

RFID Words of Wisdom

Susan Flake of Motorola has authored the following list of items to consider before and during a successful RFID implementation.

Steps to a Successful Installation

1. Understand the customer's requirements/mandates.

RFID installations can be very customized and may differ from location to location within the same customer. Understanding the customer's requirements will help create a solution that satisfies all parties involved.

2. Set realistic expectations.

Opposite is true; RFID is governed by the laws of physics and works differently given different environments. Establish objective, quantifiable performance metrics with a customer pre-install.

3. Deploy for scalability.

Many RFID implementations begin with pilots using a partial product offering, usually a single SKU. The ability to be able to visualize future challenges or issues with other products farther down the installation timeframe will help to reduce cost, labor and time in the future. Also, consider using EPC compliant tags even if it is an internal only application. This allows for better flexibility, should the implementation be taken outside the four walls.

4. Run a pilot or test period in which the customer's employees or workers will be able to interact with the RFID hardware.



The hardest thing to plan for is the 'human factor.' The people that are going to be using this system on a daily basis will help create a solution that encompasses all of the practical use cases. Test the limits of the environment and their impact on RF and system performance, to whatever degree possible (such as bodies near a sorting conveyor, temperature extremes, network traffic, etc.) Test with the tag to be used in rollout and the actual product.

5. Identify areas of risk up front and define strategies to mitigate these risks.

Test specific read points in a lab environment prior to implementation, but expect and allow for unforeseen issues to arise that were not present in the lab.

6. Don't underestimate the importance of the RFID tag.

Finding the right tag for the right application is a very important, if not the most important, factor in an RFID implementation. Different tags perform differently on different types of products. It is possible that a few different form factor tags may be required in a single implementation in order to meet customer requirements. Try different tag types during the pilot phase if the read rates are not meeting expectations. Many times customers decide on the tag based on cost. While this is an important factor, it is not the only factor.

7. Understand the parameters of the system

- a) Tag selection, tag placement, reader antenna placement and type of reader antenna all play critical roles in the success of an RFID implementation. Pay special attention to the following:
- i) Understanding where your read points will be and the tagged item's orientation in relation to these read points,
 - (1) Is the tag orientation in the read zone always consistent or is it variable?
 - (2) How many tagged items need to be read in the read zone?
 - (3) What flexibility do you have in reader antenna placement at each read zone? For example, can you cant the antennas to a 30 degree angle when installing on a dock door or portal to improve read rates?
 - (4) How much time do you have to read the item tags at each read zone?
 - b) Understand the constraints on item tag placement, identify best tag location keeping in mind the following:
 - i) What are the contents of the items being tagged? (Note, even metal and liquid can be tagged and read successfully using the proper tag and tag location).
 - ii) Are there tag size constraints?
 - iii) Can you use a single dipole (orientation sensitive) tag or do your read points require a dual dipole (orientation insensitive) tag?
 - iv) Using a single dipole tag requires special attention at each read point to the reader antenna placement, especially if the reader antenna is a linearly polarized antenna.



7. Test and document any environmental issues that may be there, i.e. cordless phones, anything that may be wireless that is in the frequency range.

8. Realize that more power is not always better.

Excess power can cause compression at the reader's receive port (metal surfaces can reflect the transmit power back into the receive port) and can cause extraneous reads. With the advent of GEN2, the tags themselves have improved in performance to allow for less power to generate a successful read.



Never point the TX portion of an antenna to the RX portion of the opposite facing antenna.

Try different antenna configurations. Use RX-TX-RX-TX, RX-TX-TX-RX, TX-RX-RX-TX, TX-RX-TX-RX dependant upon tag placement and item or pallet height of the product being read. Configure read points in a way that maximizes TX energy at a tag height that's consistent to the business process.

9. Always evaluate reflecting RF energy versus absorbing it when creating a singulating array

10. Always run the most current version of firmware offered for the readers unless there is a compelling reason not to.

11. Do not have all air protocols enabled if you only need one.

12. Thoroughly understand the settings on the reader, area, portal or conveyor and how to configure each properly.
13. Do your homework. Test, Test and Re-Test the application before going live.
14. Create a materials list and project plan.
15. Understand the business process.

Evaluate how the end user's actions can/will affect the technologies performance in a real life scenario. Based on this evaluation, determine a suitable risk analysis regarding "no changes in the business processes", "minimal impact" and "show stoppers". Re-evaluate and solve.



16. Review the read point atmosphere from a RF and a physical trait perspective since not all environment floors, walls, etc. perform exactly the same even if they appear to be made of similar material.
17. Review the "tag to product characterization" placement and physics in addition to how the tags enter the RF field. This can be the key to performance.
18. Always design the read point for minimal business process impact.
19. Don't expect that because you get great reads on one type of product that the entire system is ready for production.

A successful implementation is one that works with all of the tagged products. A pilot is great for identifying these types of scenarios. A balanced implementation allows for scalability, reliability and overall customer satisfaction.
20. Don't expect lab test results to be repeated on site, unless you have tested in the environment with the actual product.
21. Don't assume that RFID will 'just work' in your environment.

Passive UHF RFID uses the 900 MHz spectrum. Many older 'wireless' pieces of equipment operate in this spectrum, including cordless phones, scanners, etc. It is important to conduct a walkthrough of the potential RFID environment in order to identify any of these possible interferences.

For more information about this topic, questions you might have about the technology or to challenge us with your situation, please contact Allen Bennett at 336-454-7122 x 101 or email at lab@sysconcepts.com