



RFID Tag-Based Dashboard for Factory Production Line Improvement

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ABSTRACT

Production lines in manufacturing industry deal with various processes and activities with the aim of producing output in line with customer orders. The high number of orders make the whole environment dynamic as the shop floor workers need to take care of the production lines, as well as conveying the details to superiors. The details include the production output quantity and overall status like the number of rejected items and many others. The process of reporting the production lines status to superiors (ranging from engineers, managers and above) consumed time as it is done manually. There is a need to have a mechanism that is able to replace the manual or conventional reporting method into a system that is able to show the status of the production lines visible to engineers and managers. Due to that, the design of Radio Frequency Identification (RFID) tag-based dashboard is introduced in this study. RFID tag will contain the necessary details about the products to be manufactured. The details will be read by RFID reader, kept inside a database and finally will be turned into useful information. This information will be in the form of a computer dashboard that can be monitored by the engineers and/or managers. The system is beneficial in terms of it can display the current status of the products to be manufactured, including the rejected status of them. This in turn can overcome the problem of not achieving production output since the manual reporting is no longer needed and rejected products can be repaired immediately.

Key words: Dashboard, Manufacturing, Production lines, RFID.

1. INTRODUCTION

Industry is one of the key resources for profit for a certain country [1]. Manufacturing is one of the industries. Manufacturing factory produces its own product requested by customers [2]. A manufacturing plant received many customer orders each month, sometimes reaching thousands. To cater the orders, the production line itself needs to run 24

hours. Due to that, production planning section in a manufacturing factory is very crucial. Without proper plan, it may affect the customer orders and subsequently the future of the organization.

It is common for a factory production line to experience a 'line down' situation [3]. This downtime is caused by many reasons. One of them is the product defect. Previously, any defects occurred to the products will be known to the shop floor workers like operators, line leaders and supervisors first. After that the supervisors have to report the any problems including the defects to the engineers or managers for further action. All this takes up time. The valuable time can be used to produce another products requested by customer for example. Thus, the dashboard system will solve the problem by displaying the real-time process on the production line [4]. The dashboard will show the defects and this information will be known to all staffs including engineers and managers.

2. LITERATURE REVIEWS

2.1 Production Lines

All manufacturing industries will produce their products accurately following the specification that has been standardized in order to achieve their goals [5]. A production line will run the products line-by-line according to models. Every factory will produce their products with the aim of many outputs in shorter time. However, not all products are functional since there is a probability that the products have defects [6].

2.2 Dashboard System

Stephen (2006) [7] stated that a dashboard has the most important information needed to achieve objectives. This information is shown on a single screen. Dashboard system is part of Business Intelligence (BI) tools where data is integrated in a way that organization can benefit from it. The benefits include the monitoring, measuring and managing business more effectively. Figure 1 shows the example of dashboard application.

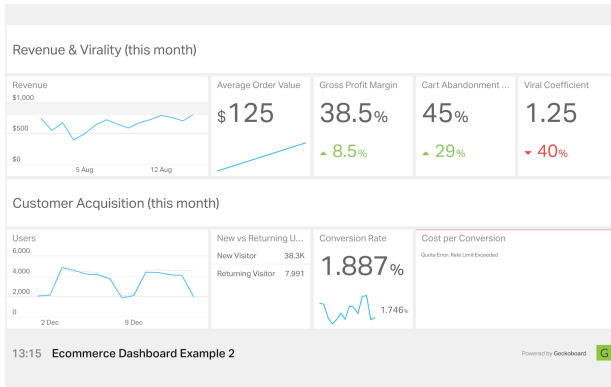


Figure 1: Example of a Dashboard [8]

3. METHODOLOGY

3.1 Block Diagram

Figure 2 shows the block diagram of the system. The diagram starts with an RFID tag. The RFID labels information is kept inside the database. At the moment when an RFID label is scanned by RFID reader, the data will be checked against the database and acknowledged. The client interface will show the information about the product.

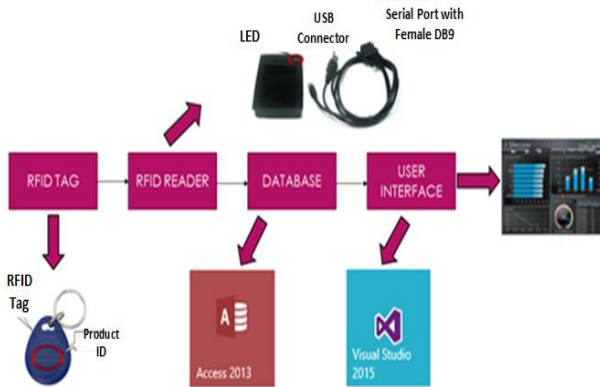


Figure 2: Block Diagram of the System

3.2 Process Flow

To illustrate the process further, Figure 3 shows the process flowchart that begins with scanning process of the RFID tag. After the RFID reader received signal, it will display the related information. This is followed by updating the database and display in the dashboard system.

3.3 Hardware Implementation Prototype

This prototype is designed for the production line in factory. The dashboard system will be used in production line. Figure 4 shows the designation of the hardware at production line, while Figure 5 shows the designation of the hardware at the engineer's or manager's office in a factory.

As in Figure 4, the main components that are used are RFID reader and RFID key chain tag. The RFID reader is mounted on the wall at production line while RS232 serial cable communication will be mounted with the trunking from the reader to the Personal Computer (PC) or Laptop.

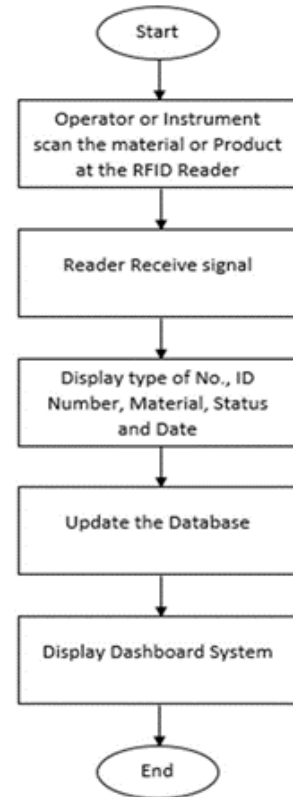


Figure 3: Process Flowchart

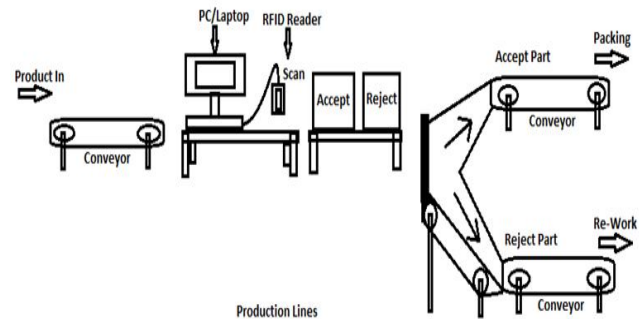


Figure 4: Implementation of Prototype at Production Line



Figure 5: Implementation of Prototype at Engineer's or Manager's Office

As shown in Figure 5, the hardware of the dashboard system is installed at the office stationed by engineers or managers. All the data for products in the production lines will be visible to the dashboard system in the form of the Graph, Pie Chart, Gauge and etc. The engineers or managers can monitor the products status here.

4. RESULTS

Figure 6 shows a dashboard system that shows the information that will appear after all the products have been scanned using RFID Reader. The pie chart shows the percentage of Accepted and Rejected. The gauge shows the alert went the target is not achieved. The graph shows the graphical view of the products that have been accepted or rejected. Lastly, the grid shown is in the form of table that displays all the products information.

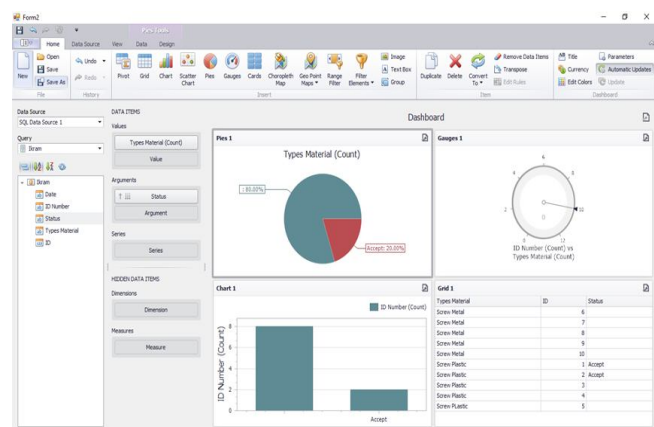


Figure 6: Dashboard System

5. CONCLUSION

Having all the products status in the production line visible to all the workers can help to improve the overall manufacturing processes. The improvement can be seen in the form of time taken to troubleshoot rejected products, thus improving the production output quantity and quality as well. The time taken is less for the troubleshooting tasks. The dashboard system is able to cater for the needs, as it is able to display related information needed to engineers and managers. Other than overcoming the hassles of doing paper work administrative jobs, this also can help engineers and managers to make fast approach to solve products reject issues. Furthermore, the information displayed in the dashboard pane can be customized according to users' need. The dashboard system can improve organization's performance by all the advantages discussed in the previous paragraph. Future work is recommended on having the dashboard displayed at the mobile interface, as the mobile usage is the most popular gadget used by the nation these days.

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