Airport Passenger Conveyance
Benchmarking Discussion

Presented by:
Los Angeles World Airports
Greater Toronto Airport Authority
Salt Lake City International Airport
Seattle-Tacoma International Airport
Sacramento International Airport
Agenda:

- Presentation format and ground rules: Joshua Amos
- General Introduction: Stuart Mathews
- Presentation from LAWA: Phu Tong, Rick Connelly
- Presentation from GTAA: Vivek Kaushish
- Presentation from SLC: David Jacks
- Presentation from SEA: Erik Knowles, Mike Tasker
- Presentation from SMF: Greg Nowakowski
- General Q&A – Next Steps
Basic Standard Data

- 84.56 - Million Annual Passengers (MAP) 2017 CY (71% Domestic)
- 141 - Total number of Escalators
- 199 - Total number of Elevators
- 19 - Total number of Moving Walks
- $14.9M - Total annual budget for Conveyance Maintenance
- 31 FTE for maintenance budgeted – 23 filled
- 24x7 - Hours of service coverage
- 388 Total number of personal injuries in 2017
- 667 - Total number of elevator entrapments in 2017
- 12,137 - Total service requests (SR) or problem tickets (PB) in 2017
- How you share equipment status with outside customers
  - Not currently sharing info outside of LAWA departments
Basic Data Cont’d - Normalization

• Cost per device: (# devices/total annual cost)
  – $41,504

• Entrapments per enplanement
  – For every 126,773 there is 1 entrapment

• Escalator Passenger Injuries per enplanement
  – For every 234,883 passengers there is 1 injury

• Entrapments per elevator
  – 3.35

• Service Requests per device
  – Average 34 SR per asset for 2017
Questions for all to answer

• How is your airport measuring equipment availability?
  – Availability = 1 – Downtime / Operational Terminal Hours
    • Labors (SRs, WO) = Downtime
    • Operational Hours = Calculate based on hours that the terminal is open (6,935 hours per year)

• How are you collecting the data necessary to measure equipment availability?
  – Recording hours against WO and SR in Maximo
  – Moving toward using mobile asset up/down feature

• How are you holding your service provider accountable to the requirements of your contract?
  – Currently revising the process – can discuss on call should time allow

• How are you notified if a piece of equipment is not operating?
  – Call to Airport Response Coordination Center (ARCC) to create SR/ticket

• How do various airports measure proactive to reactive ratio for conveyance & what are goals for this KPI?
  – Use work order hours recorded in Maximo
    • PM and % CM work orders proactive
    • Service Request and Field Corrective reactive
  – Have not established goals
Questions?
Greater Toronto Airport Authority
Airport Stats

- Consistently adding 3 Million passengers every year from 2015-2017.
- On track to achieve 50 Million passengers in 2018
Equipment Stats

387 People moving devices (PMD’s) service the Airport

213 Servicing Terminal 1
133 Servicing Terminal 3

132 Escalators
181 Elevators
65 Power Walks
5 Baggage Lifts
2 High-Speed Walks

2 Automated people mover (APM) trains servicing 3 stations. Moves 16,000 people per day on a 1.46km (0.91mi) track. Each train is comprised of 7 cars that can hold 25 passengers
Labor Stats

- PMD Maintenance outsourced to Thyssen Krupp.
  - 18 Mechanics (O&M Contract)
  - 2 Mechanics (Capital Projects)
  - 4 Management/Administrative
  - 6.5M/yr Thyssen Krupp Contract
  - 47M 47 million passengers / year with a 7% average growth

- Inspection & Auditing
  - Elevating Devices Inspection Services (EDIS) Inc.

- APM Maintenance and Operations outsourced to Doppel Mayr Cable Car
Service Coverage

18 Mechanics
Crew Size: 2 Mechanics

- 2 crews for Terminal 3
  - One crew on radio response and one crew on planned maintenance

- 3 crews for Terminal 1
  - Two crews on radio response and one crew on planned maintenance

- 2 Crews for Annual Inspections (CAT 1)
  - For both terminals

- 1 Crew for Major Maintenance (CAT 5)
  - For both Terminals

- 1 Crew for repairs/upgrades
  - For both Terminals
Equipment Stats

- $16,883 Cost per Device including Escalators, Moving Walkways and Elevators
- 1 in 600,000 Passengers reported an elevator/moving walk incident
- 0.39 Incidents reported per Escalator and Moving Walkway
- 1.04 Entrapments per Elevator
- 1 in 250,000 Passengers reported an entrapment incident
- 34 Service Requests per device (elevators, escalators and moving walkways)
Monitoring

- Monitoring and Reporting is completed Through application called: **Lift-Net**
- Vendor of application: **Integrated Display Systems**
## Reporting & Metrics

### People Moving Devices

**Dec 2017**

#### Performance Metric

<table>
<thead>
<tr>
<th></th>
<th>Target</th>
<th>Dec 2017</th>
<th>Trend</th>
<th>YTD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevators (112 units)</td>
<td>96.2%</td>
<td>97.1%</td>
<td>↑</td>
<td>96.1%</td>
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<tr>
<td>Escalators (101 units)</td>
<td>96.2%</td>
<td>95.1%</td>
<td>↑</td>
<td>94.2%</td>
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<tr>
<td>MW (47 units)</td>
<td>96.2%</td>
<td>94.6%</td>
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<td>93.3%</td>
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</table>

#### Elevators, Escalators, Moving Walks

<table>
<thead>
<tr>
<th>Area</th>
<th>Elevators</th>
<th>Escalators</th>
<th>Moving Walks</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1 (166 Units)</td>
<td>97.5% (70)</td>
<td>94.5% (65)</td>
<td>95.7% (31)</td>
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<tr>
<td>T3 (44 units)</td>
<td>99.4% (15)</td>
<td>95.8% (21)</td>
<td>89.0% (8)</td>
</tr>
<tr>
<td>Transfer (50 Units)</td>
<td>94.5% (27)</td>
<td>96.9% (15)</td>
<td>89.0% (8)</td>
</tr>
</tbody>
</table>

**Summary:**

- Elevators: 99.4%
- Escalators: 96.9%
- Moving Walks: 95.7%
Minimum Equipment Level

People Moving Devices – MEL’s

Dec 2017

**People Moving Devices – MEL’s**

**Dec 2017**

**Toronto Pearson**

**APTS - Technical Performance**

**Minimum Equipment Level**

**People Moving Devices – MEL’s**

Dec 2017

**Toronto Pearson**

**APTS - Technical Performance**

**Minimum Equipment Level**
Reporting & Metrics

People Moving Devices
Dec 2017

<table>
<thead>
<tr>
<th>Overdue Directives</th>
<th>&lt;30 days Overdue</th>
<th>30 To 60 Days Overdue</th>
<th>61 to 90 days Overdue</th>
<th>91 to 120 days Overdue</th>
<th>&gt;120 days Overdue</th>
<th>Total Overdue</th>
<th>Coming Due in next 30 Days</th>
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<td>73</td>
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<td>28</td>
<td>202</td>
<td>378</td>
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<td>9.0%</td>
<td>19.3%</td>
<td>10.8%</td>
<td>7.4%</td>
<td>53.4%</td>
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</table>

Source: Elevating Device Whiteboard & Perspective
# High Speed Walks

**Dec 2017**

## Service Availability

<table>
<thead>
<tr>
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<th>Target</th>
<th>Dec 2017</th>
<th>Trend</th>
<th>YTD</th>
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<tbody>
<tr>
<td>FEM11</td>
<td>95%</td>
<td>97.8%</td>
<td>↔</td>
<td>94.2%</td>
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<tr>
<td>FEM12</td>
<td>95%</td>
<td>88.9%</td>
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<td>80.9%</td>
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## Normalized Service Availability

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<tr>
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<th>SA Normalized for GTAA Approved Outages</th>
<th>Holds/Approved Outage Trend</th>
<th>SA Normalized for GTAA Approved Outages YTD</th>
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<tbody>
<tr>
<td>FEM11</td>
<td>97.8%</td>
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<td>94.3%</td>
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<tr>
<td>FEM12</td>
<td>96.7%</td>
<td></td>
<td>96.7%</td>
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**Summary:**

Source: Litnet

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### FEM11 - 2016 vs 2017

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### FEM12 - 2016 vs 2017

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<td>Dec</td>
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Reporting & Metrics

**Automated People Mover**

**Dec 2017**

**Performance Metric**

<table>
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<th>Target</th>
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<tbody>
<tr>
<td>System 1</td>
<td>99.5%</td>
<td>99.8%</td>
<td>↔</td>
<td>99.8</td>
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<tr>
<td>System 2</td>
<td>99.5%</td>
<td>99.8%</td>
<td>↔</td>
<td>99.7</td>
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<tr>
<td>Overall</td>
<td>99.5%</td>
<td>99.8%</td>
<td>↔</td>
<td>99.7</td>
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</table>

**Summary:**

Source: Dupelmyr OMMIS Software
Metrics Definitions/Calculations

\[ S_{\text{elevators}} = \frac{\text{# of Units} \times \text{Total Operating Time} - \text{Total Out Of Service Time}}{\text{# of Units} \times \text{Total Operating Time}} = \frac{\text{# of Units} \times \text{Total Operating Time}}{(115 \times \# \text{ of hours in Month} - \text{Total Out Of Service Time (hrs)})} = \frac{115 \times \# \text{ of hours in Month}}{115 \times \# \text{ of hours in Month}} \]

\[ S_{\text{escalators}} = \frac{\text{# of Units} \times \text{Total Operating Time} - \text{Total Out Of Service Time}}{\text{# of Units} \times \text{Total Operating Time}} = \frac{\text{# of Units} \times \text{Total Operating Time}}{(92 \times \# \text{ of hours in Month} - \text{Total Out Of Service Time (hrs)})} = \frac{92 \times \# \text{ of hours in Month}}{92 \times \# \text{ of hours in Month}} \]

\[ S_{\text{moving walks}} = \frac{\text{# of Units} \times \text{Total Operating Time} - \text{Total Out Of Service Time}}{\text{# of Units} \times \text{Total Operating Time}} = \frac{\text{# of Units} \times \text{Total Operating Time}}{(41 \times \# \text{ of hours in Month} - \text{Total Out Of Service Time (hrs)})} = \frac{41 \times \# \text{ of hours in Month}}{41 \times \# \text{ of hours in Month}} \]

\[ S_{\text{High speeds}} = \frac{\text{Total Operating Time} - \text{Total Out Of Service Time}}{\text{Total Operating Time}} = \frac{\text{Total Operating Time}}{(18 \text{ hrs} \times \# \text{ of days in month} - \text{Total Out Of Service Time during 0500–2300 (hrs)})} = \frac{18 \text{ hrs} \times \# \text{ of days in month}}{18 \text{ hrs} \times \# \text{ of days in month}} \]

- PMD’s Operating Time = 24hrs/day 7 days/week
- Planned maintenance not included in out of service time
- New metric being used to capture PMD availability as per passenger experience. Therefore would include planned maintenance outage.
Reliability

Technical Performance Review Room

(War Room)

• Meet daily with terminal operations, PMD maintenance staff and GTAA management

• Discuss previous day performance (restarts, failures, shutdowns)

• Track all performance issues on tracker board and terminal map

• Look for trends, patterns, high impact/critical areas
Questions?
Salt Lake City International Airport
Basic Standard Data

- Million Annual Passengers (MAP) 24,691,217
- Total number of Escalators 25
- Total number of Elevators 26
- Total number of Moving Walks 10
- Total annual budget for Conveyance Maintenance. $380,000.00
- FTE for maintenance (if in-house) N/A
- Hours of service coverage 0800-1700, Mon-Fri
- Total number of treated passenger injuries in 2017 Not Tracked
- Total number of elevator entrapments in 2017 Not Tracked
- Total service requests (SR) or problem tickets (PB) in 2017 178
- How you share equipment status with outside customers PASSUR/OPS
Basic Data Cont’d - Normalization

- Cost per device: (# devices/total annual cost) $6,229.50
- Entrapments per enplanement Not Tracked
- Escalator Passenger Injuries per enplanement Not Tracked
- Entrapments per elevator Not Tracked
- Escalator Passenger Injuries per device Not Tracked
- Service Requests per device 2.91/Average
Questions for all to answer

• How is your airport measuring equipment availability? Not currently measured
• How are you collecting the data necessary to measure equipment availability? N/A
• How are you holding your service provider accountable to the requirements of your contract? Current contract does not include measurable, only response time.
• How are you notified if a piece of equipment is not operating? BAS system sends signal to Control Center. They notify maintenance tech.
Questions?
Seattle Tacoma International Airport
Basic Standard Data

- Million Annual Passengers (MAP)
  - 46.9 million in 2017
- Total number of Escalators
  - 86
- Total number of Elevators
  - 81
- Total number of Moving Walks
  - 6
- Total annual budget for Conveyance Maintenance.
  - 2018 Approved estimate 5 million a year/ Previous contract spend approx, 16 million over 4 years
- FTE for maintenance (if in-house)
  - 1 Manager/ Split responsibilities 33%
- Hours of service coverage
  - M-F 0400-2400/ Weekend 1.75 Hours opening shifts
- Total number of treated passenger injuries in 2015* (most recent data)
  - 39
- Total number of elevator entrapments in 2017
  - Not Tracked. Very dependent on track cleaning.
- Total service requests (SR) or problem tickets (PB) in 2017
  - 5,103
- How you share equipment status with outside customers
  - Weekly report sent to stakeholders by Manager
Basic Data Cont’d - Normalization

- **Cost per device: (# devices/total annual cost)**
  - $10,240 elevators/ $20,840 for escalators and walkways average X2

- **Entrapments per enplanement**
  - Not tracked

- **Escalator Passenger Injuries per enplanement**
  - 188/45MM*

- **Entrapments per elevator**
  - Not Tracked.

- **Escalator Passenger Injuries per device**
  - 188/81 (2.3 per device)*

- **Service Requests per device**
  - 29.6 for 2017
Questions for all to answer

• How is your airport measuring equipment availability?
  – Weekly report and contractor meeting
• How are you collecting the data necessary to measure equipment availability?
  – Weekly reporting makes this relatively easy
• How are you holding your service provider accountable to the requirements of your contract?
  – Most repairs fall under customer damage* but regular maintenance work is determined in concert with operations on a weekly basis. The longest downtime would be a long handrail replacement (vulcanizing) and step replacement.
• How are you notified if a piece of equipment is not operating?
  – Liftnet is monitored in our ACC center but most common is customer calls.
• How do various airports measure proactive to reactive ratio for conveyance & what are goals for this KPI?
  – Not measured.
Questions?
Sacramento International Airport
Sacramento International Airport

• Quick Facts
  • 2017 Annual Passenger Traffic: 10.9 Million
  • Traffic growing by 7% over previous year
  • 2 Terminal, 2 Concourse System
  • 31 Gates
  • 2 Active Runways
Conveyance

- Elevators 34
- Escalators 18
- People Movers 2
Contractual Information

- Elevator/Escalator Contract with KONE
  - $600,000 Annual cost
  - All inclusive performance contract
  - Provides for 1 full time tech on site 8 hours/day
  - Outside normal working hours response 60min; 30min for entrapment
  - Callback penalty: frequency of callback determined by formula
    - No penalty under .333
    - 5% penalty for .333 to .399
    - 10% for greater than .400
  - Availability Penalty: Average of 98.7% of property hours of operation over each 3 month period
    - This includes allowance for equipment service time
    - 98% and below: 20% penalty
Contractual Information

• Automatic People Mover Contract with Bombardier
  • $2,954,757 annual cost; includes insurance costs
  • All inclusive performance contract
  • 24/7 365 maintenance coverage
  • Normal business hours staffed with maintenance personnel
  • Performance determined by formula based on equipment availability
Conveyance Injuries

- Total number of treated passenger injuries in 2017: 7
- Total number of elevator entrapments in 2017: 7
- Total service requests or problem tickets in 2017: 155
- Equipment status shared by e-mail, operation center announcements or direct contact
Data Normalization

- Cost per device:
  - Escalators/Elevators $11,538
  - APM $1,477,378
- Entrapments per enplanement
  - .0000006
- Escalator Passenger Injuries per device
  - .38
- Service request per device
  - 2.98
Additional Questions

• How is your airport measuring equipment availability?
  • Equipment availability is measured by formula
• How are you collecting the data necessary to measure equipment availability?
  • Data is collected by vendor, verified by Airport staff, cross checked with Operations
• How are you holding your service provider accountable to the requirements of your contract?
  • Monthly status meetings between Management. Formula based penalties applied as appropriate
• How are you notified if a piece of equipment is not operating? Operations, maintenance, vendor, CMMS system aggregate status and notifications
Questions?