

BAGGAGE HANDLING

Within this baggage handling in-depth focus, a sustainable, cost-efficient, customer-centric baggage operation is investigated; a first-of-its-kind robotic system evaluated; and new Baggage Acceptance Rules detailed.



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Looking at the future landscape of **baggage**

A sustainable, cost-efficient, customer-centric baggage operation is achievable, if the industry is willing to openly collaborate, discusses *Andrew Price*, Head of Global Baggage Operations at IATA.

BAGGAGE has evolved considerably over recent years. Whilst the number of advanced airports using fully automated systems is still small compared to the total number of airports, the overall sophistication of airlines and airports is increasing.

Customer service has been a major driver in terms of this sophistication. Perhaps passengers used to accept that a bag would sometimes not make the journey, but in the day and age of always-on messaging and total visibility for most logistical processes, they simply don't expect, or accept, the state of baggage handling today. It isn't expected that baggage should be mishandled, but, if that is the case passengers expect to be told, immediately, where their

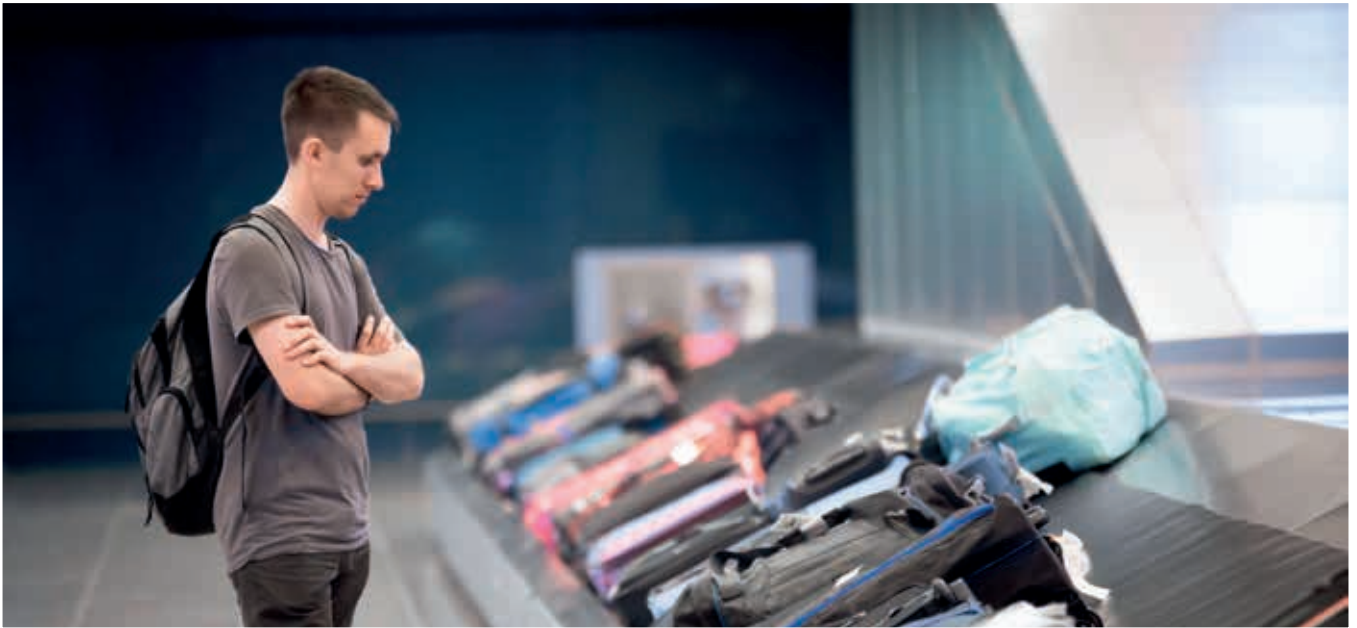
baggage is. According to the IATA Global Passenger Survey, 84 per cent of passengers expect baggage tracking as a matter of necessity.

Meeting passenger expectations

Given the high expectations of passengers, how is the industry doing in terms of the first expectation – that the bag will not be mishandled?

Mishandling performance is low, according to the SITA Baggage Report. However, looking at mishandling trends, it seems that things may change. The rate of reduction has slowed to zero, and this year there has been a small increase in mishandling figures. This is due to all of the capacity in the baggage handling systems being taken up by recent passenger volume growth.

“Modern messaging is being introduced to solve a problem that is slippery to define”



The systems are becoming stressed, and this leads to an increase in mishandling.

Furthermore, there is a big issue coming over the horizon. The number of passengers flying is also growing and expected to double over the next 15 years. Baggage systems are expensive to build, maintain and operate, and hard to retrofit into existing airport designs. Additional capacity is costly, and it will not be possible to double the capacity of the existing infrastructure in-line with passenger growth. However, new infrastructure is not the only source of additional capacity.

Finding solutions

The first way in which this increase in passenger numbers has been addressed is self service. Self-service technology helps move people from the airport front door to the security queue as quickly as possible. It has been a big factor in airport throughput. Baggage self service is more complex, as a single-step process is generally slower than when an agent manages the transaction, at least with current baggage labels. When the industry is ready, reusable RFID will overcome that issue. Until then, passengers at least feel more in control with the current one-step and two-step processes.

In addition to self-service, IATA is looking at what can be done to move traffic away from the airport altogether. We know that we cannot build twice as many runways, or suddenly have airspace that is twice as efficient. Instead, we have to be far smarter about how we use our current facilities. The obvious area to explore is the peaked nature of our airport use, where moving to off-airport activities can help with increased demand. The operation can greatly benefit from de-peaking, which would handily allow the additional baggage burden to be managed.

This means that new ways to accept a passenger's baggage are needed so that bags can be received outside of the traditional check-in windows, and maybe even flown without the passenger, deliberately. This market is in development, in that we see several fragmented services being offered by several parties with no overall consistent proposition to the passengers and no drive to make this a preferred way to travel than with a bag. After all, most passengers without a bag go directly to security clearance.

In the baggage space, IATA is looking at how we can expand the airport boundary to include the city. So, perhaps, we can drop a bag off at the post office or supermarket rather than at the airport. The issue with off-airport baggage acceptance is that there is no standard to allow airlines to work with small entrepreneurial ventures that can collect and deliver baggage for passengers. The traditional baggage delivery order is an agent-based mechanism to deliver bags when they have been mishandled, rather than on-demand. There is also no possibility to segregate bags from the normal delivery flow on demand, as there are so few arrival sortation systems. One further issue is that of customs regulation, as many authorities demand that the passenger and bag exit the airport together.

This leads us into the area of smarter regulation. In the era of massive investments in Standard 3 screening, why do we force the passenger and bag to travel together? This imposes restraints that limit customer service and increase costs. Imagine a world where the passenger can ask for their bag to be picked up from home and delivered to the destination, and that bag can travel by any available means. Luggage could travel separately ▶



ANDREW PRICE, Head of Global Baggage Operations at IATA, has worked in the area of baggage and airport operations for over 20 years, having undertaken every job from handling bags through to designing terminals. Whilst at IATA, Price has led programmes such as the IATA Baggage Improvement Programme, which led to an industry-wide baggage mishandling reduction of over 50 per cent.



from the passenger. The airlines could choose to send bags on quieter routes, be delivered in an agreed time frame that could be greater than the one available at the airport, and the passenger could travel with lighter hand luggage.

How IATA is helping

Looking at the future, one of the things that we must understand is what the passenger values. Only through this focus can aviation continue to develop and grow, funding our sustainable future. IATA captures the view of the passenger through the Global Passenger Survey, which is undertaken each year. When it comes to baggage, we learned that passengers don't want to wait for their bag to be dropped at the airport, nor to collect their bag at the end of the journey. Moving bags to an off-airport process will allow remaining passengers to make use of a less crowded, and hence faster, baggage infrastructure at the airport.

IATA is working to enable smarter regulation, such as how we can provide screening images to customs to allow more focused baggage searches on arrival. This could reduce queues for passengers leaving the airport at the end of their journey. We are also looking at how to allow passengers and bags to travel independently.

Modernising infrastructure

Of course, we are still working in our traditional area of modernising the existing baggage infrastructure, through the introduction of both

RFID and modern baggage messaging. There are two aims for this work: Reducing mishandling and increasing efficiency.

Mishandling rates drive a cost of around \$100 per bag. The current mishandling rate is a great improvement from 2008, but it is still too high to be sustainable. IATA aims to reduce mishandling through the introduction of baggage tracking which underpins a move to proactive baggage handling and the introduction of new data-based techniques such as machine learning. Resolution 753 introduced baggage tracking for all baggage journeys, but some airlines still have to make the connection between greater data availability, customer service and efficiency.

Efficient costing

Our second area of focus is the current cost of getting it right. This is around \$10 per bag but varies globally. With increasing baggage numbers, this cost of handling is rising steadily.

Modern messaging is being introduced to solve a problem that is slippery to define. What's wrong with teletype edifact messaging, except for the age of it?

Some will blame costs, others will declare they have a great deal, others will discuss the complexity of legacy systems, and others will explain they use XML wrappers over the internet already.

The truth is in the details somewhere, but a couple of facts stand out. One is that RP1745 allows a great deal of interpretation of message

“**RFID provides a unique baggage identity and an easy data capture mechanism at a low infrastructure cost**”

content, and the other is that we have data loss between journey legs. The result of these concerns over type B has been to introduce a new modern messaging standard.

IATA's new standard

This new standard is to use XML schemas generated from the AIDM (Airline Industry Data Model). It doesn't allow interpretation of content, is based on XML, and the transport protocols allow publish and subscribe to be used, reducing data loss.

When we start to use XML, we have to build a compatible infrastructure between airlines and airports, however many businesses already use XML internally for data-sharing. This can make integration into systems faster than through type B and reduce the barriers to entry in data-sharing which enables entrepreneurship.

RFID is all about identifying the bag. Our barcodes are simplistic indexes into the world of baggage data. The number range is limited and the codes repeat every few days. RFID provides a unique baggage identity and an easy data capture mechanism at a low infrastructure cost, and the possibility for data to travel with the bag. The industry adopted RFID by AGM Resolution



last June and has all the materials needed to implement RFID.

Taken together, the efforts being made by the industry can result in a true customer-focused baggage operation, which is delivered in a sustainable way aligned with the needs of the regulators and at a lower overall cost of operation. That is a future we can all work towards. ✉



SOME THINK AIRPORT EFFICIENCY HAS REACHED ITS LIMITS. WE THINK DIFFERENT.

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**MADE
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Welcome

First-of-its-kind autonomous robot

With the capability to handle nearly 450 bags per hour, DFW decided to test an autonomous solution to help improve the experience of passengers transferring from international flights.



IN JUNE 2019, Dallas Fort Worth International (DFW) Airport made the decision to trial innovative technology with the focus of helping customers experience more seamless transfers. Following this decision, the first-of-its-kind robotic

system, FLEET, was temporarily installed in the re-check area in Terminal D.

At the time of implementation, *Khaled Naja*, Executive Vice President of Infrastructure and Development at Dallas Fort Worth International



Airport, said: "DFW is testing the process to see how we might provide our customers with a more seamless journey using the award-winning technology within our current baggage infrastructure, and integrating automation for efficiency." With the trial now complete, *International Airport Review* spoke to Naja to get an insight into the results obtained.

Trialling autonomous robots

The FLEET autonomous vehicles trial was an intuitive initiative for customers. The kiosks were strategically placed in the baggage transfer area, and all customers had to do was choose the airline they were transferring to. The kiosk then instructed them to place their luggage on the unit and the next available FLEET vehicle picked up the bag and dropped it off on the corresponding transfer belt.

The trial included a handful of autonomous vehicles in a cordoned-off section in the baggage transfer area outside of customs in Terminal D. This meant that there was no disruption to the normal procedures or customer throughput at the airport.

The space used was strategic in nature as it offered an easy access point for customers in the baggage transfer area. The space was used efficiently to accommodate the FLEET autonomous vehicles and facilities were coordinated to offer optimum use by customers.

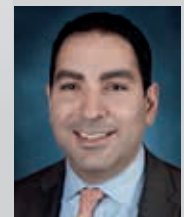
Passengers were intrigued by the robots and, since the trial, many positive testimonies from

passengers have been collected. The consensus is passengers enjoyed using the FLEET autonomous vehicles to transfer their bags.

Looking to the future

This was a trial to better understand how autonomous vehicles could function in different areas of the airport. DFW Airport is always looking at new and innovative technologies that could improve the customer experience throughout the terminal.

For example, October 2019 witnessed the Airport Board approve funding for a six-month pilot of a self-driving shuttle to serve passengers in the Remote South Parking Lot. Once initial mapping and preparation is completed in November, the shuttle, leased from EasyMile, Inc. of Denver, will provide a quick and efficient ride from the outer reaches of the expansive parking lot to the transportation centre for shuttle service to the terminals. While the focus of this pilot is customer service, it also will provide the airport's Innovation Division team with valuable information about autonomous vehicle mapping, operation, charging and maintenance. This will be vital in assessing the viability of autonomous vehicles in other roles around the airport for the future. ✕



KHALED NAJA serves as Executive Vice President for the Infrastructure and Development Division of Dallas Fort Worth International Airport. He oversees the design, code and construction; commercial development; energy; transportation and asset management; and also the planning departments. His responsibilities include directing all aspects of development at DFW, including master planning, engineering, a \$3 billion capital improvement programme, construction work, and commercial real-estate development.



Safeguarding the integrity of Bahrain's BHS

On 1 October 2019, new Baggage Acceptance Rules were introduced at Bahrain International Airport to prevent system disruption. We spoke to **Bahrain Airport Company** regarding how these will alter both the passenger experience and terminal procedure.

What are the new baggage rules that were introduced in October?

We identified three types of checked baggage that can compromise the integrity of the baggage handling system (BHS): Round bags, blanket-wrapped bags tied with rope, and baggage with long or loose straps. Accordingly, these items will no longer be permitted. Normal out of gauge (OOG), bulky and fragile items, including sports equipment, wheelchairs and baby strollers will still be checked in via the OOG facility.

These new guidelines are a result of extensive studies and are in line with baggage acceptance regulations at airports around the world. The new rules will also help eliminate jams in the BHS that cause shutdowns and delays, and inconvenience to passengers and airlines. The baggage rules will allow the airport to achieve the highest level of performance and deliver a quality baggage service to all passengers.

How does the new baggage system compare to the previous procedures?

The current process at Bahrain International Airport allows for any bag within the IATA size guidelines to be checked in, irrespective of shape. The majority

of airlines have their own policies and procedures to manage irregular shaped items. However, these policies focus more on loading items into the aircraft hold based on space and weight. As the airport's operator and managing body, we have a responsibility for the complete journey of passengers' luggage from check in to aircraft loading and offloading.

How will the new guidelines affect the passenger experience?

The new Baggage Acceptance Rules are being implemented to improve the overall passenger experience. Passengers arriving at the airport with luggage that does not meet the new acceptance criteria will have the option to repack their

“The new Baggage Acceptance Rules are being implemented to improve the overall passenger experience”



belongings into a box offered at the departure area. Our main objective with this initiative is to protect the BHS and, in turn, enhance customer satisfaction. These new rules will ensure that any luggage items that could potentially cause jams and breakdowns are intercepted before they are checked in.

Does using automated systems at Bahrain International Airport make operations easier?

High-end baggage systems support the uninterrupted journey of passengers' baggage from check in to the flight-build area in the baggage hall. Modern BHS are more intelligent than ever, allowing airport operators to track, trace and transport baggage based on information provided on the baggage tag. All automated processes are overseen, managed and controlled via a 24/7 manned control room.

The Baggage Acceptance Rules cover check in of local baggage, but will arriving luggage disrupt this process?

We are encouraging all passengers arriving, departing or transiting through Bahrain International Airport to adhere to these rules. Arrival and transfer passengers are informed about these important regulations via pamphlets, media and other signage. At this point, they are not presented with a complimentary box. At the current terminal, we facilitate the transfer of luggage remotely, meaning all transfer baggage offloaded from flights is sent to the two facilities located on the eastern side of the apron and another facility located on the western side of the apron.

These facilities have direct feeding lines with no sortation or complex baggage systems. At these locations we are able to process large and non-compliant items. The arrival in-feed consists of a short in-feed line, screening and out-feed onto the collecting carousel, which again allows for non-compliant items to be offloaded without any disruption to the system.

However, looking forward to the advanced system we will be utilising in the new passenger terminal building, these types of bags will either be placed in a baggage tub or screened through a standalone facility. We will not be able to feed them directly into the BHS. Communications about the roll out of the baggage acceptance rules have been sent to all airlines to share with their network.

What happens when passengers arrive at the airport with baggage that is non-compliant under the new baggage acceptance rules?

As the operator and managing body of Bahrain International Airport, we pride ourselves on delivering a seamless journey to all passengers and their luggage. Accordingly, we are striving to support and assist airlines and passengers during the transition to the new baggage rules.

To ensure we lived up to this promise, we took the initiative to hand out free boxes, for a period of one month, to all passengers arriving with baggage items that were non-compliant or not accepted at check in. There were two dedicated repackaging facilities erected for this purpose where baggage porters assisted each passenger to repack and seal their items into a BAC-branded cardboard box.

This initiative continued until the end of October, following which a small fee is now charged for the service. We have made every effort to ensure that all passengers are aware of the new rules ahead of time, giving them plenty of time to prepare themselves so they can avoid disappointment when arriving at the airport.

Who will be in charge of managing the BHS?

The BHS at BIA will be managed and overseen by a newly established team, which is comprised of mainly Bahraini staff and a limited number of expatriates who are on hand to offer additional support.

The team has undergone in-depth training to familiarise themselves with the new, state-of-the-art baggage system at the new terminal ahead of its opening. Alongside the Operational Readiness Airport Transfer (ORAT) team, the BHS team will shortly be participating in crucial trials which will see the entire airport undergo extensive testing. Once these tests are completed, the BHS team will take control of the new baggage system when the new airport opens in the first quarter of 2020. ✉

“These new rules will ensure that any luggage items that could cause breakdowns are intercepted””



Updating an existing **BHS** without disrupting the **live screening** process

Ben Cordingley, Head of Baggage and Commercial Operations at Gatwick Airport, discusses the challenges of replacing 27 hold baggage screening machines while still processing 50,000 bags a day.

“ The £160 million programme has been one of the most challenging in the airport's history ”

A NEW ERA of hold baggage screening started at Gatwick in August 2019 with the whole airport operating the latest Explosive Detection Systems (EDS) Standard 3 technology, which can look for a new generation of threats.

Gatwick was the first large UK airport to achieve this landmark and the programme was completed more than a year ahead of the EU's deadline for compliance. As a consequence, the airport's baggage experts are now in high demand from airports across the world as they too start integrating new scanners into their baggage systems.

A total of 27 EDS machines have been installed across three baggage halls to ensure that Gatwick can screen all hold baggage in compliance with new regulations.

Each machine uses computed tomography technology in place of the X-ray technology in the Standard 2 machines and provides a much clearer 3D image with more advanced detection algorithms to identify threats.

One or two constraints

The £160 million programme has however been one of the most challenging in the airport's history. For many airports, replacing these machines might be reasonably straightforward. The baggage halls at Gatwick however, are highly constrained spaces. Working alongside the operation and replacing the existing machines has been likened to conducting open heart surgery while the patient is running a marathon.

The 27 new machines replaced 31 older-generation X-rays and each machine took about three months to replace from start to finish. This often meant working in very confined spaces, often at height and almost always including additional structural work to take the load of these seven-tonne machines.

Getting these heavy pieces of equipment into the existing 'live' baggage system required individual plans for each machine, sometimes building rafts to lift and set and, at other times, breaking the entire operational structure and carrying out several intricate manoeuvres in order to get the old machines out and new £1 million ones in place.

Each lift took an entire night to complete and short working windows were another issue. Sometimes, at peak periods, the operation could only give just four working hours a night while, crucially, not disrupting the screening and preparation of over 50,000 bags in the operational part of the system.

This could only be done with a high amount of integration between the baggage programme team, third-party suppliers and the baggage



One of Gatwick Airport's new scanners

operations team. Each and every day represented a new challenge and required complete trust at all levels.

We upscaled our baggage programme team from five to 58 people and blended the operations and construction teams so that they all worked together in the same location for the first time.

Decision making was fully integrated, from governance for the £160 million programme right down to day-to-day decisions with a set structure for decision-making authority as each machine passed through the process.

Improving resilience

The programme meant the complete replacement of a lot of our existing baggage kit, some of it less than 10 years old. Fortunately, we managed to redeploy these machines across Gatwick and other airports, and we recycled those we could not off load, which helped to raise money for our assigned charities.

The programme was also an opportunity to review everything, enhance resilience and future proof the system where possible. The team overhauled other major elements of our baggage network and the system is now built with resilience in mind.

This was hugely important for us. Reliability is our key priority and we have learned so much more about the capacity of the baggage systems as we have progressed through this programme.

We now have a platform that allows us to increase throughput if required for less operational cost, which will help us meet some of our growth aspirations. We forecast up to 6,600 bags going through the system each hour by 2023 – around 16 per cent more than today – if our passenger numbers reach 53 million annually.

As always, our passengers are key. I needed to deliver the new system without passengers ever knowing it was happening or that we were down there in the belly of the airport and – thankfully – I think we just about managed to do that. ✉

“ Replacing the existing machines has been likened to conducting open heart surgery while the patient is running a marathon **”**



BEN CORDINGLEY, currently Head of Baggage and Commercial Operations at Gatwick Airport, has been working at the airport since 2014. Cordingley's previous roles at Gatwick include Airport Security Operations Manager, Head of Airside Projects and Incident Operations Manager.