JAL’s status of RNP AR APCH in Japan

Nobumichi Akagi
Flight Operations Standard,
Japan Airlines (JAL)
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SESSION 3: PBN IMPLEMENTATION
Outline

- FY12 RNP Implementation Status in Japan
- Environment
- Experiences
- Traces of RNP AR Approaches
- The Effect of the Implementation of RNP AR Approach
- Issues in the Future
- Summary
FY12 RNP Implementation Status in Japan

- RNAV approach @ 14 APTs
- RNP approach @ 12 APTs
- RNP AR approach @ 9 APTs
- RNAV1 SID/STAR @ 26 APTs
- Basic RNP1 SID/STAR @ 13 APTs
- * Planned APT in FY2012
Environment

- JAL Group Started the RNP AR APCH from 03 MAY, 2012
- B737-800
- Operated by JAL and JAL Express (JEX)
- Approved approaches (6)
  - Hakodate RNAV (RNP) Z RWY 30
  - Haneda RNAV (RNP) RWY 23
  - Kochi RNAV (RNP) Z RWY 14
  - Kochi RNAV (RNP) Y RWY 14
  - Kitakyushu RNAV (RNP) RWY 18
  - Kitakyushu RNAV (RNP) RWY 36
Experiences

- **Number of Trained Flight Crew (as of 30 SEP, 2012)**

<table>
<thead>
<tr>
<th></th>
<th>JAL</th>
<th>JEX</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Captain</td>
<td>69 (86.3%)</td>
<td>141 (95.3%)</td>
<td>210 (92.1%)</td>
</tr>
<tr>
<td>First Officer</td>
<td>59 (100%)</td>
<td>124 (95.4%)</td>
<td>183 (96.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>128 (92.1%)</td>
<td>265 (95.3%)</td>
<td>393 (94.2%)</td>
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</tbody>
</table>

- **Experiences (as of 21 SEP, 2012  total 181 approaches)**

<table>
<thead>
<tr>
<th>Airport</th>
<th>Approach</th>
<th>Number of Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hakodate</td>
<td>RNAV (RNP) RWY 30</td>
<td>1</td>
</tr>
<tr>
<td>Haneda</td>
<td>RNAV (RNP) RWY 23</td>
<td>0</td>
</tr>
<tr>
<td>Kochi</td>
<td>RNAV (RNP) Z RWY 14</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>RNAV (RNP) Y RWY 14</td>
<td>11</td>
</tr>
<tr>
<td>Kitakyushu</td>
<td>RNAV (RNP) RWY 18</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td>RNAV (RNP) RWY 36</td>
<td>53</td>
</tr>
</tbody>
</table>
Traces of RNP AR Approaches (1)
Hakodate RNAV (RNP) RWY 30

RNP AR APCH
Track Time: 560 sec.
Track Mile: 26.61 nm
Burn-off Fuel: 463.782 lbs

RNAV APCH
Track Time: 618 sec.
Track Mile: 28.98 nm
Burn-off Fuel: 685.249 lbs
Traces of RNP AR Approaches (2)
Kochi RNAV (RNP) Y/Z RWY 14

RNP AR APCH (Z)
- Track Time: 526 sec.
- Track Mile: 23.83 nm
- Burn-off Fuel: 580.809 lbs

Visual APCH
- Track Time: 374 sec.
- Track Mile: 16.03 nm
- Burn-off Fuel: 490.520 lbs

RNP AR APCH (Y)
- Track Time: 535 sec.
- Track Mile: 23.97 nm
- Burn-off Fuel: 543.476 lbs
Traces of RNP AR Approaches (3)
Kitakyushu RNAV (RNP) RWY 18

- **RNP AR APCH**
  - Track Time: 331 sec.
  - Track Mile: 12.07 nm
  - Burn-off Fuel: 338.209 lbs

- **ILS APCH**
  - Track Time: 764 sec.
  - Track Mile: 36.55 nm
  - Burn-off Fuel: 807.196 lbs

- **Visual APCH**
  - Track Time: 296 sec.
  - Track Mile: 12.49 nm
  - Burn-off Fuel: 293.596 lbs
Traces of RNP AR Approaches (4)

Kitakyushu RNAV (RNP) RWY 36

**Visual APCH**
- Track Time: 349 sec.
- Track Mile: 14.65 nm
- Burn-off Fuel: 332.511 lbs

**RNP AR APCH**
- Track Time: 321 sec.
- Track Mile: 13.48 nm
- Burn-off Fuel: 336.951 lbs
The Effect of the Implementation of RNP AR Approach (1)

改善的最低标准

<table>
<thead>
<tr>
<th>机场</th>
<th>跑道</th>
<th>途径</th>
<th>DH(MDH) / RVR (ft / m)</th>
<th>比较</th>
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</thead>
<tbody>
<tr>
<td>岩手</td>
<td>30</td>
<td>RNAV</td>
<td>418 / 1000</td>
<td>降低最低标准 DH: - 47</td>
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<tr>
<td></td>
<td></td>
<td>RNP AR</td>
<td>371 / 1000</td>
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<tr>
<td>科池</td>
<td>14</td>
<td>ILS Circling</td>
<td>731 / 2400</td>
<td>降低最低标准 DH: - 62, RVR: - 800</td>
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<tr>
<td></td>
<td></td>
<td>RNP AR Z</td>
<td>569 / 1600</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>RNP AR Y</td>
<td>569 / 1600</td>
<td></td>
</tr>
<tr>
<td>久留米</td>
<td>18</td>
<td>VOR</td>
<td>479 / 1200</td>
<td>对比 VOR: 降低最低标准 DH: - 179, RVR: - 200</td>
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<td></td>
<td></td>
<td>RNP AR</td>
<td>300 / 1000</td>
<td>vs ILS: 减少转弯线</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ILS</td>
<td>200 / 550</td>
<td></td>
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<tr>
<td>久留米</td>
<td>36</td>
<td>ILS Circling/VOR</td>
<td>479 / 2400</td>
<td>降低最低标准 DH: - 173, RVR: - 1000</td>
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<tr>
<td></td>
<td></td>
<td>RNP AR</td>
<td>306 / 1400</td>
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## Improvement of Track Mile and Burn-off Fuel

<table>
<thead>
<tr>
<th>Airport</th>
<th>Approach</th>
<th>Track Time (sec.)</th>
<th>Track Mile (nm)</th>
<th>Burn-off Fuel (lbs)</th>
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<tbody>
<tr>
<td>Hakodate</td>
<td>RNAV</td>
<td>- 58</td>
<td>- 2.4</td>
<td>- 221.5</td>
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<tr>
<td>RWY 30</td>
<td>RNP AR</td>
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<tr>
<td>Kitakyushu</td>
<td>ILS</td>
<td>- 433</td>
<td>- 24.5</td>
<td>- 469.0</td>
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<tr>
<td>RWY 18</td>
<td>RNP AR</td>
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<td></td>
</tr>
<tr>
<td>Kitakyushu</td>
<td>Visual</td>
<td>- 28</td>
<td>- 1.2</td>
<td>4.4</td>
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<td>RWY 36</td>
<td>RNP AR</td>
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The Effect of the Implementation of RNP AR Approach (3)

- Improvement of Trace for the Route

**Trails of Conventional APCH**
60 FLT

**Trails of RNP AR APCH**
53 FLT

This achieves to avoid the routing above the noise sensitive area.
Issues in the Future

- Expand the RNP AR Approved Ship Type
  - B777:
    - Lack of LNAV Auto Engagement during Go-around
  - B787:
    - RNP AR APCH is not implemented in current destination (BOS/DEL/DME/SIN)

- Lack of the Information about the System of World Wide Authorities
  - Process of the Application
  - FOSA
  - How to reflect the RNP AR APCH for Operations Specifications

- Early Flap Extension induces the Increasing of the Burn-off Fuel

PBN Symposium 2012
Summary

- FY12 RNP Implementation Status in Japan
- Environment and Experiences of the JAL Group’s RNP AR APCH
- Show the Trails of RNP AR APCH in Japan
- Effect of the Implementation of RNP AR Approach
  - Decreasing Minima
  - Decreasing Track Mile/Burn-off Fuel
  - Minimize the noise for noise sensitive area
- Issues in the Future
  - Expanding the aircraft type and fly into countries
Thank you for your kind attention.