PHARMACEUTICAL

# RFID Case Study: Purdue Pharma

## Purdue Pharma Efficiently Protects their High-Value OxyContin® Product using RFID Technology

**Customer:** Purdue Pharma, L.P., a privately held company headquartered in Stamford, Connecticut, is a leading developer of long-acting, pain-relieving medicines, the most well-known of which is the prescription medicine, OxyContin®. Originally established in 1892, Purdue Pharma has grown to approximately 1,350 employees, distributed amongst three locations and three associated companies.

**Challenge:** Using lessons learned from an earlier RFID pilot, Purdue defined the process improvements they sought for a Gen 2 RFID implementation:

- Integrate the RFID functions into the existing packaging lines, so that operators would only need one station to set up the line
- Add case-level tagging and aggregation to ease warehouse order processing
- Use off-the-shelf tags available from multiple vendors

**The Solution:** Purdue obtains tags from their suppliers (including Impinj Monza™ tag chip-powered tags), prescreened for quality and preprogrammed with SGTIN-96 codes. These rolls of labels require no special equipment or handling and bottles proceed down the packaging line in the normal process.

After filling, the bottles approach the first item-level RFID read point, powered by an Impinj® Speedway® reader and Mini-Guardrail reader antenna. Here, the bottles undergo a series of challenges they must pass to avoid rejection at the end of the line:

- The static information at the front of the SGTIN-96 must match data in their recipe-driven system
- The tag must respond within roughly 500 milliseconds (Purdue runs approximately 100 bottles per minute)
- The tag must respond above a preset received signal strength indication (RSSI) level to avoid sending weak tags into the case reading process

If tagged bottles pass all challenges, they are shrink-wrapped into packages of six bottles, eight of which are then manually loaded into a case. The case is sealed, and an RFID shipper label, programmed with the case-level product EPC number is applied.


To accommodate in-line reading of the bottles, Impinj specifically designed the Mini-Guardrail reader antenna to fit into the guardrail of a line conveyor system (replacing the rail at that location).

The case read portal is powered by an Impinj Speedway reader and Guardwall reader antennas. At this portal, operators watch for 49 reads (48 bottle label tags plus the case label tag). The bottle EPC codes must match those expected by the system, and the case EPC code must match the value encoded on the case tag. As with the item-level bottle read point, all tags must respond within a maximum time interval and with an RSSI above a preset level (independent for item and case). If the full case passes all tests, the 48 items are aggregated and associated with

the case tag in parent/child relationships. These cases then proceed down the line to be palletized.

Impinj specifically designed the Guardwall reader antenna for this portal application, sizing it to accommodate standard pharmaceutical cases, and intending it for use as a pair. This configuration maximizes stray read rejection by constraining the read zone to the area within the two antennas. (Very little energy passes beyond the exterior faces of the antennas, because each absorbs energy from its opposing mate.) It also increases read reliability by maximizing the intensity within the read zone. While this design approach worked exceedingly well in the system integrator's laboratory setting, the amount of interference from overhead fluorescent lighting in Purdue's facility had not been anticipated. Working with the system integrator, Systech International, and Purdue, Impinj suggested capping the portal with an additional Guardwall to make an RFID tunnel—the configuration in use today on the production line.


For item-level reading of packed goods, the Guardwall antenna provides a tightly controlled read zone and intense RF field, critical to penetrating deep into packed cases.

**Winning Vendor Selection**

Impinj products performed reliably during the vendor selection process, but it was the depth of Impinj's RFID knowledge—the understanding of why Impinj products performed well and what the performance margins were—that helped sway Purdue to select Impinj reader antennas and Speedway readers for their packaging line.

Impinj's unique approach to read zone control and read reliability was another contributing factor. Traditionally, most companies approached a stray read problem by lowering the power a reader emits during tag interrogation. This method helps reduce the chances of reading tags outside the range of interest, but can also negatively affect read reliability within the appropriate read zone. Impinj took a different approach. By keeping the power levels as high as possible, and controlling the read zone with application-specific antenna designs and software-managed thresholds, Impinj was able to very accurately control the read zones, yet keep read reliability at the desired magnitude.

> "Impinj was a compelling choice with their control of the read range and their reproducible results at both the case and the item level."
>
> **Harry Ramsey**
> **Senior Package Development Engineer**
> **Purdue Pharma**
> **(***speaking at RFID Journal Live 2009)*

**The Results**

Seven months after making vendor selections, Purdue had integrated RFID into their existing production line and had validated the line—a remarkable achievement that speaks to the close cooperation between the contributing companies.

Purdue initially planned to perform a controlled launch—monitoring the first line and learning from any mistakes before proceeding with the second line. But after only two weeks, the success of the UHF Gen 2 implementation became apparent. Purdue accelerated implementation of RFID on the second line, and since May 31, 2007, every bottle of U.S. OxyContin 100s has been packaged using RFID technology.

By April of 2009, Purdue had tagged over 7.5 million bottles and over 155,000 cases of OxyContin. Of those, about 1.1 bottles for every 10,000 were found to be unreadable, but one lot of tagged bottles accounted for 89% of all warehouse rejects. So ignoring that one lot, the warehouse reject rate is 1.2 bottles for every 100,000—without an exception handling process. And although this number is not yet the holy grail of Six Sigma, Purdue is very happy with these results. The ability to accurately read serial numbers through sealed cartons and totes represents a huge efficiency improvement in the drug supply chain. Without RFID, the impact of serialization would be much more disruptive to their packaging operations.

The Purdue RFID implementation is a prime example of how Impinj works with other companies, each contributing in their own area of expertise, to create highly reliable RFID systems. By partnering with Systech International, Impinj was able to leverage its deep RFID knowledge into a very successful implementation that more than satisfied the customer. For more information about Impinj or our products, visit **www.impinj.com**.

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