



# How **RFID technology** can cure pharmaceutical manufacturing woes

**Exploring how RFID devices unlock real-time tracking and tracing, enhancing drug safety, improving supply chain efficiency and ensuring regulatory compliance.**

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Given its complexity and highly regulated nature, pharmaceutical manufacturing places many demands on manufacturers—from complying with strict laws and standards, to combating the rise of counterfeit drugs. Radio-frequency identification (RFID) technology has emerged as a key technology to address many of these issues.

These devices enable real-time tracking and tracing of works in progress (WIP) and serve as a powerful deterrent against counterfeit drugs by enabling quick contactless identification and real-time data collection. RFID technology can also help manufacturers ensure high product quality and patient safety by providing up-to-date information on medicinal inventories, preventing the use of expired medications. And, it can help manufacturers meet strict regulatory requirements by providing traceable records of pharmaceutical products.

This white paper delves into the key challenges faced by pharmaceutical manufacturers and explores how RFID technology can help mitigate these issues.

## **The complexity of pharmaceutical tracking and tracing**

Ensuring drug safety and effectiveness depends on proper traceability. Yet manufacturers face significant challenges. For example, pharmaceutical manufacturing involves coordinating and controlling many complex processes, making it difficult

to accurately track all the variables associated with WIP and inventory levels.

Unfortunately, many traditional manual and semi-automated tracking methods don't provide the accuracy and level of detail these complex processes require, leading to bottlenecks and driving production costs. For example, manual data entry errors and other inefficient tracking systems all affect a company's ability to maintain accurate inventory records, leading to under- or overstocking and disrupting production schedules. Since products have limited shelf lives, a big part of pharmaceutical inventory control is expiration date management. Because expired products can't be sold, failure to track these dates accurately leads to waste and financial losses.

A related challenge manufacturers face involves compliance. Adhering to rigorous standards, set by bodies like the Food and Drug Administration (FDA), involves meticulous record-keeping, accurate inventory tracking and complying with good manufacturing practices (GMP). Failure to comply can result in severe financial penalties and a damaged company reputation.

While enterprise resource planning (ERP) and manufacturing execution systems (MES) can help manufacturers manage and control inventory, these systems still rely on humans to perform tasks like scanning parts with handheld devices, driving valuable time. What's needed is a technology that can automatically monitor the status, location and inventory levels of each pharmaceutical product in real-time.

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## Addressing manufacturing challenges with RFID

Addressing these WIP tracking and inventory control issues, RFID technologies unlock real-time product traceability and inventory management, leading to better drug security and regulatory compliance. These devices use electromagnetic fields to automatically identify and track tags attached to objects. Tags contain electronically stored information that can be read from a distance using RFID readers, which can gather tag information at multiple points along the production line and automatically update the data within the system.

In the pharmaceutical industry, specifically, RFID tags contain unique data that stakeholders in the industry can use to verify the authenticity of medications and track their journey through the supply chain. With these real-time verification and comprehensive tracking capabilities, RFID systems ensure only genuine drugs reach consumers, enhancing patient safety and preventing dangerous drug counterfeiting—which has, unfortunately, become a multi-billion-dollar problem.

### Additional benefits of RFID devices include the following:

- **Proper inventory management.** By enabling real-time tracking and monitoring of products, RFID systems can also help manufacturers improve the accuracy and efficiency of inventory management, reducing the risk of over- or under-stocking.
- **Ease of compliance.** RFID technology facilitates compliance with regulations such as the FDA's Drug Supply Chain Security Act (DSCSA) by providing a secure and transparent method for tracking and verifying the authenticity of drugs. In addition to ensuring compliance, this outcome goes a long way toward enhancing consumer trust in pharmaceutical products.
- **Greater supply chain efficiency.** RFID solutions streamline supply chain operations by providing accurate and timely data on product location and status. In addition to optimizing inventory management, this visibility empowers manufacturers to reduce waste and improve overall operational efficiency.
- **Less human error.** By automating data capture, RFID systems avoid human errors in data entry and manual tracking, minimizing the risk of errors that lead to product recalls or compliance issues.
- **Seamless integration.** RFID technologies integrate seamlessly with ERP/MES systems, avoiding the data silos and communication gaps that occur when trying to integrate disparate systems. This combination offers real-time visibility into inventory levels and production status, helping manufacturers maintain optimal stock levels.

## RFID and cold chain management

Transporting sensitive pharmaceutical goods can be a challenge. For example, the majority of vaccines must be maintained at a narrow temperature range—between 35.6° and 46.4°F—while some COVID-19 vaccines require a constant -94°F.

Tracking solutions like RFID enhance visibility and transparency across supply chains, unlocking the benefits of real-time traceability and constant temperature monitoring. As vaccines move, fixed RFID readers register vaccine consignments into depots, providing pinpoint visibility into their location. These devices also record and share data on a distributed ledger to create an immutable record of consignment progress. Distributed ledger technology can also eradicate counterfeiting and accelerate delivery since all parties in the supply chain can synchronize their activities based on a real-time view of consignment progress.

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**Taking these benefits a step further, integrating RFID systems with temperature sensors can help manufacturers monitor cold chain conditions, ensuring temperature-sensitive drugs are stored and transported under optimal conditions across the supply chain.**

## Types of RFID devices

RFID technologies can take several forms, the first of which is handheld readers. These rugged, portable devices give users the flexibility to track and trace goods in real time. Examples include mobile computers with short-range UHF RFID functionality, wearable devices, RFID shields and hybrid units that support handheld and hands-free scanning.

Fixed readers are a second type. These RFID readers offer speed and simplicity for managing high volumes of products and are typically installed at a specific location where they can scan wide zones or moving objects. Featuring high bandwidth and computing power, fixed RFID readers can read entire pallets of goods, all while reducing labor requirements, improving accuracy, and saving time and cost.

**Beyond the devices themselves, it's important for pharmaceutical manufacturers to centralize RFID data using inventory management software.**

These platforms collect, manage and analyze real-time data from tagged assets, readers and sensors to create meaningful information manufacturers can act on quickly.:



## Learn more

RFID solutions can effectively address many challenges in pharmaceutical manufacturing, from enhancing inventory management to combating counterfeit drugs and ensuring regulatory compliance. By providing real-time data on the status and location of products, this technology is poised to become an indispensable part of the industry.

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