









# 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: Key Requirements Solution Implementation Working Benefits Links

#### TECHNOLOGY

Solution: EPC Gen2 compliant inventory tracking solution

#### Tag Type:

µMetallica<sup>™</sup> UHF Passive Metallica<sup>™</sup> 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<sup>™</sup> WebToolkit Xtenna<sup>™</sup> 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

For further details contact:

Essen RFID 24-B, Jolly Maker II Nariman Point Mumbai 400021 India www.essenrfid.com







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









#### WORKING:

Essen RFID's tracking system Suchishastra<sup>™</sup> consists of the following:

- Download GRN service
- Web application
- HandyScanna<sup>™</sup> 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.

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MASTER	Home / Rack Master					
🗊 Rack Master						
Material Rack Mapping						^
GRN	*Rack Code	A				
Sample Master	D. I.T.	DAWAATCOM				
Sensor	Каск Туре	RAW MATERIAL	V			
Material Master	*Rack Location	PLANT	~			
Location Tagging Details	No. of Rows	4	V			
Bag Placement Overview	* No. of Columns	10				
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User Profile	Status	ACTIVE	$\checkmark$			
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	ACTION	ROWS	RACK CODE	COLUMNS	RACK	YPE
	EDIT	4	A	10	RAW MATERIAL	
	EDIT	4	В	10	RAW MATERIAL	
	EDIT	4	С	10	RAW MATERIAL	
	EDIT	1	BAY	10	RAW MATERIAL	
Essen RFID 2014						Powered by: Essen

**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.

MASTER	Hon	ne / Material F	Rack Mapping									
Rack Master												
Material Rack Mapping												
r GRN		F	Rack A		~							
Sample Master		Deadwet (	DI STGA	MEDOCHI								
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Location Tagging Details												1
Bag Placement Overview		A401	■ A402	A403	□ A404	■ A405	■ A406	■ A407	■ A408	A409	■ A410	
MY ACCOUNT												
User Profile		A301	A302	A303	A304	A305	A306	A307	A308	A309	A310	1
Rights Details												
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		A201	A202	A203	A204	■ A205	A206	■ A207	A208	A209	■ A210	
		A101	A102	A103	□ A104	□ A105	□ A106	■ A107	□ A108	□ A109	A110	1
												1
Essen RFID 2014											Pov	vered by: E



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

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**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.

MASTER	Home / GRN Master							
Rack Master								
Material Rack Mapping								
GRN	CRN No.	20100						
Sample Master	Citrito	20100						
Sensor	* GRN Date	07/18/201	14					
Material Master	<ul> <li>Bag Count</li> </ul>	4						
Location Tagging Details								
Bag Placement Overview	* Supplier	CARE03						
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	Search in Table ACTION EDT CDT EDT EDT EDT	Save chi 1 39 2 39 3 39 4 39 5 39 6 39	Celer Prod Like 2 * ye M Celer NUMBER 100 102 102 103 104	Gen CATGANCOVY)      Grin CATGANCOVY)      Grino2014      orriso2014       orriso2014       orriso2014      orriso2014      orriso2014	BAG COUNT 4. 2 2 2 2 4 4 0	REMARKS	SUPPLER           CARB03           MVEL01           DRI+011           ELH267           SRIS52           AL0008	STATUS ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE
	Search in Table	Save dat 10 39 2 39 3 4 39 4 39 7 3 9	Clear         Press Like () * ar the           GRM MARKIER         1           100         1           102         1           103         1           104         1           105         1           106         1           107         1           108         1           109         1           109         1           109         1           109         1           109         1           109         1	Grie CATEBMICOVY)  Orn60014  Or	BAG COUNT 4 2 2 2 2 4 4 0 0	REMARKS	SUPPLER CARBOD MVEL01 DRIV401 ELIX807 SIR522 ALCC00 VINA04	STATUS ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE
	Search in Table COT	Sove dat 1 39' 2 39' 3 99' 4 39' 6 39' 7 39' 8 39' 8 39' 9 39'	Point (An a 1 - ye) (An Point (An a 2 - ye) (An Point Point Point Point Point	GRI DATIGNICOTY GRI DA	BAG-COUNT 4 2 2 2 2 4 4 0 0	REDARRIS	30991.ER CARDO3 MVELO1 DIRHAD1 ELIZEO7 SRID22 SRID22 SRID22 CARDO3 USMO4 CARDO3	STATUS ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE
	Search in Table ACTION EDIT EDIT EDIT EDIT EDIT EDIT EDIT	ID         39           1         39           2         39           3         39           4         39           5         39           6         39           7         39           8         392           9         30	Color Prote Like 2 * ye Ma Color NUMBER 100 100 100 100 100 100 100 10	GRN DATGMMCOVY)	BAG COUNT 4 2 2 2 4 4 0 0 0 0 0	REMARKS	CARBOD WELD1 DI9961 EUX07 SIRI22 SIRI22 CARBOD CARBOD CARBOD CARBOD	STATUS ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE



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

Rack Master	GRN-Master / GRN-Ma	iterial Ma	pping										
III Material Rack Mapping													
/ GRN													<u>^</u>
Sample Master	* GRN No	39199	9										
Sensor	*Material List	CAH	GRM3	0HI2			$\sim$						
Material Master	Manufacture Date	10/09	/2014						×	Format			
Location Tagging Details	manuactore bate	0	2014	Octo	ber :	2014		0		MM/DD/YYYY (e.g 01/3	1/2014)		
Bag Placement Overview	*Expiry Date	Su	Мо	Tu	We	Th	Fr	Sa					
MY ACCOUNT	ID				1	2	3	4					
User Profile		5	6	7	8	9	10	11					
Rights Details		12	13	14	15	5 16	17	18	Man	datory Fields.			
Role		19	20	21	22	23	24	25					
	Search In Table												
									_				
	ACTION	400	GRN	NUMBI	ER			0.0014	N	IATERIAL CODE	M	ANUFACTURE DATE	EXPIRY DATE
	EDIT 39	199					CAP	IGRM	SUHI	2	10/09/2014		10/31/2014
	EDIT 39	199					WER		1011	2	10/09/2014		10/31/2014
		133						MIMI- D		2	10/03/2014		10/51/2014

**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.

I Rack Master		o mapping			
Material Pack Manning	Search In Table				
	0000011111000				
Sample Master	GRN NU	MBER	P.O NUMBER		
	39199		1512646		
sensor					
Material Master					
Location Tagging Details					
Bag Placement Overview					
IY ACCOUNT					
User Profile					
Rights Details					
Role					
Essen REID 2014					Powered by: Es
Essen RFID 2014					Powered by: Es
Essen RFID 2014					Powered by: Es
Essen RFID 2014					Powered by: Es
Essen RFID 2014					Powered by: Es
Essen RFID 2014					Powered by: Es
Essen RFID 2014					Powered by: Es
Essen RFID 2014					Powered by: Es





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.

	theme is blocked at a second				
Rack Master	Home / Material Master				
Material Rack Mapping					
GRN					
Sample Master	*Material Code	CAHGRM30HI2			
Sensor	* Material Name	CAHGRM30HI2			
III Material Master	*Material Color	D5C1DAI ×			
Location Tagging Details					
Bag Placement Overview	Status				
MY ACCOUNT	ID				
L User Profile		+			
Rights Details		Save changes Clear	Fields Mark as * are Mandatory Fields.		
	Search in Table				
	Search In Table				
	Search In Table	MATERIAL CODE	MATERIAL NAME	MATERIAL COLOR	STATUS
	Search In Table	MATERIAL CODE CAHGRM30HI2	MATERIAL NAME CAHORM30H12	MATERIAL COLOR	STATUS ACTIVE
	Search In Table ACTION EDIT EDIT	MATERIAL CODE GAHGRM30HI2 CLHYEXUK1	MATERIAL NAME CANGRINJOHI2 CLIPYEXUK1	MATERIAL COLOR	ACTIVE ACTIVE
	Search in Table ACTION EDIT EDIT EDIT	MATERIAL CODE CAHORM30H2 CLHYEXUK1 V/FMMP51CU2	MATERIAL MAME CANORIASOHI2 CLIVTEZUKI WFMMPS1CU2	MATERIAL COLOR	ACTIVE ACTIVE ACTIVE ACTIVE
	Search in Table ACTION EDIT EDIT EDIT EDIT EDIT	MATERAL CODE CAHGRM30HI2 CLI-WEXUK4 WFMMP51CU2 CM570VCH1	мателяц наме Санолизуні2 Снуржикі укумируєсца Смазуюсні	MATERIAL COLOR	ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE
	Search in Table ACTION EDIT EDIT EDIT EDIT EDIT EDIT	MATERNAL CODE CAHORAJOHI2 CLIMEDXIM WFMMPSICU2 CMS70VCH KVTRMEINOUS1	MATERIAL NAME CAHGRADOHI2 CLIPPEXIKI WWMMPSICU2 CASTWOVH KVRME100U31	MATERIAL COLOR	ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE
	Search In Table ACTION EDIT EDIT EDIT EDIT EDIT EDIT	MATERAAL CODE CAHGRA30H12 CLIPTEXUK1 WFMAR510L2 CMS78VCH1 KVFMEF100L91 MU60ME36CH1	MATERNAL MANE CAHORMO9H2 CLHYPEXUK1 WYMMPSCU2 CMS70VCH1 KYRME10US1 MU60ME3BCH1	MATERAL COLOR	ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE
	Search In Table ACTON EDIT EDIT EDIT EDIT EDIT EDIT EDIT EDIT	MATERAL CODE CANGRUSHIC CLIVERKICH VEYNMERSIOL2 CMS78VCH1 KYRME SBUSS LUKAME SBOCH1	MATERIAL MAME           CAHORM30H2           CLHYEXUK1           VFMMPS1CU2           CMS70VCH1           KYRME100U51           MU60MEEXCH1           MU60MEEXCH1	MATERAL COLOR	TTATU3           ACTIVE           ACTIVE           ACTIVE           ACTIVE           ACTIVE           ACTIVE           ACTIVE           ACTIVE           ACTIVE
	Search In Table ACTION EDIT EDIT EDIT EDIT EDIT EDIT EDIT EDIT	MYTERAL CODE CAHORM30H2 CLIMERUKH WPMMP3ICU2 COST70/CH XYRME100US1 MUGMER20CH1 RLST00ME20CH1 RLST00ME20CH1	MATERIAL NAME           CAHGRAG0412           CHYPZUKK           VPMAIPS1CU2           CMS70VCH1           CMS70VCH1           KYRME100US1           MAR0ME28CH1           MAR0ME28CH1           RLSTR0M220H1	MATERIAL COLOR	STATUS           ACTIVE
	Search In Table ACTION EDIT EDIT EDIT EDIT EDIT EDIT EDIT EDIT	MATERAAL CODE CAHORM30HI2 CLHTEXUK1 WFMMBF3LOU2 CMS70VCH1 KYRME100US1 MURME30CH1 MURME30CH1 RLSTERME20CH1 CLACASBRH_1	CAHORMO9H2 CAHORMO9H2 CLYYEXUK1 WMMMPSCU2 CMS79VCH1 KYMME16UUS1 MU60ME38CH1 MU60ME38CH1 RLST60ME38CH1 RLST60ME38CH1 CMCA258HL1	MATERAL COLOR	ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE
	Search in Table ACTION EDI	MATERAL CODE CANGRIGHE2 CANGRIGHE2 CANTEXICA WAMARISOL2 CMS70VCH1 KYRBE ROUS1 KVRBE20CH1 RLST0060E20CH1 CMCA25RBL1 CMCA25RBL1	CAHORM30H2 CAHORM30H2 CLHYEXKH WMMMPSCU2 CMS70VCH1 KMB60E30CH1 MJ600E30CH1 RLST60M230CH1 RLST60M230CH1 CMC425RH,1 PKJ68FR01673	MATERAL COLOR	TTATUS           ACTIVE           ACTIVE

**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.

MASTER	Home / Bag Pla	cement Overview								
Rack Master										
Material Rack Mapping										
GRN	Rack A	Rack B	Rack C	1						
Sample Master	Filled : 2 Empty : 38	Filled : 0 Empty : 40	Filled : 0 Empty : 40							
Sensor					-	-	-			
Material Master	Column : 01	Column : 02	Column : 03	Column : 04	Column : 05	Column : 06	Column : 07	Column : 08	Column : 09	Column : 10
Location Tagging Details	Empty Rack	Empty Rack	Empty Rack	Empty Rack	Empty Rack	Empty Rack	Empty Rack	Empty Rack	Empty Rack	Empty Rack
Bag Placement Overview										
MY ACCOUNT	A301 Empty Rack	A302 Empty Rack	A303 Empty Rack	A304 Empty Rack	A305 Empty Rack	A306 Empty Rack	A307 Empty Rack	A308 Empty Rack	A309 Empty Rack	A310 Empty Rack
User Profile										
Rights Details	A201 Empty Back	A202 Empty Back	A203 Empty Back	A204 Empty Back	A205 Empty Back	A206 Empty Back	A207 Empty Back	A208 Empty Back	A209 Empty Back	A210 Empty Back
Role	Linpy room	Linply Hour	Rack Loc Material	ation : A104 Code : CLHYEXUK1	Lingsynaats	Linpy hade	Linply Hook	Linpy nook	Linply Hour	Linply Halle
	A101 Empty Rack	A102 Empty Rack	A10 click for Empty Rack	Bag Details	A105 Empty Rack	A106 Empty Rack	A107 Empty Rack	A108 Empty Rack	A109 Empty Rack	A110 Empty Rack
sen RFID 2014										Powere
//ocalbort:62904/fmpDirpab/PlacedPa	ar 100									

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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'.

VESUVIUS India Pvt Ltd	-						L Super -
MASTER	Home / Sa	ample					
Rack Master							
Material Rack Mapping							^
GRN		CDN No. 20100					
Sample Master		33133	•				
Sensor	Sample Dat						
Material Master	Sample Dat	Bag Sample	Test	ed			
Location Tagging Details	Sample	No MATCODE Date	Tested Date By	Lab Exp Date	Remarks	Test Result	ACTION
Bag Placement Overview	000000000	2 CAHGRM30HI2 10/10/2014	0/10/2014	10/31/2014	Test	TESTED OK	✓ Update
IY ACCOUNT							
User Profile	Bag Data:						
Rights Details	Bag No	MAT Code	Lab Exp	Date	TERT	Test Result	1
Role	3	CAHGRM30HI2	10/31/2014		TEST		1
	15	CAHGRM30HI2	10/31/2014		TESTE		1
			10/3/12014				
							Update Bag Dat
Free DEID 2014							Damaged has Free
23361 Rt 10 2014							Powered by. L55

Sensor Master: All tablets and HandyScanna<sup>™</sup> details are saved into the Sensor Master.

	Linna I. Conner Manler						
Rack Master	Home / Sensor Master						
Material Rack Mapping							^
/ GRN							
Sample Master	* Sensor Code	HANDY-001					
▶ Sensor	*Location	PLANT 💌					
Material Master	*Sensor Type	HANDYSCANNA READER					
Location Tagging Details	0 D	here the second se					
Bag Placement Overview	Sensor Desc	handyScanna 1					
MY ACCOUNT	*Device ID	354720054418012					
User Profile	Status	ACTIVE					
Rights Details							
Role	ID	1					
	Search In Table	PENPAG TYAT	FENROD CODE	DECONTON	DD4CE ID	CTATUR	
	Search In Table	SENSOR TYPE	SENSOR CODE	DESCRIPTION	DEVICE ID 354720054418012	STATUS	LOCATION NAME
	Search In Table	SENSOR TYPE CANNA READER DEVICE	SENSOR CODE HANDY-001 TAB-01	DESCRIPTION handyScanna 1 TABLET-01	DEVICE ID 354720054418012 192.168.123.119	ACTIVE	LOCATION NAME PLANT PLANT
	Search In Table  ACTION  EDIT HANDYS  EDIT TABLET EDIT TABLET	SENSOR TYPE CANNA READER DEVICE DEVICE	SENSOR CODE HANDY-001 TAB-01 TAB-02	DESCRIPTION handyScanna 1 TABLET-01 TABLET-02	DEVICE ID 354720054418012 192.168.123.119 192.168.123.112	ACTIVE ACTIVE ACTIVE	LOCATION NAME PLANT PLANT PLANT
	Search In Table  ACTION EDIT HANDYS EDIT TABLET EDIT TABLET EDIT TABLET	SENSOR TYPE CANNA READER DEVICE DEVICE DEVICE	SENSOR CODE HANDY-001 TAB-01 TAB-02 TAB-03	DESCRIPTION handyScanna 1 TABLET-01 TABLET-02 TABLET-03	DEVICE ID 354720054418012 192.168.123.119 192.168.123.112 192.168.123.113	ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE	LOCATION NAME PLANT PLANT PLANT PLANT
	Search In Table	SENSOR TYPE CANNA READER DEVICE DEVICE DEVICE DEVICE CANNA READER	SENSOR CODE HANDY-001 TAB-01 TAB-02 TAB-03 Handy-002	DESCRIPTION handyScanna 1 TABLET-01 TABLET-02 TABLET-03 handyScanna 2	DEVICE ID 354720054418012 192.168.123.119 192.168.123.113 192.168.123.113 22222	STATUS ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE ACTIVE	LOCATION NAME PLANT PLANT PLANT PLANT PLANT



#### HandyScanna<sup>™</sup> Application:

The HandyScanna<sup>™</sup> 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<sup>™</sup> application.



Location Registration (Rack Tagging): After the web application has created the racks, the data is downloaded into HandyScanna<sup>™</sup> 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.

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





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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<sup>™</sup> 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<sup>™</sup> device.

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Vesuvius V-1.0.4		Vesuvius Vesuviu	ls V-1.0.3	
🗧 🗧 Bag Registration 📃		В	ag Chargir	ng 📕
Bag Splitting		Material		
Selected Bag				
BagNumber 9				
Vendor DBKH01		Quantity		_
Vendor DAKHOT		Bag Charc	ing Details	
TagID			, <u> </u>	
01090142414700000000900		Material	Status	Action
Weight 500		MAT01	SUCCESS	ACKNOWLEDGE
MaterialCode KYRME100US1	_		ОК	
Mfg_Date 01 Oct 2014				
Exp_Date 25 Oct 2014	1			
SplitBag Cancel		Ok		Clear

**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<sup>™</sup> 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<sup>™</sup> into the Essen Server, after which the bag is sent back for placement.







■ = © ± ■ ± Vesuvius V-1	* 🗊 ⊿124% 🗕 2:36 PM 1.0.3 harging
Select System	System-01
Mater 🗸 🗖	ata successfully Uploaded
ОК	

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





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.

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	Reade	r Setting
	3000 🗸	3000 v
	Bistatic v	Full v
	Default 🗸	None v
	S0 V	European_Union 9
	ВАСК	SaveXtennna
	Цx	tenna™

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**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<sup>™</sup> 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.

± ❷ 🖬 📾 🏔 🐡 🖾 I VesuviusTab 1.0.3		≵ ﷺ 🛣 16:02
SUCHISHASTRA <sup>™</sup> - BAG TR	ACKING SYSTEM	Logout
CODE: FLT-HM01 Welcome Mahesh JOB DONE 0/4	Please pick up the bag no 2 fo location A401 Please pick up the bag no 3 fo location A101 Please pick up the bag no 6 fo location B102 Please pick up the bag no 7 fo location B203	or placement and place it at or placement and place it at or placement and place it at or placement and place it at
Instruction: PLACE 4 BAG STATUS: Connected	S IN LOCATIONS message	FLT # 1
The forklift reader then starts to read	d the bag tags.	
± 🛯 🖾 🔤 🎽 🍎 I 📷 I VesuviusTab 1.0.3		<b>≱ ⊯։ 🛜 "վ </b> 16:10
SUCHISHASTRA <sup>™</sup> - BAG TR	ACKING SYSTEM	Logout
CODE: FLT-HM01	Please pick up the bag no 2 fo location A401 Please pick up the bag no 3 fo location A101	or placement and place it at or placement and place it at acement and place it at acement and place it at
0/ 4 Instruction: PLACE 4 BAG STATUS: Connected	S IN LOCATIONS TagFound=1	0000
		^



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.

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SUCHISHASTRA <sup>™</sup> - BAG TF	RACKING SYSTEM	Logout
CODE:         FLT-HM01           Welcome         Mahesh           B201         B202         B203         B204           B101         B102         B103         Image: Second	BAG : MAT CODE : LOC : WEIGHT :	CMS70VCH1 CMS70VCH1 B102 950
Instruction: PLACE 4 BAG STATUS: Connected	S IN LOCATIONS TagFound=1	0000
		^

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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CONFIRM : BAG PLACED	
BAG: CMS70VCH1	Confirm
LOC: B102	Cancel
This will save the placement record confirm for if shows correct location	
	^





Once the bag placement has been confirmed, the placement alert count gets decreased.



**Re-shelving:** After a bag has been split, the new bag is registered through HandyScanna<sup>™</sup> 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.

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SUCHISHASTRA <sup>™</sup> - BAG TRACK	(ING SYSTEM	Logout
CODE: FLT-HM01 Welcome Reading Bag JOB DONE 0/4	Please pick up the bag no 8 for place location B103 Please pick up the bag no 9 for place location B204 pla location A301	ement and place it at ement and place it at cement and place it at cement and place it at
Instruction: PLACE 4 BAGS II	N LOCATIONS TagFound=1	0000
		~

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

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< SUCHISHASTRA	- BAG TRA	CKING SYSTEM	Logout
CODE: FLT-           Welcome Ma           B202         B203         B204           B103         B103         B103	HM01 hesh B205 B105	BAG : MAT CODE : LOC : WEIGHT :	MU60ME38CH1 MU60ME38CH1 B204 870
Instruction: PLAC	E 4 BAGS	IN LOCATIONS	FLT#1
		☆ う	~^

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.

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**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.

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< SUCHISHASTRA™	- BAG TRACKING SYSTEM	Logout
PLACEMENT	2 RETRIEVAL	RE-SHELVE IT
STATUS: Connected	TagFound=1	0100
		~

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.

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SUCHISHASTRA <sup>™</sup> - BAG TRA	ACKING SYSTEM	1	Log	jout
CODE: FLT-HM01	Mat Code	Quantity	Required	Fullfilled
<u> 44</u>	CAHGRM30HI2	2000	500	0
Welcome Mahesh	CMS70VCH1	1900	700	0
<b>JOB DONE</b> 0 / <b>2</b>				
Instruction: PLACE 12 BAG	<u>SS IN LOCAT</u>	<u>IONS</u>		
STATUS: Connected	message		FLT #	1
				$\sim$

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#### CASE STUDY

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.

			* 🍞 📶 📥 14:19
< SUCHISH	ASTRA™ - BAG	TRACKING SYSTEM	Logout
Quantity: 200	0 Fullfilled: 0	Requirenment: 500	
BAG NUMBER	RACK CODE	RACK LOCATION	QUANTITY
2	A	A401	1000
STATUS: Conne	cted	message	FLT # 1
			^

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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VesuviusTab 1.0.3		
< SUCHISHASTRA <sup>™</sup> -	BAG TRACKING SYSTEM	Logout
Quantity: 2000 Fullfille	ed: 0 Requirenment: 500	
BAG NUMBER RACK CO	DDE RACK LOCATION	QUANTITY
STATUS: Connected	TagFound=1	0000
		^





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

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< SUCHISHASTRA	\™ - BAG TF	RACKING SYSTEM	Logout
CODE: FLT           Welcome N           A401         A402         A403           A301         A302         A303	<b>-HM01</b> lahesh A404 A304	BAG : MAT CODE : LOC : WEIGHT :	2 A A401 1000
STATUS: Connected		TagFound=1 ☆    ∽	0000

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.

	∦ ₩\$ 🛜 📶 🛑 19:02
BAG: Z	Confirm
LOC: A4U I	Cancel
This will save the placement record confirm for if shows correct location	
	~

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.

		\$ 🍞 📶 💼 14:22
SUCHISHASTRA <sup>™</sup> - BAG	TRACKING SYSTEM	Logout
Quantity: 2000 Fullfilled: 50	0 Requirenment: 0	
BAG NUMBER RACK CODE	RACK LOCATION	QUANTITY
STATUS: Connected	message	FLT # 1
		^

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#### 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 touch screens 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:



Tags:



METALLICA<sup>™</sup>

Software:



Reference Example:

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

FSSF