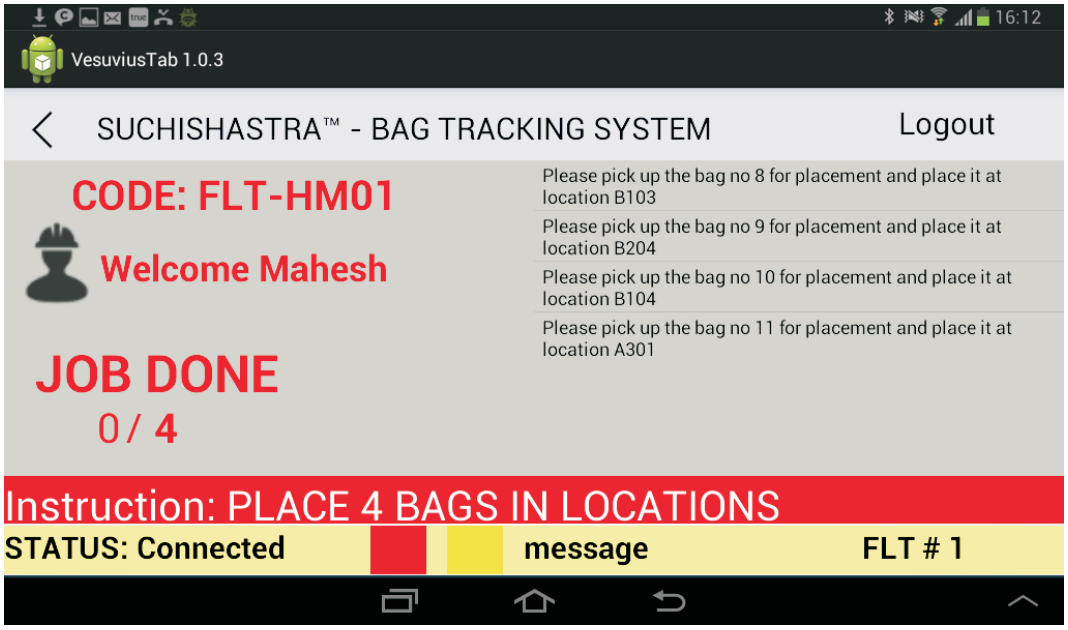


Re-shelving: After a bag has been split, the new bag is registered through HandyScanna™ and its data sent to the server. When this data reaches the server, it sends an alert to the forklift tablet for re-shelving. The forklift operator selects the re-shelve alert and all re-shelve tasks are displayed on the screen along with their suggested locations.



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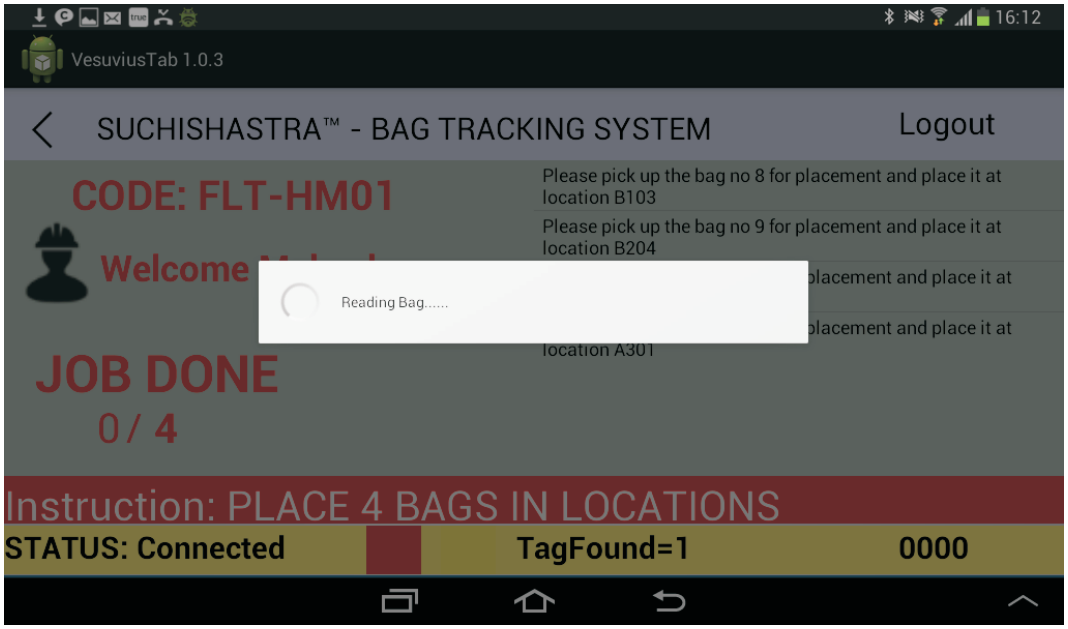
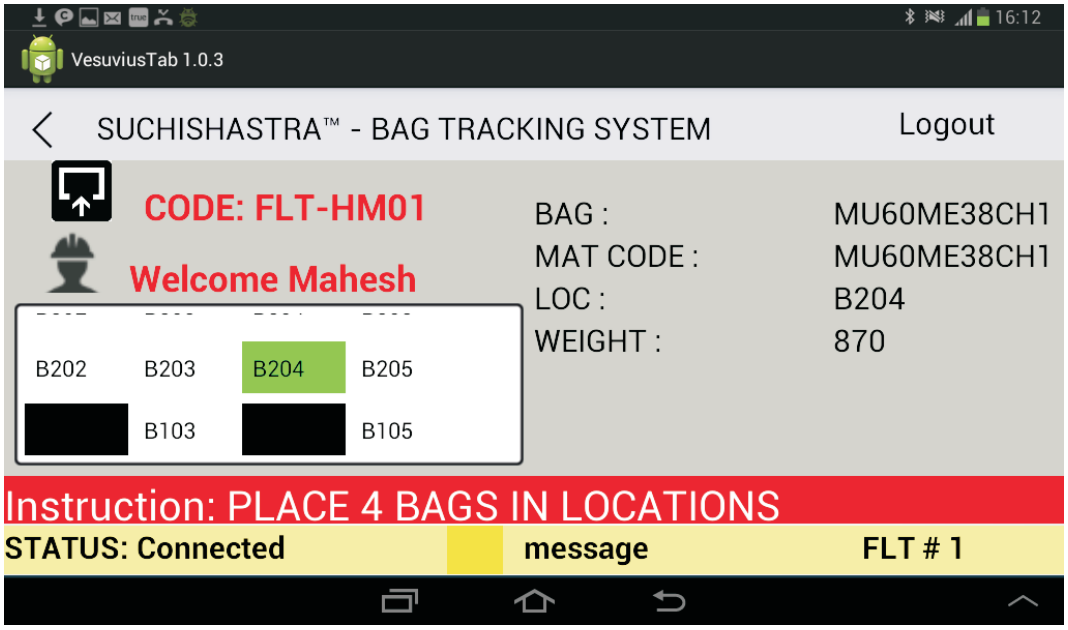
The forklift RFID reader reads the bag's tags.

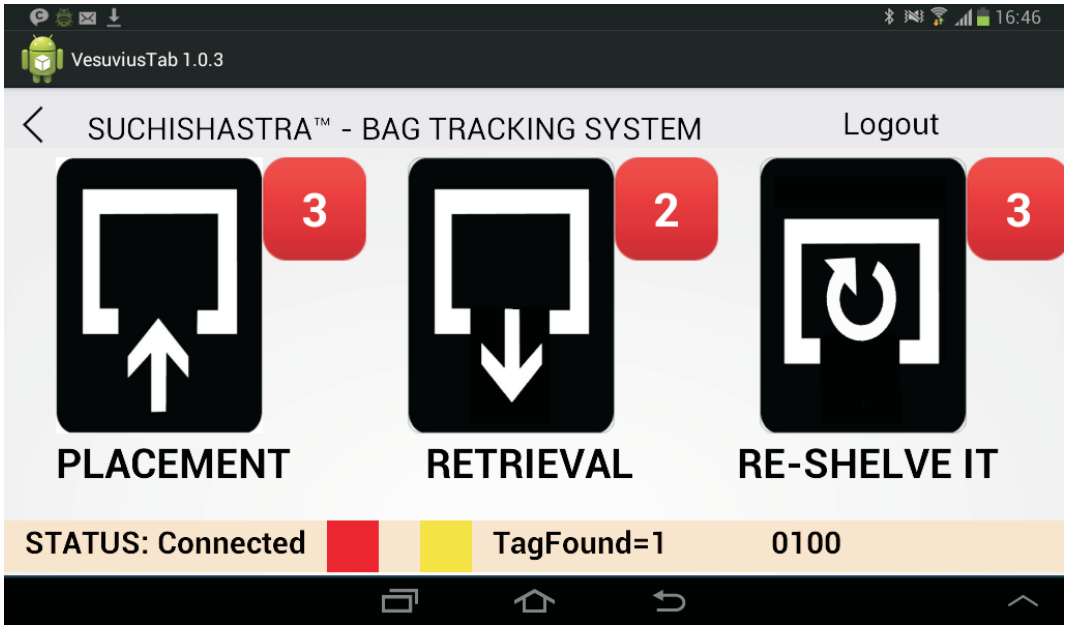


The bag's details are displayed on screen and the operator places the bag at the proper location.

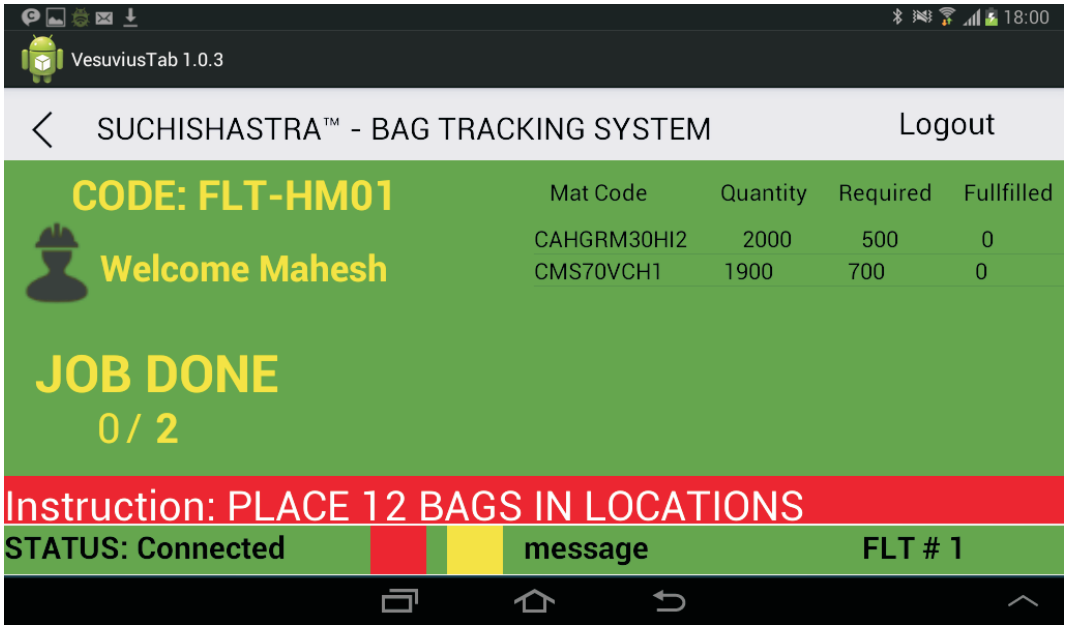


After bag placement, the location tag is read and the operator is asked for placement confirmation. After confirmation, the re-shelving alert count gets decreased.

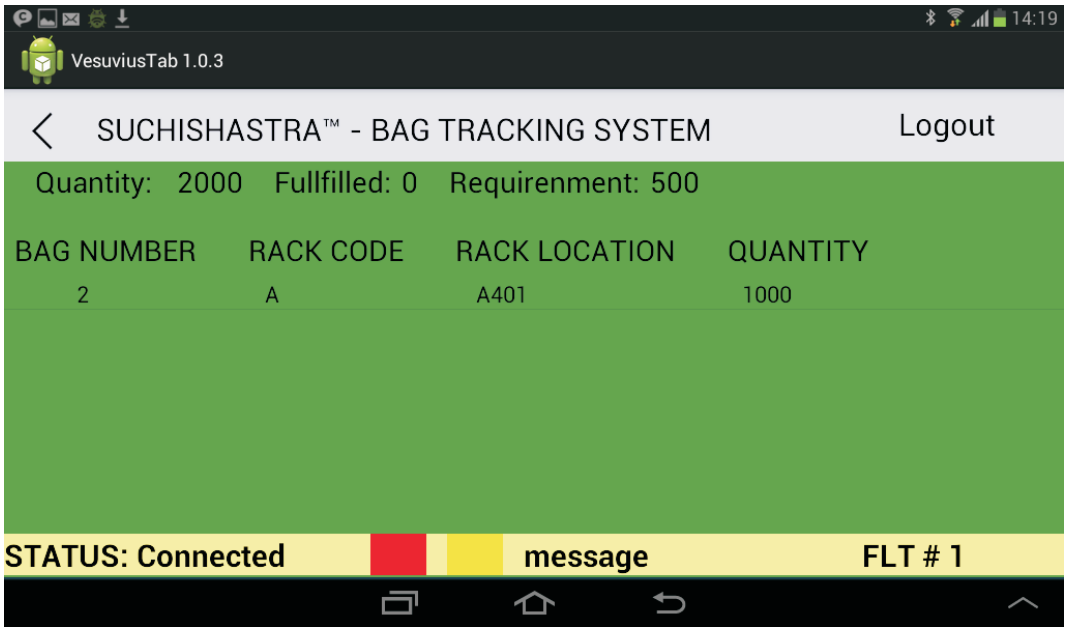
Retrieval: Material mixing recipes are created by the PLC and this data is downloaded by the Essen Server. Once the server receives this data, it knows which recipe is in process and the quantity required for preparing the recipe. The server sends alerts to retrieve material for the current recipe and this alert is posted on the forklift tablet along with the alert count.



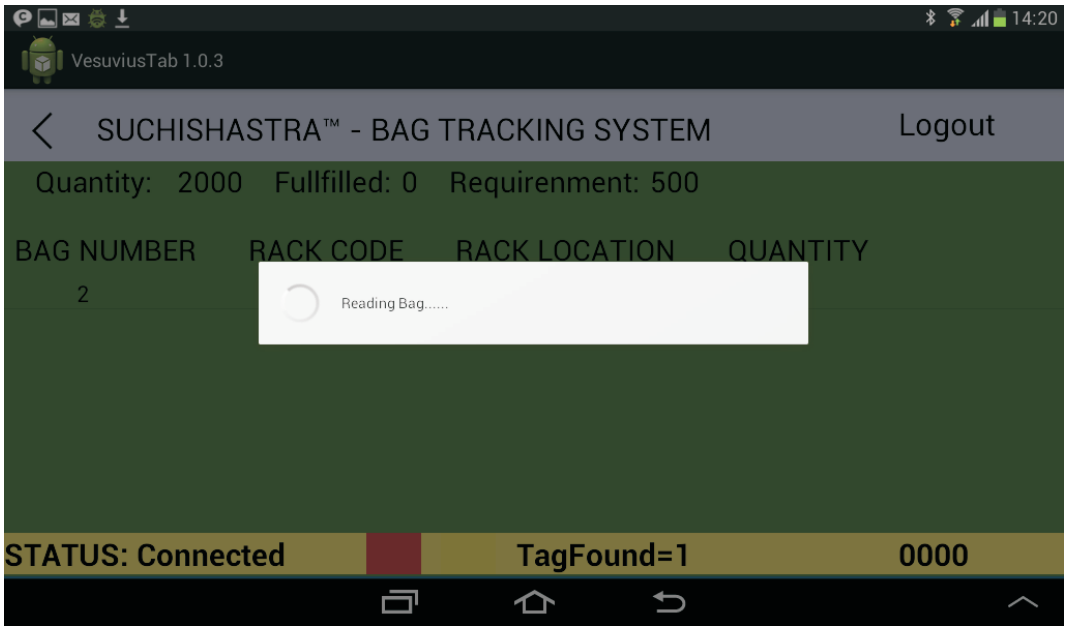
The operator selects the retrieval alert and the retrieval list is displayed on the screen. The list shows the material code with the available quantity and the required quantity.



The selected task is displayed along with retrieval location and the quantity at that location. The server sends details of bags nearest to the expiry date, so that such bags are utilized first.



The forklift goes to the location where the bag is stored. When the forklift lifts the bag, its reader reads the bag's RFID tag.



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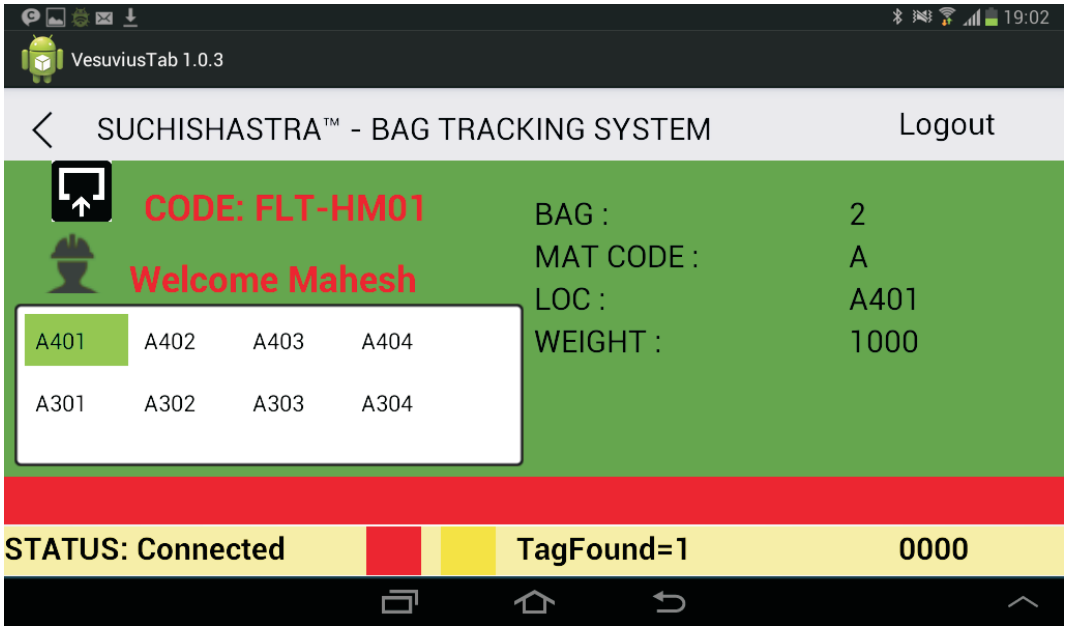
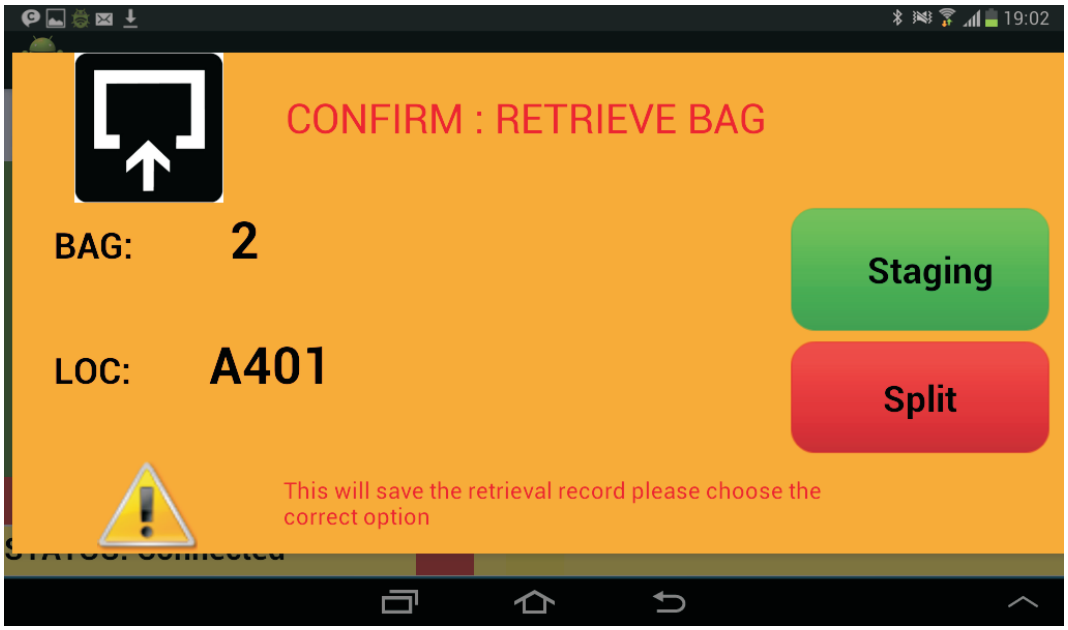
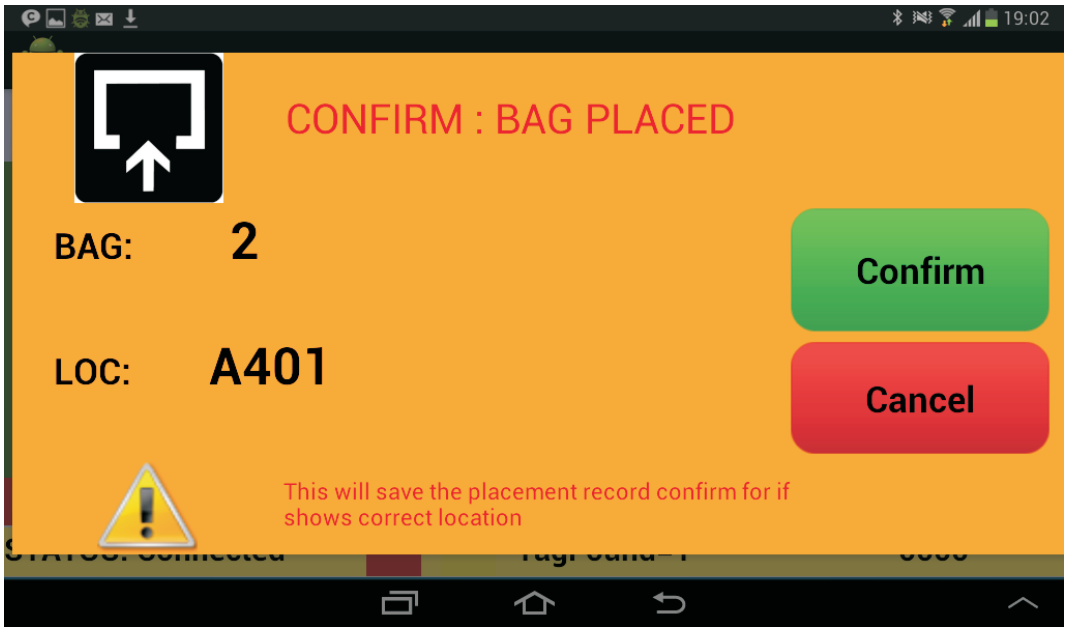
When the bag's tag is read, its information and location details are displayed on the forklift's tablet screen.



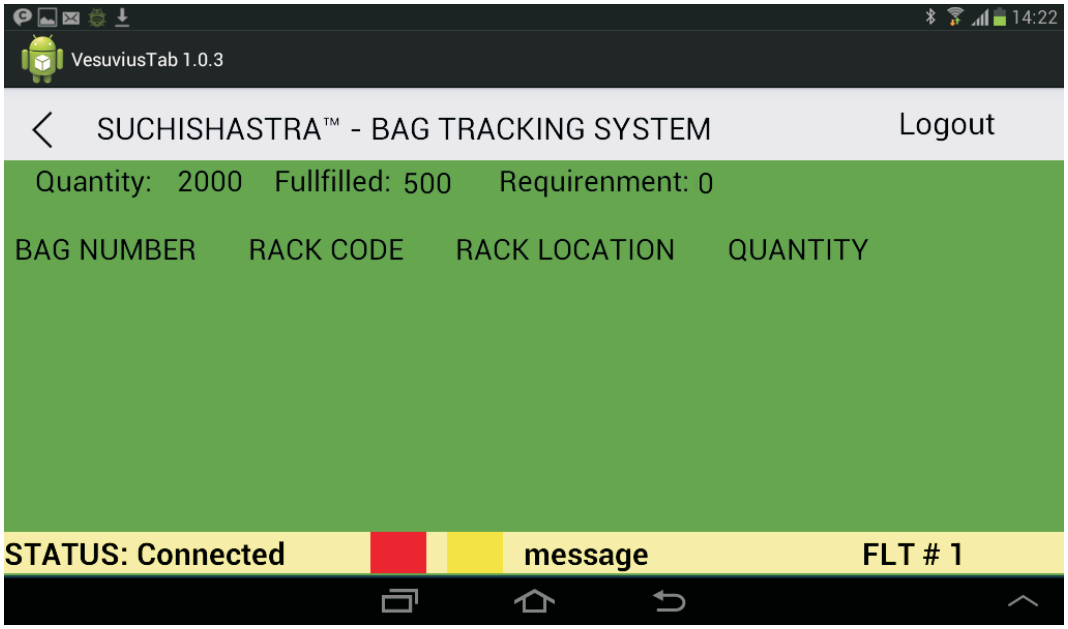
The forklift then reads the location tag and the retrieval confirmation screen appears on the tablet with Staging and Split options. The operator selects the required option as follows: When a full bag is required for fulfilling the required quantity, the bag is brought to the staging area for lifting (charging) the material into the silo. When the required quantity is less than the full bag quantity, the material is brought to the splitting area and split into a new bag.



The operator then takes the bag to either the staging or splitting area. After selecting the appropriate option, the confirmation screen will be displayed on the forklift tablet.



At the time of fulfilling the required quantity, the current status is displayed on the forklift tablet helping the operator know the balance quantity required for retrieval. When the required quantity becomes zero, the alert count is removed.



CASE STUDY

BENEFITS:

- Automatic tracking resulting in accurate and efficient management of stock.
- Efficient stock distribution at designated locations in warehouse.
- Logical representation on screen of physical rack storage locations.
- Easy identification of stock required for current order.
- Optimum rack management and efficient FIFO stock utilization.
- Ease of use via touchscreens for directions to forklift operators.
- Easily identify forklifts available for current order.
- Efficient forklift management putting them to optimum use.
- Silo operations integrated with stock dispensation and verification.
- Automated report generation of stock and deliveries.

LINKS:

Hardware:

Xtenna Proximity™

Xtenna Hybrid™

Handy™ Scanna

Tags:

µMETALLICA™

METALLICA™

Software:

Xtenna WebToolkit™

Xtenna Studio™

Reference Example:

http://www.essenrfid.com/Mailer/manufacture-flash-demo.pdf