WORLD CARGO SYMPOSIUM

13th

MARINA BAY SANDS – SINGAPORE

12 – 14 March 2019
Focus on Freighters Track

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Last Night’s Gala Dinner Kindly Sponsored by:

SINGAPORE AIRLINES
Welcome Address and Opening Remarks

Tom Crabtree
Regional Director, Marketing Analysis
Boeing Commercial Airplanes
Setting the Scene for the Freighter Outlook

Brian Pearce
Chief Economist
IATA
Backdrop to the freighter market

Brian Pearce
Chief Economist

14 March 2019
FTKs have not grown for more than 12 months.

Source: IATA Economics using data from IATA Statistics.
Recent weakness is widespread

Growth in FTKs by market segment

Source: IATA Economics using data from IATA Statistics
Export orders point to further decline in near term

Export orders and FTK growth

Source: IATA Economics using data from Thompson Reuters Datastream, IATA Statistics
The problem is weakening world trade, not GDP

Global GDP and world trade growth

Source: IATA Economics using data from Oxford Economics and the Netherlands CPB
Slower but continued GDP growth expected

Source: IATA Economics using data from Markit, IMF World Economic Outlook January 2019
US-China tariffs depressed cargo at year-end

Source: IATA Economics using data from Thompson Reuters Datastream

Export and import volumes growth

- US imports
- Emerging Asia exports
- EU28 imports

% change year-on-year
China/US trade matters

Share of world trade, %

China
US
Germany
Japan
India

Source: IATA Economics using data from Oxford Economics
Trade outlook forecast to improve

Source: IATA Economics using data from Oxford Economics
A pause in globalization constrains the outlook

Source: Netherlands CPB, UNCTAD Eora database, Datastream
Reasons for optimism on share of world trade

Ratio of FTKs to world trade volume

Sources: IATA Economics using data from the IMF World Economic Outlook Database, IATA Statistics
Weak 2019 outlook but improving trend

Source: IATA Economics 5-year Air Freight Forecast, March 2019
Thank you

Brian Pearce
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www.iata.org/economics
The Future of Freighters

Frederic Horst
Managing Director
Cargo Facts Consulting
THE FUTURE OF FREIGHTERS

Frederic Horst, Managing Director
fhorst@cargofacts.com

IATA WCS, Focus on Freighters Track,
14 March 2019
OUTLINE

- THE WORLD FREIGHTER FLEET: THEN, NOW AND THE FUTURE
- WHAT’S DRIVING DEMAND AND SUPPLY IN EACH SEGMENT?
- WHAT’S AVAILABLE TO OPERATORS?
- DOES THIS MEET THEIR REQUIREMENTS?
Cargo Facts Consulting
Freighter Forecast 2018-2037 covers both the outlook for jet freighters and turboprop and regional jets.

Includes interactive forecasting tool.
Currently, there are 1780 jet freighters in operation, plus another 240 turboprops and regional jets.

<table>
<thead>
<tr>
<th>Narrowbody</th>
<th>Medium Widebody</th>
<th>Large Widebody</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 40 tonnes</td>
<td>40 - 80 tonnes</td>
<td>&gt; 80 tonnes</td>
</tr>
<tr>
<td>671 Total Units</td>
<td>544 Total Units</td>
<td>565 Total Units</td>
</tr>
<tr>
<td>7 BAe 146</td>
<td>9 A310-200/-300s</td>
<td>16 DC-10-30/-40s</td>
</tr>
<tr>
<td>21 DC-9, 6 MD-80</td>
<td>10 A300B4s</td>
<td>117 MD-11s</td>
</tr>
<tr>
<td>12 B737-200</td>
<td>171 A300-600s</td>
<td>152 B777s</td>
</tr>
<tr>
<td>43 B727-100/-200s</td>
<td>41 A330F &amp; P2Fs</td>
<td>45 747-400SF/BCF</td>
</tr>
<tr>
<td>125 737-300, 135 737-400</td>
<td>56 B767-200s</td>
<td>152 B747-400F/ERF</td>
</tr>
<tr>
<td>3 B737-700s, 8 B737-800s</td>
<td>237 767-300s</td>
<td>83 B747-8s</td>
</tr>
<tr>
<td>4 TU-204C</td>
<td>20 DC-10-10s</td>
<td></td>
</tr>
<tr>
<td>307 757-200s</td>
<td></td>
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</tbody>
</table>

Source: Cargo Facts Consulting, March 2019
Overall, two thirds of the world’s fleet are flown by or for express or postal operators, and increasingly, e-commerce companies.

Source: Cargo Facts Consulting, March 2019
The world’s freighter fleet has been growing again since 2014. The world fleet grew by about 70 freighters in 2018.

Source: Cargo Facts Consulting, March 2019
Over 2400 freighters are needed for replacement and growth by 2037.

Source: Cargo Facts Consulting 2018-2037 Freighter Forecast
SUPPLY AND DEMAND DRIVERS DIFFER IN EACH SEGMENT.

- Large Widebodies – 50% fleet growth in 20 years
  - Driven intercontinental trade and commerce
  - Factory built freighters rule
  - Declining freighter share of traffic

- Medium widebodies and narrowbodies – 63% and 80% fleet growth in 20 years
  - Driven by growth in regional express networks and e-commerce
  - Conversions are king
WHAT HAPPENS IF KEY ASSUMPTIONS CHANGE?

- Traffic growth – 4% baseline
- Freighter productivity growth – 1% baseline
- Belly share – 50:50 now moving to 60:40
- Cargo Facts Consulting Freighter Tool shows subscribers the impact of changes to assumptions.
### Options for freighter operators now.

<table>
<thead>
<tr>
<th></th>
<th>Narrowbodies</th>
<th>Medium Widebodies</th>
<th>Large Widebodies</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facing near-term extinction</strong></td>
<td>DC-9, DC-8, 707, 727s, Bae 146, 737-200</td>
<td>DC/MD10-10, A300B4s, A310s</td>
<td>747F Classic, DC-10-30F/40F</td>
</tr>
<tr>
<td><strong>At peak use, or with little future growth potential</strong></td>
<td>MD-80 (niche player)</td>
<td>767-200, A300-600, A330-200F (?)</td>
<td>747-400F/ERF, 747-400SF/BCF, MD-11F</td>
</tr>
<tr>
<td><strong>Expanding role going forward</strong></td>
<td>737-300/400, 757-200</td>
<td>767-300F/SF/BCF, A330(P2F)</td>
<td>777F, 747-8F (?)</td>
</tr>
</tbody>
</table>
NEW OPTIONS FOR FREIGHTER OPERATORS IN THE FUTURE.

- Narrowbodies: 737 NGs, A320/321s
- Medium Widebodies: A330 conversions, 787s
- Large widebodies: A350, 777 conversions, 777X
What will happen to outsize markets once the 747 disappears?

Will we ever see a factory built 747 freighter life extension program?

Will we ever see a 747 with two engines?

What happens if there is no factory built A350 or 777X Freighter?

What happens if densities change?
NEW FORECAST WILL BE PRESENTED IN APRIL AT CARGO FACTS ASIA

APRIL 15-17 / LANGHAM SHANGHAI

YOUR GATEWAY TO OPPORTUNITY
The Leading Air Cargo Consultancy Since 1978
The Boeing Freighter Fleet Forecast Through 2037

Tom Crabtree
Regional Director, Marketing Analysis
Boeing Commercial Airplanes
Freighter fleet evolution

Tom Crabtree | Boeing Commercial Airplanes, Market Analysis

14 March 2019
World air transport revenue: passenger versus cargo

Total world air transport revenue totaled $634 billion USD in year 2017.

- Passenger: $534 billion (84%)
- Cargo: $100.2 billion (16%)

Freighters are critical to compete in air cargo markets
Airlines operating freighters generate nearly 90% of industry revenues

2017

- Express Carriers: $42.9B
- Combination Carriers: $36.3B
- All Cargo: $9.1B
- Passenger Belly Only: $11.9B

TOTAL: $100.2B

Sources: www.flightglobal.com, U.S. DOT F41, airline reports, and Boeing estimates (2017 data)
Air cargo demand slowing; yet holding up against difficult “comps”

Year-over-year RTK (traffic) and AFTK (capacity) growth

Sources: IATA Monthly Statistics, Boeing Market Analysis
Air cargo demand slowing, yet holding up against difficult “comps”

Air cargo slowing due to decelerating industrial production and geopolitical uncertainty

Sources: Oxford Economics, RTKs: IATA, Boeing Market Analysis

Leading indicators point to long-term trend air cargo growth
Air cargo yields are up 22% since 2016
All-in air cargo rate, USD/kilogram (general freight only)

Source: IATA CargoIS
Air cargo is a growth business

World air cargo traffic has grown 5.3% per year since 1980

RTKs = Revenue Tonne Kilometers

Sources: IATA, ICAO, company reports, Boeing Market Analysis

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East Asia will lead cargo industry growth

RTKs (billions)

<table>
<thead>
<tr>
<th>Region</th>
<th>2017 RTKs</th>
<th>2018-2037 RTKs</th>
<th>Annual growth %</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Asia–North America</td>
<td></td>
<td></td>
<td>4.7%</td>
</tr>
<tr>
<td>East Asia-Europe</td>
<td></td>
<td></td>
<td>4.7%</td>
</tr>
<tr>
<td>Intra-East Asia</td>
<td></td>
<td></td>
<td>5.8%</td>
</tr>
<tr>
<td>North America</td>
<td></td>
<td></td>
<td>2.3%</td>
</tr>
<tr>
<td>Europe–North America</td>
<td></td>
<td></td>
<td>2.5%</td>
</tr>
<tr>
<td>Domestic China</td>
<td></td>
<td></td>
<td>6.3%</td>
</tr>
<tr>
<td>Europe-Latin America</td>
<td></td>
<td></td>
<td>4.0%</td>
</tr>
<tr>
<td>Latin America–North America</td>
<td></td>
<td></td>
<td>4.1%</td>
</tr>
<tr>
<td>Africa-Europe</td>
<td></td>
<td></td>
<td>3.7%</td>
</tr>
<tr>
<td>South Asia–Europe</td>
<td></td>
<td></td>
<td>4.2%</td>
</tr>
<tr>
<td>Middle East–Europe</td>
<td></td>
<td></td>
<td>3.2%</td>
</tr>
<tr>
<td>Russia and Central Asia</td>
<td></td>
<td></td>
<td>3.0%</td>
</tr>
<tr>
<td>Intra-Europe</td>
<td></td>
<td></td>
<td>2.3%</td>
</tr>
</tbody>
</table>

World Air Cargo Growth: 4.2%
Freighters comprise 7.6% of the world commercial jet transport fleet.
World passenger jet airplane fleet: Single aisle fleet continues to expand the fastest

Passenger fleet units

Sources: Cirium, Boeing CMO
World freighter jet airplane fleet: Up-gauging of freighter fleet size continues

Sources: Cirium, Boeing CMO
Freighter demand – 980 new, 1,670 converted
Freighters will continue to account for more than 50% of world air cargo traffic carried

Percentage of world RTKs carried on freighters

Average world air cargo traffic growth of 4.3%

Average world air cargo traffic growth of 2.6%

World Air Cargo Forecast growth of 4.2%

Sources: IATA, ICAO, company reports, Boeing Market Analysis

* Forecast

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Freighters playing key role in major east-west markets

Total air cargo traffic carried by freighters (percentage)

~75% ~75% ~40%

Sources: US DOT T100, OAG, Boeing Market Analysis
Freighters will remain the backbone of the world air cargo industry

Passenger lower-hold capacity, while plentiful, is not sufficient to meet air cargo traffic demand

- Most passenger belly capacity does not serve key cargo trade routes
- Twin-aisle passenger schedules often do not meet shipper timing needs
- Freight forwarders prefer palletized capacity, which is not available on single-aisle aircraft
- Passenger bellies cannot serve hazmat and project cargo
- Payload-range considerations on passenger airplanes may limit cargo-carriage
Boeing provides more than 90% of world’s freighter capacity

Weekly freighter available tonne-kilometers (ATKs, billions)

SOURCES: Cirium, Boeing for year-end 2017 fleet
Large freighter fleet is modernizing

In-service freighter aircraft

Sources: Cirium, Boeing as of 31 December 2018
The only complete family of freighters

Boeing family of commercial freighters

Revenue payload tonnes

747-8F

Large freighters
>80 tonnes of payload

777F

Medium widebody freighters
40-80 tonnes of payload

767-300F
767-300BCF

Standard-body freighters
<45 tonnes of payload

737-800BCF
World air cargo traffic slowed in 2018, expanding about 4% over 2017

World air cargo traffic forecast to grow 4.2% per year through 2037

Freighters carry - and will continue to carry – more than ½ of all cargo traffic

The world freighter fleet will expand to 3260 airplanes over the next 20 years
WORLD AIR CARGO FORECAST
2018—2037

http://www.boeing.com/commercial/market/cargo-forecast
Networking Break
10:30 to 11:15 in Roselle Simpor Ballroom
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France Cargo Handling
Airline Expectations – Challenges and Opportunities in 2019

Panel Chair:
• Mr. David Hoppin, Senior Vice President, Cirium

Panelists:
• Dr. Anselm Eggert, VP Strategy, Portfolio & Cooperation, Lufthansa Cargo
• Mr. Peter Penseel, SVP Cargo Sales and Network Planning, Qatar Airways Cargo
• Mr. Michael Steen, Executive VP & Chief Commercial Officer, Atlas Air
Closing Remarks

Tom Crabtree
Regional Director, Marketing Analysis
Boeing Commercial Airplanes
Focus on Freighters Track
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