Today’s Agenda

- MRO Forecast
- Meet the Frackers!
- The *not-so-mighty-mighty* BRIC House
- The Next Big Thing!
MRO Forecast
The current commercial air transport fleet consists of over 27K aircraft.

2015 Global Commercial Air Transport Fleet

By Aircraft Type:
- Narrowbody Jet: 53%
- Regional Jet: 14%
- Widebody Jet: 19%
- Turboprop: 14%

By Global Region:
- Asia Pacific: 31%
- Europe: 25%
- North America: 27%
- Latin America: 8%
- Middle East: 5%
- Africa: 5%

Source: CAPA 2015
The combination of strong air travel demand and the need to replace ageing aircraft will drive fleet growth at 3.4% annually.

- Air travel growth of ~4.1%
- Fuel costs in $55/bbl range
- ~19,600 aircraft deliveries
- ~8,800 aircraft retirements

Source: ICF International, CAPA 2015
Current air transport MRO demand is $64.3B; with Asia equivalent to North America and Europe in market size.
The global MRO market is expected to grow by 4.1% per annum to $96B by 2025

- The strongest drivers of growth are the engine and component markets
- Reduced labor intensity of airframe heavy checks as the fleet renews and increased intervals...offset in emerging markets by increasing labor rates
- Aircraft upgrades (e.g. interiors, winglets) drive high modifications growth

Source: ICF International; Forecast in 2015 $USD, exclusive of inflation
The current Latin American commercial air transport fleet consists of over 2,100 aircraft.

2015 Latin American Commercial Air Transport Fleet

By Aircraft Type

- Narrowbody Jet: 51%
- Turboprop: 16%
- Regional Jet: 8%
- Widebody Jet: 25%

By Country

- Brazil: 28%
- Mexico: 17%
- Colombia: 11%
- Venezuela: 7%
- Chile: 6%
- Argentina: 6%
- Panama: 5%
- Other: 21%

Source: CAPA 2015
The Latin American MRO market is expected to grow to approx. $6.3B by 2025, at 5.7% per annum

- Latin American MRO growth is driven by continued narrowbody aircraft deliveries
- MRO spend on widebodies in Latin America will also nearly double by 2025 as the fleet increases by 56%
- With the anticipated fleet growth, the strongest MRO spend areas will be for engines and components

Source: ICF International; Forecast in 2015 $USD, exclusive of inflation
Meet the Frackers!
Breakthrough technologies in horizontal drilling and hydraulic fracturing (aka fracking) resulted in a US-led energy revolution.

North American crude oil and natural gas production have soared in recent years...

U.S. Crude Oil Production
(Barrels / day)

10 year growth = 105% (7.45% CAGR)

U.S. Natural Gas Production
(Monthly marketed production)

10 year growth = 66% (5.22% CAGR)

Source: ICF International analysis
The US energy revolution has completely upset the global economic and geopolitical balance of power.

...making the U.S. a global powerhouse in energy production

**Global Oil Production**
(Million barrels / day as of June 2015)

<table>
<thead>
<tr>
<th>Country</th>
<th>Production (MMb/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>11.5</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>11.6</td>
</tr>
<tr>
<td>Russia</td>
<td>10.8</td>
</tr>
<tr>
<td>Canada</td>
<td>4.3</td>
</tr>
<tr>
<td>China</td>
<td>4.2</td>
</tr>
<tr>
<td>UAE</td>
<td>3.7</td>
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<tr>
<td>Iran</td>
<td>3.6</td>
</tr>
<tr>
<td>Iraq</td>
<td>3.3</td>
</tr>
<tr>
<td>Kuwait</td>
<td>3.1</td>
</tr>
<tr>
<td>Mexico</td>
<td>2.8</td>
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</tbody>
</table>

**Global Natural Gas Production**
(Billions of cubic meters as of June 2015)

<table>
<thead>
<tr>
<th>Country</th>
<th>Production (Bcm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>728</td>
</tr>
<tr>
<td>Russia</td>
<td>579</td>
</tr>
<tr>
<td>Qatar</td>
<td>177</td>
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<tr>
<td>Iran</td>
<td>173</td>
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<tr>
<td>Canada</td>
<td>162</td>
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<tr>
<td>China</td>
<td>135</td>
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<td>Norway</td>
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<tr>
<td>Saudi Arabia</td>
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<td>Algeria</td>
<td>83</td>
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<td>Indonesia</td>
<td>73</td>
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</tbody>
</table>

Source: BP Statistical Review of World Energy June 2015, ICF International Analysis
The potential for sustained reduction in oil revenues could further destabilize many already fragile economies.

Low oil prices are exerting tremendous stress on economies dependent on energy exports.

National Government Fiscal Budgets’ Break-Even Oil Price (2014)

Source: BP Statistical Review of World Energy June 2015, ICF International Analysis
Continued low fuel costs will have significant repercussions throughout the aviation & MRO supply chain.

Aviation fuel costs have dropped over 55% during the past 24 months.

**U.S. Gulf Coast Jet Fuel Price per Gallon**

Source: EIA; ICF International analysis
Continued low fuel costs will have significant repercussions throughout the aviation & MRO supply chain.

Aviation fuel costs have dropped over 55% during the past 24 months.

Global Airline Profitability

Source: EIA; ICF International analysis
The Not-So-Mighty-Mighty BRIC House
China’s seemingly insatiable demand for global commodities was a key driver of the BRICS economic growth.

After years of staggering GDP growth, China’s economy has been steadily slowing.

Source: IMF, World Economic Outlook Database October 2015, ICF International Analysis.
Latin American economies must continue to diversify away from commodities in order to minimize the adverse economic impact of plunging commodity prices.
The dramatic increase in oil & gas market supply and reduced demand for commodities has led to a stronger US Dollar.

**FOREX Impact**
- Partially offsets the positive impact of low fuel costs for operators
- Increases the cost of dollar based flight hour agreements (and parts/material in general)
- Cost of labor for in-country MROs is cheaper driving up margins for US dollar based contracts

Source: Oanda historical exchange rates, ICF International Analysis
Latin America GDP growth continues to be negatively impacted by the global economic slowdown (more specifically China and commodities).

Note: All GDP Growth are calculated based on constant price (nation currency)
Source: IMF Economic Outlook Oct 15
While North American carriers are enjoying historic profitability, Latin American carriers continue to struggle.

Source: Company websites, IATA, ICF International Analysis
March of the Middle East Titans; coming soon to an airport near you!

Emirates announces the world's longest non-stop flight; Dubai to Panama City that lasts 17 hours and 35 minutes

**European Secondary Airports**

*Average Number of Seats per Departure in 2015*

<table>
<thead>
<tr>
<th>Airport</th>
<th>Gulf Carriers</th>
<th>Non-Gulf Carriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcelona</td>
<td>333</td>
<td>174</td>
</tr>
<tr>
<td>Duesseldorf</td>
<td>328</td>
<td>141</td>
</tr>
<tr>
<td>Glasgow</td>
<td>354</td>
<td>121</td>
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<tr>
<td>Hamburg</td>
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<td>Lyon</td>
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<td>Manchester</td>
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<td>Munich</td>
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<td>150</td>
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<tr>
<td>Nice</td>
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<td>109</td>
</tr>
<tr>
<td>Newcastle</td>
<td>354</td>
<td>121</td>
</tr>
<tr>
<td>Venice</td>
<td>264</td>
<td>148</td>
</tr>
</tbody>
</table>

Lufthansa’s Frankfurt hub has lost nearly a 3rd of its market share on routes between Europe and Asia since 2005, with more than three million people now flying annually from Germany to other destinations via Gulf hubs – The Economist

Source: OAG Data, ICF International Analysis
The Next Big Thing...
ICF believes that virtual reality (VR) technology will be as disruptive to MRO training as 3D-printing is to parts manufacturing.
In Summary…

- The US energy revolution has disrupted global economics and geopolitics
- The economic slowdown in China has dramatically impacted commodity export dependent BRICS
- Latin America’s exposure to commodity prices and impact of currency exchange rates will continue to drive economic headwinds in the region
- Virtual reality has the ability to transform the way technicians are trained
THANK YOU!

For questions regarding this presentation, please contact:

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ICF provides a full range of MRO advisory services

- Market Research & Analysis
- Airline Maintenance Benchmarking
- M&A Commercial Due Diligence
- OEM Aftermarket Strategy
- Aviation Asset Valuations & Appraisals
- MRO Information Technology (IT) Advisory
- Strategic Sourcing & Supply Chain Mgt.
- LEAN Continuous Process Improvement
- Military Aircraft Sustainment
ICF is one of the world’s largest and most experienced aviation & aerospace consulting firms

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  - Blend of consulting professionals and experienced aviation executives
- Specialized, focused expertise and proprietary knowledge
- Broad functional capabilities
- More than 10,000 private and public sector assignments
- Backed by parent company ICF International (2014 revenue - $1.05B)
- Global presence — offices around the world

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- Airports