AERIAL REFUELING
DSB TASK FORCE
Aerial Refueling DSB Task Force

KC-135 issues

- Are we in trouble
- How many do we need
- What makes sense for near-term steps
KC-135 Program of Record

- Retire 61 E-Models FY04-06/aircrews retained

<table>
<thead>
<tr>
<th>MDS</th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
<th>FY07</th>
<th>FY08</th>
<th>FY09</th>
<th>FY10</th>
<th>FY11</th>
</tr>
</thead>
<tbody>
<tr>
<td>KC-135E</td>
<td>112</td>
<td>71</td>
<td>63</td>
<td>63</td>
<td>63</td>
<td>63</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>KC-135R</td>
<td>417</td>
<td>417</td>
<td>417</td>
<td>417</td>
<td>417</td>
<td>417</td>
<td>417</td>
<td>417</td>
</tr>
<tr>
<td>KC-10</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>TOTAL</td>
<td>588</td>
<td>547</td>
<td>539</td>
<td>539</td>
<td>539</td>
<td>539</td>
<td>539</td>
<td>539</td>
</tr>
</tbody>
</table>

- Funding in FY05 President's Budget Request

<table>
<thead>
<tr>
<th>($M)</th>
<th>FY 06</th>
<th>FY 07</th>
<th>FY 08</th>
<th>FY 09</th>
<th>FY 10</th>
<th>FY 11</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>KC-135 Replacement</td>
<td>154.0</td>
<td>369.7</td>
<td>1,385.2</td>
<td>2,128.6</td>
<td></td>
<td></td>
<td>4,033.9</td>
</tr>
</tbody>
</table>
KC-135 History

- Total of 732 KC-135A airframes procured from the mid-50s to the mid-60s as an “interim tanker”
- Procured at rates of 75 to 100 year
- Current airframe average age of 44 years
- All upgraded to E or R models
  - Engine upgrade for E-models limits it to .8 fuel transfer capability of an R-model (KC-10 = 1.95xR-model)
Are we in Trouble?

• Fatigue life is 36K hours for an E and 39K for an R
  – Current airframe hours average at 16K
• Based on fatigue life, airframe capable to 2040
• Corrosion is asserted to be an increasing problem by USAF; is it severe enough or irreversible enough to change the replacement dynamics?
DSB Corrosion Findings

- Air Force has a robust corrosion control program
- Because these aircraft are in depot every 5 years, most have had 3 or 4 depot periods since corrosion became an issue in the late 80's
- Depot Major Structural Repairs (MSRs) appear to be decreasing
- Consensus view on corrosion was that it is manageable – DSB structural experts, commercial entities (FEDEX), other government entities (DoN and USAF 2001 ESLS)
Corrosion Control Program

- Air Force has robust program to deal with KC-135 corrosion and ageing
  - Field level maintenance and inspection
  - 60-month (or shorter) cycle for depot maintenance
  - Innovative procedures have reduced time in maintenance
  - Further improvements possible (sheltering, basing rotation)
Major Structural Repairs/ Aircraft in Depot*

MSR/Aircraft

Aircraft in Depot

*Data from Oct 2003 USAF “KC-135 Corrosion and Service Life Report”
USAF Estimates of 
KC-135 O&S Costs

• 2001 USAF Extended Service Life Study (ESLS) estimate of .9% increase per year (FY2001-FY2040)
• March, 2003 Letter from CJCS to Sen McCain states updated annual cost increase 1.5% (FY2003-FY2040)
• May, 2003 USAF Business Case Analysis (BCA) estimate of 6.5% annual cost increase (FY2003-FY2017)
Differences Between ESLS and BCA

• BCA updated ESLS cost estimate for
  – Phased Depot Maintenance (PDM)
  – Military personnel
  – Modifications

• MilPers and Mod changes apparently unrelated to aircraft aging

• PDM revision is based on observed growth of 18% in weighted average unit sales price (USP) compounded annually
  – Most-nearly-comparable ESLS data show growth of 3.2% compounded annually in total depot maintenance costs
Projection Based on USP Probably Overstates Future Growth

- USP is product of hours per aircraft and price per hour
  - Hours per aircraft have peaked and are budgeted to remain about level
  - Very recent AF projection shows price per hour peaked in FY04 and may turn down
Aircraft
Maintenance Trends

Planned Depot Maintenance (PDM) Hours

35,000 hours

Time
Now

PDM Hours

91 92 93 94 95 96 97 98 99 00 01 02 03 04 05 06 07


As of Mar 04

\[\text{NO OBJ if exceeded}\]
## Depot Hourly Rate

<table>
<thead>
<tr>
<th>FY</th>
<th>Sales Rate</th>
<th>Cost Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>96</td>
<td>$97</td>
<td>$89</td>
</tr>
<tr>
<td>97</td>
<td>$106</td>
<td>$93</td>
</tr>
<tr>
<td>98</td>
<td>$95</td>
<td>$95</td>
</tr>
<tr>
<td>99</td>
<td>$106</td>
<td>$100</td>
</tr>
<tr>
<td>00</td>
<td>$94</td>
<td>$127</td>
</tr>
<tr>
<td>01</td>
<td>$111</td>
<td>$140</td>
</tr>
<tr>
<td>02</td>
<td>$163</td>
<td>$131</td>
</tr>
<tr>
<td>03</td>
<td>$200</td>
<td>$148</td>
</tr>
<tr>
<td>04</td>
<td>$211</td>
<td>$188</td>
</tr>
<tr>
<td>05</td>
<td>$190</td>
<td>$199</td>
</tr>
</tbody>
</table>

Growth in overall O&S is marginal. Of figuring was overestimated (?).

Working capital and prices have a "noise" in data. A 79% increase, rate over 18%.
Preliminary Conclusions

• If you are willing to tolerate manageable growth in KC-135 O&S costs, you can defer major near-term recapitalization investments

• “But” such a decision also pushes the block obsolescence problem to the right

• Corrosion is manageable
What is the required capability?
Most Recent Study

- Tanker Requirements Study – 05 completed in FY01
  - Never promulgated
  - Concluded 500-600 R-equivalents adequate for 2 MTW or SIOP/1 MTW/1 SSC
  - Needs to be updated for changing tanker CONOPS
    - Potential Increases in Requirements
      - “Efficiency tanking” for loitering aircraft in kill boxes
      - The new planning scenarios
      - Homeland defense needs
    - Potential Decreases in Requirements
      - Potential re-engining of B-52’s
      - F-22/JSF CONOPS

100 tankers
Two Examples

• 2001 DSB Task Force recommended re-engining and February 2004 DSB Task Force re-confirmed value of B-52 re-engining:
  - 10K mile mission (US to Afghanistan and return) would only require one refueling versus two
  - Fuel offload demand declines from 276K pounds to 118K pounds

• F-22/JSF capabilities may allow refueling on mission egress only
# Tanker Tasking during OIF
(Snapshot on 27 March '03)

<table>
<thead>
<tr>
<th></th>
<th>Total Active Inventory</th>
<th>Possessed</th>
<th>FMC</th>
<th>Tasked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total KC-10s</td>
<td>59</td>
<td>50</td>
<td>45</td>
<td>48</td>
</tr>
<tr>
<td>Total KC-135s</td>
<td>480</td>
<td>400</td>
<td>344</td>
<td>271*</td>
</tr>
<tr>
<td>Totals</td>
<td>539</td>
<td>450</td>
<td>389</td>
<td>319</td>
</tr>
</tbody>
</table>

*14 of these missions were in support of homeland defense Noble Eagle

Did not analyze where these tankers were used because they were needed, or just by the hand them.
Updated Aerial Refueling Requirements

- Mobility Capabilities Studies scheduled over next 12 months
- Unknown unknowns for aerial refueling needs in 2015-2020, e.g., role of UAVs, force structure changes, CONOPS changes
What to do in the Near-Term?

- There is no compelling material or financial reason to initiate a replacement program prior to the completion of the AoA and the MCS.
- Block obsolescence of entire fleet suggests "some" recapitalization should begin in the near term (FY07?).
- Long term requirements will be resolved by MCS.
- If compelled to do something now, there are several options – 767 lease/buy, re-engine the KC-135Es, convert retired commercial aircraft, encourage commercial sources for CONUS tanking, …
Can Refurbished KC-10's Solve a Near Term Problem?

- FEDEX has converted retired DC-10s for use as cargo carriers with 20 year life
- Northwest flying 22 DC-10s, with average cycles less than 20K
  - Design Service Goal for DC-10 is 42K
  - 37 large DC-10s currently in the desert with average cycles of 18.5K;

\[ P = \frac{4575}{30} \text{ W/ nK} \]
Refurbished KC-10’s?

- Aerial refueling capability installation cost
  - IDA estimate is $20M/airframe over rehab cost estimates
  - Combined with cost to upgrade/rehab total package would be about $50M/airframe
- Dutch KDC-10 tanker conversion total cost approximately $45M each
- One KC-10 is the equivalent of 2.4 KC-135Es; replace the 63 remaining KC-135Es with 25 refurbished KC-10s?
Potential Hybrid Recap Program

- Retire 61 KC-135Es in near term (USAF plan) and make available to commercial entities for use as commercial tankers for CONUS missions such as training and homeland defense

- Phase out remaining 63 KC-135Es by FY11 and replacing with converted KC-10s by leveraging the stored DC-10s and the Northwest fleet
Potential Hybrid Recap Program (Cont’d)

- Work with major airframe manufacturers to develop new tanker options with more modern airframes versus the 20 year old 767 design
Conclusions

- Air Force Tanker Force is an essential element of our ability to project power
- Corrosion can be controlled
- KC-135 O&S growth is not as large as once projected
- Total requirement is uncertain (but clearly in the hundreds); MCS to resolve
- There is a need to embark on a major tanker recap program upon the completion of the AOA and the Mobility Capabilities Study (MCS)
  - Doesn’t necessarily mean new aircraft