

Modeling of the Steel Manufacturing Processes

Sang Young Lee

*Department of Health Administration Namseoul University,
21 Maeju-ri, Seongwan-eup, Cheonan, South Korea.*

ORCID: 0000-0001-9440-8338

Abstract

In this paper, presents the feasibility of deploying RFID for the steel industry as a tool to reduce the production costs. Steel industry that is applicable to RFID-based tracking management system is proposed. The results of this paper proved that the recognition of 100 per cent came from the material input and output and the location, the location indicated 99 per cent detection rate. Therefore, the proposed RFID-based tracking management system was found superior to the existing system in terms of productivity.

Keywords: Modeling, Materials Management, Ubiquitous, Logistics, Steel Industry

INTRODUCTION

Recently, steel industry including the ubiquitous logistics cost savings with IT skills and enhance their competitiveness in terms of traceability and logistics management through efficient management and utilization of real-time information about the importance of awareness and with increased require of needs[1, 2]. Therefore, the development of the information technology companies to keep pace with the flow of information on the identification of logistics and the logistics information system for controlling the development and application focusing on corporative competitiveness[3, 4].

The steel industry compared to other industries that occur in the Inbound Logistics. Logistics and production logistics are characterized by relatively high. But the steel industry because of the nature of logistics provider focused on improving the aspects lightly. Recently, however, steel industry including the ubiquitous logistics cost savings with IT skills and enhance their competitiveness in terms of traceability and logistics management through efficient management and utilization of real-time information about the importance of awareness and with increased require of needs. Therefore, the development of the information technology companies to keep pace with the flow of information on the identification of logistics and the logistics information system for controlling the development and

application focusing on corporative competitiveness

Ubiquitous technology RFID (Radio Frequency Identification) tags using radio frequency to fall from close range to tens of meters from the tag is recognized by the technology of giving and receiving information. Using these techniques, Logistics Information Logistics to handle the flow of accurate and timely information can contribute to a significant improvement. Steel industry, particularly the weakness of RFID exist simultaneously, steel columns and metal products caused technical problems in the practical application. In addition, the costs of tags, tag attachment and damage costs are one of the challenges to be solved[5, 6]. In general, metal RF (Radio Frequency) energy, and that reflect characteristics of the RF energy has the property to absorb the liquid. Thus, the received RF energy from the reader communicates using UHF band passive tag, the RF energy, adhesive molecules, depending on the actual tag reading rate of change factors will affect a lot. In particular, the spread of RFID application in various industrial environments, according to the order of attachment on the properties to overcome the special Tag antenna, material development, and packaging technologies are essentially required to be developed[7].

DESIGN OF THE RFID-BASED TRACKING SYSTEM

The function of each part to the RFID tag reader that can read from and write to the device and antenna frequencies and protocols defined by the tag is configured to exchange data stored on devices, and RFID tags to store the data of the key features plays. The technology used in RFID is one of the automatic identification technology. Incorporating a microchip tags, cards, labels, data stored in the radio frequency are the non-contact reading.

RFID tracking management system based on the basic functional modules, RFID integration module and the tracking support module. The basic functional modules of the basic features of a tracking system make possible to track the stock of required data, delete, modify, view and features.

And RFID integration module works with the default function module reads the RFID reader and tag, the tag information stored in the DB which has a function of the location tracking.

Support module to track the relevant sector information on the network, the instructions and information, and factory information, directions, check real-time information, and make the factory. The module configurations for the system are shown in Fig. 1.

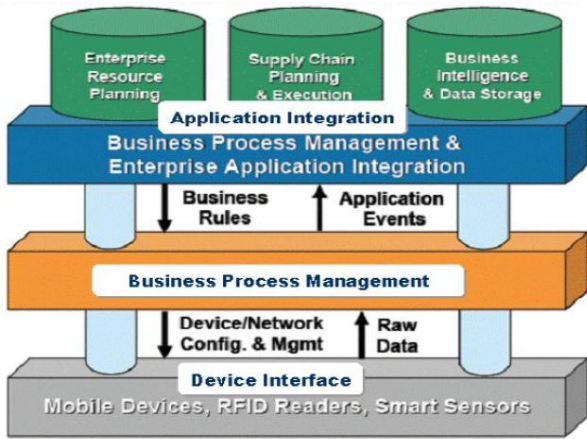


Figure 1 : System Configurations

IMPLEMENTATION OF TRACE-BASED RFID SYSTEM IN THE STEEL INDUSTRY

The basic dipole antenna in terms of the metal cannot be used. The reason for the metal in the traditional dipole antenna is attached to the metal loses the original nature of tag.

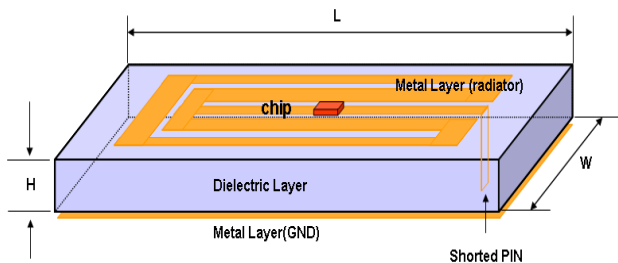


Figure 2 : PIFA-type Microstrip Antenna

As shown in the picture of PIFA-type micro-strip antenna radiator to the presence of the dielectric substrate and the size of the antenna in the direction of the length $\lambda / 4$ and width using the width of the antenna impedance is adjusted for to be accounted. In particular, the emitter side of the ground plane conductor grounded by grounding planes because they used when attached to a conductive object is less affected on the characteristics of the antenna. Major features of the PIFA antenna using a short circuit can reduce the size of the antenna, thus the miniaturization of antennas is one of many methods being used. But the biggest problem of PIFA ground plane and have less than 1 if the ground plane, depending on the size and shape change represents a serious performance. Ground for the characteristic frequency of the radiation

pattern changes with the change brings.

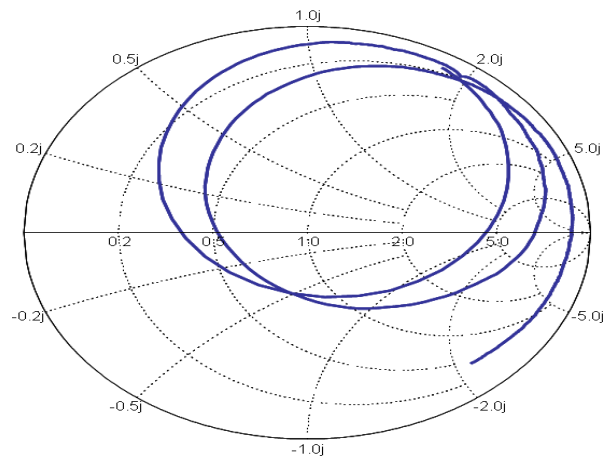


Figure 3 : Measured Tag Antenna Value

The following figure indicate that according to the size of the ground plane, shows the change in reflected return loss. As shown in the figure, return loss characteristics depending on the size of the ground plane the frequency shift can be found as a sudden phenomenon. The figure below is shown on the change of ground plane and the radiation pattern. The ground plane 600 mm x 600mm at size 0 at zero level (when you have a (null) is formed.). In addition, since the tag must be attached to the vertical chip production some difficulties arise because the tag chip impedance matching has difficult nature of structure.

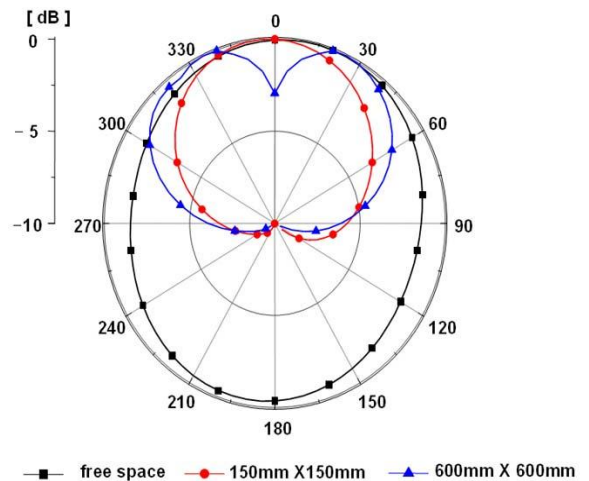


Figure 4 : Size of Metal & Radiation Patterns of Antenna

In this paper, we apply the tag structure of the ground plane layer of the dielectric layer and of the emitter configuration. And the floors of the radiator loop type of antenna structures were selected. The fabricated antenna applied has a reliable effect in considering the development of antennas and tags at the bottom of the package by placing two magnets. With the

post-production on-site recognition and awareness of the tag antenna distance were measured. Produced were made from two kinds of tags. One kind of size 80mm x 30mm x 4mm and the other the size of the tag (A10010006) is a 100mm x 100mm x 6mm.

Table 1. RFID Tag Specification

Physical Characteristics		Electrical Characteristics	
Parameter	Specification	Parameter	Specification
Length(L)[1]	100[mm]	Chip Feature	Alien Higgs3
Width(W)[2]	100[mm]	Memory Size(bit)[5]	EPC[96] + USER[512]
Thickness(T)[3]	8[mm]	Write Endurance	10,000 Programming Cycles
Weight[4]	-	Data Retention	10 years
Material	PCB/Silicon	Interface Protocol	ISO/IEC 18000-6C EPC global Class1 GEN2
Finish	PSR(Yellow,Red) Silicon(Blue)	Frequency[6]	UHF
Adhesive	Silicon tape	Reading Distance[7]	Up to 2.5m
Max. Temperature	-20°C ~ +200°C (24Hr~)	Reading Ratio	100%

These tags, by default, can withstand high temperatures and strong shock and can recognize the distance and the other with containing the multi-function by the function of the sensor applied to the tag.



Figure 5 : Tag-attached to Steel

Finally, for those tracking the performance of RFID systems we tested fixed reader installed in the 10m distance is based on recognition, PDA mobile readers use expression when measured by 2m interval. First, in order to measure the recognition rate - exit - exit the gate of an installation and teller machines were tested with the same tag testing performed on the mouth. Location on the product coming out process when loading a package of products loaded at the factory in the form of recognition from the state for the package was measured. Measurement conditions were used 100 metal tag attached, portable reader, the maximum output power (30dBm), while the behavior was measured recognition of the tag. The table below shows the measured results from such a system. Measurement results, the pass was secured when the recognition rate of 100%, when the product load ratio of 99% was recognized.

CONCLUSIONS

In this paper to target the ubiquitous technology in the field of logistics has been introduced with some minor degree of advantage. In steel industry, especially the nature of RFID, there is weakness at the same time, steel columns and metal products caused some technical problems in the cause of the application. In this study, basically small and medium-sized steel industries, reflecting the characteristics of the building systems and by allowing for faster application time, while minimizing the capital investment.

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