WHITEPAPER

8 Tips On Work-in-Process Implementation using RFID
8 Tips On WIP Implementation

Deploying Intelligent Work-in-Process through RFID

There are a variety of reasons as to why a company may be looking into the implementation of an intelligent work-in-process (WIP) management system utilizing sensor-based technology that includes RFID. Some key drivers include:

- Raw materials or finished goods variances
- The burden of reporting the status of WIP
- An increase or desire to gain visibility into yield loss.
- Lean initiatives demanding improved data collection and process visibility
- Identifying process touch-points that can be streamlined or automated

This paper offers tips on how to identify the need and position an RFID based solution for intelligent WIP. It addresses three important aspects that Plant Managers need to consider when designing, implementing, and using RFID solutions:

- Know the current process, its timing, its strengths, and improvement needs
- Understand the physics of RFID and the environmental conditions of a facility
- Recognize how to identify, minimize, and handle exceptions to the process

Tip 1: If the pain isn’t clear, neither is the solution

The core problem for anyone who has a need for greater process efficiency is identifying “the pain.” This is usually a multi-faceted question, what is it, how many are there, and where are they? Documenting the current processes inefficiencies is important for justifying the need through an ROI, but more importantly, to identify where improvement and impact can be introduced. RFID solutions provide the visibility to answer the questions of how many, where is it, how long has it been there, where has it been, and many other asset and process related questions. When plant managers develop strategies to implement intelligent WIP management systems it is very serial, tending to derive a tacit agreement at the top that there is a specific pain. Addressing this specific pain requires drilling down step by step into the process to find out what steps to eliminate and what technologies to add and where.

Tip 2: Examine your process, reduce the touches

Maximizing efficiency requires understanding the processes on an intimate level. The human touches in the business processes must be clearly identified. The ultimate goal in an intelligent WIP management implementation is to reduce touches. A touch is any instance where there is human interaction, and it is important to know where they are, why they exist, and how they are executed. Wherever there is a touch there is a high probability for error. RFID technologies are optimal resources for reducing touches that relate to data collection and identification of exceptions.
Tip 3: The laws of physics don’t change
Implementing an RFID solution is not a do-it-yourself weekend project. A successful installation requires a basic working knowledge of physics and radio frequency identification technology. RFID hardware cannot be expected to do something that it cannot do. Case in point, radio emissions reflect off of metal and are absorbed by fluids. Tracking materials that are metal or contain fluids can be done but these issues need to be considered and designed into the system to introduce a data collection technology reliably.

Tip 4: Be aware of RF signal behavior in the environment
It is important to understand the behavior of RF signals being produced by the RFID readers and the RFID tags. More and more RFID technology used in the manufacturing space operate in the UHF band at 915 MHz. Other legacy technologies that broadcast on this frequency will interfere with the RFID signal. Conducting a site survey using a frequency analyzer throughout your facility to identify conflicting signals is a key step in the design process. Be diligent, an RFID process that works 99 times might fail on the 100th because the introduction of a conflicting signal such as older walkie-talkie systems which broadcast on the same frequency. A thorough understanding of the way UHF signals behave in a confined space allows you to read RFID tags in creative ways by modifying the environment. Manipulating the RF signal and modifying the environment goes hand in hand with the next tip.

Tip 5: Design a system to maximize the solution
As painful as it may be, there is no “one size fits all” or out of the box solution. Every process and desired outcome is different. At a component level RFID provides the flexibility to modify a design

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to fit an environment or a solution. It is also important to understand that based on the physics discussed above that it may become necessary to modify the physical location or the process itself to accommodate RFID tags and readers. If there is interference with your deployment of an intelligent WIP management system, perhaps your RFID hardware is not reading or transmitting properly, or your workers are causing exceptions because they refuse to accommodate the new technology, you must find creative solutions. For example, adjusting tag orientation to match the antenna orientation, using hand-held readers or stationary portal readers, etc. are all considerations in the design. A design that eliminates potential human error is best.

Tip 6: You cannot prove or disprove an unknown
An RFID system is challenged unless it knows in advance what to expect. Without a database of defined items or processes, the system will not know that it has read all of the tags or if a tag is not reporting. Each item or group of items that is to be managed through an RFID system must be associated with an RFID tag. Items can be associated as an individual, as a sub-set, or as a group. These associations can be dynamic as the process changes, constructs, or deconstructs items in this process. An RFID system must offer this flexibility while tracking and managing this effort for the users.

Tip 7: Simple exception reporting
Today, many plant managers want their intelligent WIP solution to work “headless,” or basically be autonomous and “just work”. The question becomes how do you report exceptions and who do you report them to? The easiest solution is to match the results to the human who will be addressing the exception. A common and simple solution might be using visual aids to alert the operator with a stack-light. Change in the pattern of lights is proven to generate the most immediate response from operators. On the plant floor, where detailed software training and deployment may not be feasible, this is optimal. As a process or line runs, there is no longer a need to guess to confirm proper flow. The simple light structure provides a verified visual signal to keep workers up to date on the status of the WIP and more importantly, it does not overcomplicate the reporting to humans. Data is then collected in the system to provide for real time or post hoc analytics. This solution provides a line of sight status in rudimentary form, while higher level analytics can be followed by the plant manager or process engineers.

Tip 8: Architect your process to eliminate touch points
Suggesting that a process be re-engineered is daunting for many COOs and Plant Managers, as many of these industrial processes are traditions passed down from workforce to workforce. But, adapting the processes and accepting the way that the RFID frequency works delivers greater efficiency in the long term. Planning processes from the outset to identify tags and readers, and to eliminate human touches allows operators to deal purely with exceptions and not the volume of work proceeding normally. Human intervention should only come into an automated WIP at the moment of exception, not before.
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