



# RFID for Transportation

Improve Airline Baggage Handling  
and Customer Experience with RFID

Maybe this has happened to you: You're waiting for your bag at the baggage claim, having just flown in. The crowd thins as passengers recover their bags and trundle off to vacations, waiting family and business meetings. Eventually only a few bags remain, and none of them is yours. You check, again, to make sure this is the right claim area. Suddenly the carousel stops. An airport worker appears and starts to remove the unclaimed bags from the carousel. Your bag is gone. "Fill out this form. We'll call you if it turns up," says the harried clerk in the lost baggage office.

The next time you are standing in line at the airport, look around you. One out of every 20 people you see will lose bags that day. Thirty-five million bags were mishandled last year, with an average cost per bag of \$90 to the airline industry. Passenger claims for cash compensation total over \$1.2B per year. This says nothing about the inconvenience and lost satisfaction for travelers, whose business trips and family vacations are ruined.

## A Complex and Growing Problem

The problem is growing. In the last 5 years, the number of lost bags has increased by 75%. This is due in part to the increased complexity of baggage handling. Growing security concerns have led to a process that can involve 5 to 7 separate handoffs on a 2-leg flight:<sup>2</sup>

1. Passenger to Airline ticket counter
2. Airline ticket counter to airport system
3. Airport baggage system to security agency
4. Security agency to airport baggage system
5. Airport baggage system to airline
6. Tail to Tail transfer on the tarmac
7. Airline to passenger at baggage claim

Many bags are mishandled due to the limitations of barcode-based baggage handling systems. According to an analysis by the International Airline Travel Association (IATA), about 10% of all mishandled bags are caused by bad barcode reads. Another 11% are attributed to missing baggage sortation messages (BSMs) which tell handlers where the bag is going. Both of these issues can be addressed directly by RFID. The remainder, which includes human error, late arrival and other mishaps can be indirectly improved through more comprehensive tracking enabled by RFID.

<sup>1</sup> International Air Transport Association (IATA), <sup>2</sup> Quatrotec





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### RFID Can Help

Barcode accuracy varies from 80% to 90%<sup>3</sup> in most systems, with most errors attributable to the inability of the barcode reader system to “see” the barcode. This can be due to the tag being pinned under the bag, being crumpled or marked, or being pressed between



two adjacent bags on the conveyor. In contrast, RFID does not need “line-of-sight” to automatically capture the tag number. RFID tags can be hidden by suitcase handles, other bags, ink, dirt and other marks and still

be read. As a result, capture rates range from 95% to 99%<sup>4</sup>, which can lead to a direct reduction of read errors by a factor of 10.

Capital costs are also lower as well: 360-degree barcode readers employed on the baggage line are over \$100K investments, where the typical RFID system costs around \$25K to \$35K,<sup>5</sup> including readers, antennas, wiring, controller and mechanical. Lower capital costs not only reduce the investment, but also enable more read points, providing a richer source of information about bag location and chain of custody.

According to IATA, the airline industry can realize a hard savings of about \$733 million per year by implementing RFID in the top 200 airports.<sup>6</sup>

Airports, security agencies and passengers also benefit:

### Passengers

- › Fewer lost bags
- › Real-time status and faster resolution

### Security Agencies

- › Prioritization of bags based on departure time
- › High level oversight and improved security

### Airlines

- › \$733M in annual savings
- › Better customer satisfaction

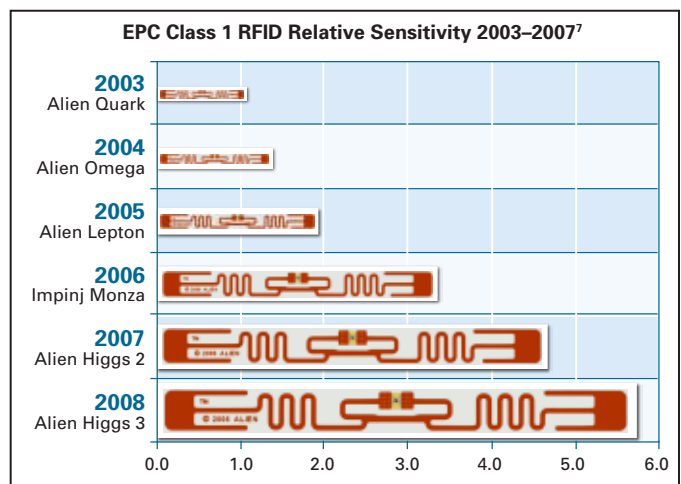
### Airports

- › Enhanced safety and quality control
- › Lower cost infrastructure

### Is RFID up to the job? Yes.

Early hype and immature technology led to unrealized expectations in the early 2000s. UHF RFID has limitations in the presence of metals and liquids, for example. Additionally, cross-reads can lead to inadvertent reading of tags on adjacent conveyors.

But these issues are well understood, and five years of work in the retail, asset tracking and Pharma sectors have led to significant improvements in performance of both readers and tags. Tags based on the Gen 2



<sup>3</sup> IATA, <sup>4</sup> Quatrotec, <sup>5</sup> Alien, <sup>6</sup> IATA, <sup>7</sup> Alien Squiggle tag performance data



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standard now deliver over five times the range of earlier tags, resulting in significantly higher read rates, even on difficult materials.

While tag performance has improved, cost has dropped by 70%<sup>8</sup> and continues to decline. According to IDTechEx, the cost of bag tags will decline by about 75% over the next decade.<sup>9</sup>

Reader capability has improved as well. Until recently RFID performance was limited by the ability to discern individual, fast-moving tags on baggage conveyors. Random orientation and spacing of the bags made it necessary to artificially increase the gaps between bags to ensure that the system could individually identify RFID tags as they moved past the antenna. This forced users to reduce system throughput, with negative impact on ROI.

Alien has introduced a new technology called Intelligent Tag Radar™, or ITR™ to address this issue. ITR enables Alien Enterprise Readers like the ALR-9900 to isolate individual tags reliably and maintain the accurate order of tags moving on a conveyor belt without additional shielding or special equipment. System throughput and ROI is preserved. Alien’s subsidiary company Quatrotec, having expertise in the airport security system market, is using ITR software in its RFID-enabled conveyor appliance being evaluated now by airports and material handling partners.



Alien ALR-9900 Enterprise Reader



The ecosystem for Gen 2 RFID is robust and mature. Industry standards like EPC Gen 2 and ISO 18000-6c deliver a high level of interoperability, which in turn has created a broad ecosystem of vendors that supply labels, encapsulated tags, readers, handhelds, software, printers and other related products. Among these are label converters, who assemble a huge variety of labels and tags using RFID inlays produced by companies like Alien.

Inserting RFID inlays in baggage tags introduced challenges early on for converters. Difficulty in inserting 4-inch-long inlays increased costs, while other inlay form factors were more expensive and provided lower performance. Only when converters such as George Schmitt & Co. mastered the insertion of industry standard inlays like the Alien Squiggle® in baggage tags was it possible to achieve the low cost and high performance required for bag tags.



Alien Squiggle®

<sup>8</sup> Alien, <sup>9</sup> IDTechEx, "RFID in Airports and Airline, 2008-2018", 2008,



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### The Promise for Airline Baggage Handling & RFID

Early RFID experimentation on baggage started in 1991, and made little progress until 2005, when IATA issued standards for frequency, data format and other variables. Since then over 20 airports have implemented some form of RFID, with high-profile pilot projects at McCarran Airport in Las Vegas and Hong Kong International Airport<sup>10</sup>.

In 2007, IATA recently issued its "RFID Transition Plan for Baggage," which provides a roadmap for the implementation of RFID across 80 top airports in 5–6 years. The plan projects these results:<sup>11</sup>

- › 80 airports covering 80% of mishandled baggage
- › Savings of \$200M per year after full implementation
- › Full implementation in 5–6 years
- › Payback in 2–3 years

According to IDTechEx, by 2012, over 1 billion pieces of passenger luggage will be tagged every year, and airports will spend almost \$100M annually on baggage tags. By 2017 this will reach 2 billion units, and RFID-enabled baggage tags will cost less than 5¢<sup>12</sup>. Alien Technology and Quatrotec will provide readers, tags and services to support this growing market.

So the next time you wait for your baggage at the airport, think about how RFID can be of help to you, your customers and your partners. Imagine a world where lost baggage is rare and the airlines can tell you where your bag is all the time.

Companies and organizations mentioned in this article

- › Alien Technology <http://www.alientechnology.com/>
- › Quatrotec <http://www.quatrotec.com/>
- › International Air Transport Association <http://www.iata.org/index.htm>
- › IDTechEx <http://www.idtechex.com/>

Alien products mentioned in this article

- › ALR-9900 Enterprise RFID Reader
- › Squiggle Gen 2 Tag with Higgs Gen 2 RFID IC
- › Intelligent Tag Radar technology for tag singulation

<sup>10, 12</sup> IDTechEx, "RFID in Airports and Airline, 2008-2018", 2008, <sup>11</sup> IATA

