

## RFID AND BAR CODE TECHNOLOGY IN WIP

### **Using Rfid And Bar Code Technology In Work In Progress Management**

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### ABSTRACT

The key of success is based on the right decisions at the right time. And in order to make a correct decision one's required correct and real time information. In the manufacturing industries a paper based manual system is always a time consuming and prone to errors and in fact sometimes the data even may be lost. So this situation does not lead to real time information and the decision based on that sort of information cannot be accurate. And that causes a huge loss for any business in the very competitive today's market. Here in this paper we discussed the new technique of capturing the real time information based on WM (wireless manufacturing). WM consist on wireless devices such as RFID (Radio Frequency Identification) or bar codes etc. This paper covers a way out how to use the said devices to gather the information of each and every operation carrying out on the product during its manufacturing phases and also the real time status of the WIP (work in progress) inventory. Now having the real time information correct decisions can be made and this also helps the top management to improve the quality of the product.

Key words: WM (wireless manufacturing), RFID (Radio frequency identification), WIP (Work in progress)

## THE DEFINITION OF WIP AND MOVE TASKS USING RFID AND BAR CODE TECHNOLOGY

Real time information of WIP (work in progress) is always a bottle neck in any manufacturing industry. Paper based information is always a misleading because of considered to be a non value added process for the operator and also the paper containing this information may be misplaced and resulted in total chaos. Now if any non-confirmation happened during manufacturing, it is impossible to trace the route cause because of lack of information or misleading information. More over if even all the required information is available from paper based, still the time gap is the key. Introduction of RFID and bar code technology results in achieving a real time data of WIP that's help the decision making process more effectively.

Similarly move task operation is being simplified through the use RFID technology and hence it also improves the tractability and reduces the chances of pilling up of the buffer zone WIP inventory.

### PROBLEM STATEMENT AND OBJECTIVE

In the manufacturing industry, WIP (work in progress) management is a real issue. Most of the times the top management is interested in the WIP status, because that leads them in the decision making.

Let's suppose there is a part to be manufactured as shown in figure 2. There are number of operations involved in manufacturing of the said part. Now to have a real time data for decision making and also for WIP management, a paper based system is required to be replaced with efficient and real time information system. Hence using RFID and bar code technology provides the solution for the said problem.

### USING RFID AND BAR CODE TECHNOLOGY IN WORK IN PROGRESS MANAGEMENT

It is the goal of every company to maximize its profit and lead the comparative market. In order to achieve this the right decision at the right time is the key. The emerging RFID and bar code technology helped in this regard, it gathers the real time data and sent back to ERP (enterprise resource planning).

## ARCHITECTURE

Now consider a job shop having two different work stations. The figure 1 shows the architecture of the whole system,

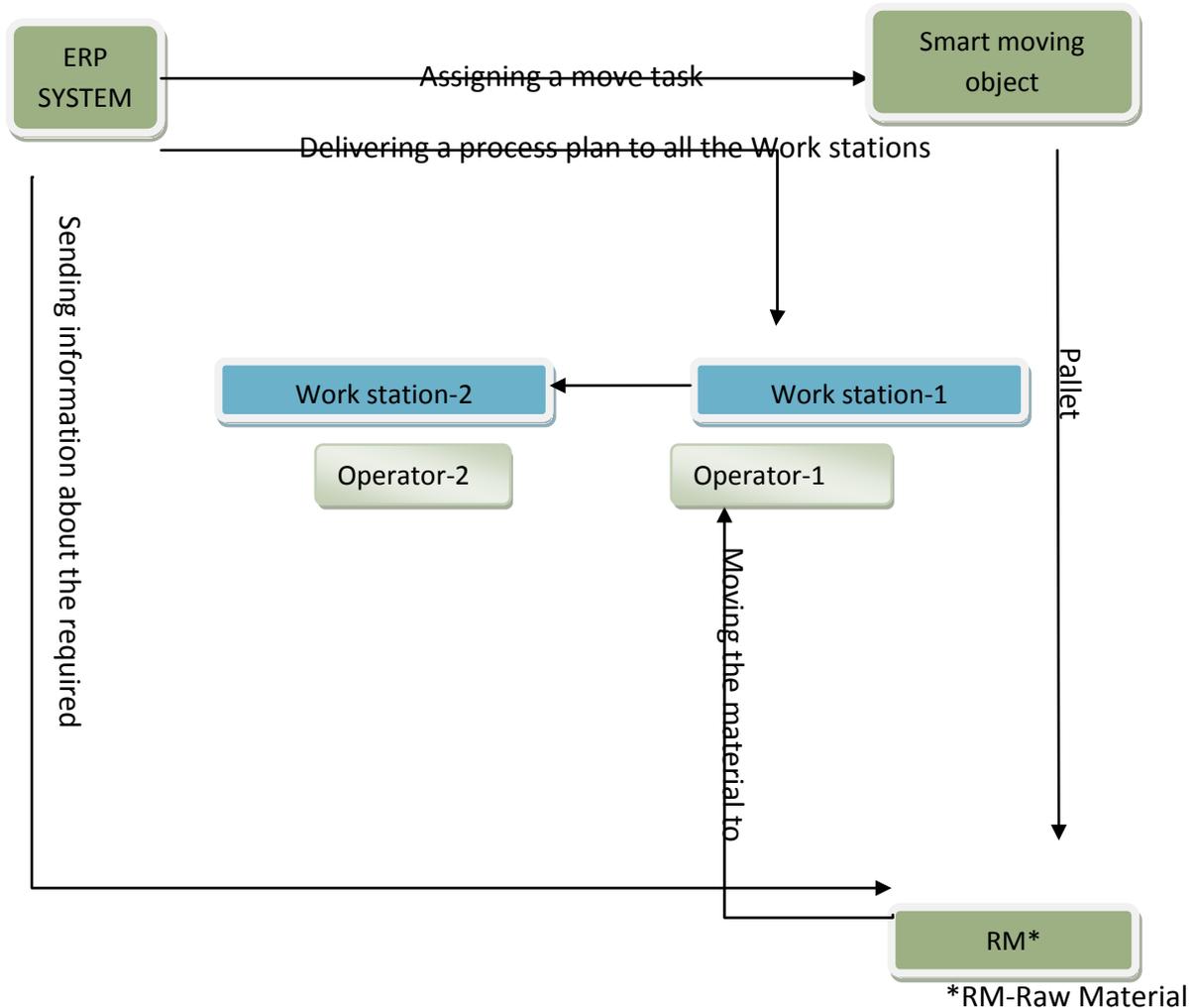


Figure 1: Architecture of RFID and BAR CODE BASED wireless manufacturing system

Now in order to make a wireless manufacturing work shop, it is required to know that which object is assign a tag or a reader or a bar code. Keeping in view the cost effect, all the manufacturing parts can not have tags so its better to stick a tag to a bin or a pallet. Now in this case the pallets or the bins are reuseable. So the pallets becomes smart objects. In addition, each location of WIP inventoried is also tagged to become a smart location of storge. Workstations and their buffers are tagged as well. Similarly shop floor passeges, together with critical turning points such as road-signs, lifts, and doors are tagged, instead of being equipped with expensive readers. In order to minimize the number of readers (and thus cost), it is decided to attach readers to vehicles (forklifts, trolleys, etc.) that are directly used for moving WIP pallets. They are therefore smart vehicles. Some hand-held readers are provided for standby uses in case manual interventions are necessary.

Smart objects deployed in shop-floors must communicate and interact with back-end IT systems. At present, it is proposed that shop-floors are wirelessly networked. That is, wireless devices are deployed in important areas of shop-floors. This is an inexpensive approach and avoids the wiring efforts and inconvenience caused by wiring. Wireless networking is important for real-time information visibility and traceability. Any changes are recorded in the back-end systems and reflected to the front-end operators. This will further enhance other decision support systems. In a wireless shop-floor, smart vehicles are more sophisticated. Each is mounted with an industrial computer to which the reader is connected through a simple Savant middleware. This computer is also equipped with a wireless card to interact and communicate with the shop-floor wireless network. Smart trolleys are equipped with RFID readers for interacting with tags deployed in the shop-floors, and wireless networking cards for interacting with back-end systems. This wireless networking approach is considered technically and economically more viable than wired networks.

Now one more thing which is different to other literatures is that a process plan or a work instruction including each manufacturing step is provided at every workstation. There is bar code printed at every manufacturing step in the process plan. A hand held bar code reader is also available at every workstation.

#### PROCESS

Let's consider an example of the part shown in figure, 100 parts are required to be manufactured. Let this part requires three different operations at the work station 1. A process plan is being prepared simultaneously a requirement of material being raised and this requirement is also sent to the raw material store through the use of wireless net working.

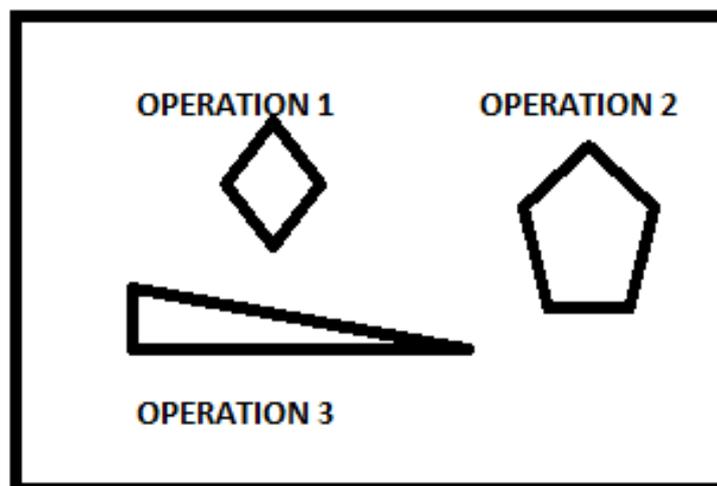


Figure 2: Part to be manufactured

A complete move task is planned. As the ERP receives back the information from the material store. This information is then sent to an idle smart vehicle. The smart vehicle either a trolley or a fork lifter receives the information and the driver confirms the start of the move task. As all the staff is equipped with a staff card which is readable by the RFID reader. So the information about who is moving the smart vehicle also sent back to ERP. And now the smart vehicle moves to the place of the material pallet, picks it up. As the smart vehicle loaded the pallet, the information is automatically updated at the back end. Now the smart vehicle moves the pallet to the planned work station. As the operator receives the material at the work station, the information at the back end again updated.

Now when the operator completed the first operation as instructed in the process plan, he will scan the bar code as shown in figure 3 of that particular operation. Now as a matter of fact it updates the real time information of the WIP (work in progress). Similarly the operator has to scan after the completion of each operation. Now as all the operations will be completed, the operator will scan the bar code of completion of the manufacturing of the part and that's update the data at the ERP and hence the real time data will be stored.

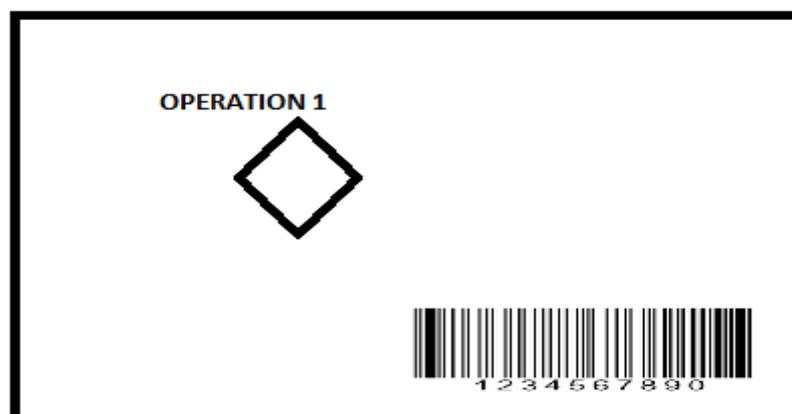


Figure 3: Operation 1

Now the ERP system is designed in the way that after the completion of all the required operations on the particular work station it will automatically plan a move task to the next working station. And so the whole process goes on.

## **Conclusion**

By replacing the old paper based system with the RFID and bar code technology we achieve the goal of receiving the real time data and also reduces the stocks at the work stations.

## **Future Implications**

In future the bar code technology can be replaced by modified CNC control panels which may sent the information back to ERP after the completion of each operation.

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