INTERNATIONAL ASSOCIATION OF



BAGGAGE SYSTEM COMPANIES

Technology & Innovation Early Bag Storage (EBS)

January 12th 2017



What is Early Bag Storage

- Term used to describe concept for storing bags that are not immediately due for Aircraft Loading.
- Also referred to as Cold Bag Storage (CBS)

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Manual EBS

- Bags are accumulated at Check-In and manually processed (retrieved and loaded) when needed
- Bags are accumulated at Make-Up Area and Manually processed (retrieved and loaded)
- Bags designated for EBS are manually identified and tracked

CON's of Manual EBS

- MBR figures increase
 - No visibility to individual bag location, bag retrieval delayed
 - Bags incorrectly retrieved and loaded, bag tags mis-read
- Manpower costs increase due to Manual Handling Requirements
- Bag damage costs increase due to accumulation
- Ergonomic concerns for bag retrieval
- Unsightly "bag mountains" in Ticket Lobby or Make-Up Area



CON's of Manual EBS



www.alamy.com - AB2BE1





PRO's of Manual EBS

- Capital Expenditure is saved as no form of transportation or software system is required to implement
- Equipment Maintenance Costs are saved
- Real Estate is available for other uses
- Less training on new technologies



Automated EBS

- Early bags are identified and processed by the system to the EBS
- Bags are stored in certain locations with the BHS until required for processing
- Bags are released for screening and/or Aircraft
 Loading by Flight or Timeslot designation



CON's of Automated EBS

- Expensive Capital Investment in Automated Bag System
- Real Estate taken from other uses
- Training Requirements for New Technologies
- Increased Maintenance Costs for Automated Equipment
- Increased Energy Costs on Running Automated Equipment

PRO's of Automated EBS

- No "Bag Mountains". Bags are inducted into system anytime and only released for Aircraft Loading when ready
- MBR numbers are decreased
- Bag location is known 100% of time
- Staffing is reduced
 - Reduced Manual Handling
 - Reduced Make-Up Area
- Bag pick times improved as only bags for a flight are at a pier / make-up

PRO's of Automated EBS

- Bag hygiene is improved as bags are not stacked and at risk of damage
- Ergonomic issues are addressed as bag retrieval is simpler
- Can be used to feed automated ULD make-up
- Can be used to buffer bags during system faults
- Individual Bags are automatically transferred for flight changes / re-routes
 / missed flights
- Can improve overall system throughput by removing bags from a sortation system that are not ready



Technologies for Automated EBS

- Belt lanes
- "Virtual store" in sorting loops
- Tray lanes (ICS)
- Tilt-Tray/Cross-Belt Loops
- Tray carousels (ICS)
- AS/RS
- Lift and run



Belt Lanes

- Bags are stored on lanes of conveyor belt
- Lanes can be designated by Flight or Timeframe
- Bags are "inched" onto the lane to maximize storage space
- IT System tracks each bag onto and off the Lane
- Lanes can be released as a whole or partially (FIFO)
- Individual bags can be retrieved by physically picking the bag off the belt or by "Flushing" a Lane
- Bags are stored in a static configuration (Low Energy Consumption)



Belt Lanes





"Virtual Store"

- Bags are "held" within sortation loops pre or post screening
- IT System tracks the bags onto and off the sortation loop
- Bags are not stored in any particular order and are released as required
- IT System tracks each bag onto and off the sortation loop
- Throughput is reduced on the sortation loops if more bags are stored
- Individual bags can be retrieved on demand
- Bags are stored in a dynamic configuration (High Energy Consumption)



Tray Lanes (ICS)

- Trays are stored on Lanes of designated track or conveyor
- Lanes can be designated by Flight or Timeframe
- Trays are sequentially loaded from the furthest end to the entry
- IT System tracks each tray onto and off the Lane
- Lanes can be released as a whole or partially (FIFO)
- Individual bags can be retrieved by "Flushing" a Lane
- Bags are stored in a static configuration (Low Energy Consumption)



Tray Lanes (ICS)



Tilt-Tray / Cross-Belt Loops

- Dedicated Loops are utilized for EBS
- Bags are not stored in any particular order and are released as required
- IT System tracks each bag onto and off the storage loop
- Throughput is improved as Early Bags are outside of the mainline
- Individual bags can be retrieved on demand
- Bags are stored in a dynamic configuration (High Energy Consumption)



<u>Tilt-Tray / Cross-Belt Loops</u>







Tray Carousels (ICS)

- Dedicated Track or Conveyor Loops are utilized for EBS
- Trays are not stored in any particular order and are released as required
- IT System tracks each Tray onto and off the storage loop
- Throughput is improved as Early Bags are outside of the mainline
- Individual bags can be retrieved on demand
- Bags are stored in a dynamic configuration (High Energy Consumption)



AS/RS (ICS and BELT)

- Dedicated Warehouse Type Storage Racks are Purpose Built
- Can be used on ICS systems or Belt (Bags are transferred to ICS at entry to storage area and loaded back onto belt at exit)
- By the use of an AS/RS Crane Trays are stored in racks
- Trays are not stored in any particular order and are released as required
- IT System tracks each Tray onto and off the storage loop
- Throughput is optimized as Early Bags are outside of the mainline
- Individual bags can be retrieved on demand
- Bags are stored in a static configuration (Lowest Energy Consumption)

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Lift and Run (ICS and BELT)

- Dedicated Warehouse Type Storage Racks are Purpose Built
- Can be used on ICS systems or Belt (Bags are transferred to ICS at entry to storage area and loaded back onto belt at exit)
- By the use of a Lift and Shuttle setup Trays are stored in racks
- Trays are not stored in any particular order and are released as required
- IT System tracks each Tray onto and off the storage loop
- Throughput is optimized as Early Bags are outside of the mainline
- Individual bags can be retrieved on demand
- Bags are stored in a static configuration (Lowest Energy Consumption)







Uses of Technology

	Early	Overnight	Buffer on bottleneck	Build cell	Empty tray	Throughput
Lift & run	+	+	+	+	о	+
AS/RS	+	+	+	ο	-	ο
Tray lane	+	+	+	ο	+	+
Tray carousel	+	+	+	+	+	ο
Virtual store	ο	-	ο	+	+	ο
Belt lane	+	+	ο	-	-	ο
Manual store	0	+	-	-	-	-



AS/RS





Lane Storage





Beumer AS/RS CrisStore System

Daifuku AS/RS Storage System (1min37s)

Vanderlande AS/RS BAGSTORE System (4min15s to 5min0s)

Siemens Tray Carousel and Lift & Run VarioStore System (40s)