

Providing Solutions to Customers' Logistics-Related Issues —Efforts in the Area of Airport Logistics Solutions—

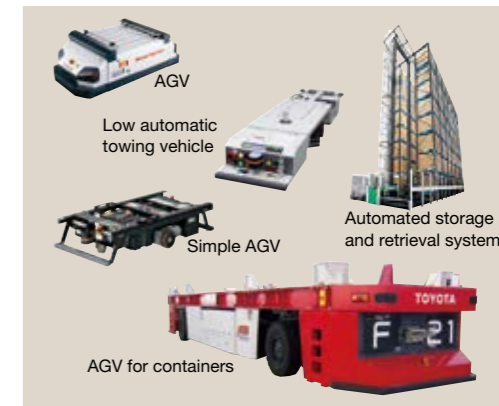
Toyota Industries' Logistics Solutions Business provides total solutions to logistics issues. Besides the land and sea domains respectively covering distribution centers and automatic guided vehicles (AGV) for use at seaports, needs for such solutions are growing rapidly in the air domain centered around airports. This Special Feature highlights how we muster the strengths of the entire Toyota Industries Group, achieve business growth by striving to offer solutions to airport logistics issues and aim to contribute to society.



Past Efforts in the Logistics Solutions Business

Recognizing future needs for logistics automation as business opportunities, Toyota Industries extended its reach into the logistics systems business, an area peripheral to lift trucks. Our Lift Truck Business allowed us to capture automation needs for greater efficiencies in warehouse logistics. Based on the experience and know-how accumulated in improving production processes within our own plants as well as customers' logistics operations, we launched the development of AGVs and successfully initiated sales in 1986. Our extensive sales and after-sales service networks in the Lift Truck Business in Japan have also underpinned growth of the logistics systems business.

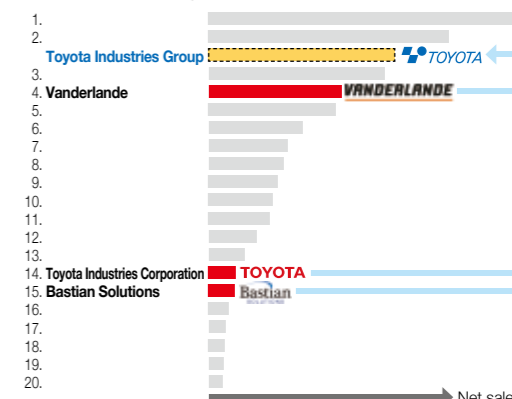
Toyota Industries' Main Logistics Systems Equipment to Date



Strengths of the World's Leading Logistics Solutions Provider

The scale of our Logistics Solutions Business, combining the existing logistics systems business of Toyota Industries, Netherlands-based Vanderlande Industries Holding B.V. and U.S.-based Bastian Solutions LLC, boasts one of the largest in the world. The three companies have different strengths. Vanderlande demonstrates comprehensive strengths encompassing the design of logistics systems for airports and warehouses, development of associated equipment and provision of after-sales services. Bastian has an outstanding capability to develop software programs that satisfy a variety of logistics needs, while Toyota Industries has strengths in the development of automation systems for materials handling equipment. Through the collaboration of the three companies, we will promote dynamic business development as a logistics solutions provider.

Toyota Industries' Position in the Logistics System Supplier Industry

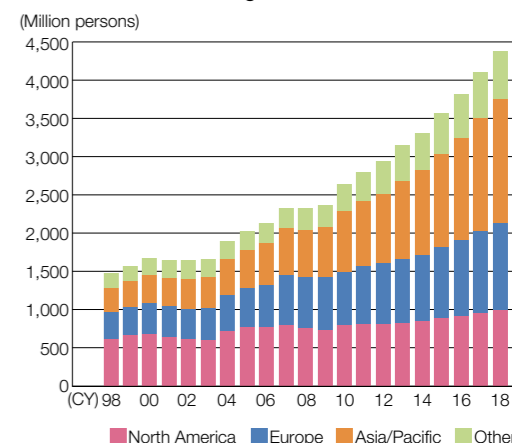


Source: Produced by Toyota Industries based on the Top 20 Worldwide Material Handling Systems Suppliers in 2019 by Modern Materials Handling magazine

Changing Environment for Airport Logistics

The number of air passengers and the volume of air cargo have grown dramatically in line with economic growth mainly in Asia and increasingly globalized economic activities. Amid this marked growth, various systems (check-in systems; baggage handling systems (BHS) covering everything from baggage check-in to baggage claim; and conveying and storage systems for baggage and cargo) used in airports have taken on additional significance and now have a greater influence over the operation of airports and how passengers evaluate them. Corresponding to these changes in the environment, we are addressing the needs for logistics efficiencies at airports, with Vanderlande taking the lead.

Number of Air Passengers in the World



Sources: Japan Aircraft Development Association (JADC), International Civil Aviation Organization (ICAO) and International Air Transport Association (IATA)



Toyota Industries' Airport Logistics Solutions

⑦ Loading into containers (make-up)
Our conveyor systems that transport checked-in baggage to containers are highly acclaimed by customers for their maintainability and reliability. To reduce work load, we also develop and sell loading assisting equipment.

② Passenger security check
We respond to enhanced security checks and ensure higher procedural efficiencies and less stress among passengers through automation.

① Flight and baggage check-in
We facilitate quick check-in procedures by accommodating a broad range of check-in services from conventional check-in counters to self-service flight and baggage check-in systems.

③ Baggage security check
We reliably confirm the safety of checked-in baggage with the industry's highest-level processing capacity.

④ Conveying of baggage
We offer optimum systems, from belt conveyors to high-speed tray conveyors, matched to customers' conditions and demands in terms of conveying speed, processing capacity, baggage shapes, handling space, tracking and other functionality.

⑤ BHS utilizing autonomous AGVs
A revolutionary solution replacing conventional conveyor systems, this BHS utilizes AGVs with transporting and sorting functionality and can flexibly accommodate changes in needs, including varying baggage volumes and route changes.

⑥ Storing and sorting
Depending on the time between check-in and flight, we either keep baggage temporarily in an automated warehouse or directly sort and transport baggage on conveyors. Automation reduces operational costs and sorting errors. Besides conventional belt conveyors, we offer many options, including tray, tilt and vertical types, to suit customers' needs.

⑧ Towing containers, etc.
Our towing tractors are used for towing containers in airports in Japan, Asia and across the world.

⑨ Unloading
Our conveyors transport baggage unloaded from the arriving aircraft to the baggage claim or to a connecting flight after performing required check and other procedures.

⑩ Baggage claim
Our conveyors used in baggage claim excel in durability and reliability and have been adopted by many airports.

⑪ Cargo handling
Lift trucks for which Toyota Industries enjoys the world's top share* are used to load/unload and transport baggage and cargo in airports for either indoor or outdoor applications. In addition to internal-combustion and electric lift trucks, the use of fuel cell lift trucks is increasing.

* Survey by Toyota Industries Corporation

Roles of Logistics in Airports

Logistics plays diverse and broad roles in airports. It begins the moment baggage or cargo is checked in, loaded onto aircraft and received at their destination, encompassing aspects from conveying and sorting to baggage security checks. Worldwide growth in the number of passengers has led to an increase in the number of flights, tighter flight connections and less time given to aircraft before a return flight. These, in turn, have made logistics efficiencies, speed and accuracy all the more important. Smooth operation of an airport now necessitates the building of a comprehensive logistics system that can meet these requirements.



Self-service check-in

Toyota Industries Group's Strengths in Airport-Related Logistics

In a broad range of airport logistics, Vanderlande outperforms industry peers in the area of the development of efficient BHS that can also accommodate large airports. Vanderlande's customers are more than 600 airports around the world. Its BHS, which is installed in 14 out of the 20 busiest airports ranked by the annual number of passengers, have been highly acclaimed by customers. Vanderlande's strengths lie in its abilities to offer an advanced level of automation of the entire process from check-in to baggage claim and to respond to the demand for higher efficiencies. The world's leading airports, including Heathrow Airport in the United Kingdom, Hartsfield-Jackson Atlanta International Airport in the United States and Hong Kong International Airport, have adopted Vanderlande's large systems.



BHS (Heathrow Airport)

Toyota Industries also develops and produces towing tractors that convey baggage and cargo containers to and from aircraft, which are used in airports in Japan, Asia, the United States and in other parts of the world. By combining these tractors with BHS, we can now offer broader, total solutions for baggage logistics at airports.



Towing tractor

Additionally, leading global postal/parcel service providers have been constructing large-scale logistics air hubs near airports. We are working to expand the business in this area as well.

Future Business Development Leveraging the Group's Comprehensive Strengths

Vanderlande, Bastian and Toyota Industries have held repeated and active discussions to clarify how we collaborate and which direction we will take in conducting sales activities. In terms of development, we have made an important strategic decision to make concerted efforts in the area of automation, for which needs are expected to grow further, and launched activities accordingly.

In March 2019, as an effort to realize practical applications in progress, we carried out an autonomous driving test of our towing tractors jointly with All Nippon Airways Co., Ltd. at Kyushu-Saga International Airport. The test was a Group-wide effort, combining towing tractors developed and manufactured by a subsidiary in Italy with our technology and knowledge for autonomous driving obtained through the experience in AGV developments. We have also been proceeding with the development of automated lift trucks, anticipating their use in airports as well as various other indoor and outdoor applications. In addition, FLEET, Vanderlande's autonomous BHS, has gone into operation in Rotterdam The Hague Airport. It can flexibly accommodate layout changes and system expansions depending on the baggage volume. The system is also being operated on a trial basis at the Hong Kong International Airport and the Dallas/Fort Worth International Airport in the United States. These automated vehicles and systems also integrate sensing systems and image processing systems, which Toyota Industries has developed in automating lift trucks.

In the area of airport logistics solutions, which will gain additional importance in the future, we will leverage the experience, know-how and technology of the three companies to help resolve issues related to airport logistics by globally offering solutions that are friendly to both airport users and airport staff and seek further business growth.



Autonomous driving test of towing tractors



Outdoor test of automated lift trucks



FLEET in live operation