Inventory Automation Using RFID Technology in Romaster Engenharia

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Abstract

The inventory of assets is something common and very common in companies annually or even every semester, it is an essential factor for a large and medium-sized company. The large number and degree of complexity of the assets that a company has directly affects the difficulty of managing these assets and, of course, the definition of an accurate inventory. We are talking about a large amount of assets, not just to be on paper and registering one at a time takes a long time, so the idea of our article was to automate all the company's assets (Romaster) by tags, and install antennas at points strategic to make an accurate reading of the company's assets, thus optimizing the inventory time. This technology has existed since the last century, used for the most diverse purposes, but now inserted in the inventory management of the Romaster company.

Keywords: *Inventory; RFID. Romaster; Automation.*

1. Introduction

Romaster is a company that has been operating for 29 years with projects, assembly works and Industrial and Metal Structure maintenance. It aims to exceed customer expectations through responsibility, efficiency, a positive result and always striving for the safety, environment and competitive price relationship. However, there is a very big problem when it is necessary to inventory the company annually. However, in the meantime, what is an inventory? Inventory in simple terms, is nothing more than a list containing and describing all the materials or goods held by a person or a company. Now in the latter case, it usually refers to an inventory of inventory or equipment of high business value, as the list includes what the company stores internally or somewhere else, in the case of Romaster construction sites in the state and outside of it. It is quite laborious and tiring to make inventory of stock in Excel spreadsheets or even in programs, because even in programs it is still necessary the analogue work of people and even manual in certain cases going up and down stairs looking for deposits and construction plans . The inventory inventory

is always more detailed than the others. The more information about a given item that is described, the easier it is to control and the less complicated any necessary movement in the physical inventory becomes. In large companies, it is more work to control the flow of what comes and goes. The idea is to implantation of RFID technology, or "radio frequency identification", which is to put a tag on a specific company asset, and to be able to quickly establish the information and catalogs, the exact number of items in stock and even identify where they are items inside or outside the company.

2. Bibliographic Review

Every RFID system is composed of three basic elements, which are: tags, antennas and readers, each with a specific assignment in the structure. The first component mentioned, the label, its function is to identify the different elements in which it is inserted. Antenna is responsible for establishing the link between the tag and the reader. Let's talk now about the reader, he has the task of managing multiple accesses, corrects errors, outside, sends the data collected by the antenna to data processing software.

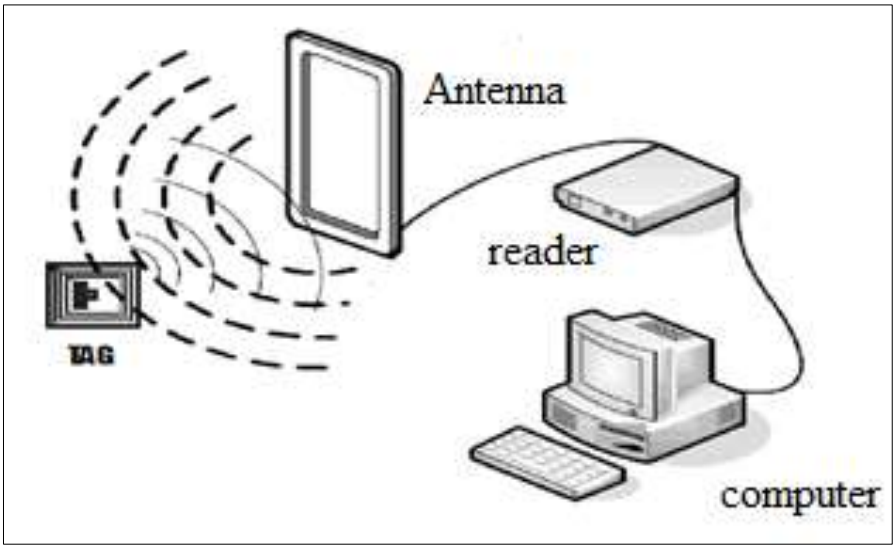

Figure 1. RFID components.
Source: ResearchGate (2020).

Since the beginning of its use, this technology has proved to be very versatile in terms of its applications. Among the various applications we highlight:

- Passage Control
- Inventory control
- Tracking
- Identification
- Access control

2.1 Standardization

With the spread of RFID technology on an increasing scale, efforts are being made to standardize it

in some countries that use it, as there is still no official resolution regarding this. Having this as one of the main objectives of some organizations such as the International Organization for Standardization (ISO), in which it is responsible for the standardization of operating frequencies and for the coding and decoding protocols, also having EPCglobal, an organization founded not only to assist in the standardization as well as to control the identification numbers of the Tags, but also to manage, control and stimulate the development of this RFID technology, in these countries.

2.2 ISO standards

Today, ISO together with the International Electrotechnical Commission (IEC), in which it is responsible for the general standards that involve area interface, data history, compliance and performance issues. In the case of radio frequency, the standards developed by these institutions are as follows:

ISO 18000

- ISO 18000-1: General frequency parameters of systems adopted worldwide.
- ISO 18000-2: Parameters for system communications with frequencies below 135kHz;
- ISO 18000-3: Parameters for systems communications with a frequency of 13.56MHz;
- ISO 18000-4: Parameters for system communications with a frequency of 2.45GHz;
- ISO 18000-5: Parameters for system communications with a frequency of 5.8GHz;
- ISO 18000-6: Parameters for system communications with frequency from 860MHz to 960MHz;
- ISO 18000-7: Parameters for systems communications with a frequency of 433MHz;

ISO 11785: Frequency standardization for the use of animal tracking devices; (134.2kHz)

ISO 14443: Standardization of frequency in proximity identification cards; (13.56MHz)

ISO 15693: Frequency standardization on neighborhood identification cards; (13.56MHz)

It may happen that smaller companies do not need an inventory with a high level of detail or a little more elaborate, it may happen that the company does not have so many valuable assets that it needs a great concern in managing everyone. Thus a simple record resolves in an Excel spreadsheet. However, large corporations both nationally and internationally have an immense number of assets and other assets and a record in Excel is not necessary, so an inventory is designed that registers, categorizes and organizes information according to the characteristics of what will be inventoried.

3. Materials and Methods

The implementation project involves the following stages of RFID technology for controlling the business inventory of the company Romaster Engenharia, involving a series of activities, such as the purchase of specific software and hardware. The process is divided as follows.

I Specialized Consulting

- RFID technology system mapping and implementation.
- Training of the team (employees) that will use this technology.

- Specialized technical support.
- Maintenance of management and inventory solution.

II System

RFID reader system that can communicate and integrate with the company's existing system, mostly a modular management system (ERP) to be able to perform intelligently with the customer's existing asset system.

III Physical Equipment

Data readers, antennas, recorders, servers, among other specific equipment.

3.1 Final features of RFID technology

As already mentioned, the main objective of RFID technology to control inventory, and to facilitate the location of company assets.

In short, this identification is made by automatic reading of smart tags, attached to each of the company's equity assets. The location process (asset inventory) must use manual RFID readers to locate the assets and allow the monitoring of the assets from fixed antennas and RFID readers, strategically installed in the company's access places, such as internal corridors, access doors to specific rooms according to the project carried out by the specialized technicians contracted by the company to implement the technology.

4. Results and Discussions

The great benefit of using RFID in inventory management is due to the capture and movement of your assets automatically, in real time you can check the status of the quantity of the company's goods already cataloged or of a specific product lost in a certain place in the company.

Imagine if RFID systems are integrated with other departments of the company, you can automate and intelligently manage by identifying suspicious equipment movements or even theft of company goods. company, previously not noticeable when it disappeared.

The reading of the bar code is done by an optical reader, with a direct view that is (directly on the data), the reading of the RFID tags is carried out even when they are not aligned close (without sight) to the antenna, even inside a The box can read without any problem, even with plastic wrapping or even dust on the TAG, nothing interferes with the reading.

There are several positive points of the RFID system, the ability to store more information in the TAG, this reading can be done at a very great distance compared to previous technologies, besides that it is possible to make simultaneous readings of several TAGs, and the tracking of products on the move, which enables a dynamic inventory in relation to previous inventories using the barcode and the individual spreadsheet reading of the assets.

Table 1. Comparison between RFID and Barcode

Characteristics	RFID	Bar code
Mechanical resistance	High	Low
Formats	Miscellaneous	Hang tags
Requires Eye Contact	No	Yes
Lifespan	High	Low
Possibility of Writing	Yes	No
Simultaneous Reading	Yes	No
Stored Data	High	Low
Additional Functions	Yes	No
Safety	High	Low
Initial cost	High	Low
Maintenance cost	Low	High
Reuse	Yes	No

4.1 Advantages of the RFID Tag

- Única Unique identification as an RFID tag is programmed with a unique code.
- Fast, paperless data collection
- Elimination of typos in reports
- Reduced working hours due to reduced paper work
- Controlada Controlled management of devices and warehouse
- Ability to store more data than bar codes
- Comply with legislation
- Easy to share updated information
- Manage equipment inspections, maintenance services, etc.
- Confiável Reliable operation in harsh environments, for example, wet, dusty and dirty conditions, corrosive environments, vibration and shock
- There is no need for contact or line of sight.

4.2 Negative points of RFID

- Since it is a radio frequency signal, tags suffer great interference when coupled to metal surfaces. As this is a common reality in the industry, it can be a problem depending on what you want to monitor.
- Another characteristic of RFID is that the signal emitted is unidirectional. Although it is not necessary to have a “visual contact” between the reader and the tag, for the tag to be recognized it needs to go in the exact direction that the reader is pointing. In this way, it is impossible to carry out a complete monitoring of the assets throughout the plant. What you have is a solution that

identifies when the monitored object passed through a certain region.

- Finally, the last point to highlight is the price of an RFID solution. The labels are inexpensive, disposable and ideal for monitoring assets with little value. However, reading antennas require a high investment, especially if the operation is complex and requires the implementation of several portals.

5. Conclusion

Technological renewal today is something applied in all areas, where somehow it manages to apply improvement in some processes, the use of radio frequency is becoming more and more common not only in the industrial sector, but also in the daily life of an increasingly technological society , we cannot be left out of this avalanche, so there is a continuous search for improvements in its processes.

In some studies, process optimization and cost reduction were observed, today companies are increasingly prepared for the future with RFID, the system is still being tested in other sectors in companies, we hope that RFID will become increasingly once an instrument of study and improvement, mainly to overcome the problems related to security, to privacy something that we have been able to observe in studies.

However, we are sure of the world that as this technology has more adherence, and makes it a basic need for organizations, the improvement in their security is something that will gradually happen until reaching a desirable status for everyone.

6. Acknowledgments

I thank God first for keeping me on the right track during this research project with health and strength to reach the end.

I am grateful to my family for the support they have always given me throughout my life.

I would like to give a special thanks to my advisor for the encouragement and dedication of his limited time to my research project.

I also want to thank the Centro Universitário Fametro, Institute of Technology and Education Galileo da Amazônia - ITEGAM and all the professors of my course for the high quality of the education offered.

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