

Pioneering Digital IDs for Pre-Fillable Syringes

How digital ID technology
is advancing next generation
fill-finish production lines.



The patient safety, process automation, and monetary benefits are compelling. Compared to vials, pre-filled syringes (PFS) reduce unnecessary waste of expensive drugs, prevent contamination and errors in dosing, make treatments easier to administer, and reduce the cost per injection.

The Challenge:

Becton, Dickinson and Company (BD) is a leading manufacturer of pre-fillable syringes for global pharmaceutical companies that operate highly optimized fill-finish production lines. However, proper drug batch segregation is a growing challenge as the industry is implementing a platform approach where multiple products or doses may be filled into the same type of syringe container. Consequently, the risk for mix-ups is evolving as current technologies used for monitoring production units, such as color coding systems, are reaching their performance limitations.

Errors may have serious implications for patient safety. These increased requirements, coupled with the need for efficient inventory management to avoid drug shortages, have created a critical need for the pharmaceutical industry. With the industry accelerating its efforts in implementing digital transformation (Pharma 4.0), a more innovative, digital solution was identified and developed.



Industry analysts forecast the demand for parenteral drugs to grow by more than 50% over the next seven years¹.

¹ "How Sterile Pharma Manufacturers Can Grow Capacity without Capital Investment". McKinsey and Company, 2023.



The Solution:

Unit-level identification with embedded Radio Frequency Identification (RFID).

Upgrading from current monitoring systems to digital technologies, allowing for unit-level digital identification, would provide a foundation for Pharma 4.0 opportunities. By tracing individual units, manufacturers can mitigate risk related to mix up and use advanced analytics to optimize the manufacturing process. The solution would also need to meet stringent regulatory requirements and enhance the overall efficiency of the manufacturer's operation.

BD teamed up with the Digital ID's product development team at Avery Dennison, to develop a solution that would have a low impact on existing manufacturing lines and a high potential for future Pharma 4.0 applications. RFID technology was selected because, unlike optical solutions such as 2D barcodes, RFID does not need a direct line of sight and it would not interfere with visual inspections of the syringe.

The result is considered an industry leading innovation. RFID tags have been embedded into the rigid needle shield of the syringe to become an intrinsic part of the product. While allowing the fundamental design of the syringe barrel to remain unchanged, the rigid needle shield now functions as a digital identity. The integrated RFID carries the container's unique identifier (CUID) through the entire life cycle of the PFS from manufacturing to end of life.

On the filling line, each CUID will be associated with the current drug filling batch and drug code. As the unit proceeds through each stage of the production line, RFID readers will track its status (i.e. successfully filled, rejected, etc.) allowing real-time control on the syringe ID which can be cross-checked to prevent mix-ups during or post-assembly².

“The BD vision of unit-level traceability in the pharma supply chain is being accelerated through our partnership with Avery Dennison. By uniting our expertise and embracing the shared vision of granting every item a digital identity, our partnership has the potential to transform risk and quality management in pharma manufacturing.”

Fernand Goldblat, Vice President/General Manager, Pre-Fillable Systems

² Haddadi Y, Soukiassian H, “RFID-Based Unit-Level Traceability: Could it be the Key to Operational Excellence for Fill-Finish Lines?” ONdrugDelivery, Issue 150 (Jul 2023), pp 40–44.



The Result:

BD is a pioneer in the medical device industry, innovating the use of digital technologies for risk mitigation, regulatory compliance, and yield optimization. RFID technology was chosen because of its proven reliability and standardization, with minimum impact on existing fill/finish manufacturing lines. Partnering with Avery Dennison has led to a customized innovation that enables unit-level traceability in the filling process. This collaboration showcases the power of Avery Dennison's digital identification technologies to solve complex challenges in healthcare and advance best practice in the parenteral drugs industry supply chain.

Connect with our team!

About us:

Avery Dennison Corporation is a global materials science and digital identification solutions company that provides branding and information labeling solutions, including pressure-sensitive materials, radio-frequency identification (RFID) inlays and tags, and a variety of converted products and solutions. The company designs and manufactures a wide range of labeling and functional materials that enhance branded packaging, carry or display information that connects the physical and the digital, and improve customers' product performance. The company serves an array of industries worldwide, including home and personal care, apparel, e-commerce, logistics, food and grocery, pharmaceuticals and automotive.

Contact us to talk to one of our experts:
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