

The RAPID RFID Read Tunnel

Accurate Conveyor-Line Tag Verification at an Affordable Price

Introduction



RFID Read Tunnels are a proven method of ensuring the accuracy of in-line RFID Systems. While tunnels can be placed anywhere that tagged items are moved through a designated area, this article focuses on the benefits of conveyor-mounted RFID read tunnels.

The RAPID RFID Read Tunnel was built in collaboration with industry leaders to provide a more economical means of RFID in-line verification. It's a solution that, when combined with our RAPID RFID software, provides a feature-rich experience accommodating even the most complex RFID automation scenarios.

Common Use Cases

Retailer RFID Tag Mandates

There is a growing list of retailers requiring manufacturers to RFID tag and verify the tags before they are shipped. At the time of this article, retailers like Walmart, Macy's, Nordstrom, Dick's Sporting Goods, and even Chipotle are requiring some level of RFID tagging and verification. While smaller manufacturers can validate using mobile devices ([RAPID RFID Mobile](#)), larger

manufacturers desire an automated approach. With an RFID Read Tunnel, each product can be conveyed through a tunnel to ensure tagging accuracy (uniqueness, GS1 standard formatting, and quantities). Once verification is complete, the products with tagging anomalies can easily be rejected for further evaluation.

Pre-Shipment Order Verification

It's common for products being shipped to be placed into boxes/cases. Once the box is sealed, it's no longer possible to read a product barcode to ensure that it's the correct item for the order. By labeling each product with an RFID Smart Label and leveraging an automated RFID Read Tunnel, product type and quantities can be validated prior to shipment. A common use case leverages a stationary barcode imager that reads a shipping label, then queries an ERP system to determine order contents. The ordered items are then compared to the tagged items moving through the RFID Read Tunnel. In the end, there are fewer returns which saves money and results in a happier customer-base.

Automated Sorting and Shipment Labeling

Reading tagged items as they move through a tunnel can trigger numerous events. Consider reading previously boxed items and generating case or pallet label to print and apply. Another common scenario is to use the tag read to determine item/shipment information and divert each box to a designated shipping lane.

Monitor Manufacturing / WIP Tracking

As products move between Assembly Areas, they may be transported through a RFID Read Tunnel. This process is used to provide real-time updates on order status and capture historical WIP reporting. The reads can also be used to ensure that all production steps are followed for each build.

Key Benefits of a RFID Read Tunnel

Tag Isolation

The primary benefit of adding an RFID Tunnel to your system is to provide tag isolation at the time of each read event. Without a tunnel, even well-tuned antennas may read nearby product tags.

Tag isolation on the RAPID RFID Read Tunnel is achieved through the following features:

- The tunnel's structure and 6-sided panels shield the antennas from reading nearby tags.
- Read timing coordinated with curtain closure minimizes stray reads through tunnel entry & exit.
- *Optional: software feature to ignore previously read (downstream) tags for a period of time.*

Increased Read Performance

Without a Read Tunnel, it may be necessary to tune down antenna power to shrink the RFID read zone. Lowering the antenna power may help avoid extra reads, but it increases the likelihood of missing tag reads; this is especially true if the product is densely packed into a box or container. Using a tunnel for isolation allows each antenna to be set at a higher power during the read event.

How Does an RFID Read Tunnel Work?

Items must first be affixed with RFID tags before they can be read. The most common approach is to have the RFID inlay (UHF Passive) embedded within a Smart Label which is then placed onto each item.

The tagged items are then moved through the tunnel. Most tunnels include a product detection sensor, such as a photo eye, that initiates the read event. During the read event, the attached RFID reader and antenna will broadcast radio waves to the RFID tag. The signal sent from the reader will “wake up” each passive RFID tag and give it enough power to broadcast its identifying signal back to the reader. The read event is either timed or stopped automatically as the product passes another sensor near the tunnel exit.

There must be software combined with the RFID Read Tunnel to make the tag data usable. The RFID Software (aka RFID Middleware) can be used to pass the data to another system or take actions based on specified logic and the corresponding reads that have occurred.

RAPID RFID Read Tunnel Overview

Product Detection (Photo Eye)

Product will pass by a Product Detection sensor (typically a photo eye). This will trigger a read event based on delay and duration settings. If desired, a second photo eye may be placed on the exit side of the tunnel and tied to the timing of a Diverting/Reject mechanism.

RFID Reader (Zebra or Impinj)

The RAPID RFID Read Tunnels can work with Zebra or Impinj RFID Readers. Vertical Systems and our partners will help you decide the best hardware for your business need.

Optimized RFID Antennas

Through rigorous testing, we have found the best RFID Antennas to meet your RFID reading requirements. Depending on the tunnel size, we will often lead with powerful near field antennas.

Directional Antenna Mounting using VESA compatible RAM Mounts™

We’re not cutting corners and have found that RAM Mounts provide the most flexibility to optimally position the antennas within the tunnel.

Extruded Aluminum Frame

Using an extruded aluminum frame allows us to customize the RFID Tunnel to your product size. The frame will mount directly to your conveyor with or without stabilization legs. If desired, our team can also provide a conveyor proven to work with the tunnel.

RFID Blocking Panels

Proven RFID Blocking Panels are used on all six sides of the tunnel to ensure isolation.

RFID Blocking Curtain



Each tunnel door is covered by an RFID blocking material with multiple panels. This allows the product to move through and read once the curtain has “closed”.

This is a cost-effective approach vs. closing a door before performing each read.

A Full Solution with RAPID RFID Automation Software

RAPID RFID is a software solution that controls RFID Readers, aggregates the tag reads and makes the tag read data actionable. It can be as simple as passing the tag data to another system (i.e. RFID Middleware), or our RAPID RFID Automation product can integrate with sensors, back-end systems, and the conveyor inputs/outputs to provide a complete solution.

Vertical Systems’ RAPID RFID Read Tunnel has been integrated in countless ways. Our Conveyor Automation solution includes integration with Barcode Imagers, Label Printers & Applicators, Metal Detection, Scales, Stack Lights, and Conveyor Diverters.

Conclusion

The RAPID RFID Read Tunnel is a powerful, cost-effective approach for ensuring RFID Tag Read Isolation. The proven tunnels can be stand-alone or built into a more complex conveying system powered by our RAPID RFID Automation Software.

Contact us today to get more details or for pricing information.