Essen RFID your window to the interconnected world

ESSEN

CASE STUDY

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DEEPAK FERTILISERS AND PETROCHEMICALS CORPORATION LIMITED

Well-known chemical industry corporation adopts for its dispatch operations, a RFID optimized TRUCK LOGISTICS SYSTEM

Automatic and efficient tracking of truck movement within plant premises

Efficient queuing and minimizing of waiting time

Optimum utilization of loading bays and weighbridges

Automated dispatch processing, trip data management and seamless backend integration with existing ERP

INSIDE:

TECHNOLOGY

Solution:
EPC Gen2 compliant vehicle tracking solution

Tag Type:
Parka™ UHF Passive

Reader/Antenna:
Xtenna™
Xtenna Proximity™

Method:
Multiple Tracking via Integrated Reader/Antenna modules

Integration Platform:
RFID Middleware:
Xtenna™ WebToolkit
Xtenna™ Studio
Application: Essen RFID's Truck Logistics System
Database: SQL Server 2012
ERP: SAP

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

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

Systems Integrator:
Essen RFID

Xtenna™ Integrated RFID Antenna/Reader

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www.essenrfid.com

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KEY REQUIREMENTS:

Deepak Fertilisers and Petrochemicals (DFPCL) is a leading producer of industrial chemicals and fertilizers in India. From its plant at Taloja near Mumbai, its various products are manufactured, packed in bags and sent to distributors. The company utilizes a fleet of trucks for product distribution, consisting of both, permanent and temporarily contracted vehicles. These trucks are booked by the company's transport department and called to the plant when required as per the truck's distribution destination. This requisition and dispatch process needed to be automated and streamlined as truck movement within the plant area was inefficient with truck drivers availing of additional waiting time, resulting in loading bay underutilization and delays.

Main challenges:

- Knowing how many trucks were lined up and waiting outside the plant gates for entry into the premises.
- Efficient utilization of all loading bays for loading dispatch goods with least waiting time for the trucks.
- To track the availability of suitable loading bay for each truck.
- To manage and guide the truck drivers so they can reach their allotted loading bay within minimal period of time.
- To automate the process of detection and loading of trucks within the company premises.
- Determining the time spent by the trucks at each touch point within the plant.
- Generating a token as a unique code for each truck, helping in identification and the ascertaining current status of the truck within the premises.
- Information sent to truck drivers through SMS during token generation, regarding estimated time before loading of material.
- Reduction in time spent by dispatch office in ascertaining required trucks available which have reported for loading and bringing down the waiting time of these trucks outside the plant.
- Instant information and alerts to administrator regarding current status and waiting queue at each loading bay.
- Tracking history of trucks pertaining to timings, documentation, and details of vendors, materials, trips, etc.

SOLUTION:

Essen RFID offered an efficient solution for truck tracking and transit management based on RFID, that would track the delivery trucks at each touch point starting from issuing of token till the loaded truck moves outside the plant, while minimizing waiting period for loading of goods. It involved the use of RFID tags on the vehicles and deployment of integrated antenna-readers at the various touch points within the plant. The solution is implemented through SQL Server 2012 as the database with backend ERP integration through SAP.

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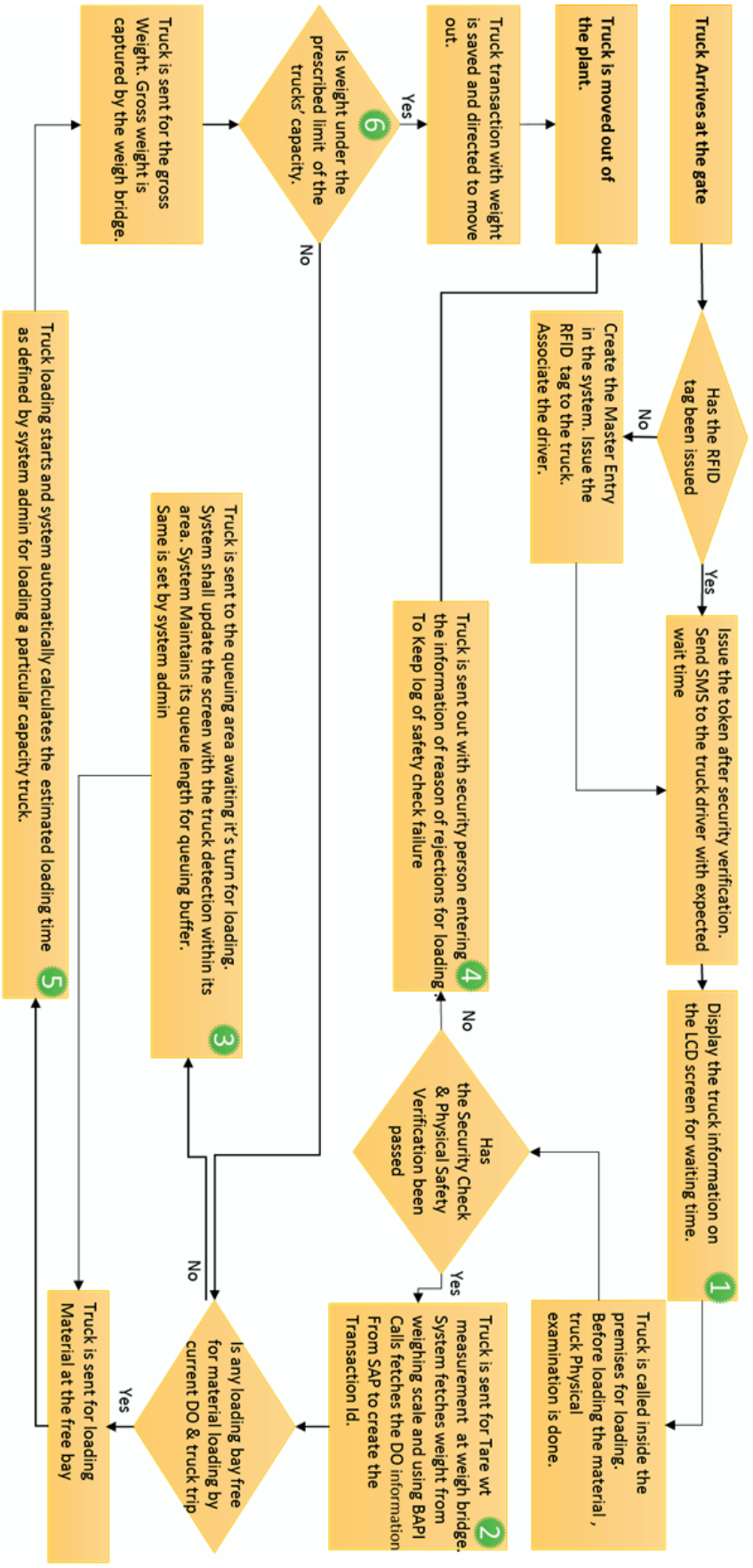
Operation Flow:



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IMPLEMENTATION:

A PARKA™ RFID tag is issued to each truck when it receives a token number on entering the premises. These tags are registered into the database using Xtenna Proximity™ readers. Xtenna™ antenna-readers for detecting truck movement are mounted at each touch point within the plant, such as entrance/exit gates, weighbridges, queuing area and loading bays. LCD displays are mounted at all the truck queuing areas.

The entire tracking process is controlled through Essen RFID's Truck Logistics System, and its front-end VETRA™ web application.

WORKING:

Modules:

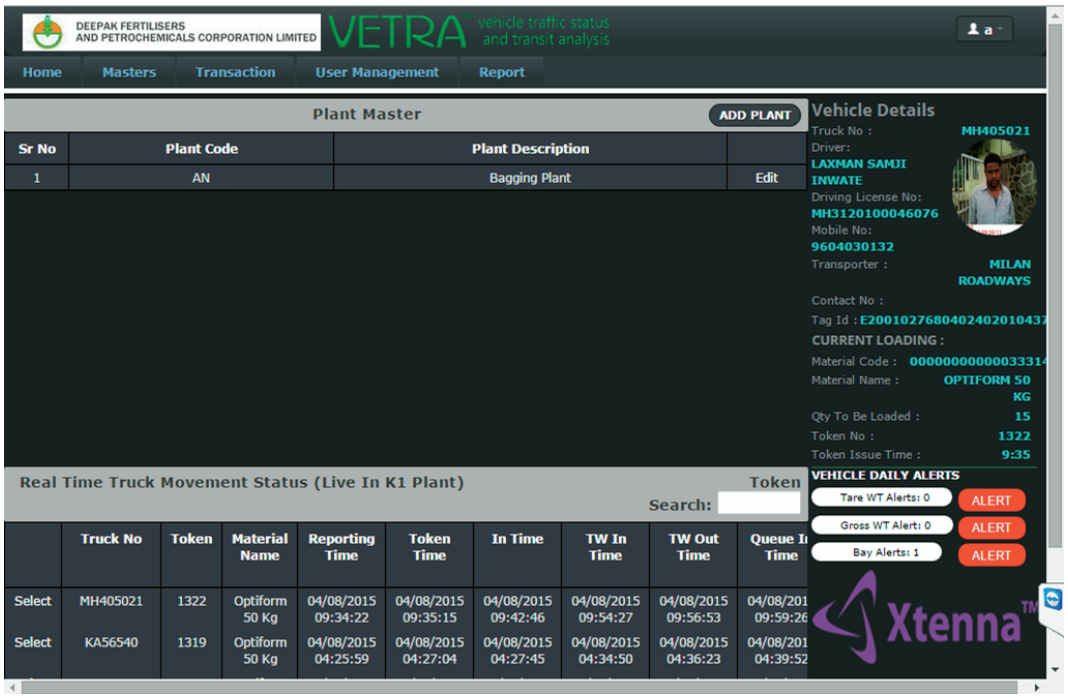
The Truck Logistics System has the following main modules:

- Registration
- Mapping Modules
- Dashboard

Registration Module:

This module is used to register the truck, driver and other important entities into the RFID system. The main masters used in this module are:

Plant Master: This is used to register the various plants within the company premises along with data such as plant name, description, etc.



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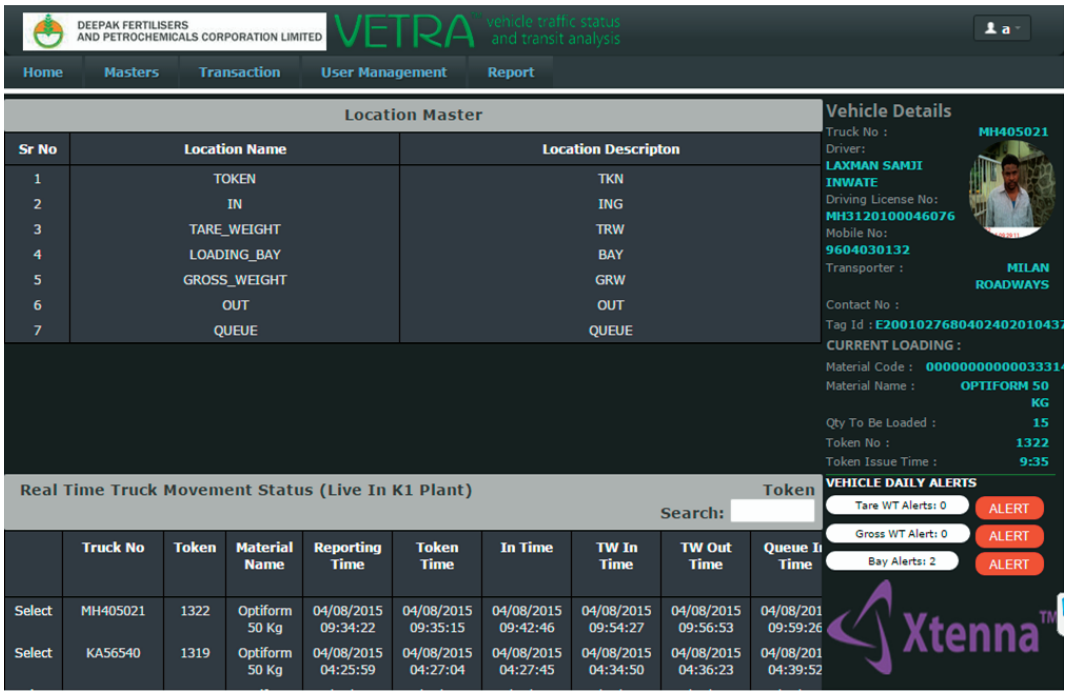
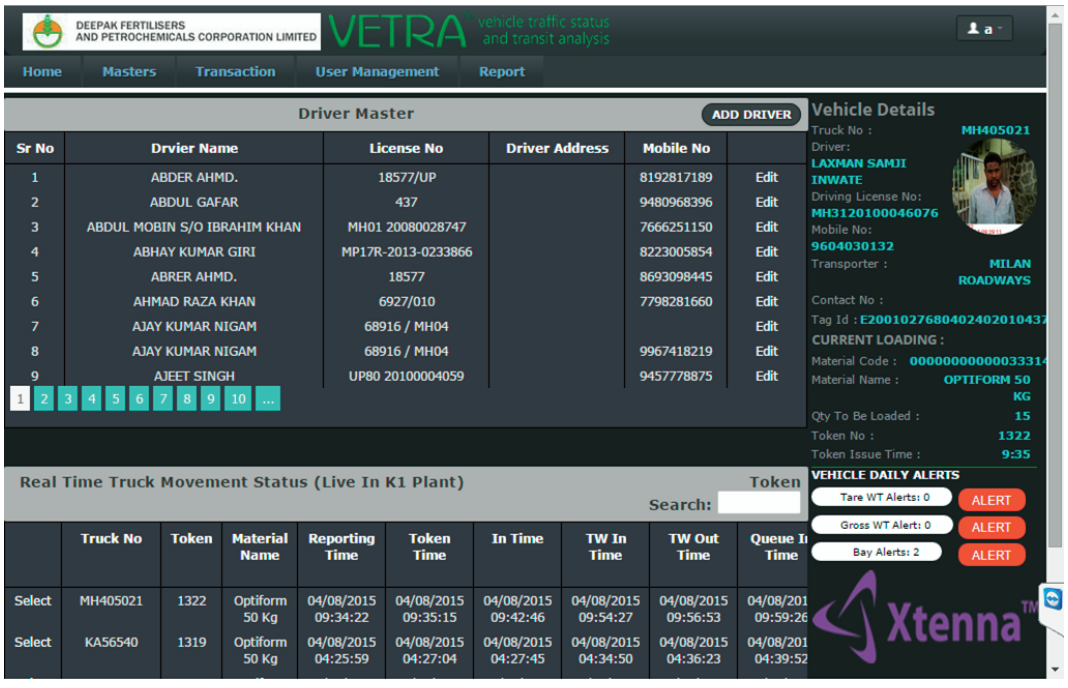
Location Master: This is used to register the various truck-stop locations within each plant, such as Token Issue, Tare Weighbridge, Loading Bay, Gross Weighbridge, etc.



Vendor Master: Here the vendors (transporters) available with the company are registered into the database along with their name, address and other contact details.

Driver Master: Using this, the driver of the truck is registered into the database along with necessary details such as driver's name, driver's address, driving license number, etc.



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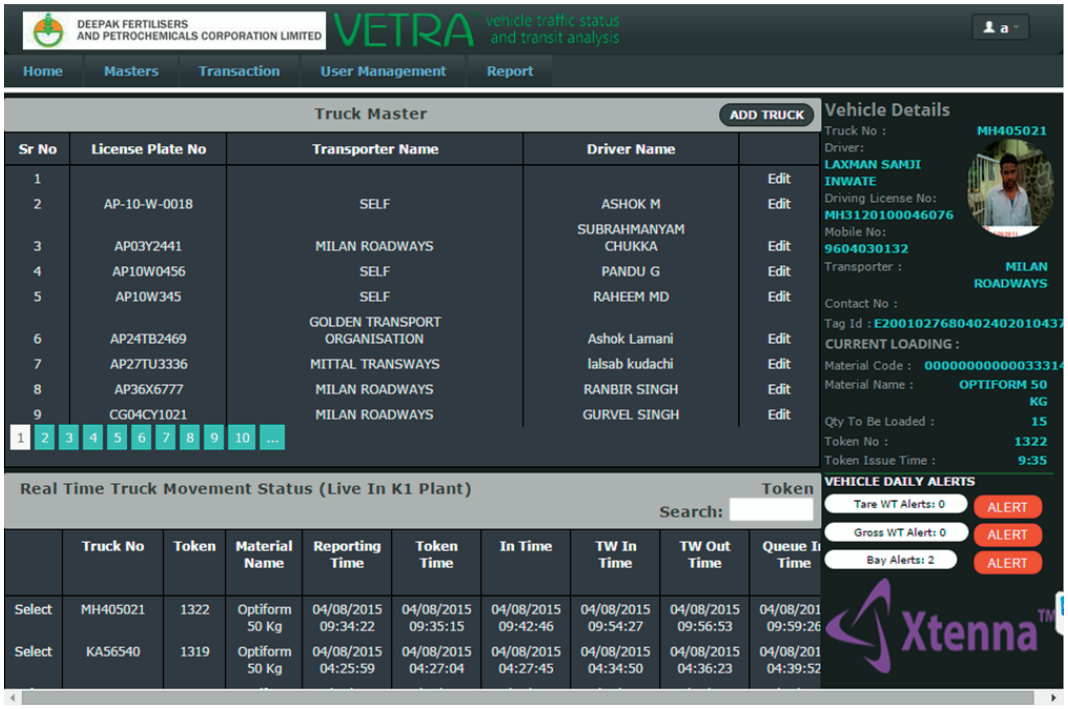
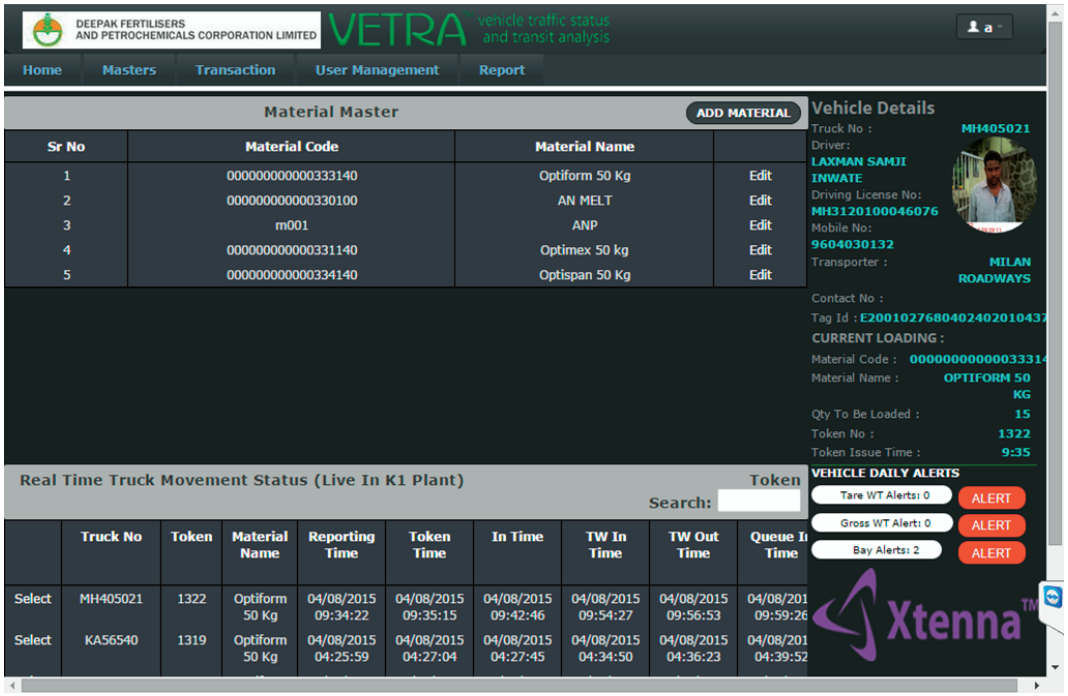
Truck Master: Each truck is registered into the database along with its details such as license plate number, truck driver, vendor (transporter/truck owner), truck's maximum carrying capacity, etc.



Material Master: This is used to register the various materials being transported by the trucks from the company's plants. Details such as material name, description, etc. are entered into the database.



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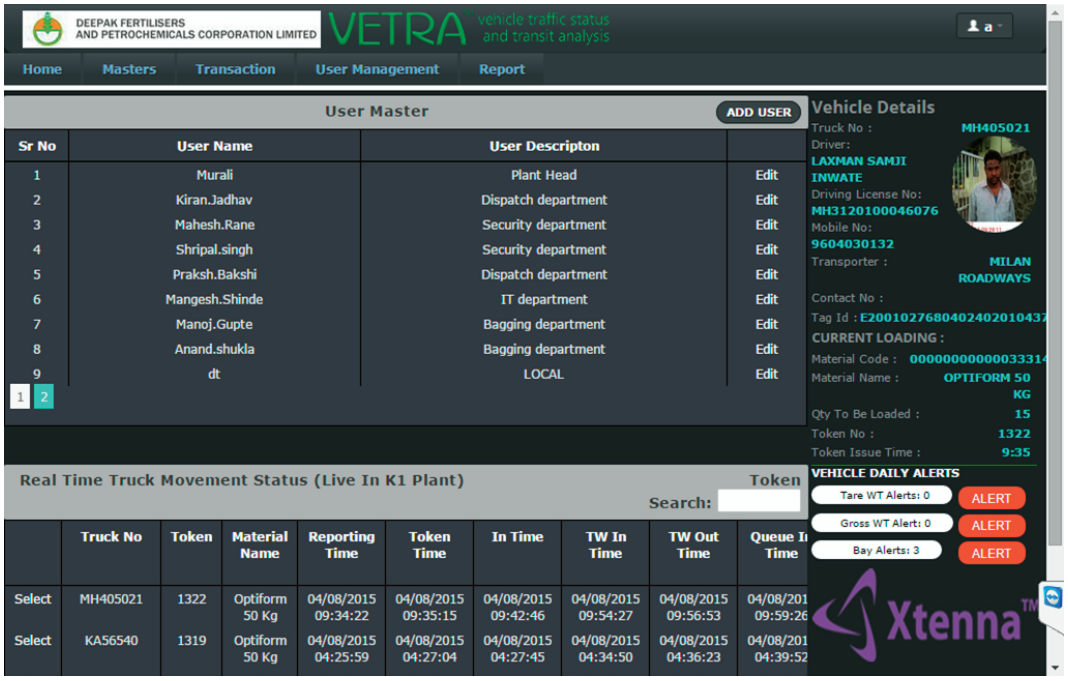
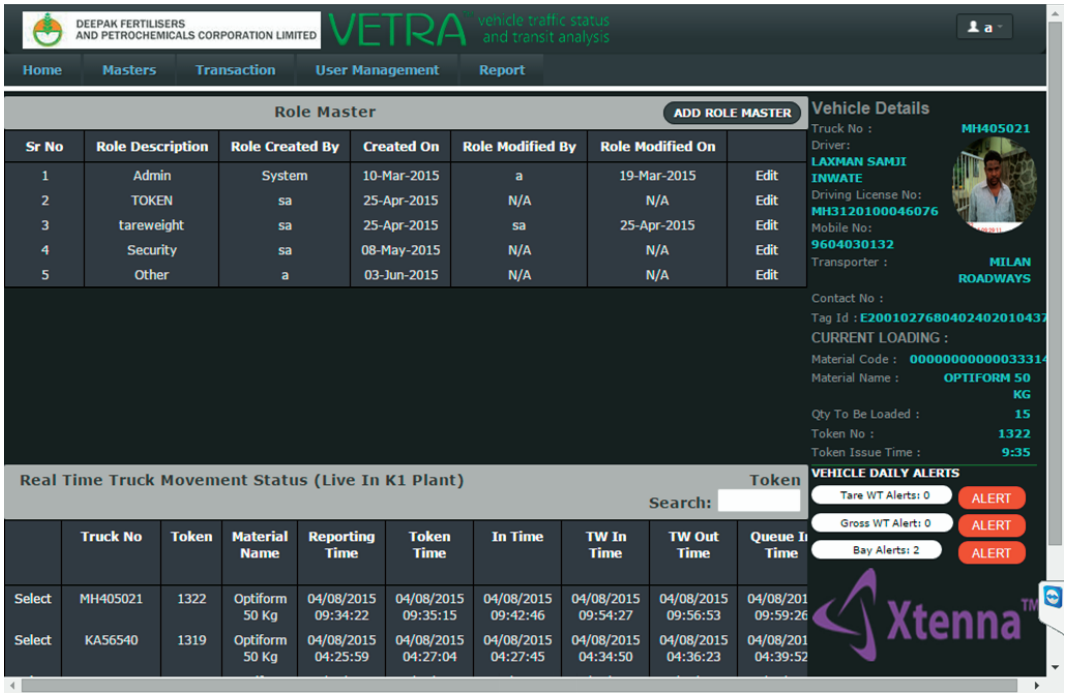
User Master: This maintains all information about each user along with user ID, user status, etc.



Role Master: This is used to define various roles or designations for the various users within the system, such as administrator, operator, etc. Each user can only have access to the data that has been assigned to his particular role.



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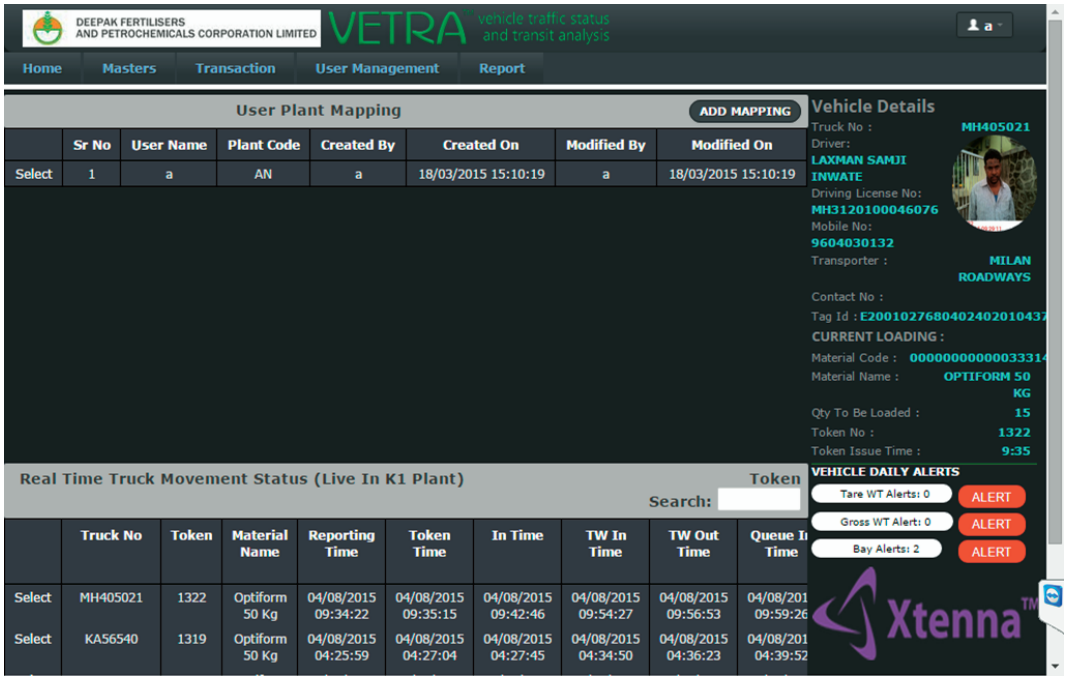
Mapping Modules:

Mapping modules are used to establish the relationship between the data in various masters, such as the materials with their loading bay location. The various mapping modules are:

User Plant Mapping: This is used to map a particular user of the application with a plant registered in the Plant Master. The user will then only be able to details of the plant/plants that have been mapped to him.



Plant Location Mapping: This maps registered plants to registered locations within the system.

Role Menu Mapping: This maps a specific user role to the various menus within the application. A particular user defined role can access only those menus that have been authorized to that role in order to modify or update the data within the application. For e.g. a user defined as administrator can access all menus, whereas a user designated as operator will have restricted access.

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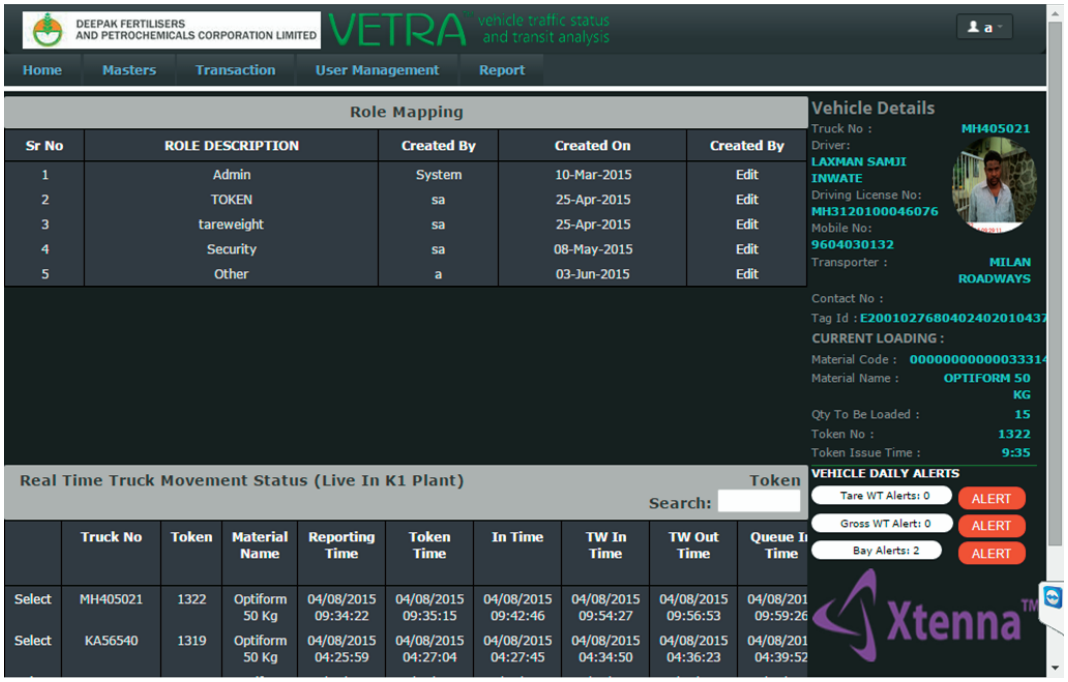
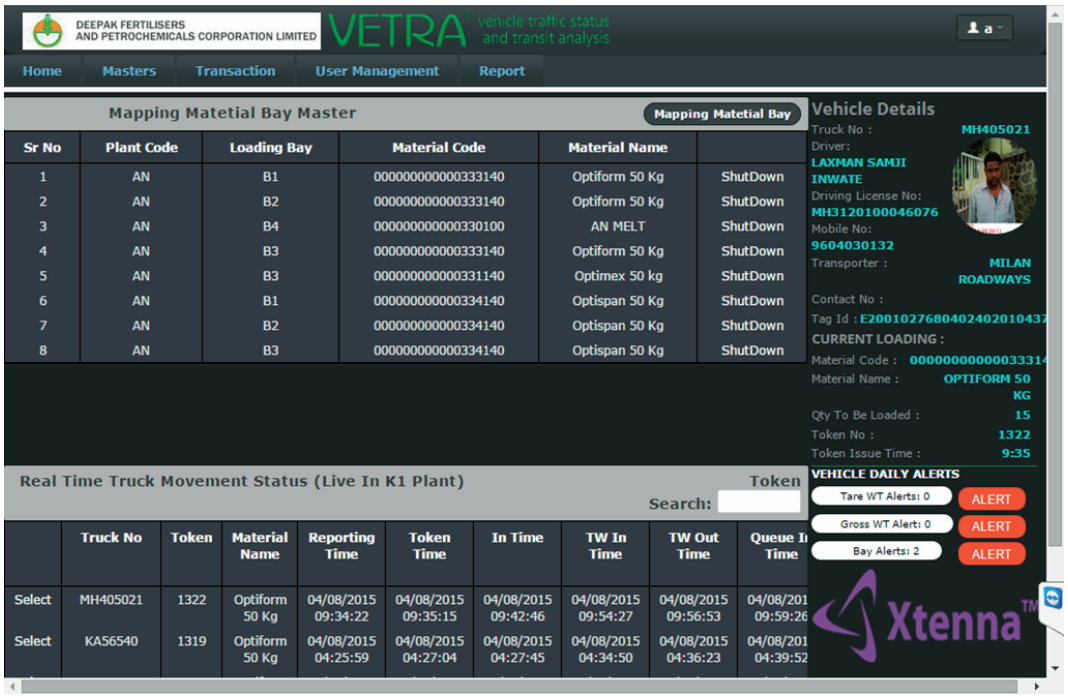
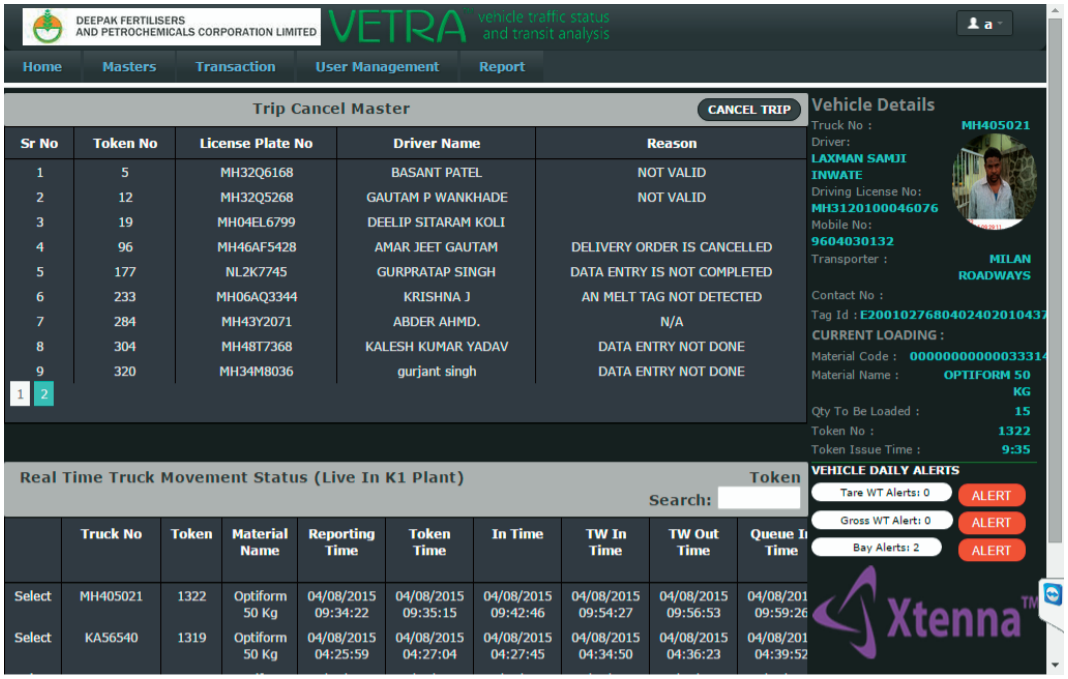


Material Bay Mapping: This is used to map the availability of material at a particular loading bay.



Trip Cancel: This is used to cancel the trip of a particular truck. This can be done only by an authorized person who has to enter the reason for trip cancellation.



Dashboards:
Dashboards are used to display the current status of trucks at various locations within the plant. They are also displayed on large LCD screens at these locations for the benefit of the truckers. They are used to provide directions to the trucks, such as proceed and wait instructions. There are three dashboards used by the system as follows:

Token Dashboard: This shows the list of trucks to whom the token has been successfully issued. It also shows the approximate time for the truck to reach the loading bay, along with instructions that help the truck towards their assigned bay.

Queue Dashboard: When a truck completes weighing of tare weight, it proceeds to its assigned loading bay. However, if the loading bay is occupied by another truck, then the truck has to wait for its turn in the queue waiting area. The queue dashboard gives details to each truck regarding the estimated waiting time and also provides them with instructions.

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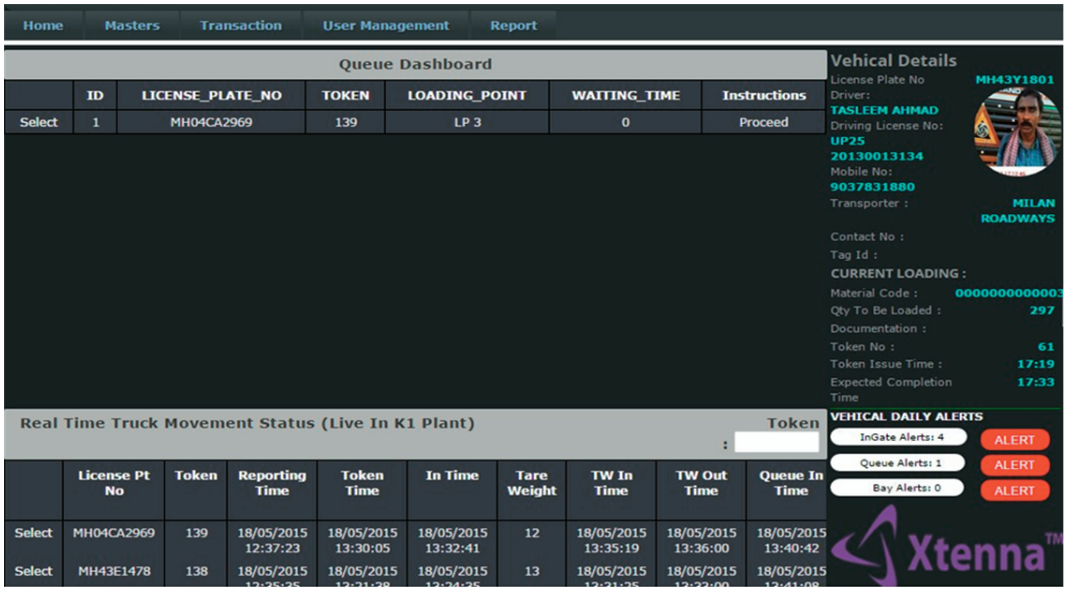
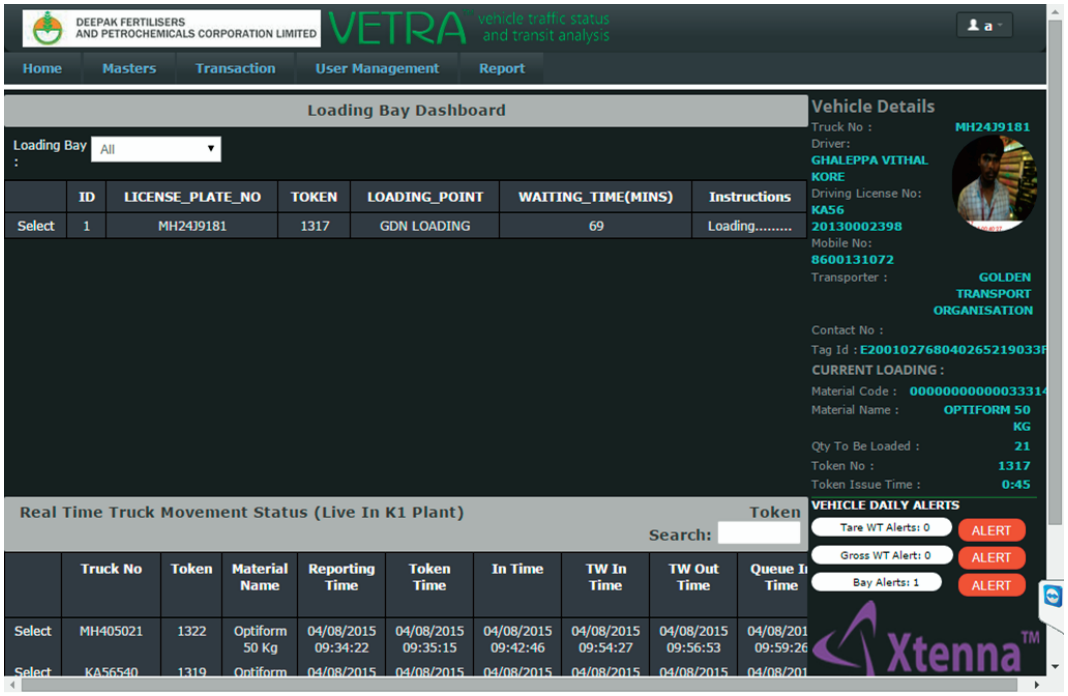
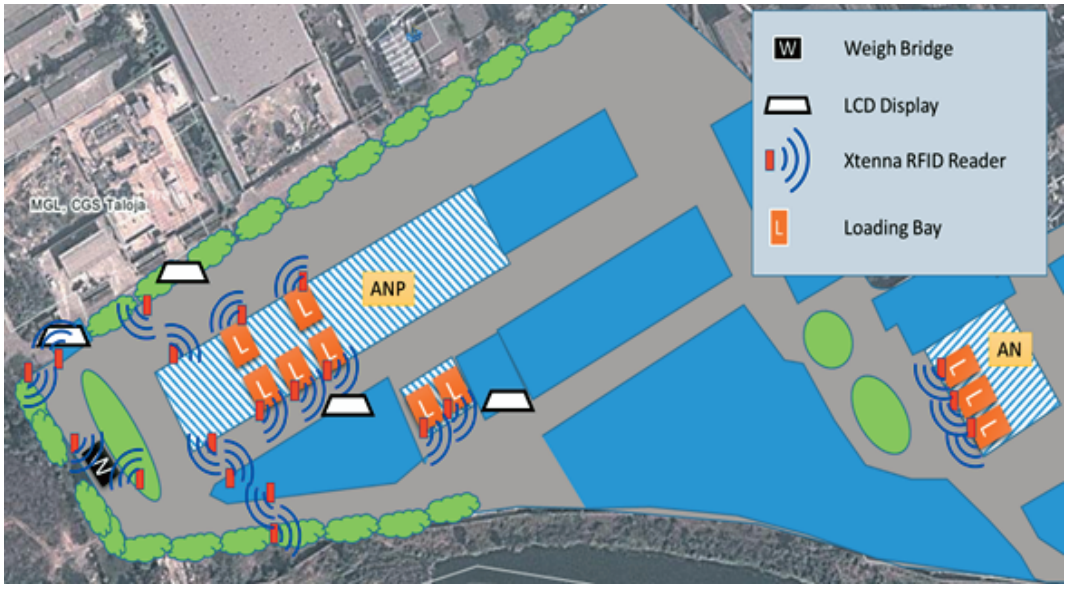


Loading Bay Dashboard: When a truck reaches the loading bay, it needs to stay there till the loading has been completed. This dashboard displays the approximate loading time for the truck at the bay and the waiting time for the next truck in the queue awaiting loading.



Working Process:

The Truck Logistics System is implemented for multiple plants of the client within the premises. An example of antenna-reader placement for one of the plants is given below.



Each truck entering the premises goes through the following process points.

1. Security Gate: Capture photo and issue token
2. Dispatch: Data is fetched from SAP to RFID
3. Issue of RFID tag
4. Entry Gate - IN
5. Dispatch - Tare weight
6. Queue IN
7. Loading Bay
8. Queue OUT
9. Dispatch - Gross Weight
10. Security Gate - OUT

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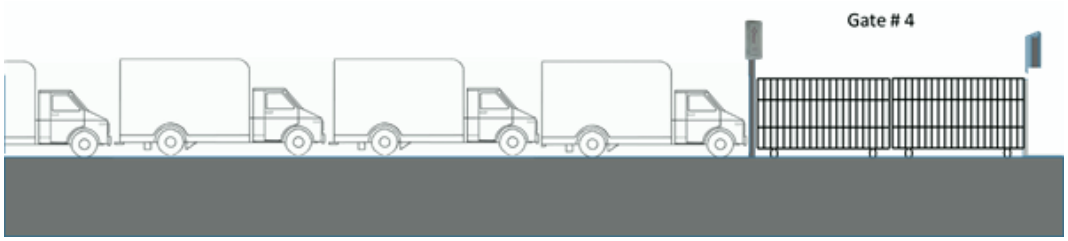
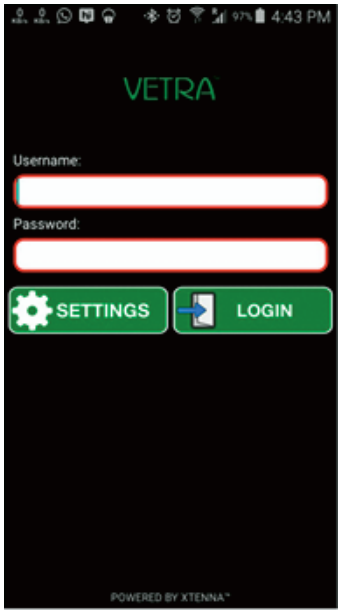


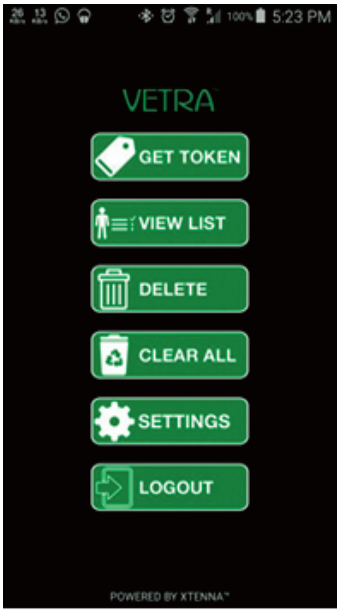
Trucks waiting at the Entry Gate

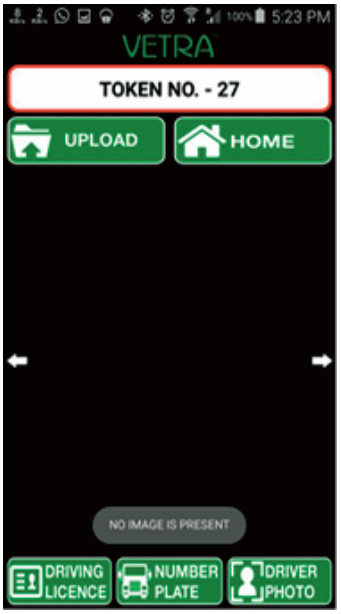
Security Gate - Capture photo and issue token using handheld VETRA™ app:

To avail entry into the plant, the truck reports at the security gate, along with the Sales Order provided by the Transporter.

The security guard verifies the driver along with his driving license. The truck's reporting time at the gate is marked and details of the truck driver such as name, mobile number, etc. along with photographs of the truck are captured into the system using the VETRA™ app on the handheld device. A token is generated and associated with this data.







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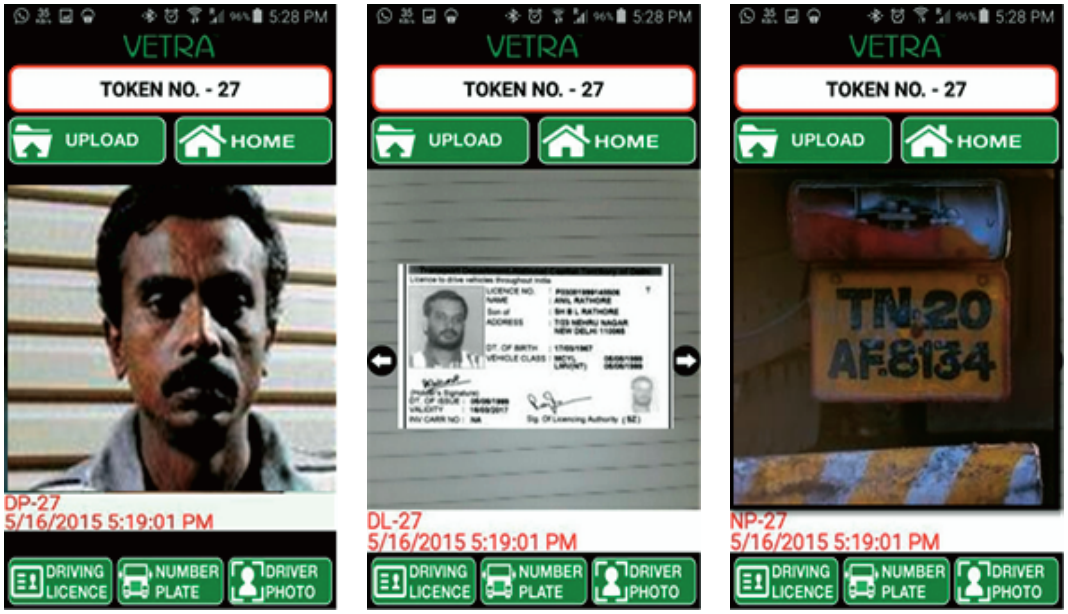
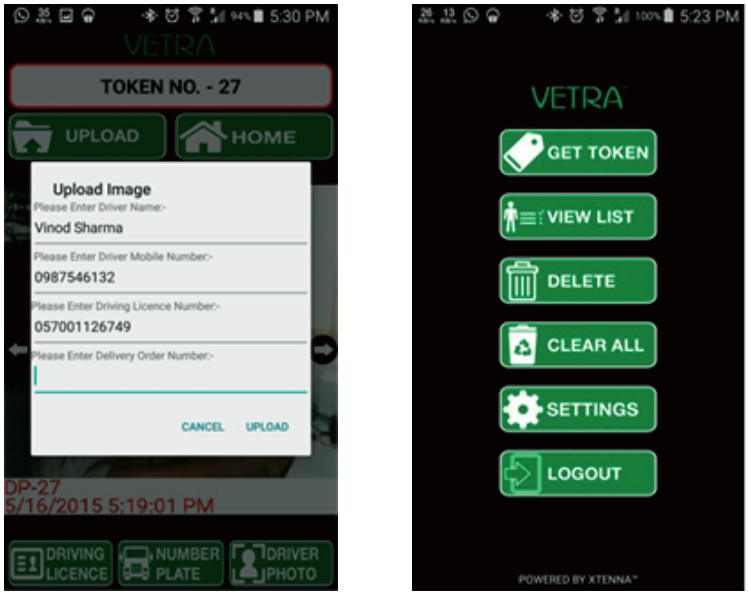
Photographs of the truck driver, his driving license and the truck license plate are captured in the handheld device by the security guard at the gate.



He then enters details such as Driver Name, Mobile Number, Driving License Number and DO number into the device for uploading into the RFID system. Once uploaded, it is confirmed on screen and the data arrives at all the other process stations in the premises.



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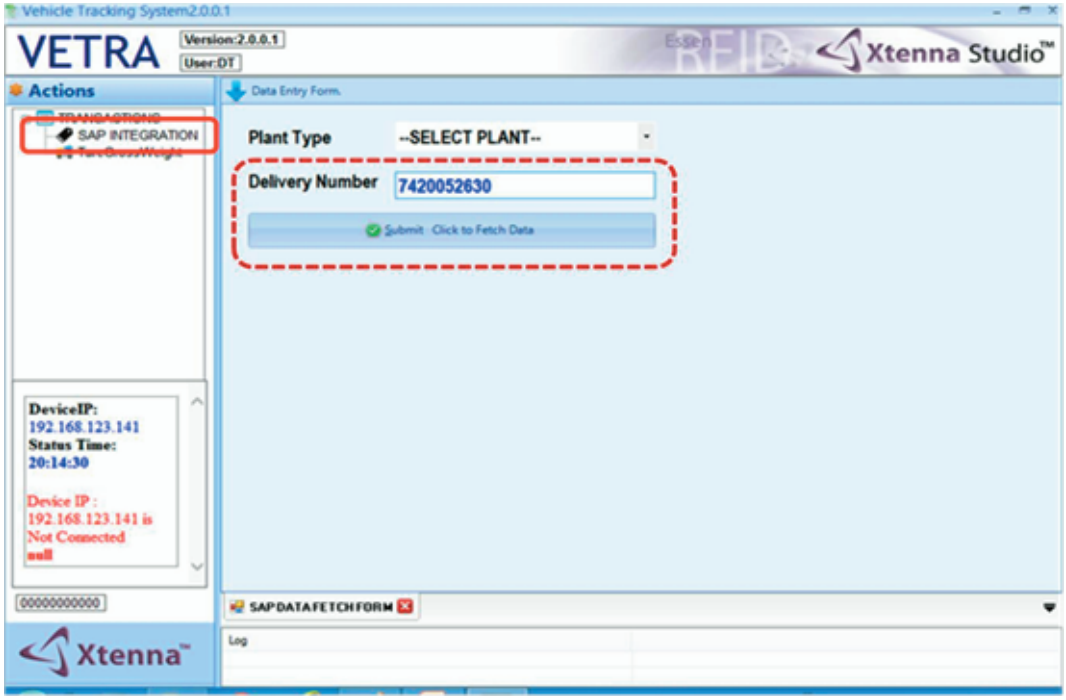
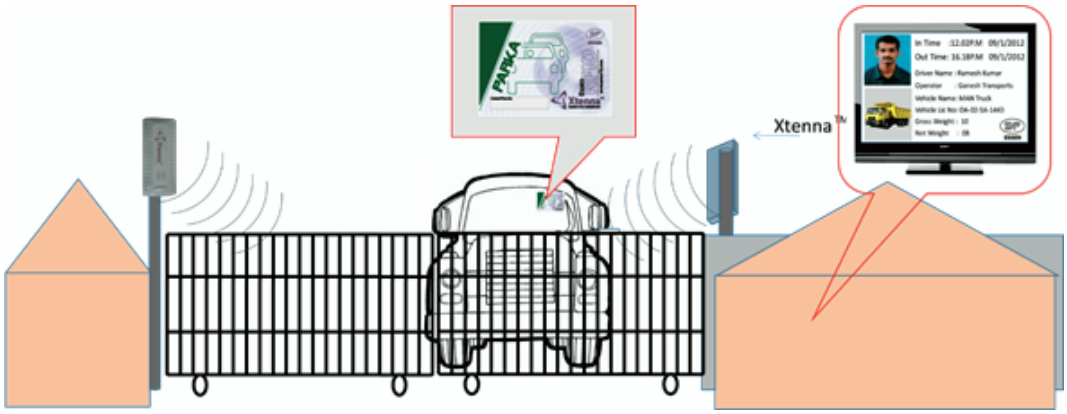
Dispatch: Data is fetched from SAP to RFID:

To obtain all truck information and DO details from the SAP, the Dispatcher/ Weigh Bridge Operator fetches (imports) data into the RFID System using the common DO number, with a single click within the provided application at the dispatch weighbridge location. This data can now be used for tracking the truck inside the plant with product information and loading quantity. The related details can be seen on the Web Dashboard.



Issue of RFID tag:

The truck driver now goes to the Security Gate after obtaining the DO number against the Sales Order. Security Personnel at the gate check the papers given by truck driver. Using the DO data, the truck details are compared with the photos taken by the security guard and a PARKA™ RFID tag is assigned to the truck for access to the plant. The tag is placed on the Xtenna Proximity™ reader and read by it, saving the data into the RFID System. From this point onwards, the truck is tracked through RFID for the rest of the duration inside the premises.



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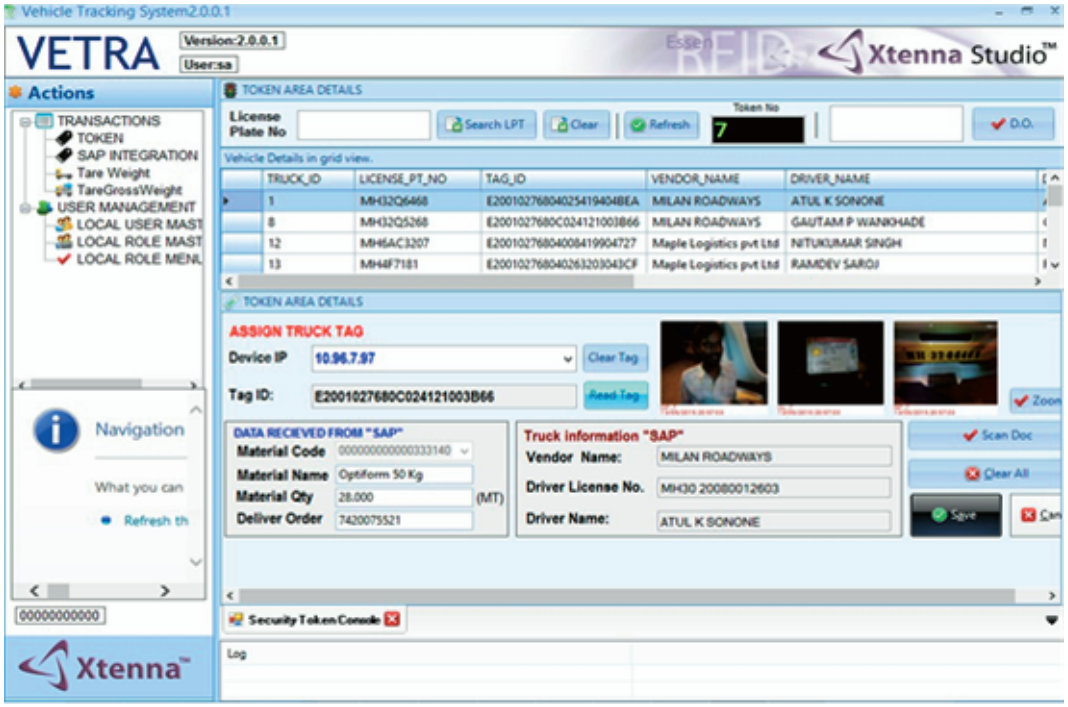
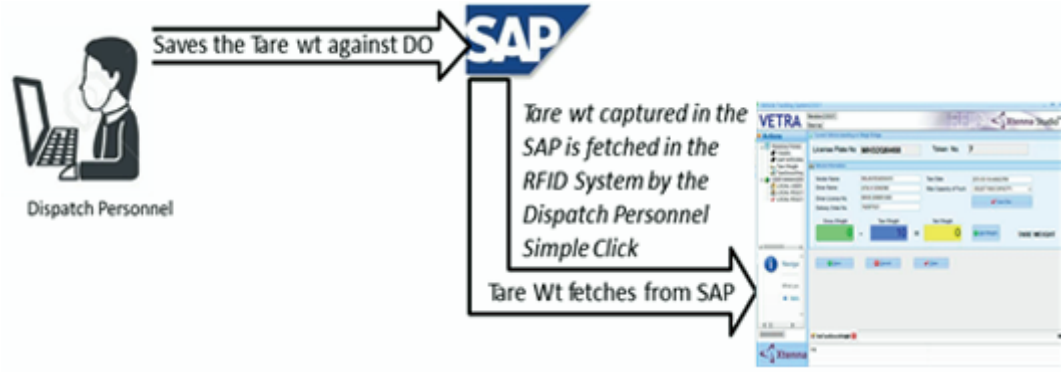


Entry Gate - IN:

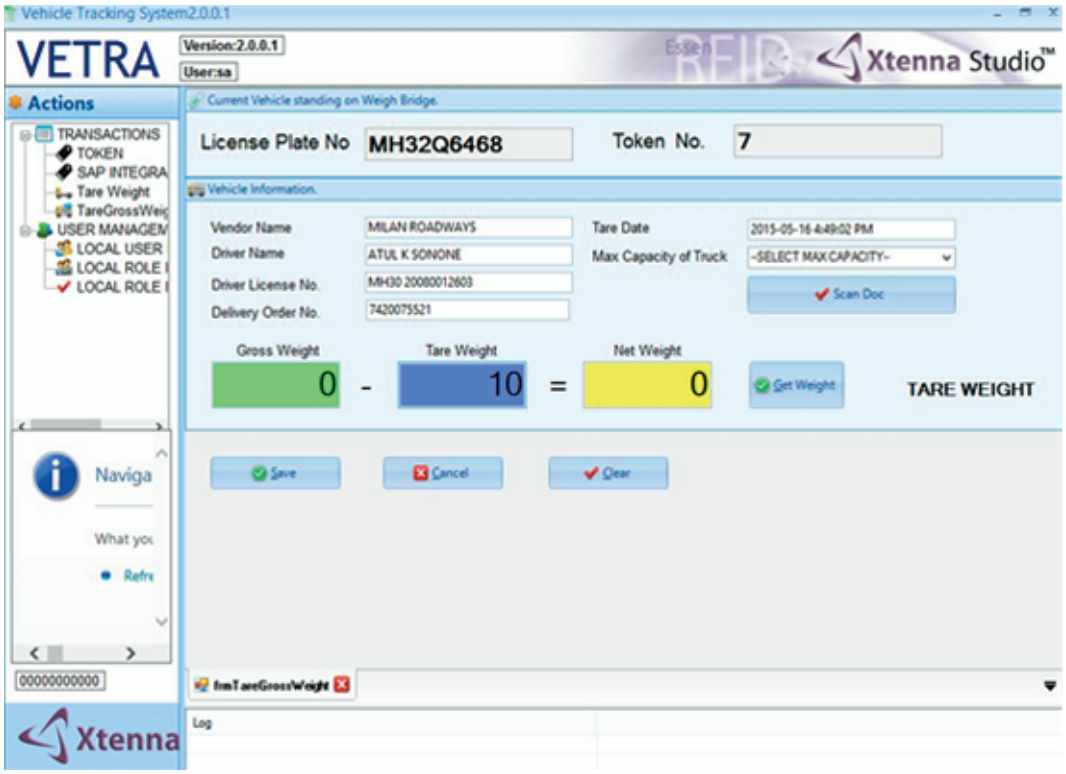
As the truck arrives at the entry gate of the plant, the Xtenna™ antenna-reader mounted detects the RFID tag affixed on the truck and marks its IN time. This simultaneously instructs the weighbridge operator about the next expected truck arrival at the weigh bridge with information about the truck. Once the RFID tag is detected at the IN gate, security can monitor the truck's movement through various locations within the plant premises with the readers mounted at all these locations. On entering the plant, the truck first proceeds for tare weight measurement at the RFID-enabled weighbridge.

Dispatch - Tare Weight:

When the truck proceeds to Dispatch for tare weight measurement, the system updates the status of the truck accordingly. The empty truck arrives at the weighbridge for measuring the tare weight of the vehicle before the goods are loaded.



The RFID system creates a transaction for the truck to load the goods. For this the truck's DO is fetched from SAP. The tare weight and time are updated in the database. A tolerance limit is allowed for the truck's tare weight as per the company's policy and is assigned by the system.



The truck is then directed by the weighbridge operator deploying an LED display, to the loading bay of the goods. If a loading bay is free for material loading on to the truck, then the truck is directly sent to the particular loading bay, else the truck needs to wait for its turn in the queuing area.

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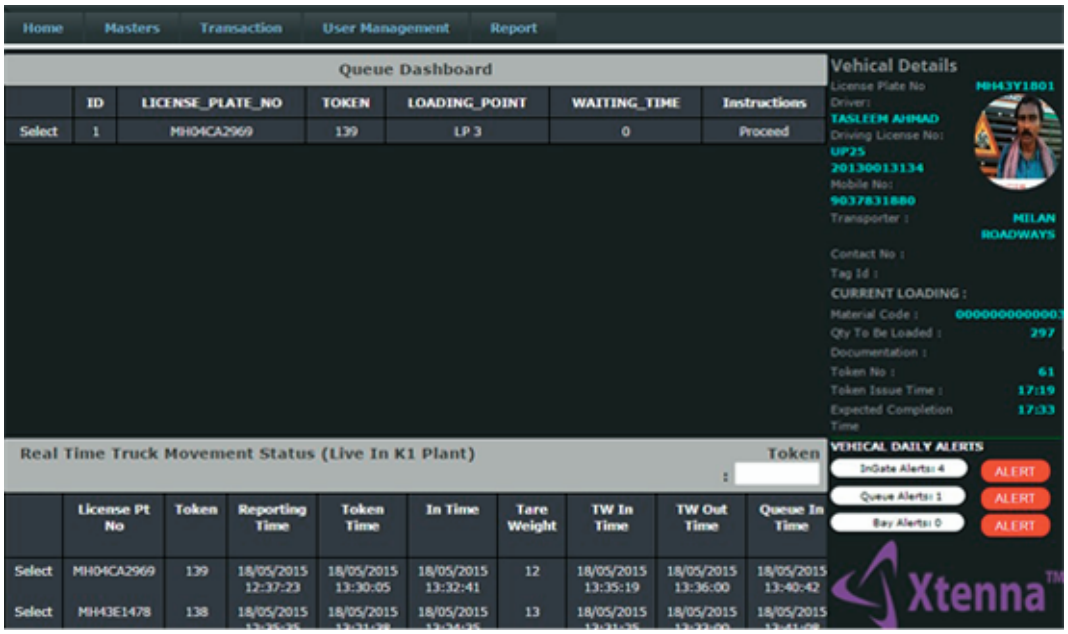
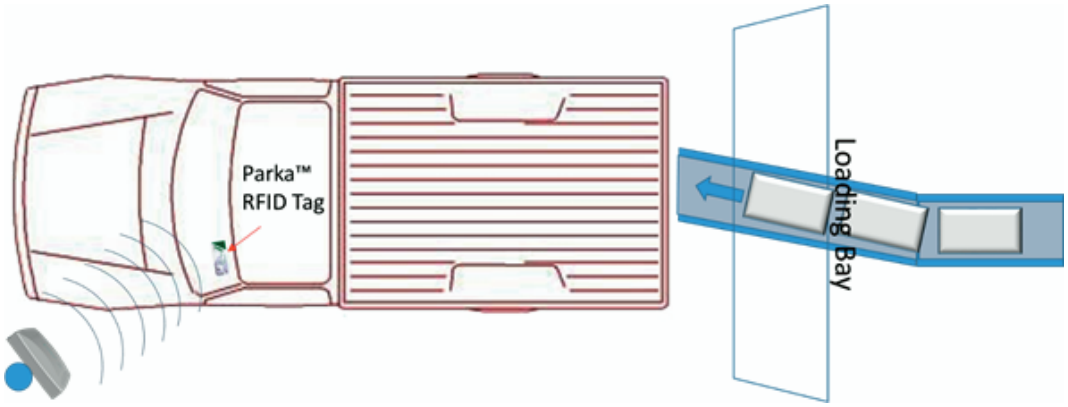
Queue IN:

After completing weighing of tare weight, the truck needs to wait in the queuing area, before proceeding for loading goods when the loading bay becomes available. Here the truck driver is instructed once again through the digital signage (LCD screen) mounted in the queuing area, which gives instructions to each truck driver of estimated time for existing loading to be finished so that he can be prepared to take his truck to the next available loading bay. A queuing time / buffer time limit is configured by the system admin for trucks' queue length and buffer time. Depending on the actual loading duration at the loading bay, the range of the waiting time is configured into the system and a minimum and maximum limit is set for the number of trucks allowed in the queue.



Loading Bay:

Loading personnel decide to whom the loading priority is given depending on the truck loading capacity and size of the truck. After checking the documents, the truck is assigned to a Loading Bay, for loading the material on the truck.



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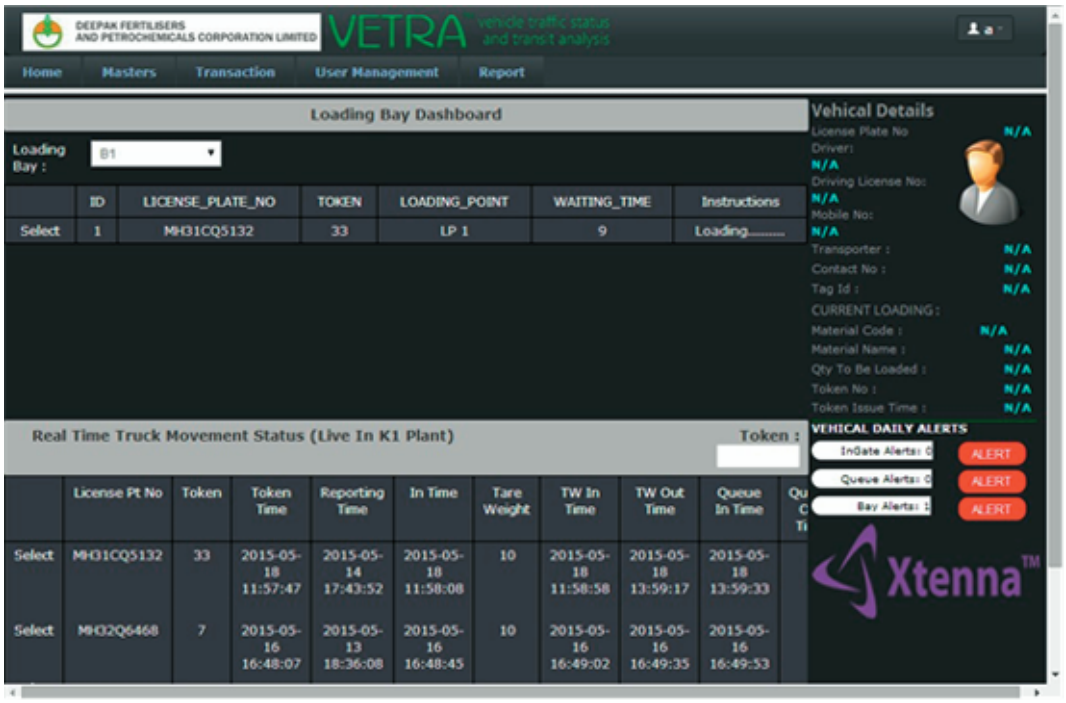
When the truck arrives at the loading bay, the Xtenna™ mounted there detects the truck and the system adds the information against the transaction created for that truck and updates the status as under loading.

Based on the capacity of the truck, its average loading time has been defined by the loader, depending on whether the loading bay has automatic or manual loading. A minimum and maximum time required at each loading bay is already defined in the system, depending on the output capacity of the loader. Therefore, the minimum and maximum time required to load the particular truck is calculated by the system.

Once loading is completed, the truck's last detection time at the bay is recorded as the Loading OUT time. Hence excess time taken for loading automatically generates an alert for the supervisors.



Queue OUT:

The truck is then directed for weighment of gross weight on the weighbridge, using digital signage (LCD screen). In case of weighbridge not being vacant, the truck is instructed to wait with approximate waiting time indicated to it. The Queue OUT reader marks the 'Out' time of the truck from the queue area.

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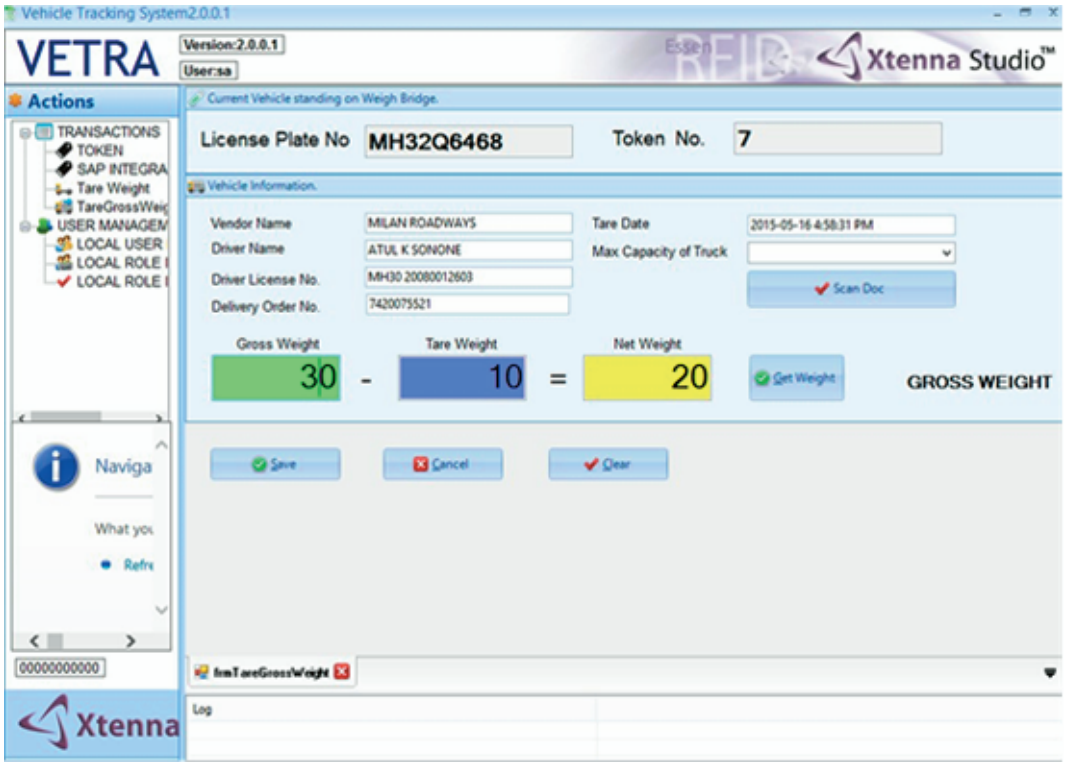
Dispatch - Gross Weight:

After goods have been loaded, the truck arrives at the Dispatch weighbridge for gross weighing. Its RFID tag is read by Xtenna™ and the truck is identified. The truck's data and gross weight allocated in the DO is fetched from SAP by the RFID system. The weighing is done and examined against its tolerable limit allowed in terms of underloading and overloading. If the truck has not been adequately loaded, it is sent for reloading, and if overloaded, it is sent to unload the excess load. The net weight of goods being transported in that transaction is thus validated by the system.



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Security Gate - OUT:

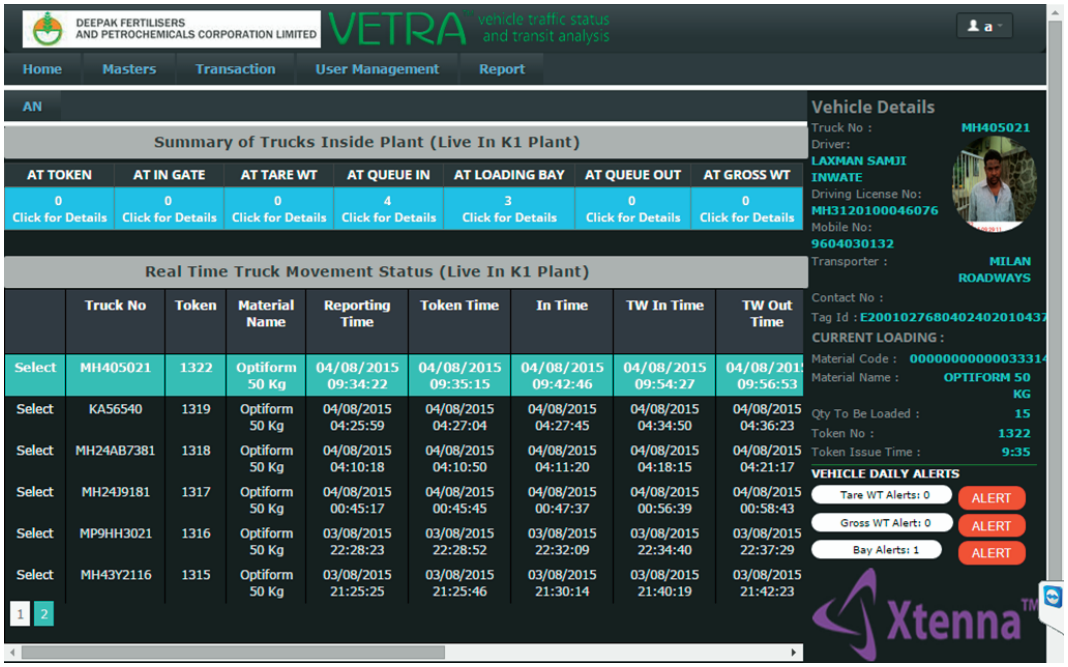
Once the gross weight is captured and net weight of the transaction validated, the truck moves to the exit gate. At the exit gate, exit documentation for the transaction is completed and the truck driver is handed over the invoice, delivery challan, excise gate pass and road permits. The truck has to reach the

exit gate within the stipulated time to enable efficient dispatch operations. The Xtenna™ mounted at the exit gate detects the truck's PARKA™ tag and logs the exit time, after which the tag is returned back by the exiting truck. The returned tag is disassociated from the assigned truck in the database and sent to the entry gate for reuse with another incoming truck.

Xtenna™ devices at various locations in the plant

CASE STUDY

The administrator can monitor the status at all locations within the premises through the VETRA™ web application.



BENEFITS:

- Regulated inflow of trucks into the plant premises.
- Automatically tracks the progress of each truck in its movement through the plant premises and monitors adherence to time cycle from entry to exit.
- Tracks the time spent by trucks at each touch point within the plant.
- Identification of delay areas and bottlenecks in the dispatch process.
- Optimum utilization of all loading bays within the plant for goods dispatch.
- Intelligently fulfilled Delivery Orders with automated messages and alerts.
- Efficient weighbridge operations and automated weighment calculation.
- Efficient queuing of trucks and minimizing of trucks in each queue.
- Indication of estimated waiting time at each section or touch point to the truck drivers as well as dispatch staff on display screens.
- SMS alerts to truck drivers to proceed for weighing and loading.
- Identification of time wasters amongst truck drivers.
- Efficiency and accuracy lead to improved dispatch management.
- In-built checking for underloading and overloading of trucks.
- Efficient document generation and processing for goods dispatch.
- Improved security within the plant premises.
- Automated real-time status report generation for trucks, trips, destinations, entry/exit times and quantity dispatched.

LINKS:

Hardware:

Xtenna™

Xtenna Proximity™

Tags:

PARKA™

Software:

Xtenna WebToolkit™

Xtenna Studio™

Reference Example:

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