INTERNATIONAL ASSOCIATION OF

IABSC

BAGGAGE SYSTEM COMPANIES

SESSION 1

Addressing The Challenges of Improving BHS Performance

January 18, 2018

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Improving BHS Performance

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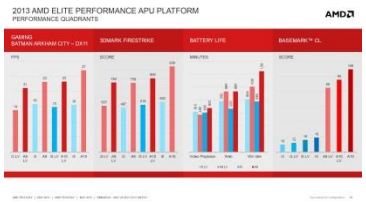
BHS – Changes Over the Years

- 9/11 - TSA & PGDS
- Increasing flights/operational hours
- Increasing passengers/bags
- Aging legacy conveyors
- Improved technology/Enhanced PLCs/ Ethernet-
- Enhanced & on-demand upper level reporting
- Increase in readability of scanners & camera solutions
- Increase of throughput capacity per EDS Machines
- Tilt Tray/ICS
- TSA Recaps for increased efficiency
- Early bag storage systems
- Alternative tote-based systems
- Self Tagging
- Mobile Devices & Bag Tracking
- Most airlines charging baggage fees

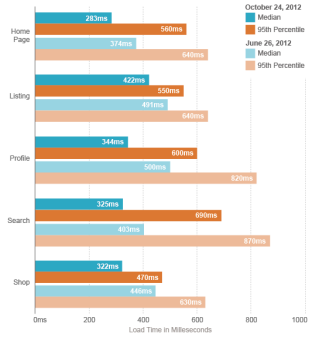
Demand for Improved Performance

- Emphasis on enhanced Missed Bag Ratio (MBR)
- Implementation of Key Performance Indicators (KPIs)
  - Increase in operational in-service time
    - Reduction in jams/outages
    - Reduction in operational outages
- Decrease in total cost of ownership

When in Doubt, Ask a Customer!



How To Measure?



- Measure/Baseline/Track Performance
  - CMMS (Computerized Maintenance Management System)

    "What you can measure, you can manage"
    - Asset performance/cost
    - Manpower
    - Parts usage
    - Inventory/Purchasing
    - Budgeting
    - Maintenance Records - (Preventive & Corrective)
    - TRENDING & ANALYSIS

Begin at the Beginning…

Differentiation

- Baseline & Trend Measurement
- What Can Be Improved?
- What Defines Value to Your Customer?
- Staff Training & Evaluations
- Perception & Aesthetics
- Becoming a “Business Partner”

The Need for Something More

Lean Journey……Kaizen???

Not Just for Manufacturing!

Case Study #1 – Setting the Stage

- Mature Site; Aging BHS
- Increase in Parts Consumption
- Steady Increase in BHS Throughput Volume
- Increase in Jams
- Increase in Turnover; Decrease in Knowledge & Bench Strength
- Increase in Overtime Hours
- Increase in Follow-up Work Orders
- Increase in Downtime

Case Study #1 – Analysis

- Identification of Parts Consumption
  - What is increasing & why?
- Jam Root Cause Analysis
  - Graphing of each jam & photograph of each scenario
- Exit Interviews for Staff
  - Identify key factors for departure
- Examination of Work Order Increase
  - Classify work orders & root cause analysis

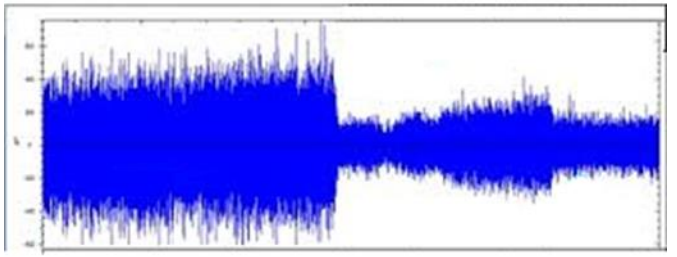
If it ain't broke, keep looking!

Case Study #1 – Parts Consumption

- Sorter: Tilting Devices, Carts, Wheels
- Conveyor: Bearings, Clutch Brakes

Revelations:

- Aging Equipment
- Component Quality
- Outdated Technology

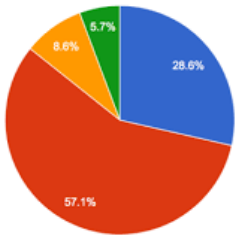


Actions:

- Custom Tailored PM Tasks to Address Trending Issues
- Brought Issues of Component Failures to Manufacturers to identify/engineer Alternate Materials
- Looked at ultrasonic detection & cycle counts toward clutch brake predictive maintenance. Turned to VFD retrofits instead.

Case Study #1 – Increase in Jams

- Took photograph for every jam root cause
  - Locations Graphed for “Gross Offenders”
  - Equipment Examined
- Equipment-Related Jam Points Identified & Corrected
- Large Amount of Baggage Hygiene Issues
  - Video Created and Distributed to Operations
  - Smiley-Faces for Spacing Painted on Conveyor Drop Belts
- Baggage Centering Devices Added



Net Reduction of Jams - 31%

Case Study #1 – Increase in Turnover

Exit Interview Information Learned:

- Industry Pay has increased
  - Dairy/Brewery taking key staff
- Baggage Handling is not Glamorous
  - Creation of shift competition KPIs
  - Awards and incentives
- No Road Map for Personal Growth & Advancement
  - Created a skills matrix for each position
  - Created online web-based training for skillsets
  - Documentation of SOPs
  - Decrease in evaluation periodic intervals – goal setting & developing staff

Case Study #1 – Repetitive Work Order Increase

- Discovered a lack of finer skills
  - Training opportunities/SOPs
- Implementation of QA/QC Program
- Parts availability
  - Eliminate stock-outs

BHS Wish List

- Accurate As-Builts
- Better Planned Emergency Stop Zones
- Catwalk in Critical Locations with @ 48” Clearance
- Standardized Components (Inventory Space)

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Enhancing Productivity and System Availability

January 18th, 2018

By focusing on airline operating costs that are within the airports control, efficiencies can be gained, delays reduced, and passenger travel times shortened. To achieve this, one key area of focus needs to be on BHS.

Within the airline world, delays have a cascading effect on schedule. Recent studies show airlines are on schedule roughly 85% of the time until mid morning, by mid afternoon in the low 70's and by early evening on time performance drops into the 60's.

Delays cost airlines approximately $8-$9 billion per year and are driven by crews, fuel and maintenance. Nearly $3 billion of this cost is due to mishandled baggage with an average cost of $100/effected bag. Additionally delays cost passengers upwards of $17 billion annually.

Airports depend heavily on BHS to ensure baggage gets to its intended destination as quickly and efficiently as possible. System availability is not only critical, but it is a performance metric (KPI) that all O&M companies are measured against. In actuality this should be accounted for in the design stage.

Root cause analysis of BHS design shortcomings demonstrates that Manufacturers and Designers are heavily influenced by acquisition cost versus lowest total cost of ownership.

Budgets are stretched during major projects and “non-essential” options are eliminated (value engineered out) impacting maintainability.

An often overlooked or value engineered option for BHS is a quick disconnect

A motor/drive change on a BHS is a fairly common occurrence, but if a quick disconnect is employed the system availability and labor cost are dramatically impacted.

Typical motor/drive replacement with a quick disconnect is 30 minutes or less (depending on motor/drive type and location) whereas a replacement on a direct wired system averages between 1-2 hrs.

Operationally this represents between 30-90 minutes saved per occurrence which on an annual basis for a medium sized airport (with 100 motor changes/year) generates between 50-150 hours of saved time. The time required for this process does contribute to delay and overall system availability. This time could then in turn be used for other maintenance activities.

Additionally BHS system availability could be impacted by as much as 50%

In summary: with the time saved as a result of utilizing quick disconnects and the associated impact on system availability, the airport industry that currently spends on average $3 billion due to mishandled baggage could see a significant cost decrease.

As an industry we need to align the airport interests of serving our passengers in a convenient and efficient manner with airline interests of increasing efficiency and lowering costs. If we are successful at doing this then the results will be measurable.

Top Three BHS Improvements

Design BHS with VFD's versus traditional clutch brakes. From an O&M perspective this reduces wear and tear on the BHS (soft start/stop), reduces down time during replacement, has a much longer life span and reduces the overall cost.

Design BHS with sealed for life bearings. This reduces the possibility of over greasing which causes premature failure and allows for a more efficient use of labor.

Determine best location for BHS access ladders away from drive lanes. This reduces impact damage to the ladders from ground equipment and provides readily available access when required.

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Operational Improvements to Mitigate Risk of Mishandled Bags

January 18th 2018

Background

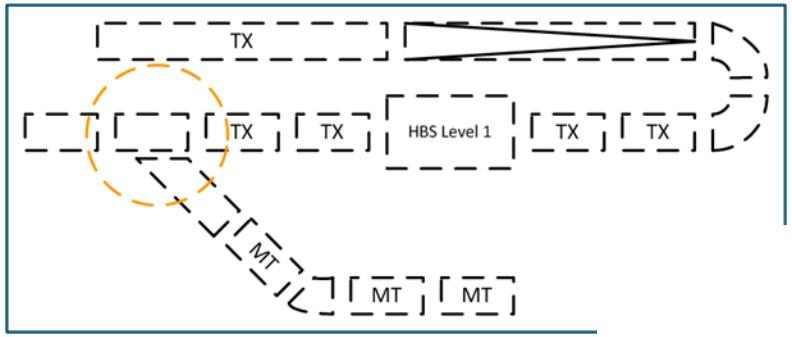
- Around 5.73 bags per thousand passengers are mishandled.
- The biggest weak spot in baggage handling involves passengers moving from one aircraft to another. Nearly half of all cases of delayed bags (47%) occurred in between connecting flights, particularly those with tight time frames.
- SITA reports that recovering and returning lost bags costs the aviation industry $2.1 billion.

Operational Optimizations

- Tracking error rate in HBS (Level 1 / Level 2)
- Tracking error rate on Transfer lines
- Tracking error rate in HBS (Level 3)
- Reduction of No-Reads
- MUF utilization
- HBS Optimizations

Tracking error rate in HBS (Level 1)

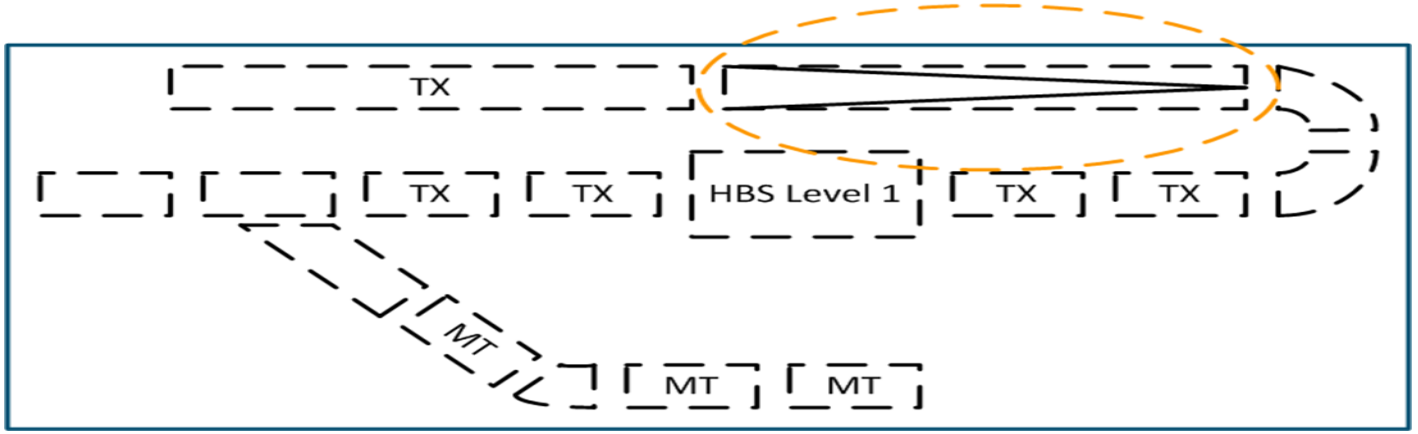
- Reduce dieback due to item too long on inductions
- Investigate all statuses from Level 1/ Level 2
- Delay stop signal from on belt in screening machine
- Priority on bag flow from MT and TX lines
- Benchmark rejects from level 2



	L2 REJECTS	MACHINE NO DECISION	MACHINE NO SCAN	L2 TIME OUT
	1486	108	249	895
Current	44%			56%
Benchmark	90%			10%

Tracking error rate on Transfer lines

- Change the ramp-up and ramp-down times
- Remove start delay time and add it to the ramp-up time to ensure the capacity is not affected.
- Add an additional PEC on incline belt to ensure the tracking window will be reset at the middle of the belt.



Tracking error rate in HBS (Level 3)

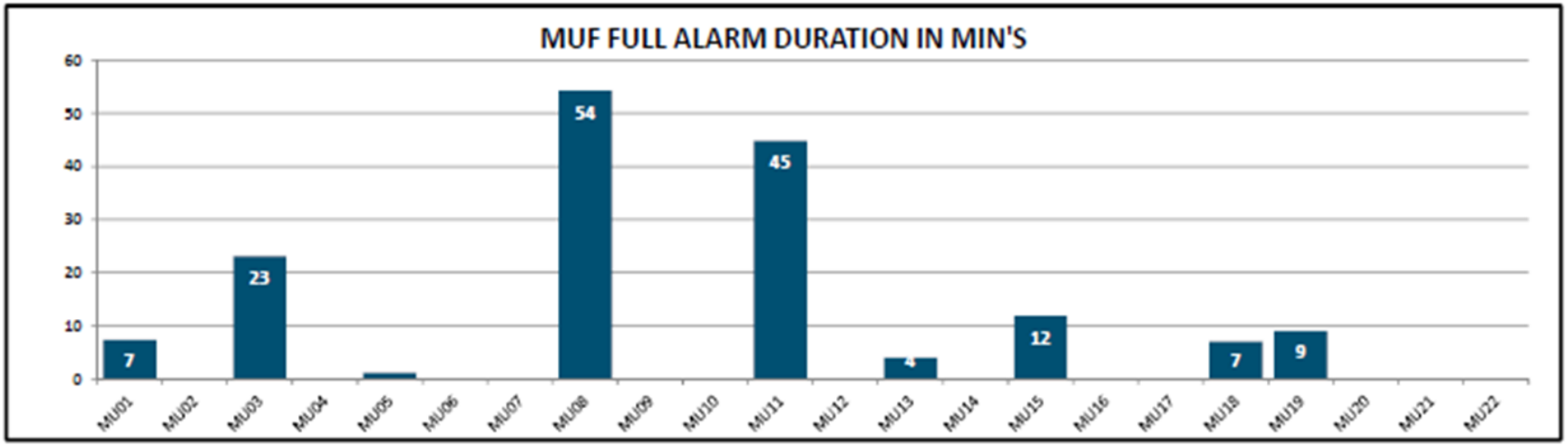
- Investigate flow of bags on ED chutes
- Adjust CTB and discharge parameters
- Re-control the tracking windows on take away conveyor

Reduction of No-Reads

- Add matrix cameras to selected scanner arrays to increase the read rate.
- Airport to carry out maintenance program for Tag printers (Including out-stations).

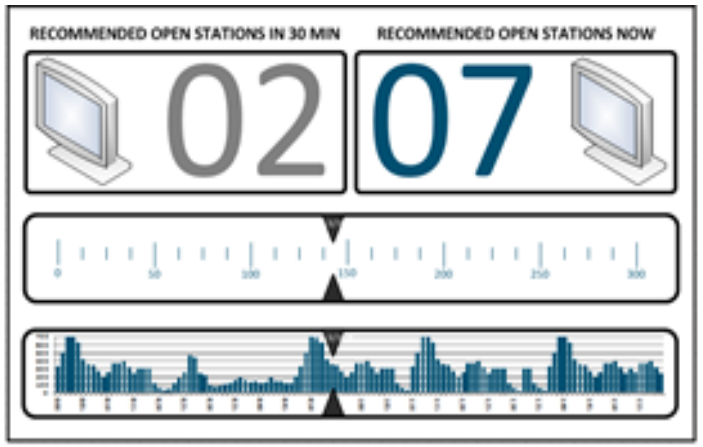
MUF utilization

- Bag is inducted optimally (Gap control)
- Bags are not inducted with less than 15 pulses
- Make benchmark on MUF Full alarm (no more than 10 min per MUF per day)



HBS Optimizations

- Replace curtains with lighter curtains.
- Change stop delay inside HBS machine on x-ray belt
- Send tracking lost bag to ME before ED.
- Introduce tool to simulate recommendation of operators at workstations



Results

- 50% fewer recirculating bags
- 50% better tracking from HBS Level 1/Level 2
- 50% better tracking on HBS Level 3
- 30% higher capacity on makeup carousels
- 50% fewer JAM errors on carousel feeding conveyors
- 25% reduction - Check in bags processing times
- 25% reduction - Transfer bags processing times

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Improving BHS Performance

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Number of Motor/Gearbox Combinations

- Limited Room for Inventory
- Increased Time Locating Parts
- Additional Funds Allocated to Inventory
- Reorder Levels
- Lead Times
- Inventory Control
- Components for Rebuilding Motors/Gearboxes

Access to the BHS

- Ladders and Crossovers
- Access Points
- Limited Space
- Mezzanine and Catwalk Placement
- Safety Concerns
- Additional Time to Address Issues

Building Relationships between Clients and O&M Companies

- Solve Matters Before they Become an Issue
- Provide Notice when an Upgrade is Recommended by an OEM
- Explain how Ticket Counter Operations can have an impact on the BHS and how we can Rectify Potential Issues
- Control Room Operators
- Discuss Industry Trends

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Operational Continuity

1/18/18

Operational Continuity

- At Chicago's Midway Airport there are several steps taken to provide Operational Continuity
  - At Midway Airport all assets are owned by the City of Chicago
  - City of Chicago has turned over the Management responsibility of these assets to the airlines
  - The Airlines created Midway Airline's Terminal Consortium (MATCO) to manage these assets

Midway Airlines' Terminal Consortium (MATCO)

- Equipment List Includes
  - Baggage Handling System
  - Passenger Boarding Bridges
  - Fuel Farm & Bulk Storage
  - Federal Inspection Facility
  - Ground Power
  - Pre-Conditioned Air
  - Flight Information Displays
  - Potable Water
  - Ramp Striping

Providing Operational Continuity

- Operational Management
  - Operator Day to Day Management
- Capital Projects
  - Funding
  - Reimbursement Agreements
  - Contracts
    - EDS Installation
    - Recapitalization Project
    - PLC / Server Updates
    - System Upgrades / Optimization Efforts
  - Operational & Contingency Planning
  - Meeting the Future Needs of the Customer

Metrics-Based Approach

- Project Development assisted by Continuous Monitoring of several Key Performance Indicators - CMMS
  - Preventative Maintenance Completion
  - Reactive Maintenance Completion
  - Emergency Maintenance Issues
    - Rates are Compared to other BHS KPI's / Industry Standard / Trend Analysis
      - Faults, Missorts, Error Rates, ATR Read Rates, etc
      - Operational Availability