



Barcode Scanning from Grantek:
Proven Airport Solutions that can be Applied to Pharma
and Food & Beverage Manufacturing Facilities

Background

Security and public safety are the paramount concerns for baggage handling systems at commercial airports. Almost equally important from a business perspective is speed and accuracy of baggage tracking and handling systems. This whitepaper provides information on Grantek's experience and expertise in developing, implementing, and upgrading baggage handling systems.

Regulations put forth by the United States Department of Homeland Security's Transportation Security Administration (TSA) and by Canadian Air Transport Security Authority (CATSA) provide requirements that must be met by airport baggage handling and tracking systems.

Grantek's airport solutions offerings come from our understanding of airport activities and specifications, learned from hands-on experience and time spent working with these systems, and our deep understanding of the current TSA and CATSA specifications.

Process Overview

Grantek has experience with designing, programming and installing baggage handling systems (BHS). Within this system, Grantek has the knowledge of interfacing with the following pieces of equipment:

- Screening machines (3 or 5 level system)
- Baggage conveyors (belt or roller driven, tote transport and destination coded vehicles (DCVs), tilt trays, carrousel)
- Baggage tracking (full traceability from ticket counter to make-up units)
- Explosive detection systems (integration of CATSA & TSA regulations)
- SCADA/HMI overview monitoring and controls
- Reporting & data analysis including predictive analytics

Grantek works to integrate the systems with other systems such as building automation and security, self-bag drop and third party equipment. We also work on network design and deployment for the baggage system, including layout and planning for fiber optic and multiple network drops.

In a typical baggage handling system, checked bags are tracked by means of temporary, low-cost paper tags, good for 48 hours (as per IATA standards). For a system like the bag transport system (BTS), the bags carried into totes containing checked bags are transported/ sorted and tracked using a combination of Bag Tag and permanent RFID tags.



Each bag ID tag contains an International Air Transport Association (IATA) code that consists of the passenger's selected airline and a unique ID for each bag. The ID tag is only good for 48 hours. All tracking throughout the airport is done based on this unique ID tag number associated to a Global Identifier Data (GID). The tag is scanned at multiple points on its journey from the check-in counter (or an automated self-Bag Drop) to the belly of the aircraft. The tags are barcode-based and the totes that transport screened bags at various points have RFID tags.

Unique numbers are assigned to each bag and managed as it sends info to the Short Allocation Computer (SAC). When a bag is checked in, it receives a unique number to allow data about the bag to be deployed as it makes its way through the Bag System. All scanned, track data, security status obtained at all scanning points on a bag's route is sent to the SAC and sorted accordingly based on different matrix and rules.

Checked bags also require a massive tracking matrix behind-the-scenes, and with much higher throughput –most systems can scan and route up to 900 pieces per line/hour, which is much faster than the carry-on bag scanners. Response to an item flagged by the automated scanning systems can be performed by the machines or by an operator. Bags deemed suspect by inspection personnel are diverted for hand scanning and examination.



Vision systems or Scanner heads perform automatic ticket reading (ATR) of the bag tags. These systems typically use SICK or Cognex sensors to read the ticket on the bag and present its ID for tracking at multiple points along the route.

Each bag is scanned multiple times as it is loaded. Level 3 scanning requires a manual inspection by a human. Bags that successfully pass manual scanning are then rescanned and associated with a carrying device to track them properly.

The SAC can be queried to review the full history of each bag. In addition to security and accuracy, fast throughput is also of utmost importance in bag transport: the aircraft turnaround time is typically 20 to 30 minutes. Full reporting capabilities are present to allow bags to be located for any reason and to provide statistical information as needed.

The baggage handling system is integrated with the building interfaces for security breaches, fire alarms and other building interfaces to a central location at the airport.

Methodology

The combination of precise tracking, combined with greater reporting options allows systems to report precisely where and when the product (baggage, in this application) passes through a facility. These systems are designed by engineering firms that work hand and hand with the airport authorities. This ability can easily be applied to other manufacturing facilities such as pharmaceutical or food and beverage, where it is important to know the exact content, batch info and location of product.



Methodology used for design and testing of an airport project typically is to design the system with all programmable logic controllers, SCADA inputs, alarm integration points, and interfaces to other

systems, build a test system, and run the system on a simulator before deployment of hardware onsite begins.

Typically, the complete simulated setup is done at the Grantek facility before being built onsite. The routing is highly complex, with multiple routes within multiple routes, so it is vital to test everything in a simulated environment before installing equipment at the airport. The system is designed to handle forecasted increases in volume of travelers and tested using simulations of baggage loads and routes.

Grantek sets up a test environment to validate the system design before installation. We use simulation modules to mimic the baggage load and quantity with numbers provided by the airport authorities. We develop our own tools if necessary to ensure complete simulated system design and testing prior to actual equipment installation and integration. The simulations allow our engineers to step through various baggage movement scenarios to help ensure the system can handle the projected throughput.

After installation and integration onsite, Grantek performs testing and validation for airport baggage and EDS systems in concert with the airport customer. Final testing with the customer is done using the principles of installation qualification, operational qualification, and process qualification (IQ, OQ, PQ). For the TSA or CATSA certification process, a BHS Response Document is generated, reviewed several times by all stakeholders, and agreed upon. This document is then used to generate the required test case. Typically, several hundred cases per system must be certified.

Grantek works with the equipment vendors to contribute to the specifications and system diagrams to be provided to airport personnel when the project is complete. Grantek provides training to airport personnel before, during and after system deployment as well as continuous support throughout the process. Ongoing support services are also available from Grantek after a project is complete.

Advantages of working with Grantek

Technology Experience

Grantek project personnel assigned to work on airport solution design and implementation are all familiar with TSA and CATSA regulations and have experience working on previous airport projects. All staff members assigned to airport projects, including upper management and project managers, are technically-trained engineers. Grantek keeps the same people assigned to a project in order to leverage their ongoing expertise with the technology and the requirements and challenges specific to each airport.

As system integrators we have the expertise necessary to engineer the logic needed for the many-in to many-out pathways checked baggage may follow through the airport. It takes 6 to 9 months for an engineer to get comfortable with the process, before being able to perform system optimization. Proper implementation of TSA and CATSA regulatory requirements also requires extensive experience. Grantek's North American experience is applicable globally, though local regulations may differ.

Because of Grantek's extensive experience with conveyors in the food and pharmaceutical production and packaging industries, we have expertise in-house that easily transitions into the airport environment. However, airports require a matrix of transport rules far more complex than food & beverage processing. In a manufacturing environment, conveyor routing remains fairly static, but in the transportation environment, many routes are possible, with multiple input points and many possible destinations with the added security layer. The complex technical challenges involved with routing and scanning bags through an airport from check-in to the aircraft, and from aircraft back to passenger, are somewhat similar to warehouse automated storage and retrieval systems, but with more complexity and with a need for very high throughput.

Partnering Experience

Grantek has successfully served as the systems integrator on several airport projects in the US and Canada, partnering with equipment vendors, with Grantek integrating devices and equipment control systems at the control level.

Grantek has designed and integrated baggage systems utilizing equipment from various vendors in the airport security and baggage handling areas. Our staff has worked with most of the major players in this specialized area and we are familiar with the regulations imposed by CATSA and TSA.

Our project manager handles preliminary engineering and proposal generation. After client approval is received, the client solution manager then builds schedules and assembles the team to tackle the project. Grantek is working to develop and offer complete airport baggage tracking and scanning capabilities in North America. As part of this endeavor we are deploying our first BTS (Baggage Transport System)



Grantek writes the required documentation, including system requirement specifications and testing protocols. We work with airport personnel to conduct acceptance testing and load testing to reduce the effort needed for post-installation testing.

As a system integrator and consultant for manufacturers, we are used to interfacing with multiple vendors on projects. If your Operations, IT, or Engineering staff would like more information about Grantek's vision systems and airport expansion or upgrade capabilities, please email info@grantek.com.

For 40 years, top manufacturers in Food & Beverage, CPG and Pharmaceuticals have called upon Grantek to solve their most complex business and manufacturing challenges. Grantek automates Pharmaceutical and Food & Beverage manufacturing operations, including integration with business systems for seamless solutions. Grantek helps customers meet the stringent requirements and challenges of the 4th Industrial Revolution. Grantek's team of professionals located in 17 offices across the globe deliver solutions to complex problems in Smart Manufacturing, Industrial Networking, Automation and Industrial Safety. Call 1.866.936.9509 or email info@grantek.com to learn more.