Barcodes or RFID Tags

Key Factors to Consider in Choosing the Data Collection Technology for Your Operation

THE KENNEDY GROUP

While there are similarities, some noteworthy differences between a barcode system and RFID may be the factors to determine which is better suited for your needs. The right solution for your application will depend on whether your situation better aligns with the capabilities and attributes associated with each data collection technology.

Each technology has its advantages and disadvantages. Key considerations include the nature of the processes and supply chain environment, impact in human capital or improving yields, need for data accuracy or item level identification and tracking, service life, and budgets.

BARCODES: Advantages and Disadvantages

Barcodes rely on optical technology for the data to be read and collected. Today barcodes are simple and universally used because barcodes are inexpensive and a variety of scanners are widely available and affordable. They are ubiquitous in supply chain, distribution and retail applications but due to its physical dimensions are limited in the type and amount of data that can be presented on a barcode. For retail applications barcodes denote only the product type and its manufacturer.

Barcodes require direct line of sight for the data to be read and captured which is generally limited to within several inches in retail applications to a few feet in distance for warehouse applications. Barcodes are read one at a time which can be labor intensive and must necessarily be positioned on the outside of item packages or containers to achieve direct line of sight reads.

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This introduces higher wear and tear, adversely impacting the integrity and quality of the barcode, and may lead to read failure or interference. Dirty, obstructed or ripped barcode labels cannot be effectively scanned.

Applying a barcode can cost a fraction of a cent or a few pennies. Its form is typically less durable at that cost and can be easily damaged, and may be at risk for counterfeiting since they are easily copied.

Barcodes may be better suited for closed loop supply chains and process manufacturing where liquids and metals are part of the equation since liquids and metals cause interference with certain radio frequencies.

RFID: Advantages and Disadvantages

RFID works on radio frequency technology and can provide unique item level identification. Unlike barcodes which has static data and can only be read, RFID tags are dynamic and can be read, write and update, even activating other transactions and events. RFID tags are capable of tracking the lifespan of an item since they can be re-programmed and may even be reused. Encryption or password protection offer better data security and are more difficult to counterfeit.

Both Passive and Active RFID options are available. The key difference between these two types is their power source for transmitting signal.

Active RFID tags include a battery that will automatically send the data, whereas passive RFID tags are without power and signals are only activated when RF energy is emitted by a reader in range. Distance can be as far as 40 feet for fixed readers, or 20 feet for hand-held readers. Once installed fixed readers do not need human involvement to capture the data, but hand-held readers are similar to hand-held barcode scanners which require human labor to operate.

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The price of a single-trip and a multi-trip passive RFID tags typically range from $0.10 to $4.00 per piece. Active RFID tags are more expensive, costing as much as $5 to $50 per piece when fully loaded with a broad range of options and functionalities, such as motion or temperature sensors or tampering indicators. They have longer read ranges as far as hundreds of feet or more and last about 3 to 8 years depending on the rate of broadcasts.

RFID formats are more durable and have longer service life where inlays are encased and protected. Some durable passive tags may have a service life of up to 10 years and can be embedded in containers and packaging to perform in harsh environments. There have been advancements in overcoming interference for processing involving liquids and metal through additional protection and positioning, however limitations still exist.

Because RFID has superior read rates, it may be the preferred choice for a more complex supply chain, with high volume transactions. If your operation is looking to read multiple items in a single pass and requires identification or tracking of a product at the unique item level then RFID will outperform a barcode system especially when fully accounting for the labor costs, resulting in significant total cost disadvantages.

For a system that automatically captures data through the normal course of operations and processes, RFID is a solution that does not require human intervention, since strategically positioned readers and antennas accomplishes the data capture as events and activities occur. Although RFID tags cost more than barcode labels, moving to an RFID system will eliminate more intensive labor costs associated with individual scanning of items.

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Barcodes and RFID technology each have their fit depending on the parameters of an operation. Some facilities have implemented a hybrid approach which uses barcodes for item level identification, but RFID tags for the bulk aggregated units, eliminating the need for each individual item on a pallet to be opened and scanned. The strengths of each technology can be leveraged and coexist to enhance visibility throughout the supply chain. The following key comparisons provide a guide to determining the best solution:

	BARCODES	RFID
Technology	Optical	Radio Frequency
Line of Sight	Required	Not Required
Read Rates	Slow - one at a time	Fast - Multiples up to 1000s in a single pass
Read Range	Inches to a few feet	0 to 100s of feet
Memory Capabilities	Static – read only and limited data capacity	Dynamic – high capacity, reads, write, updates, modifies, triggers other transactions
Durability	Exposed – risk of wear and tear or damage during handling	Better protected, can be encased, withstands harsh environments
Service Life	Unlimited - subject to degradation over time	Multi-year uses, some passive tags Up to 10 years
Security	Low – easily copied or counterfeited	High – protection and encryption makes it more difficult to replicate
Interference	May be subject to obstruction from dirt or damage from handling	Metal and liquids can cause interference with some RF frequencies
Reusability	No	Yes
Media Cost	Fraction of a penny to a few cents	$0.10 - $50
Human Labor	High labor required for hand-held scanners No labor required for fixed scanners	Moderate labor required for hand-held readers No labor required for fixed readers

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Conclusion

RFID technology solves problems that organizations face in tracking their assets. Traditional inventory management processes can be labor intensive and leave room for costly errors. Organizations can track a single item from the manufacturer to the store shelf when utilizing RFID to focus on:

- Returnable Transport Item Management
- Inventory/Supply Chain Management
- Warehouse Management
- And Item Level Tracking

All of this provides unimpeded visibility into the entire supply chain, regardless of how complex or unique the process is. With this insight, gaps that are bleeding profits are identified and closed, significantly reducing supply chain costs, which will ultimately increase earnings.

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About the Author

The Kennedy Group is a leading provider of market-tested and innovative solutions to help customers package, promote, identify and track their products. Headquartered just east of Cleveland, Ohio, the company is based in an 80,000 square foot corporate facility to serve and supply our customers throughout North America. Our leadership and solutions contribute to the success of companies in the consumer products, automotive, material handling, biomedical, healthcare, chemical industries and more.

The RFID Solutions Division provides complete RFID (Radio Frequency Identification) solutions, from internal exploratory planning through implementation, post-implementation maintenance, and item level identification and tracking. Kennedy's professional RFID Services include hardware, tag selection and application, software and integration.

Learn more at www.kennedygrp.com or call 440.951.7660.

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