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Integrated Software Application with Active RFIDs to Improve Process Efficiencies

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Abstract: RFID is a tracking system that uses bar codes to track items in a store or organization. It helps to ensure operations are cost effective and efficient. Realizing the right value of each asset is critical in the supply chain process. Traditional methods involve significant time and resources to track and manage assets. Ensuring that the right type of RFIDs is used is important. Based on the organization context and need, right RFIDs can be put in use. Smart asset tracking allows businesses to know precisely where the assets are located and their movement in the process is tracked, as well as the asset's physical and environmental condition. These intelligent systems form the foundation for silent commerce. This paper explains the use of integrated software application with active RFIDs. The features of the integrated software are discussed. The right use of these applications to improve the business process is also highlighted.

Keywords - Active RFIDs, Productivity, Asset tracking, Software, Applications

Introduction

Radio-frequency identification (RFID) tags contain data and stored in electronic format. It is used to track objects or assets. These tags are read through electro-magnetic induction technique. RFID tags are embedded in the objects to be tracked. There are active RFID tags and passive RFID tags. Their usage is not limited to any particular industry. It is used in automobile industries, pharmaceuticals, ware house tracking. It can also be tagged to persons. A radio-frequency identification system uses tags, or labels attached to the objects to be identified. Two-way radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response.

1 Making faster, more proactive business decisions requires gathering rich information about inventory and assets not only the "what are you" and "where are you" but also the "how are you", including the physical and environmental condition and the precise location of an asset. Traditional asset tracking processes simply do not provide the "how are you" visibility nor the level of integration into enterprise-level planning systems that agile manufacturing operations require. Barcoding, passive and active RFID, and Real-Time Locating System (RTLS) solutions provide greater visibility in real time and give assets a virtual voice that can be used to make smart business decisions that will help improve operational performance

The amount of time spent on searching the products, retrieving it and getting it back to the process in significant. To improve competitiveness and profitability, enterprises must manage assets with the same care and innovation they use to drive excess inventory and costs. The inability to track equipment location, usage, service, and maintenance records causes companies to lose money. A good asset management program will ensure that the return of assets help to lower and control the overall cost to do business. These technologies can record asset movements automatically, and provide real-time data to asset management applications. Computerized systems provide current, accurate data that enables an organization to manage its assets with precise information instead of physical inventory. These integrated automated systems help in identifying improvement in operating costs without manual effort.

RFID Tags

There are different types of RFID tags. They are passive tags, active tags and UWB (Ultra Wide Band) RFID tags. Passive tags are typically used for kanban systems and equipment tracking. It tells the area where the unit is located. It does not pin point the exact location. It helps to identify where the unit was last seen. These are the lowest cost tags available. They can be viewed by a reader and antenna. It is considered as a mostly economical form of RFID tags. These tags are used for various industrial purposes. On the other hands active tags are used for sensitive devices that could breach a security system. For example tracking the movement of laptops or tracking of devices moving in and out of rooms. The advantage of active tags is its ability to have an alarm if tags are removed. This way the system knows of the breach and corrective actions can be taken. UWB tags help to pinpoint the exact location usually within

8 to 10 feet. One can track the movement and alert for any deviations. This is achieved through the triangulation technique. These tags are mainly used in security systems and high value systems.

Developing an integrated software

Intelligent asset tracking allows businesses to know precisely where high-value assets such as tools, forklifts, and other equipment are located, when they move, where they move, as well as the asset's physical and environmental condition. It shortens the time to find the item, reduces incidence of theft, and accelerates inventory turns. Accurate tracking of all parts throughout the assembly line enables streamlined production and lower labor costs. When businesses can ensure the right asset is at the right place at the right time, there is a measureable, positive impact on efficiency. Products that cost less to produce, store, and ship mean higher profits. The software solutions should enable visibility and traceability throughout the supply chain, allowing businesses to make smarter decisions. The solution should allow them to quickly locate misplaced tools that were not in the kit or in the designated place, while preventing purchase of excess tools. Businesses can use these real time data to make smart decisions enabling them to increase efficiency and improve productivity.

The integrated application should cover all type of operational activities irrespective of the industry. Be it a manufacturing enterprise or aerospace sector or a chemical unit, the integrated software should track and monitor all the products. Based on the organization need, the right RFID tags can be used. For some management might decide to use only passive tags, some units might require passive tags. Software should be able to recognize bar codes from all type of manufacturers. Software should not have huge maintenance activity. It should be scalable and reliable. Based on the market needs and configurable items, software should be easily updated to meet the demands. It should dynamic and have real time data. The whole modeling should be well planned. The user experience should be another important parameter. This application should be easy to use.

Identifying the right RFID tags for the right process in the organization is important. This would ensure the right return of investments. For example, in manufacturing plants where there is high speed batch process it is recommended to have active RFID solutions to reap right benefits. In plants where there is low speed batch process passive RFID solutions can be used. For wide are coverage, active RFID is recommended. Using the right tags ensures the optimum return of investment. Solution should offer flexibility to choose the different process and tag the right RFIDs. Solution should be cost effective and meet all tracking needs, regardless of the operation's size or budget. The solution should be developed with not only the current state but also the future state in mind.

The software solution can also be segmented industry wise. The solution could have modules for each industry. Each industry will have its own way of operations. Another option could be to have modules process wise. Certain business process can be common across industries. The solution should also consider and highlight the best practices for the different user groups. These lessons learnt will help the user look for similar trends and alert certain tips or solutions to the users. Integrated solutions depend on the frequency that the business desires to track the materials and the amount of information that need to be stored and processed. For example, an organization might check for a sensitive unit moving in and out of lab or monitor the usage and performance issues of important production equipment every day for all the shifts. Regardless of the frequency in which data is collated, automated data entry delivers real time benefits. It collects information faster and more accurately than manual methods.

Organizations can look at their integrated solution to collect additional information beyond just scanning fixed assets annually for inventory, audit or insurance purposes. Collecting data regularly provides invaluable information for risk management and defending against liability claims. Monitoring assets regularly, performed efficiently with automatic identification, can improve asset utilization and the total cost of ownership by providing the information needed to optimize capacity planning and preventive maintenance. For example, consider a machine that requires periodic maintenance based on number of the jobs processed. Traditional asset management would probably require verification of the machine's location and condition once a year, a requirement easily met with a simple bar code scan. An integrated solution cannot be a stand-alone solution. It should enable operators and they should see value out of these solutions. By creating procedures that require workers and maintenance personnel to record the amount of time they used the machine and any maintenance performed, the company can build a service record that supports the asset record. Database and maintenance management applications can use the information to monitor asset efficiency, schedule preventive maintenance, or send alert messages if the machine uses an inordinate amount of supplies that may indicate a performance problem. The documentation also supports service agreement and warranty claims.

For maintenance operations, departments can use an RFID tag to identify the equipment and date of installation, and then update the tag whenever employees perform service or inspection tasks. Workers who service the machine could read the tag to learn the most recent work performed or service history, which is extremely advantageous for remote asset management where personnel may not have access to enterprise databases and service records. Service documentation and record keeping can have a direct effect on profitability. Businesses that show leadership in automating their service operations are significantly more profitable. For better service efficiency and lower costs, reminder systems can be built in the solution. Automatic service records can be created and printed that will help in improving the overall efficiency. This will not only help maintain the operating costs, but also can focus on service revenue. It is not about one activity a time, multiple processes and activities can be streamed at a time and monitored.

Integrated solution should also be directly hooked with the existing ERP system. Solutions should be integrated with existing systems in the organization. It should be designed in such a way that standard software can be a plug in feature. Readers and sensors link directly to existing ERP, manufacturing execution systems, or warehouse management systems to provide timely and accurate information with minimal user interaction. Automated dispensing machines function like vending machines for tools and supplies. Employees present their ID cards to the machine, which reads the badge automatically to identify employees and verify their authorization to receive the requested equipment. The system tracks each item disbursement objectively with no human data entry required. Bar code scanners can log materials back into the system, which automatically applies a time and date stamp to the transaction documenting their return.

Determining best solution based on customer needs

Every customer or group of customers is different. Their domain or industry and nature of products vary. It is important to have an in depth understanding of the customer. A business cannot survive without conducting ongoing efforts to better understand customer needs. To discover if the solution is having a positive effect and creating customer loyalty, take time to ascertain customer's needs. Customer feedback is critical. It doesn't have to be expensive. Simple email survey or engage on the operational floor, one can capture a lot about what customers want just by asking and listening. Need of customer can be different based on the role they play in the organization. Technicians need may be different from supervisors. Managers need may be different from the operational supervisors. Financial analyst needs from the solution may be different from the operational analyst and so on. Identify the right roles and segregate them in proper groups. Then start understanding what the need is for each of the roles. Start documenting those as requirements.

Before designing the integrated solution, team should meet up with different stakeholders and understand the different inefficiencies they are trying to address. These problems then need to be tabulated and get the management buy-in to understand the priorities in terms of mandatory ones versus nice to have ones. Then the team of RFID experts will work closely with key personnel in the operations team to perform a detailed analysis of where inefficiencies exist in the mandatory requirements. They should examine where and how errors occur and recommend solutions based on how enhanced levels of visibility can provide actionable information to help you decrease errors and improve productivity.

Next step would be to understand what type of technology need to be considered. Next, determine what technologies will enable the level of visibility needed to help deliver the business goals. A single technology solution or a solution that combines multiple technologies may be required to meet the goals. The breadth and depth of barcode, passive and active RFID tags and their current usage need to be documented. A wide range of options that is flexible enough to fit the budget and need of organization need to be considered. Also the availability and usage of current systems like WMS and ERP system need to be analyzed. Always as analysts it should be kept in mind to consider all options to integrate existing software instead of creating every feature from scratch.

It is recommended to lay down the interface diagram. This diagram will clearly list down the key interface points and the expected inflow and outflow data. Then for each of the listed flow the key assumptions can be noted down. It would be a good practice to review this interface diagram and the assumptions with the stakeholders. Note that certain stakeholders might not be technical. The dependencies between systems and the challenges associated should be listed down as well. It is important that one person should be identified as the overall sponsor for this initiative from the customer end. As the analysis of the integrated solution is in progress, it will be interesting to note that there could be conflict between different internal departments. Sponsor will play a key role in resolving these conflicts and recommend changes to the approach. It is always recommended to have regular connects with the sponsor and keep him posted on the developments. Status log, issues log and risk logs should be maintained and discussed with the customer regularly till the requirements are baseline. Voice of the customer is vital for success of the integrated solution. It is important to note that the problem of the customer should be addressed by the integrated solution. There should also be a financial implication to the integrated solution. It should also be run through couple of what-if scenarios to ensure the different dimensions of the customer needs are analyzed and thought through.

Integrated software features

The integrated software should have the below features;

- Management dashboard that shows the assets and their tracking status. This can have a drilled down view and can be logically grouped based on different business units.
- Basic features of asset like asset type, asset category, asset location, asset price, asset status, asset tagged to process and so on.

- Software should have the feature to generate alerts. These alerts could be through text messages, voice alarms or email based on sensitivity of the alert. Business rules can be configured and alarms can be activated for deviations.
- Ability to check in and checkout assets. This feature helps users to share assets and automate the process of assets moving in and out.
- It should have the ability to capture data from any type of RFID. It should be technology independent. Software should be able to recognize different type of barcodes from any manufacturer.
- Ability to integrate with third party graphical representation tools. One of the option would be to integrate with google maps.
- Factor in the end user experience. One click options to view the status of assets and drill down further.
- Integrate with organization accounting software.
- Factor in the various financial rules, applicable accounting rules like tax, operating life, depreciation factor and so on.
- Provision to capture the profit or loss based on the status of asset like disposal, scrapping and so on.
- Integration with mobile hand held devices. Software should have the feature to generate mobile inventory. It should have the feature to update the mobile inventory based on the asset location and check in or check out status.
- Ability to generate reports. These reports could be standard reports or customized. Reports can be generated to analyze usage, movement history, asset location, asset transfer and so on. There should also be a facility to generate adhoc reports.
- The provision of retro-active depreciation should legislation change existing applicable rules based on the organization and legal rules. The provision of a current financial, tax and operational value for each asset

Integrated software benefits

There are innumerable benefits of this integrated software.

- On demand status and improved customer services
- Enabling operational efficiencies
- Increasing accuracy due to real time interventions
- Reduced defects or loss of products
- Improved productivity
- Better inventory management
- Enhanced Quality Control
- Delivering cost savings by improving process efficiency
- Reduced Inventory costs
- Able to locate units at the right time and reduce labor involved in searching
- Maintaining the right inventories
- Complying with various international standards and regulations
- Real time tracking of sensitive units
- Able to perform impact analysis on costs due to integration with finance module
- Increase productivity with automated business processes
- Improved utilization of assets

Conclusion

For any organization the focus is on the top line and bottom line. RFIDs help big time to improve operational efficiency and operating costs. Integrated solutions make the difference. Intelligent asset tracking allows businesses to know precisely where high-value assets such as tools, forklifts, and other equipment are located, when they move, where they move, as well as the asset's physical and environmental condition. It shortens the time to find the item, reduces incidence of theft, and accelerates inventory turns. Accurate tracking of all parts throughout the assembly line enables streamlined production and lower labor costs. When businesses can ensure the right asset is at the right place at the right time, there is a measureable, positive impact on efficiency. Integrated software should have the ability to talk to existing accounting and ERP systems in the organization. This paper highlighted the advantages of the RFID process, different types of RFID tags and its practical usage. It also covered the features of the software detailing down the benefits. An integrated software solution will help organizations experience the return of investment. It helps in providing real time processed data enabling managers to take right decisions at the right time.

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BIOGRAPHY

Dr. Venkatesh. J, Associate Professor, Department of Management Studies, Anna University, Regional Centre Coimbatore, Tamil Nadu, India have more than fifteen years of teaching experience with multi discipline specializations of Management Sciences. Understanding the uniqueness and priority of the field of education and research, he has imbibed the sense of disseminating and sharing knowledge with the environment wherever he is, which always makes him a continuous learner. Being a straight forward and transparent person with elite attitude, he would like to endorse a spectrum of educational qualification to effectively enforce his profession of teaching. His field of specialization spreads widely in the areas of Information Technology, Image Processing, Networking, Environmental Engineering, International Business, Finance and Marketing. Adding feather to his cap was the accreditation given by All India Management Association (AIMA, New Delhi, India) as Accredited Management Teacher (AMT) in the field of Information Technology (2012), Accredited as Certified Management Teacher (CMT) in the field of General Management given by Management Teacher Consortium (MTC Global, Bangalore) acknowledging his deep knowledge, research focus and excellence in the management research education.