Technology Updates

Gate Monitoring
Mobile CMMS
BHS Controls and Automation

June 2016
Services Business: Overview

- Baggage Handling Systems (BHS)
- Facility Equipment (FAC)
- Passenger Boarding Bridges (PBB)
- Ground Support Equipment (GSE)
Operational Locations
Airport Services: Next Level Focus

- **iOPS Monitoring**
  - Real-Time Assessment
  - Equipment Reliability

- **RCI**
  - Improve Performance
  - Lean Methodologies

- **BHS Ctrl & Automation**
  - System Upgrades
  - High Level Controls

- **Asset Management**
  - Work Order Management
  - Material Management
Gate Monitoring: At the Equipment Level

Anyone monitoring their Gate Equipment?
Information Generation: Gate Equipment

System Overview

Gate Status: Green = In use / No Faults
Yellow = Warning
Red = Fault

Equipment Breakdown

Performance Report
Data Collection – Component Level

Beyond Equipment Status: Look inside your equipment at component functionality
Information Dissemination

Timely, actionable information (structured, usable data) disseminated to:

- Technicians
- Operations Managers
- Asset Managers
- Facilities Managers
- Environmental Monitors
- Customer Service Managers
- Others

Real Time
Using Smart Devices
Information Dissemination

Materials Disseminated: Customized to your business needs

- Customized reports
- Real Time warnings, alerts, status updates
- Feedback on equipment
- Feedback on equipment components

Where / How Disseminated:

- WiFi Smart Devices
- LAN Lap Tops
- WAN Lap Tops – broader audience

Smart Devices, PCs, etc.
Product Configuration

System Reports

Aircraft Docked Weekly Summary Report

<table>
<thead>
<tr>
<th>Date And Time</th>
<th>Gate 10</th>
<th>Gate 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/10/2016 11:55:00 PM</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>5/9/2016 11:55:00 PM</td>
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<td>10</td>
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</table>

*Please select a From and To date from the calendar to view previous reports. The default from Date is seven days ago and To Date is today.

Operation Performance Report - Gate 12

<table>
<thead>
<tr>
<th>Dock Time Start</th>
<th>Dock Time (Min)</th>
<th>GPS/Start Time</th>
<th>GPS/Time (Min)</th>
<th>PCA/Start Time</th>
<th>PCA/Time (Min)</th>
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Report generated at: 5/12/2016 09:20:07 AM

Configurable time period report generation
# Operational Performance Report

## Operations Performance Report

<table>
<thead>
<tr>
<th>Gate</th>
<th>Dock Time Start</th>
<th>Dock Time (Min)</th>
<th>GPUStart Time</th>
<th>GPUS Time (Min)</th>
<th>PCAS Time (Min)</th>
<th>PCA Start Time</th>
<th>PCA Started after Dock Time (Min)</th>
<th>GPU Started after Dock Time (Min)</th>
<th>PCA Started after Dock Time (Min)</th>
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<td>6/19/2016 03:23:48 PM</td>
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<td>-1</td>
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</table>

**Shows Equipment Not Hooked Up On-Time.**
## Executive Weekly Summary Report

<table>
<thead>
<tr>
<th>Date</th>
<th>Gate</th>
<th>Alarm Count</th>
<th>Warning Count</th>
<th>Gate Utilization</th>
<th>Dock Time Avg</th>
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<tr>
<td>Jun 14 2016</td>
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<td>Jun 13 2016</td>
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<td></td>
</tr>
</tbody>
</table>

*Please select a From and To date from the calendar to view previous reports. The Default from Date is seven days ago and To Date is today.
# Alarms By Day

**PBB Alarms Daily Summary Report**

<table>
<thead>
<tr>
<th>Alarm Date Time</th>
<th>Cleared Date Time</th>
<th>Tag</th>
<th>Gate</th>
<th>Active</th>
<th>Alarm Lapse (Min)</th>
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</thead>
<tbody>
<tr>
<td>6/18/2016 01:55:17 PM</td>
<td>6/18/2016 02:00:56 PM</td>
<td>Gate 12 - Horizontal Retract Ultimate. Call Maintenance</td>
<td>Gate12</td>
<td>False</td>
<td>5</td>
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<tr>
<td>6/15/2016 01:55:43 AM</td>
<td>6/15/2016 01:56:03 AM</td>
<td>Gate 12 - Emergency Stop button Pressed. Call Maintenance</td>
<td>Gate12</td>
<td>False</td>
<td>1</td>
</tr>
</tbody>
</table>

*Please select a From and To date from the calendar to view previous reports. The Default*
Product Configuration

A widget is an element within a web application to display information for a user to interact with live operating metrics.
Product Configuration

Airport Overview

JFK Terminal 4

DAL Love Field

RDU Terminal 2
Customer Value

What can Gate Monitoring do for you?

**Improved customer experience:** Faster gate turns, fewer delays, less disruption

**Increased operational savings:** Reduce APU runtime, less fuel burn, optimize equipment runtime

**Heightened environment responsibility:** Reduce carbon emissions, optimize utilization

**Improved asset management:** Greater asset intelligence & analytics, predictive maintenance

**Enhanced Operational Efficiency:** Operator performance, incident review, training

**Quicker Notification ● Faster Gate Turns ● Improved Reliability**
What Can Gate Monitoring Do For Me?

Examples...
- Alert on bridge out of service...fault limit, operator error, other...control center personnel able to resolve the issue phone
- Technician is notified immediately on smart device of equipment issue...component status, recent trends...responds quickly with tools, parts
- Monitoring turn times...when were the PBB, PCA, GPU activated?
- Recording equipment status...PCA discharge temp, GPU output, etc.
• **Equipment and Asset Monitoring Systems**

- Gate Management
- Terminal Management
- Central Plant
- Hangar Management
- Building Management
- Ramp Equipment
- Baggage System
- Fleet Management

**Web-Based Application**

**Single Platform**
Data Collection – Equipment Level

Equipment Monitored

- **Gate:** Bridges, GPU, PCA, etc
- **Facilities:** HVAC, Escalators, Lighting, etc
- **Baggage:** BHS systems
- **GSE:** Tractors, Deicers, Loaders, etc
Information Generation: Facilities

- Escalators
- Conveyance Systems
- Chillers
System Overview

Monitoring Devices

- 2000 Series XT-2050C Motorized Equipment
- Cal Amp TTU 720 Portable Equipment (7 to 10 Yr. Battery Life)

Performance Reporting

- Location
- Idle Time
- Vehicle Disable
- Ignition On/Off
- Engine Hours
- Mileage
- Speed
- Battery Voltage
- Battery Disconnect
- RPM
- Fuel Level
- Fuel Use (MPG)
- Oil Level
- Oil Pressure
- Coolant Level
- Coolant Temperature
- Acceleration/Deceleration
- Crash Notification
- Geo-Zones

Information Generation: GSE
Mobile CMMS

Anyone using mobile devices to administrate their CMMS?
CMMS Using Mobile Devices

- Mobile CMMS allows access and input via hand-held devices
- Techs are able to retrieve, generate, administrate and close work orders remotely
- System allows equipment information and O&M manual retrieval at the work location
- Productivity and efficiency gains are substantial
Wastes in Service Operations

Overproduction
Unnecessary work order administration

Inventory
Too many parts & mtls stored

Waiting
On the ramp in the BHS, etc

Motion
Back and forth shop to equip.

Transportation
Across ramp and BHS rooms, to off airport facilities, etc

Quality Defects
Recurrent failures & poor work quality

Process
Too much NVA?

Unused Talent
Do we have UT?
From a Lean Perspective…Reductions in...

- **Overproduction**
  - No more time spent on filling out paper work orders, data entry
  - Speech recognition also reduces repetitive data entry efforts

- **Inventory, Materials and Costs**
  - No more paper work orders…savings in office supplies
  - Significant reductions in paper and toner usage

- **Waiting**
  - Work orders are closed, uploaded and downloaded in real-time
  - Techs can access info immediately at the work location
  - Can switch between connected and disconnected modes easily

- **Motion**
  - No more handling, distribution or storage of work order data
  - Significant reductions in travel time…ramp to office, etc.
From a Lean Perspective...Reductions in...

• **Transportation**
  • PM’s can be sequenced and routed preventing back and forth

• **Defects**
  • Increased quality of data into and out of the system
  • System allows upload of photos and other docs

• **Process Activities**
  • Real-time WO administration eliminates redundant CMMS steps

• **Talent Waste**
  • Allows for more effective use of manpower
Wastes in the Office

- **Overproduction**: unnecessary information
- **Inventory**: a task waiting to be started (WIP)
- **Waiting**: delays & queues
- **Motion**: walking, routing information
- **Transportation**: hand-offs of information
- **Quality Defects**: incomplete information
- **Process**: Unnecessary process steps, variation of process
- **Unused Talent**: Can we use our talent better?
Benefits of Mobile CMMS

- 15% + improvement in productivity
- 35% reduction in office supplies
- Immediate notifications support 20% improvement in response times
- Enhances equipment availability
- Improved accountability and customer satisfaction
- Increases available time for proactive maintenance
- Reduces reactive maintenance
- Lower wear and tear on vehicles.
Trends in Baggage Handling

- Recapitalization Projects
  - Increase in throughput
  - Decrease in required labor
  - More intelligent/automated diverts

- Mobile Capabilities for Remote Monitoring
  - Internet of Things (IOT)
    - What you can measure, you can manage (proactively)

- Enhanced On-Demand Custom Reporting
  - Storage of more I/O data points

- Trend Analysis & Benchmarking of Hubs
  - Searching for reduction in MBR

- Preparation for IATA 753 – July 2018
Questions