TAGMATIKS

BUSINESS APPLICATION SUITE FOR ASSET MANAGEMENT
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The Business Suite for Asset Management is based on the TagMatiks Sensory Adaptive Network Software Platform, which is a cutting-edge enterprise, cloud-ready software platform that enables rapid deployment and integration of RFID, NFC and other AIDC and IoT technology for scalable, real-time visibility solutions, in enterprise asset management, inventory control, warehouse management, access control, apparel tracking, work-in-process tracking, reusable assets tracking, campus tracking, construction management, security, anti-counterfeiting and other applications.

TagMatiks delivers significant improvements in efficiency of business processes and develops new capabilities within industrial, healthcare, agriculture and social verticals that bring not only higher revenues, but also increased quality, safety and customer satisfaction.

1. TAGMATIKS BUSINESS APPLICATION SUITE OVERVIEW

TagMatiks Business Application Suite provides many unique features making it a perfect solution for any auto ID deployment. TagMatiks features:

- Fully scalable, intelligent, enterprise-ready platform
- Robust, flexible and fully customizable
- Modular approach (TagMatiks Core, TagMatiks FI, TagMatiks AT, etc.)
- Cloud based with an option for local deployment
- Fast customization – customer branding, nomenclature, processes
- Mobile device app (iOS, Android, Windows) in addition to Cloud based browser interface
- Easy addition of hardware and read zone configuration including multiple RFID provider support for readers
- Multiple endpoints support (Database/REST API/Flat File)
- LLRP (Low Level Communication Protocol) support
- Secured Restful API support and Advanced Message Queue Protocol
- Multi-tenant architecture
- Integration with existing systems – inventory and asset management systems, ERP, enterprise databases, etc.
- Secure access, tiered user permissions
- Over the cloud updates and maintenance that saves time and travel cost
- Provides real-time visibility of the supply chain, equipment and personnel, reducing cost, and increasing efficiency and safety in customer operations.
- It can be used for asset tracking and inventory of machinery, tools and materials; as well as monitoring safe practices, emergency response and mustering.
In production and post-production allows for quick deployment of systems to manage manufacturing from start to end, as well as anti-counterfeiting, warranty tracking and repairs, inventory control, shipping and warehouse management.

TagMatiks Business Application Suite consists of several applications:

- TagMatiks Core 4.0 – RFID and Sensors Middleware, which collects and provides RFID tag data to Enterprise Applications. TagMatiks Core is necessary if the system utilizes RFID readers and/or RFID printers. The remaining application modules may function as stand-alone (if only handheld readers are deployed) or in conjunction with Core (if fixed readers and printers are deployed).
- TagMatiks – AT – Asset Tracking & Inventory Control Application with some WMS functions
- TagMatiks – FI – Field Inventory Application for consignment, trunk, rental, expiry and waste management
- TagMatiks – UT – Uniform Tracking Application
- TagMatiks – WIP – Work in Process Application
- TagMatiks – CF – Counterfeit and Brand Protection Application
- TagMatiks – AG – Business Applications specific for Agriculture Industry

2. CUSTOMERS

Who can use TagMatiks? This vendor neutral fully customizable platform can be adapted to any industry and application, including:

- Supply Chain Management
- Warehouse Management
- Access Control
- Hospitals and Healthcare
- Pharma
- Oil and Gas
- Mining
- Schools, Universities, Campuses
- Military
- Ground Transportation
- Sea Transportation, Ports and Marinas
- Retail and Show Rooms
- Finance
- Manufacturing
- Construction
- Hospitality
- Offices
• Agriculture
• Games and Sports
• Conference and Event Planning
• And many more.

Healthcare
Whether you are a healthcare provider or a pharmaceutical manufacturer you will receive many benefits from the TagMatiks platform that allows rapid development of systems for asset tracking (e.g. IV pumps), anti-counterfeiting, track and trace of prescription drugs, patient tracking, injection safety and infection control.

Wearables
What can TagMatiks do for you in Wearables production and post-production? This robust but flexible intelligent platform allows for quick deployment of systems to manage your manufacturing from start to end, as well as anti-counterfeiting, warranty tracking and repairs, inventory control, shipping and warehouse management.

Agriculture
With the TagMatiks based system you have all the information about your agricultural operations at your fingertips. Flexible and powerful, the TagMatiks platform enables product tracking from seeding to harvest, equipment tracking for asset utilization and repairs, transportation and inventory management and other applications.

Manufacturing
The TagMatiks Platform enables a new way of manufacturing, the “Intelligent Manufacturing” by providing business intelligence in real time and at granular level. Benefits are reduction of lead times and work in process (WIP) inventory, efficient Just in Time delivery (JIT), item level tracking, tracking defects and points of failure.

Oil & Gas
The TagMatiks provides real-time, cloud-based visibility of your supply chain, equipment and personnel, reducing cost, and increasing efficiency and safety in your operations. You can use it for asset tracking and inventory of machinery, tools and materials; as well as monitoring safe practices, emergency response and mustering.

Some of the Recent Solutions Include:

- **Johnson & Johnson** - Asset Tracking and Field Audits
- **Fitbit** - Anti-counterfeiting and Warranty Support
- **Weir Oil & Gas** - Warranty Verification and Asset Tracking
- **NASA** - Lab Assets Tracking
- **USCG** - Uniform Tracking Solution
There are three main groups of customers that are deploying TagMatiks and each group has slightly different requirements and considerations.

**In Group 1**, our customers do not have any Auto ID technology in use and no formal electronic inventory or asset management (mostly pen and paper type of tracking) and would like to deploy Auto ID technology, such as barcode, RFID or NFC.

**The second group** of customers have already deployed Barcode and have a basic inventory/asset management system in use. They would like to improve and automate their inventory/asset visibility by using RFID and integrate with their existing systems.

**The third group** has already deployed RFID technology as well as full inventory/asset management system. However, the technology is not delivering results, does not integrate with their existing systems and there is little or no ROI.

TagMatiks was developed with these three customer groups in mind and because of its scalable and flexible architecture, it can be applied to any of the above situations.

**For Group 1, TagMatiks can offer:**

- Rapid configuration, customization and delivery of inventory or asset management application built on TagMatiks
- Process setup based on customer’s needs
- Custom branding, tiered security access logins
- Cloud based application (optional desktop or local network – based on customer requirements) that can be accessed anywhere with Internet connection
- Application manages the Auto ID hardware as well as the data
- User friendly GUI, dashboards, reports, exports, automated alerts, emails and texts

**For Group 2, TagMatiks provides:**

- Integration with existing barcode technology, adding RFID technology to the mix
- Integration with existing inventory/asset management system
• Addition of new processes and capabilities
• Choice of cloud-based or local
• Management of all of the Auto ID hardware (barcode, RFID) and the data flow
• User friendly GUI, dashboards, reports, exports, automated alerts, emails and texts

For Group 3, TagMatiks allows for:
• Integration with existing RFID technology
• Adding hardware, configuration/reconfiguration of read zones
• Integration with existing processes, process improvement to increase efficiency and improve function
• Integration with existing inventory/asset management systems (ERP)
• Choice of cloud-based or local
• Management of all of the Auto ID hardware (barcode, RFID) and the data flow
• User friendly GUI used for system configuration and management only, all user interaction would be through existing enterprise systems

4. TECHNICAL INFORMATION

TagMatiks Business Application Suite consists of several applications:

• TagMatiks Core 4.0 – RFID and Sensors Middleware
• TagMatiks – AT – Asset Tracking & Inventory Control Application with some WMS functions
• TagMatiks – FI – Field Inventory Application for consignment, trunk, rental, expiry and waste management
• TagMatiks – UT – Uniform Tracking Application
• TagMatiks – WIP – Work in Process Application
• TagMatiks – CP – Counterfeit and Brand Protection Application
• TagMatiks – AG – TagMatiks Business Applications specification for Agriculture Industry
TagMatiks Core

TagMatiks Core is the heart of RFID4U’s TagMatiks platform that enables businesses worldwide to harness RFID and AIDC technologies. The Core module provides the ability to abstract the data capturing technology and to integrate seamlessly to a TagMatiks business suite application or to extract data to external systems. The cloud-ready solution enables effortless management of RFID ecosystems and provides business layer applications with real time data.

TagMatiks Core includes a TagMatiks RFID Device Manager, which helps enterprise applications to easily integrate and perform the RFID operations such as read, encode and print RFID tags and automate the tracking and inventory processes.

TagMatiks Core is a necessary part of the system if fixed RFID readers or RFID printers are deployed.

The TagMatiks Core is a middleware application, which helps the enterprise applications to integrate with RFID operations and collect the RFID data. It works as an abstract system for the enterprise applications and performs the RFID operations based on the request received from the source system. Read Points can be configured for the individual devices, grouping of devices or splitting the antennas that belong to a single device into different read points. The required business processes can be defined and attached to appropriate read points and executed in order to collect the RFID data. This application can be used as a service in order to collect RFID tags based on the business processes configured and will generate flat files with the required RFID data. The generated RFID output files can be given as an input data (Data Feed) to the other external legacy systems in order to track the assets.
Below are the major components involved in the TagMatiks Core application:

1. **RFID Device Manager**
   - a) RFID Reader Manager
   - b) RFID Printer Manager
   - c) RFID Read Zone Manager
   - d) Tag Operations Manager
   - e) Location Manager

2. **RFID Business Process Manager**
   - a) Business Process configuration
   - b) Business Process Execution (Windows Service)

**RFID Device Manager**

RFID Device Manager will provide options to configure the RFID devices by selecting the provider, IP address and the port number. This includes a Read-Point Manager where the devices can be grouped together to map the read point for performing specific processes.

Users can configure the RFID printers to perform the print operation initiated from the enterprise applications or through TagMatiks Core (RFID Device Manager) user interface. User can also read the Tag ID and the User memory bank data using this application.

**RFID Reader Manager**

- Enables Reader Configuration (Network IP / Port / Provider)
- Supports various providers: Alien, Impinj, Zebra, ThingMagic, others using LLRP
- Allows for configuration of Reader Settings: Antenna(s) Power, RSSI, Read mode, Search mode, Session, GPIO settings
- Enables aggregation and filtering of tag data: Tag duplication elimination duration, Tag Mask value
RFID Printer Manager

- Enables Printer Configuration (IP, Port)
- Provides Printer Templates Configuration (ZPL Command)
- Controls Printing jobs
Read Zone Manager

Read Zone Manager enables grouping of RFID Readers and Antennas into various zones. There are three type of read-points that can be configured.

1. Multiple readers can be grouped together and can be configured as a read point (single read zone).
   - This will support a process which requires more than one device.
2. A single reader can be configured as a read point.
   - This will support a process that can be executed using a single device (with all antennas, or with a single antenna for encoding purposes)
3. A single device with specific antennas grouped together can be configured as a read point.
   - This will support a process that can be executed by specific antennas in a reader.
   
   For example, a process called “Shipping” can be mapped with Antenna 1 & 2 of the device and the antenna 3 and 4 can be configured for “Receiving” process.

![Read-Point configuration with single device](image-url)
Read-Point configuration for grouping multiple devices

Read Zones

- Impinj 12
  - Direction: Disabled
  - Status: Stopped

- Direction Tests
  - Direction: Enabled
  - Status: Stopped

- ThingMagic
  - Direction: Disabled
  - Status: Stopped

- Alien
  - Direction: Disabled
  - Status: Stopped

- Zebra
  - Direction: Enabled
  - Status: Stopped

- Textrix
  - Direction: Disabled
  - Status: Stopped
For integration, the external system has to refer to the TagMatiks RFID Manager components (DLLs) and configure the necessary settings. The required RFID operations can be initiated by calling the appropriate methods with necessary input parameters.

After integrating the TagMatiks RFID Manager, for each and every RFID based request from the enterprise application, the TagMatiks RFID Manager will perform the required RFID operations and respond back with the appropriate information. For example, if the enterprise application initiates a read operation by selecting a particular read-point, the TagMatiks RFID Manager will read the RFID tags from the selected device/device group and send the RFID tag details back to the enterprise application. Similarly encoding can be done by selecting a particular read-point which is configured in TagMatiks RFID Manager. RFID Tag printing can be done by selecting the printer configured and initiating the printing operations using the TagMatiks RFID Manager objects (DLL).

**RFID Business Process Manager**

The required RFID based business processes are configured and managed by the RFID Business Process Manager. Users can create, start and stop the business processes. RFID Business Process Manager processes the RFID data collected from the configured Readers and pushes the data to the external system connection end-points.

**Process Configuration Steps**

1. Read Zone Selection
2. End-point Configuration
3. Start / Stop Process
End-points supported in Tagmatiks

- Database (Table & Stored Procedure)
  - SQL Server
  - Oracle
  - MySQL
  - Postgres
- RESTful Web API (Secured)
  - JSON and XML format support
  - Token based authentication support
- File Generation
  - Generate files based in the configuration
  - Supports Flat File / CSV / Excel file formats
  - Support FTP to move the files to the External System FTP site configured

“Online” process mode will follow online integration mode which will execute the business process and send/populate the processed RFID data back to the external system immediately using database connectivity or API or message queue configured.

“Offline” process mode type will follow offline integration mode which will execute the business process and generate the RFID data processed as an output file (flat file / Excel) in a given file path in a given period.
TagMatiks API

- Tagmatiks supports external applications to perform below RFID operations by calling appropriate RESTful APIs.
- RFID Tag data will be transmitted over the network using SSL after user authentication.
- Each and every API call, the application must pass the authentication token to perform the RFID operation.
- Prerequisites:
  1. A user account must be registered in Tagmatiks Cloud (For API Authentication)
  2. The Devices (RFID Readers and Printers) must be configured in Tagmatiks Cloud
  3. Devices must be connected in local network
  4. Both Reader and Printer Services must be running in local network.

- API List
  1. Get Devices (Device Type, Provider)
  2. Get Read Zones()
  3. ReadTags (Reader / Read Zone)
  4. Get PrinterTemplates()
  5. PrintTag (Printer, ZPL Command)
  6. EncodeTag(Reader, TargetTagEPC, Memory Bank, Data)
  7. OnDemandRead(Reader / Read Zone, Duration)
5. TAGMATIKS MOBILE

TagMatiks Mobile is an application created for mobile devices (iOS, Android and Windows CE) and consists of several modules that provide different functionalities based customer requirements:

- Field Inventory Management
- Cycle Counts
- Blind Field Audits
- Reconciliation
- Field Returns
- Expiry Management
- Scrap Goods Management
- Guided Counts
- And others.

TagMatiks Mobile is used for asset tracking and inventory management in the field, where the fixed readers and printers are not useful. It supports all the TagMatiks Application Modules (AT, FI, AG, UT, WIP and CP) and is integrated with TagMatiks Cloud Application. It also supports Salesforce, SAP and Oracle WMS.

6. TAGMATIKS AT

TagMatiks AT is a secured cloud based Asset Tracking system for effective tracking of assets using RFID technology.

TagMatiks AT utilizes the TagMatiks Core for all the RFID based operations. Users can easily configure the RFID devices (both RFID readers and printers) by following very few steps and start using them in TagMatiks AT. TagMatiks AT can also work as standalone (without Core) and utilize the TagMatiks Mobile.
The data transmission between TagMatiks AT and Tagmatiks Core is secured using HTTPS and Token based authentication.

TagMatiks AT is a SaaS (Software as a Service) model application which follows the Multi Tenancy approach. Multiple customers can register and start using the Asset Tracking System which is running on the Cloud. Tagmatiks AT isolates the data from each tenant database.

TagMatiks AT features are following:

- Supports wide range of asset types, such as human capital, intellectual property, goodwill and financial assets.
- Asset Types and the related parameters can be configured during asset creation.
- Supports Asset Tracking using both RFID and barcode which can be configured during Asset creation.
- Asset data bulk import support.
- Help documents (including images and videos) related to the Asset can be attached and viewed whenever it is required.
- Sites, Facilities and Locations Management.
- Management of Employees and the association with assets.
- Asset grouping with parent and child relationship to associate the assets.
- Can define the reorder level quantity of the asset / item to maintain enough stock.
- Can define critical parameters and the value range such as temperature / expiry date & time.
- Real Time Asset movement monitoring including GPS location on the cloud.
- Support for both manual and auto entry for the asset movement transaction.
- Assets located from various locations can be audited using mobile devices (iOS and Android).
- User will get notification / alerts on the change in critical parameters defined. (Example: Temperature change / Location change / Near expiration of the asset)
- Automation of Asset Tracking using RFID Technology.
- Auto Asset Check In / Check Out Process.
- Auto Asset Issue and Return process.
- Automate the business process (Shipping and Receiving).
- Asset data and the Inventory data export support (Flat File / CSV /Excel / PDF).
- Provides Analytics and Reports.
- Tagmatiks AT can be integrated with EAM (Enterprise Asset Management) using flat file data feed.

**Asset Creation Screen**

![Asset Creation Screen Image]

**Asset Audit Screen**

![Asset Audit Screen Image]
TagMatiks AT has extensive reporting capabilities. There are several types of reports built in, however, custom reports can be created based on customer requirements.

- Asset Details Report
- Asset Inventory Report
- Asset Movement History Report
- Asset Check In/Check Out Report
- Asset Issue / Return Report
- Asset - Employee Association Report
- Asset - Service Overdue Report
- Asset - Expiry details report
- Custom Reports and Analytics
7. TAGMATIKS FI

TagMatiks FI is also an asset management module but differs from TagMatiks AT in that it does not need a connection to the TagMatiks Core. TagMatiks FI is designed to function as a standalone module and utilize mobile RFID readers with TagMatiks Mobile application.

TagMatiks FI is used for field inventory and asset tracking, where the RFID tags are read by handheld readers and the data is transmitted either in real time through an internet connection to the cloud or archived and transmitted when such a connection is available.

All other features are similar to TagMatiks AT.

TagMatiks FI is used for these application:

1. Field asset and inventory tracking – ordering, picking, delivery and return of rental assets
2. Tool tracking for service vehicles – tools are scanned before and after a service call
3. Order management and issuance of uniforms, tools, vehicles and other assets
4. Any mobile application that does not utilize fixed readers

TagMatiks FI has the following features and benefits:

- Order management and Inventory replenishment
- Product and Asset Audits including Blind Field Audits
- Cycle Counts
- Expiry and Lot Management
- Consignment Management
- Trunk Stock Management
- Scrap Goods Management
- Reconciliation
- Asset Pairing and Commissioning
- Shipping Module
- Electronic Invoicing
- Field Swaps, Returns and Transfers
- Guided Counts
- Chain of Custody
- Warranty and Maintenance
- Mobile and Cloud Enabled
- Fully Customizable
- Multi-format dashboards and reports
- Communication with the ERP system
TagMatiks – Business Application Suite for Asset Management
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8. TAGMATIKS CF

TagMatiks CF has been developed to fight counterfeiting by providing product authentication. Additional benefits include product tracking and warranty management. TagMatiks CF supports RFID as well as NFC and can be applied in manufacturing as well as end user applications. TagMatiks CF can be used as a standalone module with mobile readers or together with TagMatiks Core if fixed readers are utilized in the system. There are many benefits of RFID product tracking:

- With RFID, we can identify an individual item, determine its location, review its chain of custody (when it was transferred or sold), and monitor its condition.
- We can count hundreds of items almost simultaneously and automatically, even if the RFID tag is inside the package.
- We can confirm that quality checks have been performed, or that the item has been stored at the right temperature.
- Having all this data available makes it easier to manage the supply chain, identify counterfeits, simplify any product recalls, and provide evidence in case of litigation.
- RFID, with its ability to store vital information and assign unique serial identifiers, makes it easy to identify legitimate goods quickly and with confidence.
- That means everyone in the supply chain (assembly houses, warehouse managers, shipping companies, customs officials, retailers), and even consumers can verify authenticity.
- Simply tap an RFID reader or an NFC-enabled smartphone to the product’s RFID tag, and an authentication app does the rest. Authentication can be configured to work on its own, without an Internet connection, or the app can use a cloud-based service. Either way, the consumer has a quick, effective way to know whether a product is genuine or not. For added levels of assurance, the RFID tag can be equipped with cryptography that supports “strong” or “stronger” levels of security.

<table>
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<th>Name</th>
<th>RFID Tag</th>
<th>Secret Key</th>
<th>Image</th>
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<td>Result</td>
<td>Not a Genuine Product</td>
<td></td>
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</tbody>
</table>
9. CUSTOMER BENEFITS

Deployment of the Auto ID systems using a TagMatiks platform has many benefits.

- **Time Savings:**
  - Rapid deployment by platform customization and configuration
  - Configuration and setup can be done remotely over the Cloud
  - Fast addition and setup of hardware and read zones
  - Intuitive and easy to understand layout – screens, tabs, dashboards, icons – reduce learning curve
  - Integration with existing systems, after setup, no need to enter anything twice
  - Dashboards provide quick overview of operations – with option to drill down into the details

- **Cost savings:**
  - Tagmatiks is hardware agnostic, no need to buy new AutoID hardware
  - Maintenance and updates over the Cloud reduce travel cost
  - Customization on existing standard platform costs way less than developing a new system from scratch

- **Business Benefits**
  - Deployment of AutoID technology increases speed and visibility
  - Increase in speed of inventory and location of assets
  - Automation and batch processing leads to labor cost savings
  - Bigger operational throughput increases revenue
  - Process improvements and automatic data collection increases operational efficiency
  - Real-time visibility of assets, inventory, personnel and more
  - Actionable reports and alerts delivered on screen, email or SMS
  - Real-time event and item oriented data passed to enterprise systems for decision making
10. APPENDIX – CASE STUDIES

1. Field Inventory System for Hospitals

Daily operations in hospitals require management of large amount of inventory and assets. Field inventory personnel as well as sales representatives need a simple and mobile way to track inventory on the go efficiently and accurately. RFID4U has developed the TagMatiks FI Application Software that together with the TagMatiks Mobile App and RFID tags attached to inventory provides a full field inventory tracking solution.

SOFTWARE SOLUTION

The RFID4U TagMatiks FI Software Platform enables:

- Order management and Inventory replenishment
- Product and Asset Audits
- Expiration Management
- Consignment Management
- Trunk Stock Management
- Electronic Invoicing
- Returns Processing
- Chain of Custody
- Warranty and Maintenance Management
- Access to the system over the Cloud
- Customizable interface based on customer requirements
- Multi-format dashboards and reports
- Communication with the ERP system

HARDWARE SOLUTION

If fixed RFID readers or printers are utilized, the system will be connected to TagMatiks Core that provides RFID device management as well as read zone management and location management.

RFID tags are attached to each item, kit, packaging or asset. Tags are selected based on the material, most often small RFID labels that are printed with asset and/or expiration information. For tracking larger and metal assets, rigid metal-mount tags are used.

Handheld RFID readers with barcode scanners are used to associate the tags with the products that are barcoded. Handhelds utilize TagMatiks Mobile app for scanning inventory in the field and to communicate with the TagMatiks FI application over the Cloud.
BENEFITS
Implementation of the TagMatiks FI Field Inventory Tracking System provides many advantages:

- Increased efficiency and accuracy through easy to use auditing process.
- Significantly reducing human effort and corresponding errors.
- Scanning multiple tags concurrently and automatically.
- A complete real-time visibility of the inventory for inventory planning and reorders.
- Supply chain transparency and chain of custody traceability.
- Automatic order processing, electronic invoicing, and expiration management.

We have implemented a similar system in the Power Industry for a customer that needed to inventory "tool cans" for tools and parts that go into the field to service fleet of generators and turbines.

2. Surgical Kit Tracking System

Every day, hospitals deal with massive amounts of tools, equipment and supplies, which have to be properly inventoried, allocated, cleaned, maintained, serviced, used, returned and discarded. This is a major challenge, especially if there are vendors involved that perform part of the services beyond supplying simple consumables.

Our client is a vendor and service supplier to several hospitals in the country. Among other services, the company provides the surgery departments with one-time and reusable surgical kits that include tools and parts for surgeries (for instance in orthopedics, the kits include implants, special screws, mallets, prongs, forceps, etc.). These surgical kits are received at the hospital, autoclaved, opened, certain parts used and the kits are then returned back to our client. Upon receiving, the company has to autoclave and inventory the returned kits, audit what’s missing, resupply them, and store them or send them again to back to the client hospital.

SOLUTION

RFID4U has developed the Surgical Kit Tracking System (RF-SAN) that uses RFID tags attached to the kits and software platform based on TagMatiks.

SOFTWARE SOLUTION

The RFID4U RF-SAN Software Platform enables:

- Automatic registration of shipping and receiving of kits
- Item assignment to kits
- Kit auditing (several stages) and resupply
- Inventory control
- Kit location
- Status update (received, autoclaved, audited, refilled, backordered, recalled, expired, etc.)
- Communication with the ERP system

Same system can be duplicated in the hospitals to track surgery kits (and possibly other items) throughout their whole life-cycle.

HARDWARE SOLUTION

RFID tags are attached to each kit. There are two types of tags used. For reusable non-sterile kits, rugged tags that withstand the autoclave are affixed to the kits. For single use sterile kits, printed labels embedded with an RFID tag are preferred.

Fixed RFID readers are deployed as portals at dock doors, conveyors and pick areas. Handheld RFID readers with barcode scanners are used to associate the tags with the products that are barcoded.

BENEFITS

Implementation of the RFID4U Surgery Kit Tracking System provides many advantages:

- Complete status information of each kit.
- Increased efficiency and accuracy through the multiple-stage auditing process.
- Significantly reducing human effort and corresponding errors.
- Scanning multiple tags concurrently and automatically.
- A complete visibility of the surgical kits within the supply chain. Based on the tracking information, it is easy to manage their inventory, to see which kits are in inventory and which are out at the customer.
- A complete kit history, including the time they were shipped or returned. This prevents unnecessary manual searches and increases efficiency of kit usage.
- The system also makes it possible to quickly verify that correct kits are shipped to the right customer therefore increasing shipment accuracy and customer satisfaction.
3. Oil and Gas Inventory Tracking System

In the Oil & Gas Industry, selected items and inventory has to go through certification process in periodic intervals. But how can this be done with non-networked barcode scanners or even worse with paper and pen? The lack of real time visibility of all items and their certification status was a major problem for our client.

Our client, an Oil & Gas company provides various services and supply upstream and downstream products such as pumps, flow control products and replacement expendable parts for oil field service companies, pressure control surface equipment including wellheads, valves, frac trees, etc. or centrifugal pumps and spare parts for refining and petrochemical industries. Due to immense amounts of parts and equipment that are being produced, shipped and installed every day and the need for certification and regular recertification of these items, our client’s main challenge has been inventory control, certification process and supply chain management.

SOLUTION

RFID4U has developed a solution for valve certification, recertification and inventory tracking using RFID tags and RFID handheld scanners and utilizing the TagMatiks rapid development platform.

SOFTWARE SOLUTION

A handheld software application, which communicates with an ERP system has been performing following tasks:

- Provide inventory control for valves and other tracked equipment
- Create and track work orders
- Interface with the corporate ERP to upload and download certification and inventory data, as well as work orders
- Commission and assign the UHF RFID tags through an easy to use application
- Write updated certification data to tags
- Provide secure user access and visibility controls

HARDWARE SOLUTION

To enable tracking individual parts and valves, UHF RFID tags are affixed to each of them, in form of a hanging tag. Each tag has a unique serialized ID number and a barcode printed on a label. The choice of a particular tag is based on the item material, which is most often metal and possibility of attachment, reading distance, need for visible markings such as barcode and other considerations.

RFID handhelds were deployed for mobile reading, certification and writing to tags. RFID fixed reader portals were placed in strategic positions for inventory control.
Implementation of the RFID4U Inventory Management System provides many advantages:

- Elimination of paperwork, all data is electronic.
- Easy to locate a particular item.
- Tag data is read through RF, tags stand better to wear and tear than printed tags.
- Easy and fast inventory of a group of items.
- Instant knowledge of an asset status.
- Certification on the spot, updated data written to the tag.
- Online and offline mode.
- Fast and easy work order assignment.
- Automatic data synchronization with the ERP system.
- Complete view of status of all items with regards of inventory and certification at all times.

4. Returnable Shipping Asset Tracking System

The mismanagement of returnable containers, such as crates, pallets, carts and other shipping containers can have massive effects on the time, labor and costs associated with their shipment and return from the customer.

Our client’s company has five locations and at each location there are thousands of crates (not counting lids and dividers). In the past, when the crates were shipped out, it was difficult to find out which customers they were sent to, how long they have been at customer’s site and when and if they were returned.

This created problems, when there were not enough crates to fill new orders. Consequently, the company had to procure more crates, wasting money and time.

To address this issue, the customer approached RFID4U to create a returnable asset management control system to provide complete visibility of their shipping containers.
SOLUTION

A full real-time visibility of returnable assets can be achieved by deployment of a Returnable Shipping Asset Tracking System (RSATS), which provides this capability through the use of cloud based applications, forklift mounted tablets, UHF RFID Tags, RFID enabled portals, RFID handheld scanners and bar code scanners.

A cloud based application is the heart of the system. For our client, we designed an RFID RSATS based on our TagMatiks Rapid Development Platform, that has been performing following tasks:

- Provide inventory control for returnable assets
- Interface with the corporate asset tracking system to download the shipping information
- Automatically collect the crate tracking data from RFID tags attached to crates using RFID portals
- Upload the RFID collected asset tracking data to the corporate asset tracking system
- Commission the UHF RFID tags and bar code labels though an easy to use application (Barcode Printer Application)
- Provide secure user access and visibility controls
- Create and distribute dashboard information and reports

HARDWARE USED

To enable tracking individual crates, UHF RFID tags were affixed to each crate, lid of the crate and inside divider. Each tag has a unique serialized ID number and a barcode printed on a label. The choice of a particular tag was based on the container material, material of what’s inside the container, reading distance, need for visible markings such as barcode and other considerations.
In order to capture the information from the RFID tags, RFID portals were installed. These were placed at dock doors. For mobile reading and verification, RFID handhelds and barcode scanners were deployed as well.

We have, also, helped develop business operational procedures for efficiently functioning system using our platform and technology.

**BENEFITS**

The RSATS system provides a complete visibility of the returnable assets within the supply chain. Based on the tracking information, it is easy to manage container inventory, to see which containers are in inventory and which out at the customer.

RSATS provides a complete container history, including the time they were shipped or returned. This prevents unnecessary manual searches, investment in additional containers and increases efficiency of container usage.

Crates not returned within the scheduled time frame, create alerts, which direct the sales staff to contact the customer to remind them of the return.

The system also makes it possible to quickly verify that the containers carry the correct shipment and go to the right customer thus increasing shipment accuracy and customer satisfaction.