Today’s Agenda

- U.S. Budget Analysis
- MRO Outlook
- Market Trends
U.S. Budget Analysis
The DoD budget reached a minimum in FY15.
The President’s FY17 Budget proposes slight increases in FY18-FY21 funding.
The FY17 request shifts money from procurement to O&M

<table>
<thead>
<tr>
<th>Category</th>
<th>FY16 Enacted</th>
<th>FY17 Request</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military Personnel</td>
<td>$138.5</td>
<td>$138.8</td>
<td>0.2%</td>
</tr>
<tr>
<td>Operations and Maintenance</td>
<td>$244.4</td>
<td>$250.9</td>
<td>2.7%</td>
</tr>
<tr>
<td>Procurement</td>
<td>$118.9</td>
<td>$112.1</td>
<td>-5.7%</td>
</tr>
<tr>
<td>Research, Development, Test and Evaluation</td>
<td>$69.0</td>
<td>$71.8</td>
<td>4.1%</td>
</tr>
<tr>
<td>Military Construction</td>
<td>$1.3</td>
<td>$1.5</td>
<td>15.4%</td>
</tr>
<tr>
<td>Family Housing</td>
<td>$6.9</td>
<td>$6.3</td>
<td>-8.7%</td>
</tr>
<tr>
<td>Revolving Funds</td>
<td>$1.3</td>
<td>$1.3</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$580.3</strong></td>
<td><strong>$582.7</strong></td>
<td><strong>0.4%</strong></td>
</tr>
</tbody>
</table>

U.S. Budget Commentary

- Total O&M budgets increase by over $6B in the FY17 request
- Thirteen air force squadrons that stood down under sequestration will have full flying hours restored
- LRS-B design work ramping up
- Initial Sixth-gen fighter R&D beginning

2016-2017 Total Budget (US $ Billions)
O&M budgets are increasing across the board, with the largest increase coming from DoD-wide funding.

**DoD-Wide O&M**
- Increased USSOCOM funding
- Funding for

**Air Force O&M**
- Flying hour program now fully funded
- 10% increase in base budget depot maintenance
- Increased OPTEMPO for both fighters and bombers

**Navy O&M**
- Increasing aviation depot staffing
- Flying hours projected to be roughly flat
- Increase in F-18 depot throughput

**Army O&M**
- Slight decrease in base budget flying hours through decrease in OPTEMPO
- Army Aviation funding down significantly from Iraq/Afghanistan peak

Source: DoD FY 2017 O&M Overview
Depot maintenance accounted for nearly $26B (or 35%) of the total DoD FY15 maintenance budget.

- **DoD Maintenance:**
  In FY15, total maintenance accounted for $74B of the O&M budget, 47% of which was outsourced.

- **Depot Maintenance:**
  Including OCO funding, total depot maintenance increased by nearly 4% in the latest budget request.

- In FY15, depot maintenance accounted for 35% of total DoD maintenance.

Note: Includes OCO funding.
Source: DoD Maintenance Factbooks, FY2017 O&M Overview
Fighter/Attack and Trainer aircraft will bear the brunt of the reductions.

The DoD’s FY16-45 Aviation Plan calls for a reduction in aircraft inventory from 13,900 to 12,950 by FY2025.

**Total Aircraft Inventory**

*2016 to 2025*

Source: DoD Annual Aviation Plan 16-45
A dramatic increase in defense spending in Russia and China is driving a response from neighboring countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>2010-14 Defense Budget Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>-12.0%</td>
</tr>
<tr>
<td>Canada</td>
<td>-10%</td>
</tr>
<tr>
<td>Mexico</td>
<td>+47%</td>
</tr>
</tbody>
</table>

- U.S. Budget Bottomed out in FY15
- Newly Elected Canadian Government will set tone for Defense

<table>
<thead>
<tr>
<th>Country</th>
<th>2010-14 Defense Budget Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>+44%</td>
</tr>
<tr>
<td>Poland</td>
<td>+20%</td>
</tr>
<tr>
<td>Germany</td>
<td>~0.0%</td>
</tr>
<tr>
<td>France</td>
<td>~0.0%</td>
</tr>
<tr>
<td>UK</td>
<td>+4.1%</td>
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- The continued fight against ISIS has stopped the defense budget freefall in some European countries, while emerging economies continue to increase budgets
- While falling commodity prices have affected the Russian economy, total defense spending has increased dramatically

<table>
<thead>
<tr>
<th>Country</th>
<th>2010-14 Defense Budget Δ</th>
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</thead>
<tbody>
<tr>
<td>India</td>
<td>+8%</td>
</tr>
<tr>
<td>Pakistan</td>
<td>+43%</td>
</tr>
<tr>
<td>China</td>
<td>+75%</td>
</tr>
<tr>
<td>S. Korea</td>
<td>+33%</td>
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- Budget growth is rapid in Asia with a major emphasis on new weapons systems
- Japan passed law to allow export of defense items
- Indian Air Force inked deal with Dassault for $30B for Rafale

Source: SIPRI. In current USD published figures
Note: Data includes SIPRI estimates of total defense-related expenditures, which may differ from government
Many countries in the Middle East and Asia drastically increased defense spending between 2010 and 2014.
MRO Forecast
In 2015, global military MRO spending nearly returned to the 2012 peak of $69B.
North America and Asia Pacific have the largest active fleets

Military Aircraft Fleet Commentary
- Includes most Western turbine-powered aircraft, and Eastern turbine-powered aircraft where data is available
- Asia Pacific has eclipsed Europe as 2nd largest region
- Helicopters make up over 35% of the active fleet by units

By Aircraft Type
- Fighter / Attack: 34%
- Rotary Wing - Attack: 12%
- Trainer / Light Attack: 8%
- Transport - Lt/Lt/Med: 6%
- GA / Utility: 6%
- Other: 4%

By Global Region
- North America: 29%
- Asia Pacific: 26%
- Europe: 22%
- Middle East: 10%
- Latin America: 7%
- Africa: 6%
- Other: 7%
MRO spending reached $68.8B in 2015, with 50% being field maintenance.
The UH-60/S-70, F-35, and AH-64 will each deliver more than 1,000 units between 2015 and 2024.

**Aircraft Deliveries**
- The AH-64 and CH-47 will continue deliveries of new and remanufactured airframes.
- F-35 Block 3F capability will spur rate increases and help firm international orders.
- Eurofighter and Rafale both experiencing limited export success.

**Military Aircraft Deliveries 2015–2024**

Source: ICF analysis.
Note: Western-aircraft only.
The global military fleet will grow slowly at 1% per year.

**Fleet Outlook**

- Global fleet growth is driven by Asia Pacific and Middle Eastern operators.
- India, South Korea, and Japan are driving Asia Pacific.
- Saudi Arabia and Iraq account for over 500 of the net 550 aircraft increase in Middle East.

Source: ICF International; Forecast in 2015 $USD, exclusive of inflation.

**10 Year Global Fleet Growth**

- **Africa**
- **Latin America**
- **Middle East**
- **Europe**
- **Asia Pacific**
- **North America**

2015: 51,104
2024: 55,765

CAGR:
- 8.2%
- 0.7%
- 1.1%
- (0.3%)
- 0.7%
- 0.2%

1.0% Avg.
Military MRO will grow at 1.5% per annum until 2024

MRO Outlook

- Africa, Middle East, and Asia Pacific have the highest overall MRO growth rate
- North America will have the largest increase in value, from $29.5B in 2015 to $32.5B in 2024
- Middle Eastern MRO is driven by largely by increases in Saudi Arabia, Israel, and UAE

Source: ICF International; Forecast in 2015 $USD, exclusive of inflation
Utility helicopters account for approximately half of the total increase in MRO spend between 2015 and 2024.

Source: ICF analysis
Trends
Shifting fleet demographics and the continued drive for cost reduction are the most important trends impacting military MRO.

**Fleet Demographics**
- The introduction of new platforms and consolidation of MRO spend into fewer large platforms will drive change.
- Establishing capability on growth platforms will be key for suppliers.

**Drive for Cost Reduction**
- Countries are more likely to use PMA/DER, and surplus material to support legacy fleets.
- Increased outsourcing and use of performance based contracts.
Changing fleet demographics are influencing parts buying behavior, spurring global investments in new capabilities, and shifting the key platforms driving MRO spend.
A wave of retirements will create opportunities in the secondary market

- Older F-16, AH-64, F-18, and CH-47 models will be retired as Tier 1 countries buy new aircraft and upgraded variants
- Some of these will likely find new secondary operators
- Those aircraft that are retired will be candidates for part-outs
- A growing cadre of suppliers are focusing on military aircraft surplus

Source: ICF analysis
While overall market growth will be steady, underlying shifts in the installed base will cause dramatic changes in MRO spend at the platform level.

- The top five growth platforms will drive a $7.5B increase in MRO demand, while the five platforms with the greatest decline will decrease MRO demand by over $3B by 2024.

- The shift in key platforms will force suppliers to establish new capabilities and partnerships and reevaluate strategies to ensure success on the emerging generation of aircraft.

Source: ICF analysis
Note: Assumes aircraft retirements with no secondary/tertiary operators.
The F-35 is driving the establishment of new MRO facilities across the globe

- In late 2014, initial MRO&U centers announced by JSF Program Office
- Turkey (engines) and Alenia (airframe) in Italy will establish initial capabilities by 2018
- Additional maintenance tenders in bidding process – South Korea, Israel hope to establish MRO centers
- ICF estimates the F-35 will generate nearly $15B in MRO demand between 2015 and 2024

Source: JSF Program Office
The Better Buying Power program may drive a further shift away from traditional cost-plus and fixed-fee contracts.

**BBP 3.0**

- Originally launched in 2010, Better Buying Power is the DoD’s umbrella cost reduction & productivity improvement initiative.
- BBP 3.0 is the newest iteration of the policy implemented in 2015.
- Focuses on using effective contracting to align supplier and DoD goals, less burdensome contracting requirements, and use of commercial best practices where appropriate.

**BBP 3.0 Themes and Goals**

- "Align profitability more tightly with Department goals" (BBP 3.0 Themes and Goals)
- "Employ appropriate contract types, but increase the use of incentive-based contracts" (BBP 3.0 Themes and Goals)
- "Ensure effective use of Performance-Based Logistics" (BBP 3.0 Themes and Goals)
In certain instances, the military has embraces commercial cost reduction measures like PMA, surplus, and DER repairs.

**KC-10 CLS**
- The KC-10 CLS contract was awarded to Northrop Grumman in 2009
- Chromalloy and MTU are engine maintenance partners
- Contract is currently in the process of re-bid
- The Air Force has indicated its preference to continue using PMA & DER in response to bidder questions

The KC-10 program has served as a case study for alternative MRO materials.

“When compared to the previous engine contract, we are pleased that the U.S. Air Force is saving more than $1M per engine shop visit. $500,000 of savings per engine is attributable to the use of alternative materials and repairs.”

- Chromalloy 2011

In response to bidder questions regarding “concerns over the amount of PMA & DER that has been introduced to the engines over the past few years”, the Air Force answered:

“The government understands the use of Parts Manufacturing Authority (PMA) parts and Designated Engineering Representative (DER) repairs. The government has no requirement to return the engine to original OEM state”

- 2015 KC-10 Engine CLS RFP

Source: Northrop Grumman, Chromalloy, FedBizOpps
THANK YOU!

For questions regarding this presentation, please contact:

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