



WHITE PAPER

Overcoming Barcode Challenges with Intelligent Traceability Solutions

Discussing the critical role of advanced barcode technology in achieving effective traceability solutions



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Abstract

As industries increasingly depend on barcodes for tracking and managing operations, the challenges associated with barcode readability become critical obstacles. These challenges, ranging from poor print quality to environmental damage, can significantly disrupt workflow, compromise compliance, and diminish overall productivity. Addressing these issues requires the adoption of advanced, resilient barcode technologies capable of performing under diverse and harsh conditions.

This white paper delves into sophisticated barcode reading solutions that are pivotal for effective data capture in demanding environments. It explores the technological advancements and integration of these systems into industrial processes, aiming to boost operational efficiency, ensure compliance, and foster continuous improvement in rigorous manufacturing landscapes.





Contents

- 4** Exploring Barcode Technology – Introduction and Challenges
- 6** Advanced Solutions for Barcode Reading
- 8** The Benefits of Using Handheld Barcode Reading Technology
- 10** Summary



Exploring Barcode Technology - Introduction and Challenges

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Overcoming barcode reading challenges involves addressing both quality and environmental issues

Barcodes are a tried-and-true way of visually representing data in a format that is easily readable by machines. By using patterns of black and white lines or cells, data is encoded for use in tracking and managing goods across all sectors. This ranges from the mundane identification of a product at the grocery store, all the way to the identification of an implanted device required to sustain a life. The technology has progressed from simple 1D barcodes printed on labels affixed to products to more complex 2D matrix codes, capable of being marked directly on products, while also containing significantly more data storage capabilities. All of this technology hinges on the ability to continue to read these codes for the life of the product they are attached.

Challenges that must be overcome when reading barcodes can be broken into quality issues and environmental issues. Quality is something that can be affected in the creation of the barcode. Common issues include low contrast due to poor marking or varied backgrounds, wear-and-tear marking equipment, insufficient code creation such as lacking a quiet zone, curved or uneven surfaces, and over or under printing. These challenges can significantly disrupt the longevity of the codes and speed of data collection, thereby slowing down the operator and overall production flow. Luckily, these types of problems can be easily fixed by following standard practices and by utilizing a verification device to make sure codes are compliant after they are printed.

Another significant challenge is that barcodes can become damaged after they are printed. Especially in harsh environments where they may be exposed to chemicals, extreme temperatures, or mechanical abrasion. This damage may be accidental or apart of the post-processing of the material. These problems are accentuated with barcodes printed on curved or uneven surfaces. As they can distort the barcode image, making it difficult for standard scanners to read them accurately.

The lack of a sufficient quiet zone around the barcode is another common issue. The quiet zone is the clear area around the barcode that allows scanners to recognize the start and end of the barcode pattern. When this zone is compromised, either due to the design of the packaging, or due to damage, it can prevent the barcode from being read correctly.

These plethora of challenges can be difficult to find a reliable solution for and often call for the use of advanced barcode reading techniques that can overcome a variety of barcode environmental conditions. Such solutions include scanners with enhanced imaging capabilities, sophisticated decoding algorithms, and the ability to adjust dynamically to various lighting conditions and surfaces. These technologies are crucial for maintaining high levels of accuracy and efficiency in barcode-based traceability systems, especially in challenging industrial settings where the loss of data can be crippling.



Advanced Solutions for Barcode Reading

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A great barcode reading solution is characterized by several key features that ensure it meets the demands of diverse industrial environments. These key attributes include the ability to read 1D and 2D codes across a variety of surfaces. Having a single solution that can read a large code etched into glass, as well as a small work order label, is no small feat. Even something as simple as switching from a glossy to a matte label can wreak havoc on an imaging system. Techniques for reading typical labels can then be thrown out the window when trying to read those same codes on a curve. Ultimately, for maximum adoption, a solution should be easy to

use, intuitive, capable of automatic adjustments, highly reliable in reading rates, and durable.

In order for a barcode reader to be able to effectively read 1D and 2D codes across multiple surfaces, it must have multiple lighting geometries. High-intensity lighting works great to read codes from longer ranges but fall short with curved and metallic surfaces. Dome lighting is extremely effective at reading curved and metallic surfaces up close but does not contain the required brightness to read further away. Some etched codes may even require an additional lighting technique called low-angle lighting. Each



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technique has its value and should be considered when creating a reliable solution.

Secondly, ease of setup and use is crucial. Having all of these options becomes a hindrance if they are difficult to navigate. A superior barcode solution should offer straightforward configuration and intuitive operation, allowing users to achieve optimal performance with minimal training. This is particularly important in fast-paced environments where time is a critical factor .

After the reader is initially set up, the ability to automatically adjust to different conditions is

a significant advantage. Advanced barcode readers include adaptive lighting and autofocus technologies that can adjust to variations in lighting conditions and barcode quality. This provides high read rates and reduces the need for manual adjustments or rescans.

Lastly, durability is a must. Industrial settings often expose barcode readers to harsh conditions, including dust, moisture, and extreme temperatures. A robust barcode solution is designed to withstand these challenges, ensuring reliable performance over time without frequent maintenance or replacement.



The Benefits of Using Handheld Barcode Reading Technology

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“Handheld barcode readers facilitate the quick and accurate maintenance of stringent compliance .”



Advancements in handheld barcode readers offer numerous advantages, particularly in industrial settings. These devices are crafted for user-friendliness, enabling operators to easily scan everything. This feature is especially valuable in manufacturing environments with multiple types of codes in a single operation.

These readers boost operational efficiency with their sophisticated imaging systems, which include built-in illumination and imagers that adapt to various angles and surfaces of barcodes. If done correctly, the variability of the operator can be used to the benefit of the solution. The technology combined with the operator allows for decoding barcodes on

curved surfaces or reflective materials, near and far away, without any settings changes, minimizing the chances of no-reads, and ensuring uninterrupted production flows.

Handheld barcode readers facilitate the quick and accurate maintenance of stringent compliance standards around traceability, ensuring that components or assemblies are properly logged and tracked throughout their life-cycle.

Overall, advanced handheld barcode reading technology can now address these typical challenges encountered in various industrial environments, providing a dependable, efficient, and user-friendly solution that boosts productivity and compliance.

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