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16th MAINTENANCE

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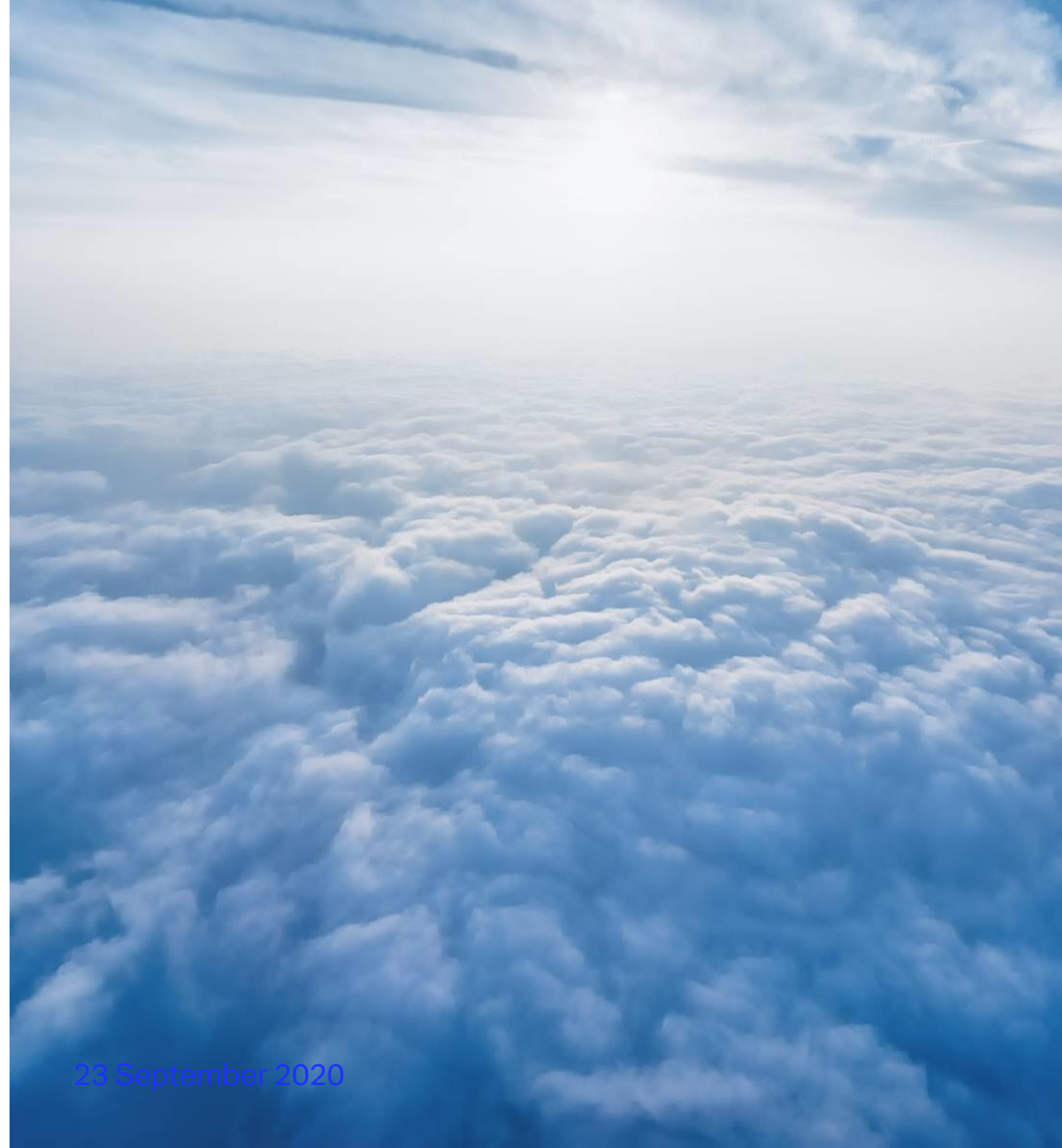
WEBINAR SERIES

**Episode 3:
How COVID-19 is
reshaping the aircraft
leasing and MRO businesses?**

Wed. 23 September 2020 - 7:30-9:30am EDT



- This session is **recorded**.
- Your mic is automatically **muted**.
- Use the **Q&A feature** on the right side of your screen to submit your questions to our panelists



Competition Law Guidelines

IATA's Legal Anti-Trust Counsel will
be screening the questions



Daniel Kanter

Assistant General
Counsel, IATA

kanterd@iata.org

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Episode 3 - Agenda

- Role of the [MCC](#)
- MCTG Data collection
⇒ www.iata.org/mctg
- [IATA resources about COVID](#)
- Q&A

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Our moderator today:



Chris MARKOU

Head, Operational Cost
Management – IATA

markouc@iata.org

MCC 2020 Final Episode

Episode 4 – Sept 30

(7:30am EDT or 1:30pm in GVA or 7:30pm SIN)

- The role of used serviceable material (USM) in the industry restart

Visit www.iata.org/mcc to register

Watch previous episodes
www.iata.org/mcc-2020

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Episode 3 - Agenda

- 00:00 - Opening Remarks & Introductions
- 00:05 – Avitas + Q&A (10')
- Trends in Aircraft/Engine Leasing
 - 00:35 – GECAS
 - 00:47 – ELFC
 - 00:59 – Jazz Aviation
 - 01:11 – Q&A
- Trends in MRO Market
 - 01:21 – ICF
 - 01:33 – Delta TechOps
 - 01:45 – Q&A
- 01:58 - Episode 3 Wrap-up

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Introductions



Adam PILARSKI

Senior VP - Avitas

Adam.Pilarski@AVITAS.com



Mark LYNCH

SVP Engineering and Material Solutions - GECAS

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Richard HOUGH

Chief Technical Officer - ELFC

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Tiymor KALIMAT

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Sonny STERN

VP Sales, MRO Services - Delta TechOps

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Martin HARRISON

Global Managing Director - ICF

Martin.Harrison@icf.com



In the medium & long term how will MROs and lessors reshape their businesses?

IATA 16th Maintenance Cost
Conference

Adam Pilarski,
Senior Vice President, AVITAS, Inc.
September 23, 2020

AVITAS[®]

**How to predict the future in these
uncertain times?**

Can we predict the future?



**Present situation – no doubt about it.
Social distancing is not conducive to
aviation**

Is this the “once in a lifetime event”?

Is this the end of aviation?

In addition to the virus we have other problems

- **When traffic collapses by 90+% it is hard to see “normal” problems**
- **Virus reality a medical phenomenon – still unknown, strength, waves, vaccinations, drugs**



- **We are in a major economic recession**
- **We experienced an extended bubble which had to burst (remember – “everything is awesome”?)**
- **Even if we did not have the virus, we would have had an economic recession and a bursting bubble**

Future of aviation



Passengers Return to 2019 Levels by ~2023

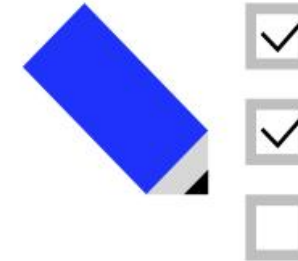
Year	GDP as a Percentage of 2019 GDP	RPKs as a Percentage of 2019 RPKs
2020	91.3%	37.3%
2021	98.6%	71.6%
2022	102.0%	88.9%
2023		97.9%
2024		102.6%



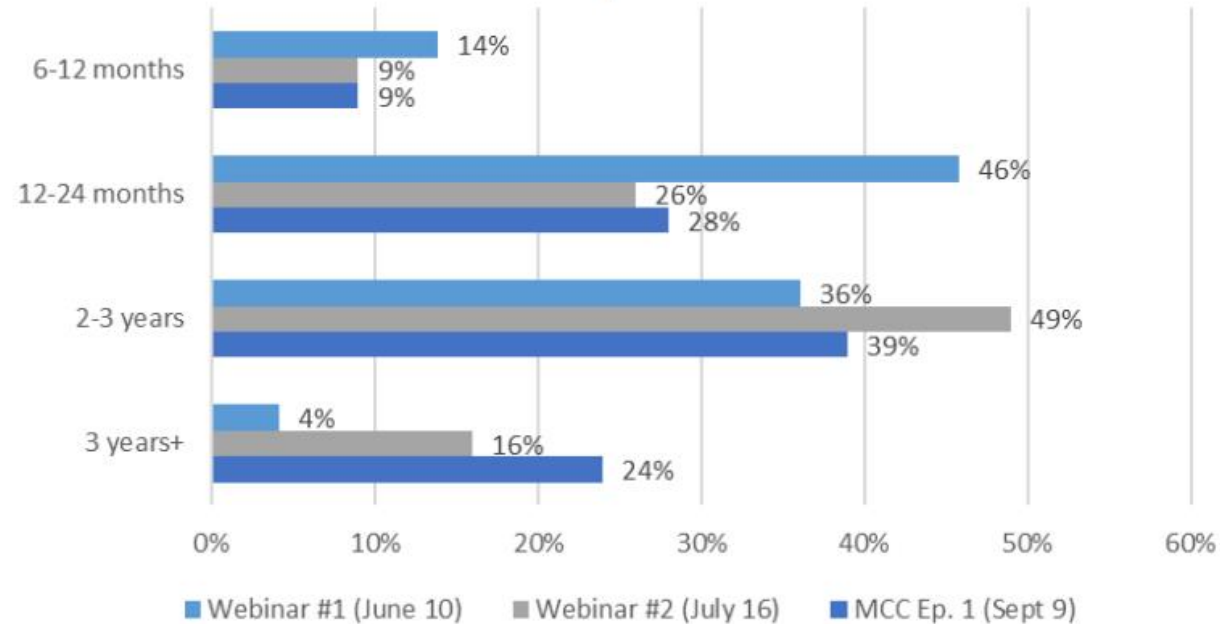
Forecast by	2020 vs. 2019	2021 vs. 2019
IATA March 5, 2020 (limited spread scenario)	-11%	
IATA March 24, 2020	-38%	
IATA April 2020	-46%	
IATA June 9, 2020	-55%	-30%
IATA July 28, 2020	-63%	-36%
AVITAS April 2020	-62.7%	-28.4%

Poll #1

When will demand for travel be back to 2019 levels?



Results from previous webinars

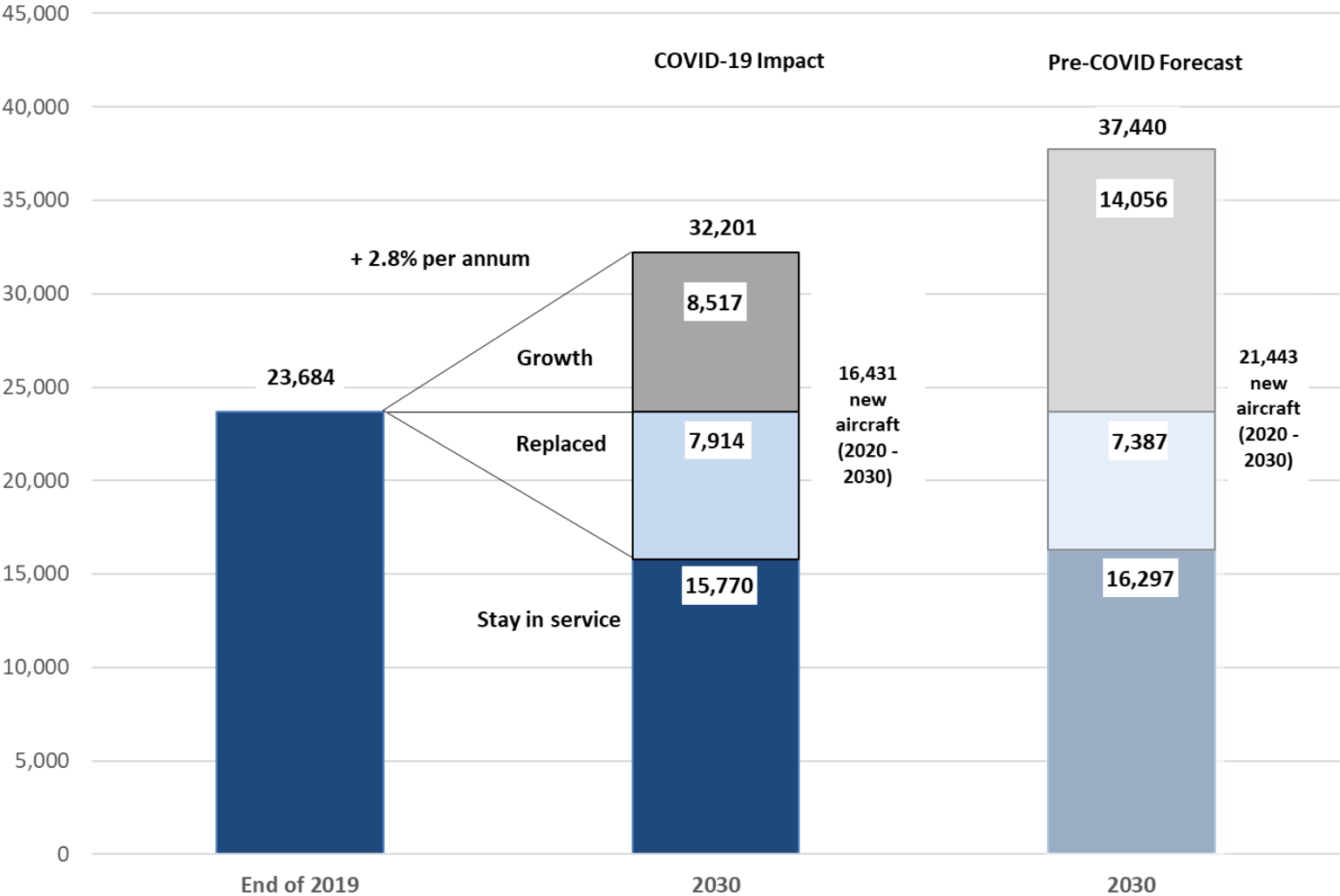


**Profitability of airlines will
be lower as costs will go up
and less business travel**

**How many planes will we
need if we reach 2019 traffic
level only by 2024?**

Forecast Demand Down 5,000 Aircraft vs. Pre-COVID Forecast

Demand for New Passenger Aircraft, 2020 - 2030



Takes us humans time to acknowledge how bad things really are

- More layoffs coming**
- Role of government**

**Who will do worse –
airlines or lessors?**

Wall Street analysts favor lessors

- **Have deeper financial pockets**
- **Less short-term variable expenses**
- **Mobility of assets and other traditional pluses of leasing**

Airlines have government support (jobs, tourism...)

What can lessors do if you do not pay (repossess planes?)

So, which planes will be retired?

- Technical reasons – you guys are the experts
- Values

Indicative Current Market Value Changes Due to COVID-19		
Aircraft Category	Min	Max
Narrowbody, In Production	-5%	-15%
Narrowbody, Out of Production	-20%	-35%
Widebody, In Production	-5%	-20%
Widebody, Out of Production	-20%	-45%
Regional Jet, In Production	-5%	-20%
Regional Jet, Out of Production	-20%	-35%
Freighters (all)	0%	0%

Note: Individual aircraft models may vary based on their market characteristics.

Source: AVITAS Special Edition BlueBook of Jet Aircraft Values 2020, May 15th, 2020

There are some positives:

- **Chocolate still good**
- **Aviation still wonderful and still has a glorious future**
- **Hard times inspire human ingenuity, expect new products, firms and processes**



Thank you for listening!

Please be safe and sane

Adam Pilarski

AVITAS[®]

Gurudude@AVITAS.com

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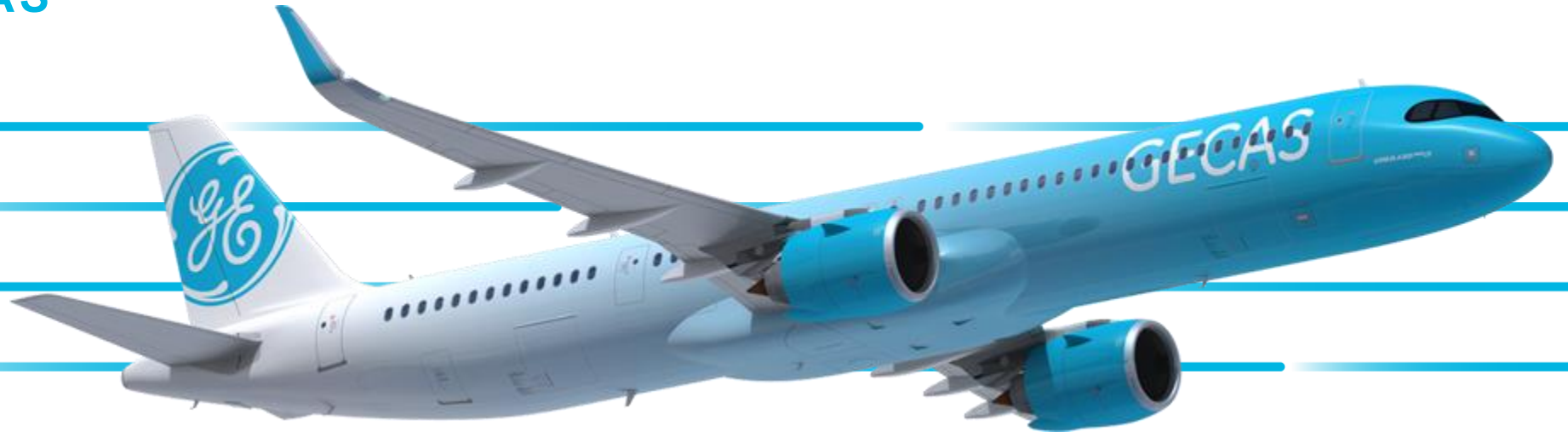
- Q&A -

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MARK LYNCH
SVP - ENGINEERING AND MATERIALS SOLUTIONS,
GECAS

September 23, 2020



GECAS



Upon GECAS request, we have removed the slides from this presentation.

You can watch Mark Lynch's presentation in the webinar recording (starting at the 34th minute).



GECAS



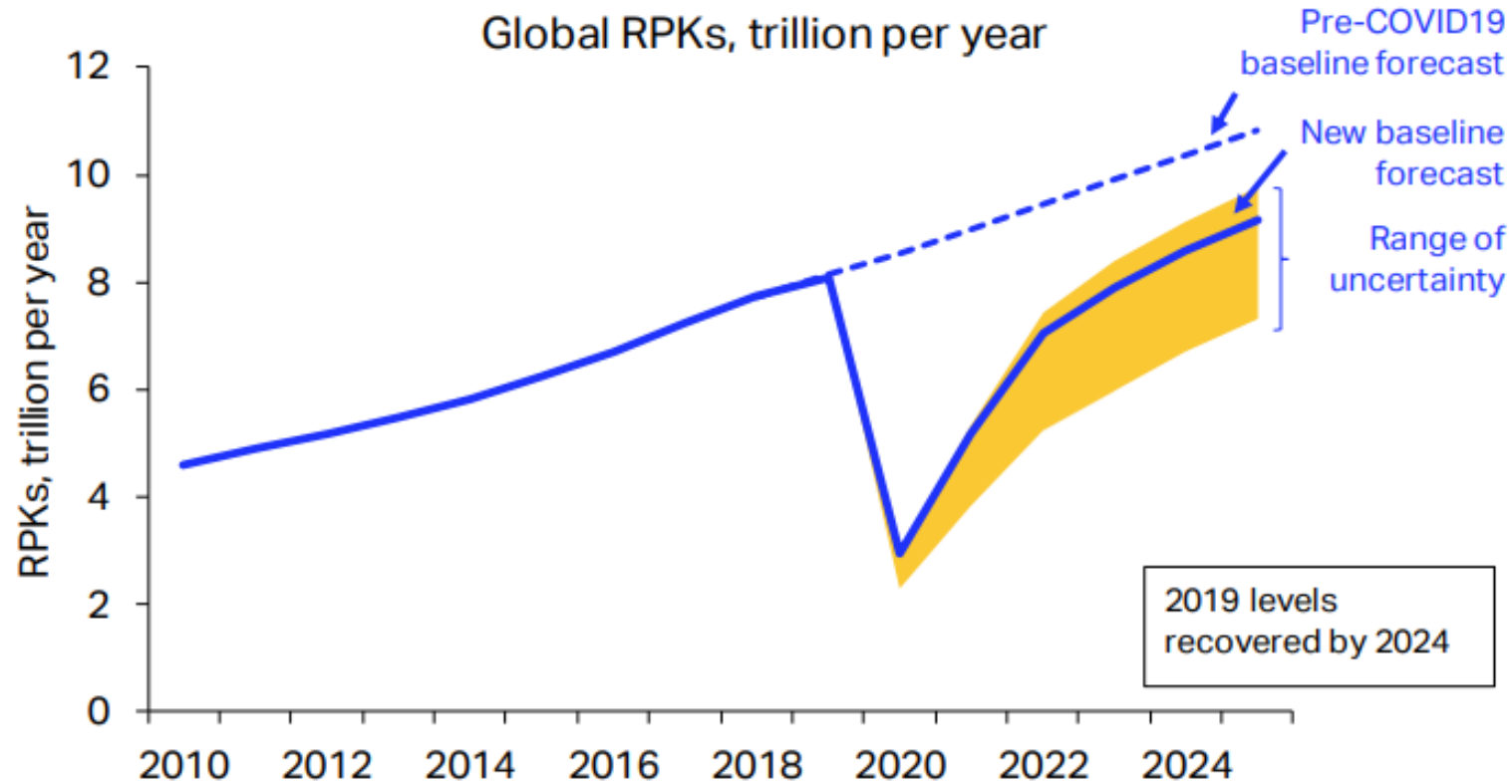
Engine Lease Finance

IATA 16th Maintenance Cost Conference
Webinar Series – Episode 3

Richard Hough
Chief Technical Officer

“Worst Economic Downturn Since The Great Depression”

Five years to return to the pre-pandemic level of passenger demand



Source: IATA/ Tourism Economics Air Passenger Forecasts

Pandemic Impact - Current



Asset & Risk Management

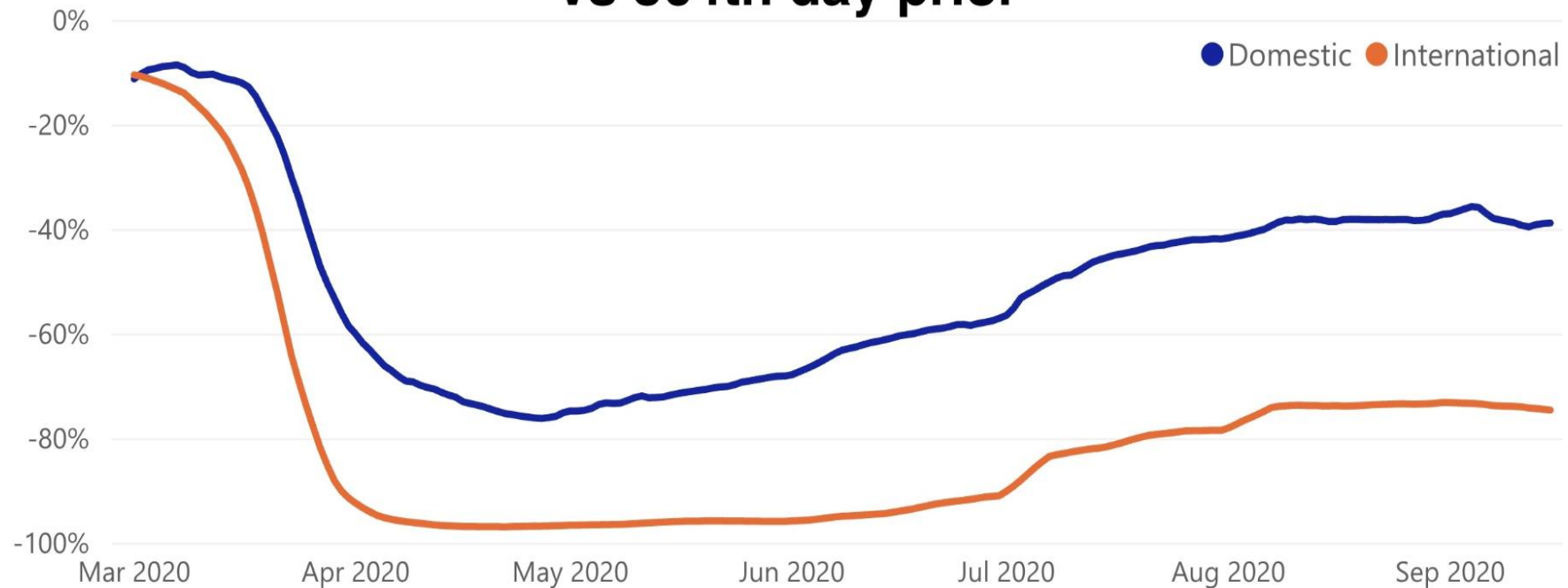
- Working with customers on payment plans
- Discussing alternatives for return conditions & potential engine exchange
- Managing recoveries and repossessions
- Ensuring technical inspector, maintenance and storage capacity

Remarketing & New Business

- Ensuring availability of funding for acquisitions
- Strategic positioning of assets globally for quick delivery
- Pre-approval of terms \ airlines \ jurisdictions

“No precedent for what is happening now”

% decline in 7-day rolling average daily passenger jet flights vs 364th day prior



Cirium Snapshot 16th September 2020 (Andrew Doyle) – Data highlights sharp decline in international flights

“The knife is still falling”

% decline

0%

Cathay Dragon said yesterday the Hong Kong Civil Aviation Department (CAD) had suspended its three times a week Hong Kong-Kuala Lumpur nonstop flight for two weeks after five people aboard KA735 from Kuala Lumpur tested positive to COVID-19. The airline, the regional wing of Cathay Pacific Group, said all five cases were connecting passengers from India on an **Air India Express** flight.

Orient Aviation Daily Digest 21st September

Raytheon Technologies CEO Greg Hayes confirmed the company plans to cut "nearly double" the 8500 redundancies it had projected in Jul-2020, with a focus on its commercial aerospace and corporate organisations (CBS News, 18-Sep-2020). **Collins Aerospace** confirmed most of the redundancies have already been made.

CAPA Aviation investor Daily, 22nd September

IBA projects >1,000 aircraft will be returned to lessors in 2021 without clear options for onward placement, which will also drive a corresponding fall in scheduled engine shop visits.

Speednews 21st September

Lufthansa Makes More Fleet, Staff Cuts

JENS FLOTTAU, jens.flottau@aviationweek.com

FRANKFURT—Lufthansa decided to deepen the cuts to its fleet and staffing levels Sept. 21 after determining that air transport is not recovering as fast as it had hoped. ...Following the executive board meeting, the company stated that it no longer expects traffic to return to 50% of 2019 levels by the end of the year. Instead it now expects a level of 20-30%.

AviationDaily September 22nd

Ryanair hits out at travel restrictions as it cuts 20% more flights

Ryanair took aim at Irish and EU travel restrictions today as it announced another 20 per cent cut to schedules on top the 20 percent cut (in addition to the 20% cut already announced in mid-August. Ryanair now expects its October capacity to fall from 50 per cent to about 40 per its Oct 2019 levels, but expects to maintain a 70 per cent, or more, load factor.

Airline Economics 18th September

Date	Total Traveler Throughput (7 day average)		YoY Change
	2020	2019 (same weekday)	
20-Sep-20	701,899	2,292,757	-69%
19-Sep-20	696,453	2,288,087	-70%
18-Sep-20	692,900	2,279,718	-70%
17-Sep-20	681,349	2,267,161	-70%
16-Sep-20	677,106	2,266,289	-70%
15-Sep-20	682,689	2,246,147	-70%
14-Sep-20	708,645	2,236,194	-68%

www.tsa.gov/coronavirus/passenger-throughput

Pandemic Impact - Medium Term



Adapting to Unprecedented Uncertainty

- Financial stress on Pre-COVID “strong” airlines and business models
- Airlines seeking to generate or preserve cash:
 - ❖ Finance deliveries or refinance unencumbered assets = S&LB opportunities
 - ❖ Defer shop visits via green time burn off = leasing opportunities
 - ❖ Timing uncertain
- Processing part out engines and getting parts available while shops are quieter
 - ❖ ELFC ownership of INAV
- Constantly scanning and evaluating
- Reduction in Spare Engine Demand
 - ❖ $D = f \{ N, U, TBO, SV-TAT, \alpha \}$

Reshaping Business – too early, Why ?

Industry Recovery Needs:-

- Increase in RPK's => Open Borders \ No Quarantines => Virus Suppression => Effective Vaccine
- Long term efficacy of vaccine (learning to live with COVID)
- Global Economic Recovery

Engine Leasing Sector Exposures:-

- Customer survival
- Aircraft Fleet Retirements – 1 less aircraft and 2+ more engines
- OEM actions on material pricing – impacts USM market



Long Term (Whatever That Is !)



Commercial Aviation Business will recover !

What Will Stay

- Long term leasing (established business with stability and discipline)
- Investment weighted towards narrowbody aircraft and engines

Market Cycle Changes

- Reduction in market participants
- More modest production rates from aircraft manufacturers
- Increased security e.g. reserves
- Perseverance of "PBH" leases

Strategic Long Term Changes

- Reduction in speculative orders from lessors
- Change to the engine OEM business model (move from razor & blade principal)
- Designs that reduce impact of future epidemics (aircraft & airport layouts)



Engine Lease Finance

Thank you

Richard Hough
Chief Technical Officer



COVID-19 Impact on Aircraft Transactions

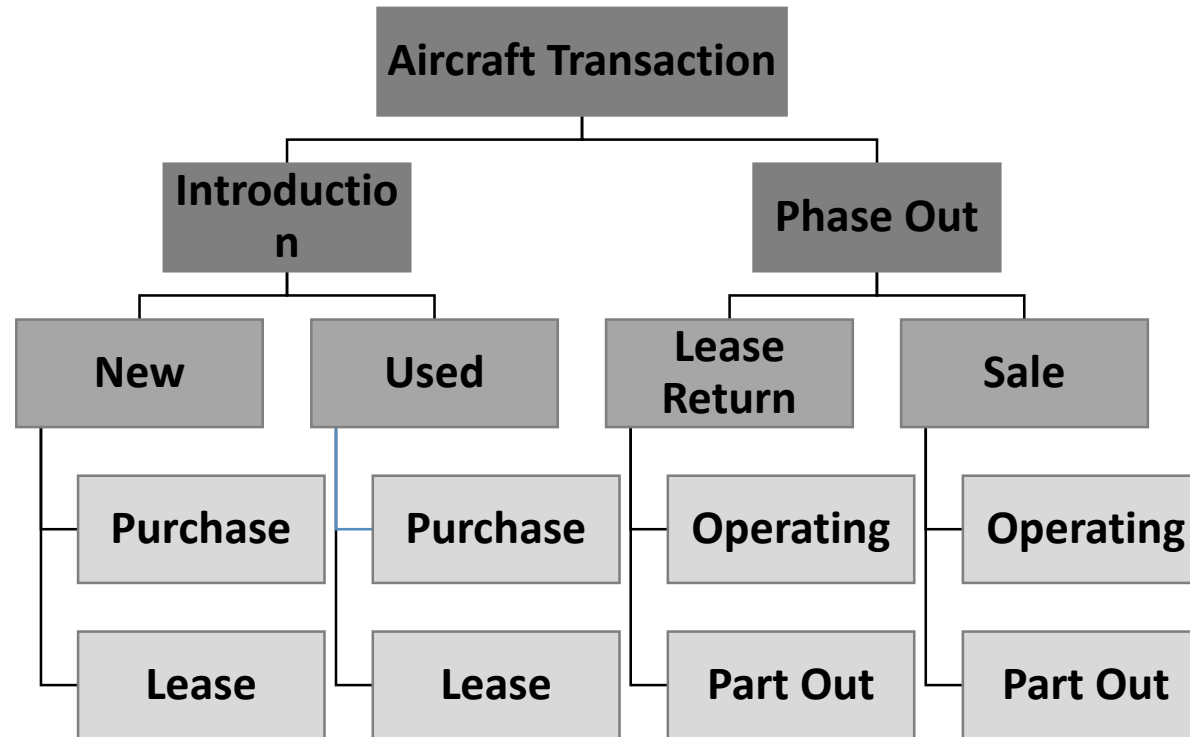


JAZZ AVIATION LP
Tiymor Kalimat
Manager Aircraft Contracts

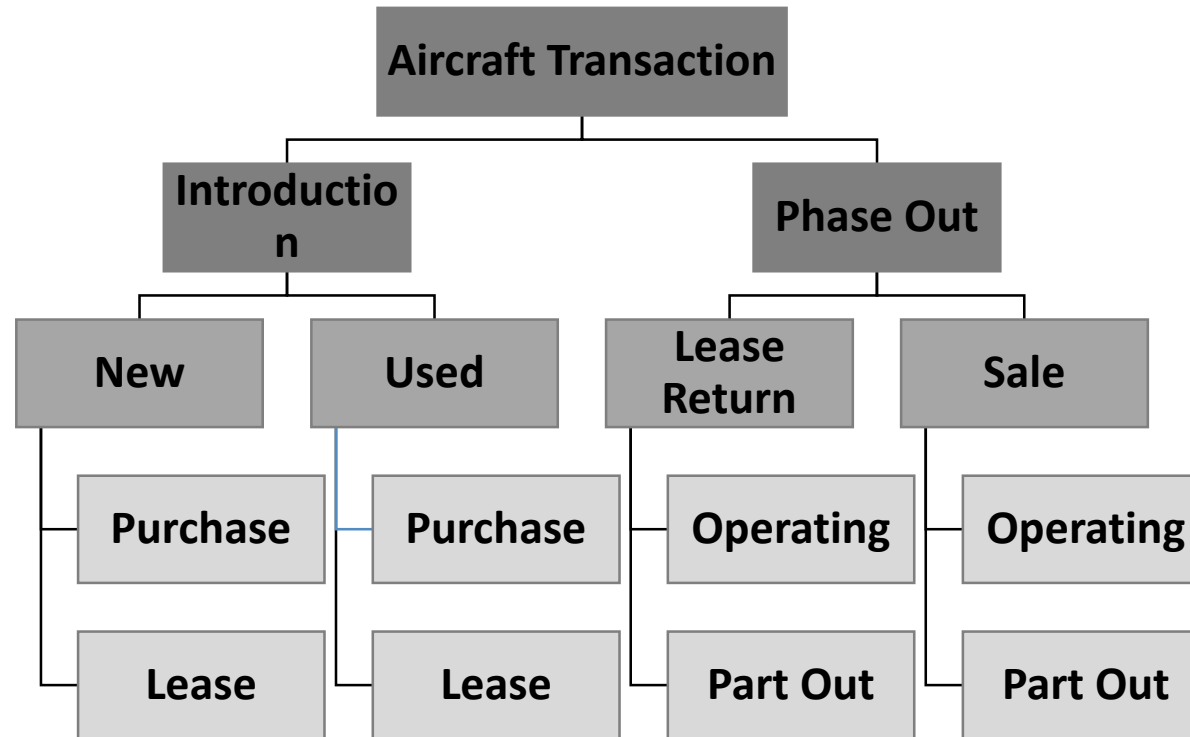


16th Maintenance Cost Conference
Sept 23, 2020

COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS



COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS



Asset Value

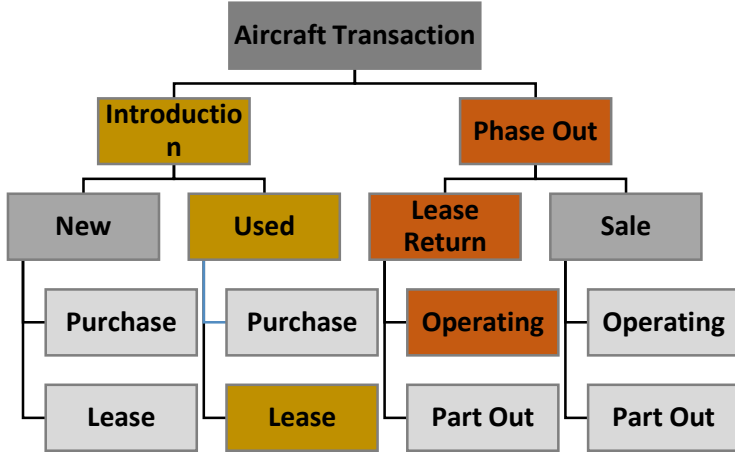
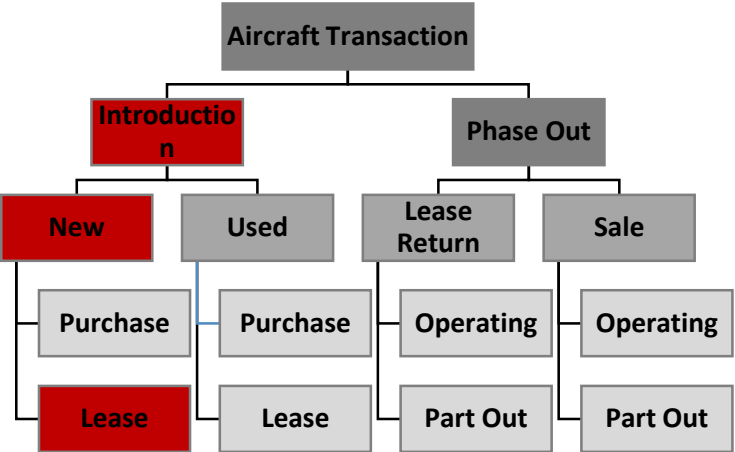
Airworthiness

Timelines

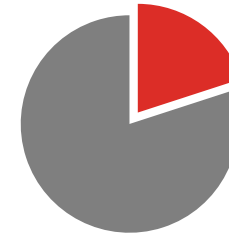
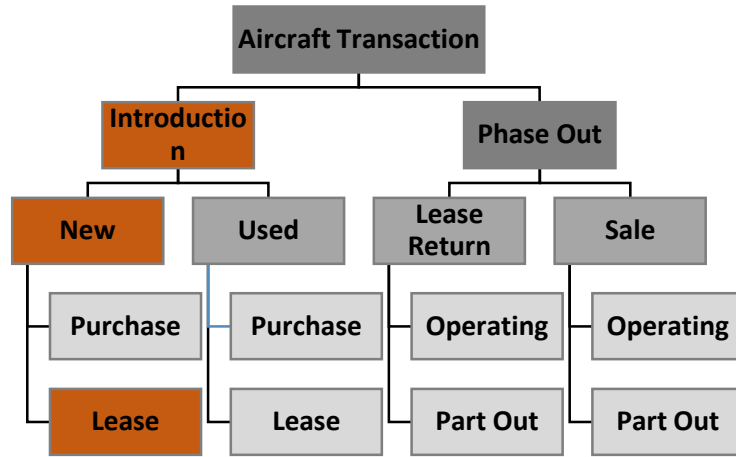
Cost & Resources



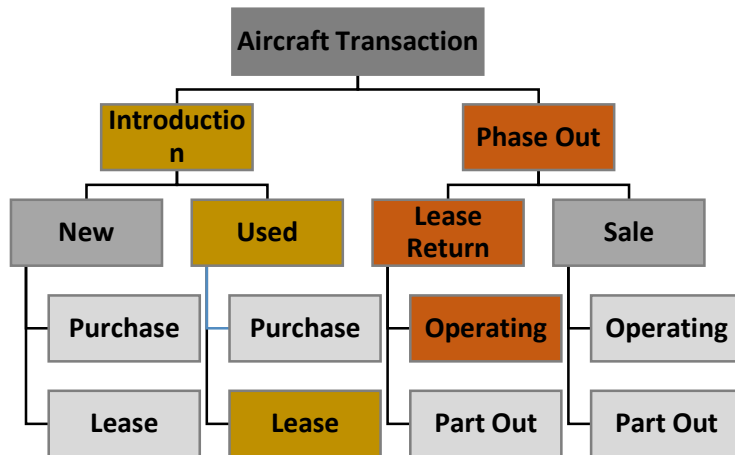
COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS



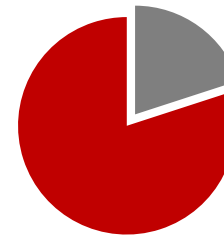
COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS



Physical Inspection



Records Audit & Transfer



COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS

- **Introduction / New / Lease**

- **Physical Inspection**

- **Production Phases Inspection**

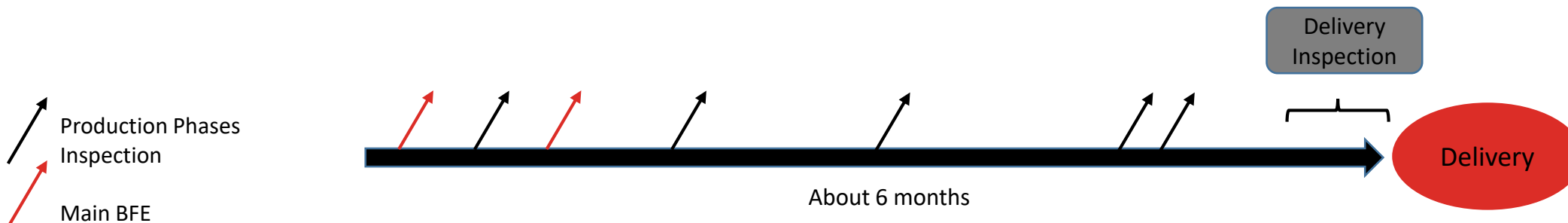
- Major Airframe Sections
- Paint
- Cabin

- **Main BFE**

- Seats
- Galley & Monument

- **Delivery Inspection**

- Test Flight
- Operational and Ground Checks



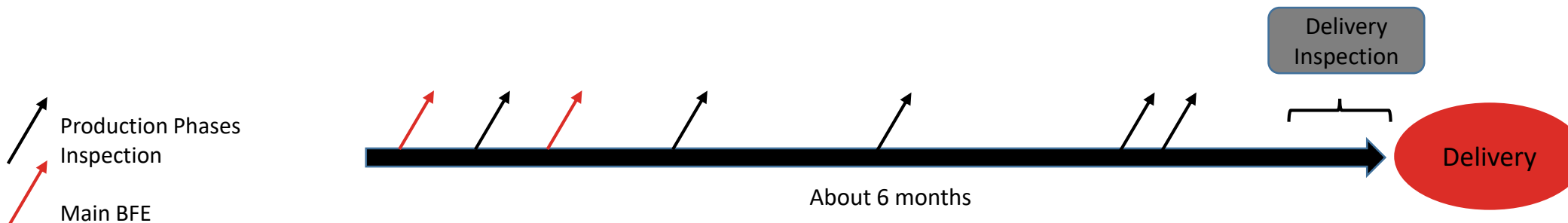
COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS

- **Introduction / New / Lease**

- **Physical Inspection**

- **Production Phases Inspection**
 - Major Airframe Sections
 - Paint
 - Cabin
- **Main BFE**
 - Seats
 - Galley & Monument
- **Delivery Inspection**
 - Test Flight
 - Operational and Ground Checks

Traditional	Current
Airline / lessor on-site inspections	The use of technology (HD pictures, video, drones) The use of local contractors Logistics optimization On-site representation



COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS

- **Phase Out / Lease Return / Operating**

- **Records Audit and Transfer**

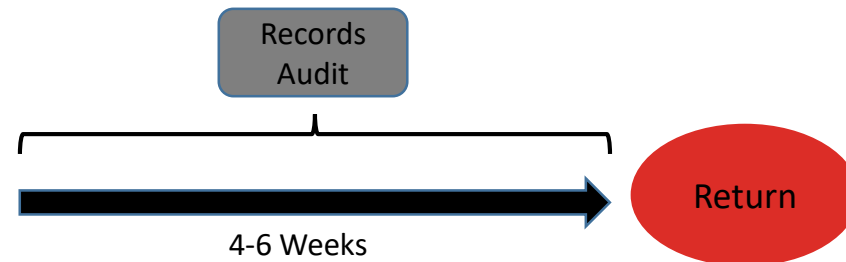
- **Certificates**

- CofA
- Component and LLP
- Cabin Burn

- **Maintenance Status**

- Airframe
- Engines
- Landing Gears
- AD / SB/ STC
- Maintenance Program

- **Historical Maintenance Records**



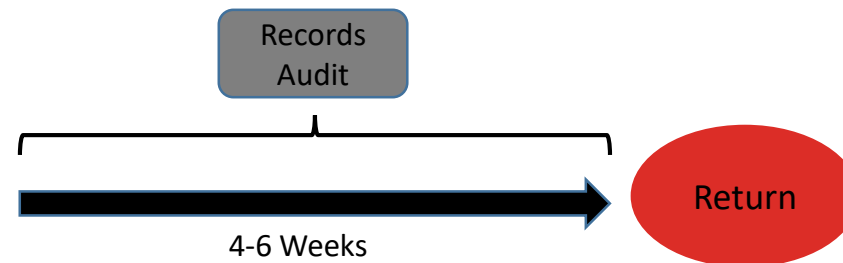
COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS

- **Phase Out / Lease Return / Operating**

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- **Certificates**
 - CofA
 - Component and LLP
 - Cabin Burn
- **Maintenance Status**
 - Airframe
 - Engines
 - Landing Gears
 - AD / SB/ STC
 - Maintenance Program
- **Historical Maintenance Records**

Traditional	Current
Airline / lessor on-site audit	Remote Communication and audit
Airlines / Lessor hard copy transfer	Electronic transfer
	The use of local contractors



COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS

Past 6 Months Outcome

- **Complete airworthiness file and compliance**
- **No negative impact on asset value**
- **Achieved the required timelines**
- **Recued cost and resources**



COVID-19 IMPACT ON AIRCRAFT TRANSACTIONS

Past 6 Months Outcome

- **Complete airworthiness file and compliance**
- **No negative impact on asset value**
- **Achieved the required timelines**
- **Recued cost and resources**

Going Forward

- **Invest of the use of technology for physical inspection activities**
- **Continue and double the effort for electronic records global acceptance**
- **Spread the awareness of available guidance material**
 - **Guidance Material and Best Practices for Aircraft Leases**
 - <https://www.iata.org/contentassets/bf8ca67c8bcd4358b3d004b0d6d0916f/ac-leases-4th-edition.pdf>
 - **Guidance Material and Best Practices for Life-Limited Parts (LLPs) Traceability**
 - <https://www.iata.org/contentassets/bf8ca67c8bcd4358b3d004b0d6d0916f/llp-traceability-1st-ed-2020.pdf>



THANK YOU



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- Q&A -
Aircraft
Leasing Market



GLOBAL MRO MARKET

Martin Harrison

At your desk

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Serving the Aviation Community Since 1963

ICF Aviation Comprehensive Services:

Airlines – Fleet, network and schedule planning. OTP, ground, flight and tech ops cost efficiencies

Airports - Strategic planning, policy, concessions planning, regulation, optimization, pax experience

Aircraft - Valuations, cash flow forecasts, portfolio due diligence, market analysis, technical services

Aerospace & MRO – Strategy & plan development, M&A support, marketing analysis, IT implementations

Sustainability – Environmental, social and economic impact of all aviation activities: measurement, mitigation, resilience

Tourism - Reframe, rebrand and renew strategies/experiences/products to maximize reach

Transactions – Business planning and transactions due diligence

BROAD PERSPECTIVE. COMPELLING RESULTS.

- Our aviation practice was founded as SH&E in 1963, after being acquired by ICF in 2007.
- We provide objective, independent commercial, financial, technical, and regulatory guidance to aviation clients, including airlines, airports, lessors, financial institutions, manufacturers & governments
- ICF offers our team of circa 100 aviation experts dedicated to strategic, financial and operations consulting for the aviation industry.
- From our offices around the globe, ICF helps aviation clients manage assets and operations, mitigate risk, and maximize return on investment. **Visit us online at icf.com/aviation.**

We also collaborate via various industry body partnerships



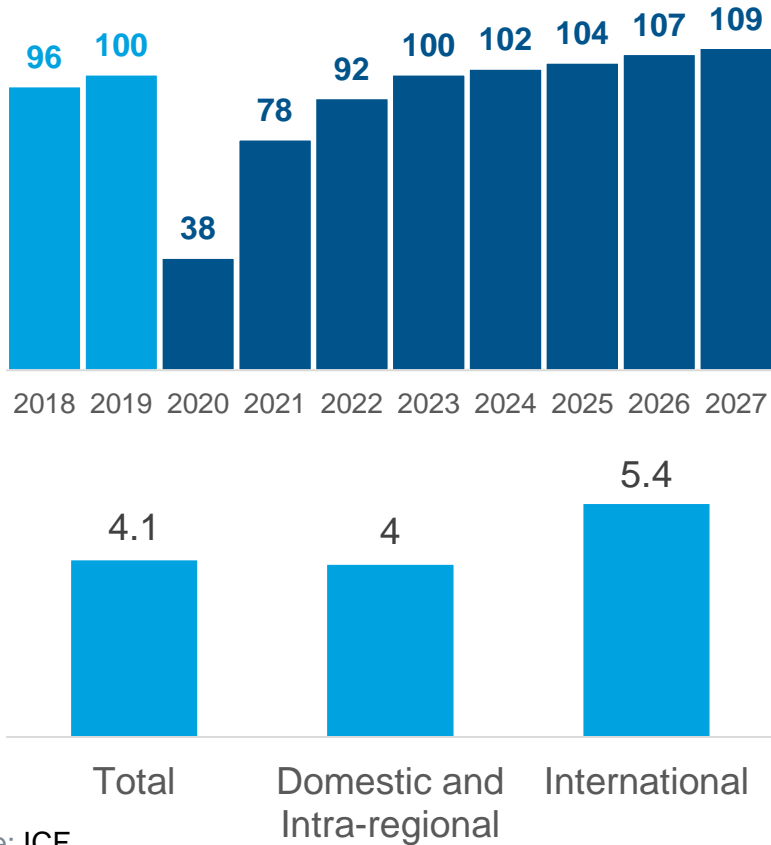


Agenda

- **Passenger and Fleet Outlook**
- **MRO Market Outlook and Trends**

Global aviation is expected to return to pre-COVID level by 2023; Europe's traffic recovery is expected to be slower (5-6 years)

Global traffic recovery outlook [years] would



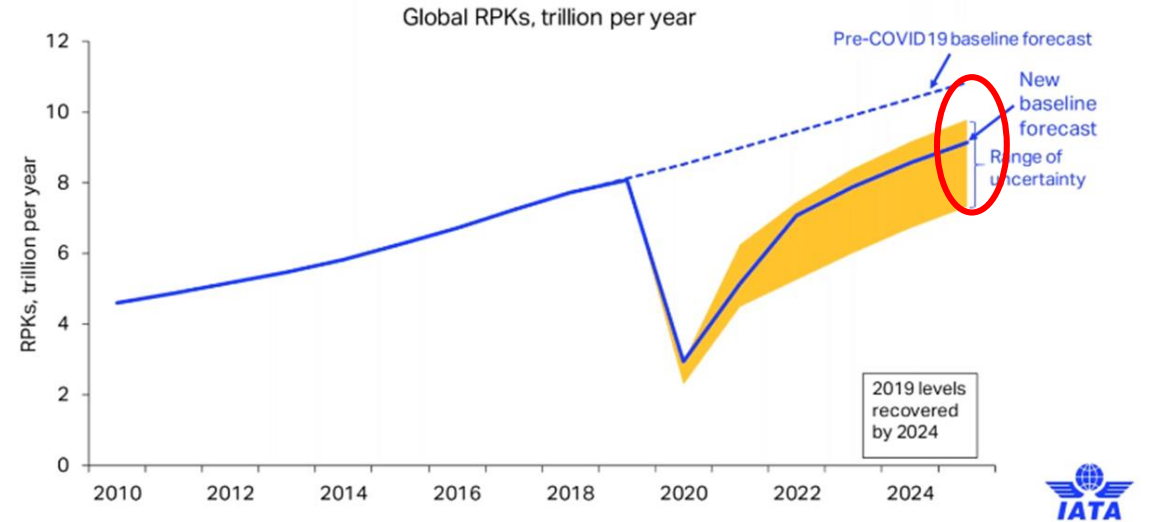
Source: ICF



ICF proprietary and confidential. Do not copy, distribute, or disclose.

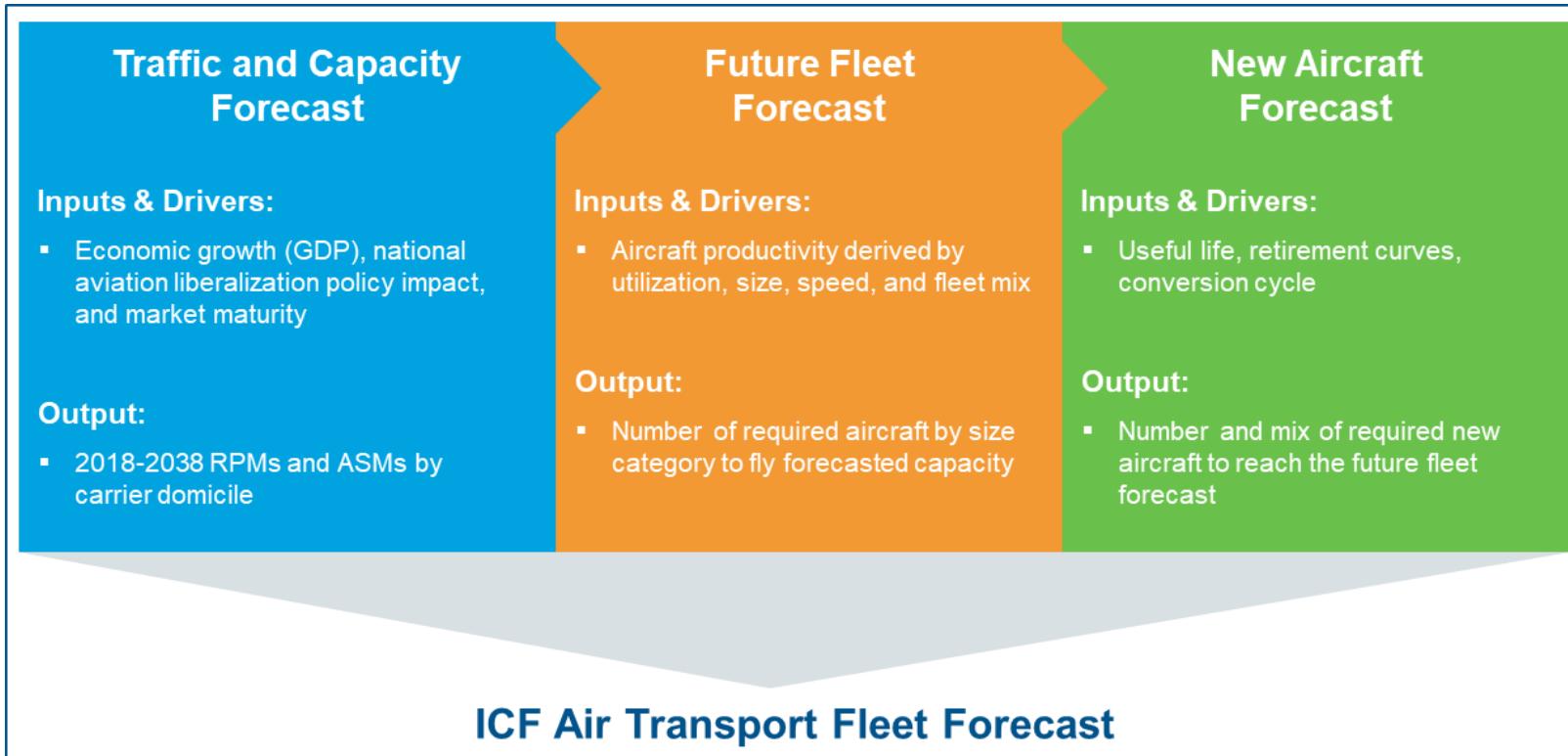
But what do we mean by recovering to pre-COVID levels?

We've assumed a vaccine in 2021H2 in baseline
Upside earlier vaccine, downside ineffective vaccine, deeper recession



Is the real answer "we will never recover to the pre-COVID forecast"... for future years

For years ICF keeps developing our air transport forecast to support our MRO Model



Big questions for the forecasters:

1 Aircraft Productivity –

Load factor and Daily Utilisation
(lower levels drives more aircraft for the same pax #)

2 Fleet Mix –

Retirements
(which are being retired early)
& new deliveries
(which are going to be deferred or cancelled)

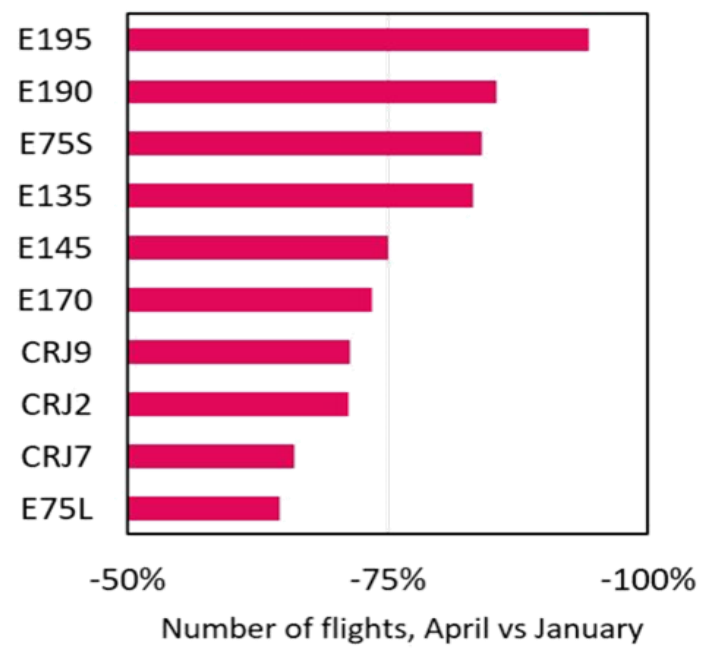
Source: ICF



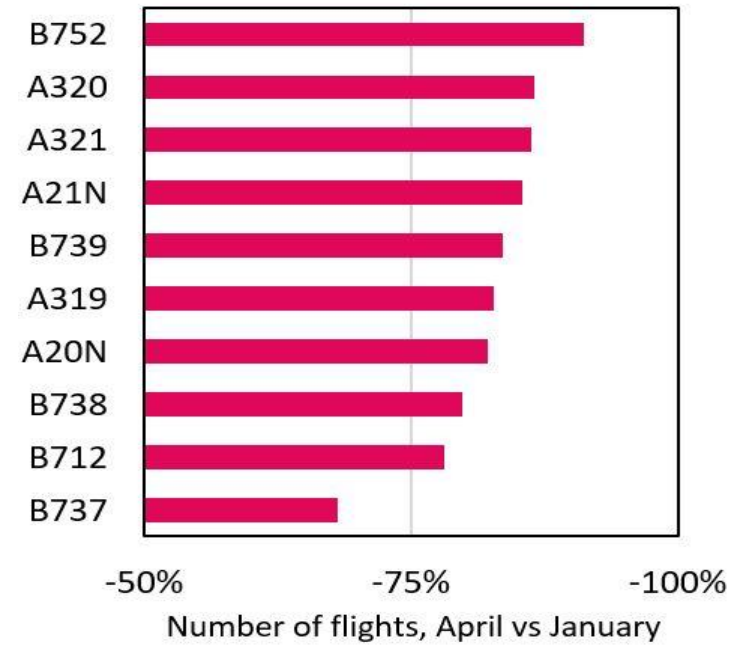
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Leading Indicators of airline fleet decision making indicate a desire to operate newer, smaller types, with 2 engines...

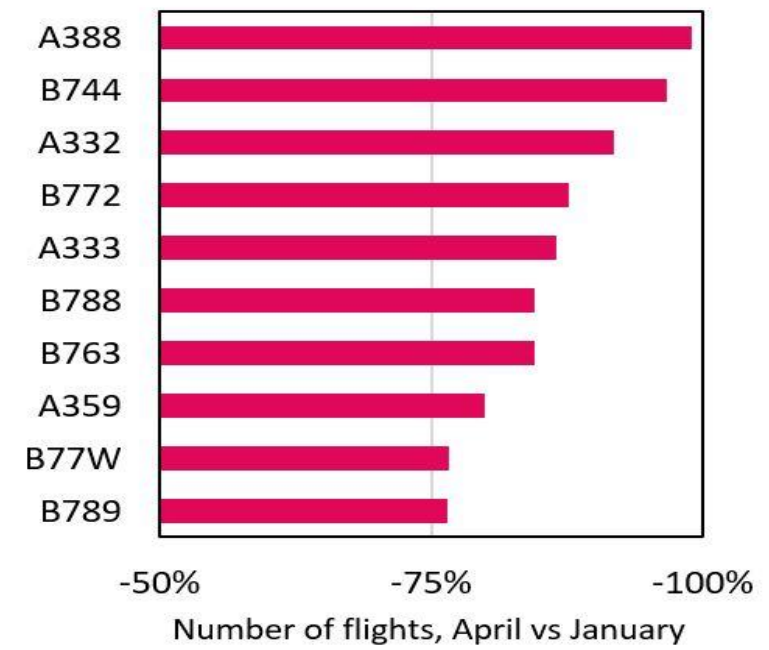
Regional jets



Narrowbody aircraft



Widebody aircraft



Source: ICF, FlightRadar24

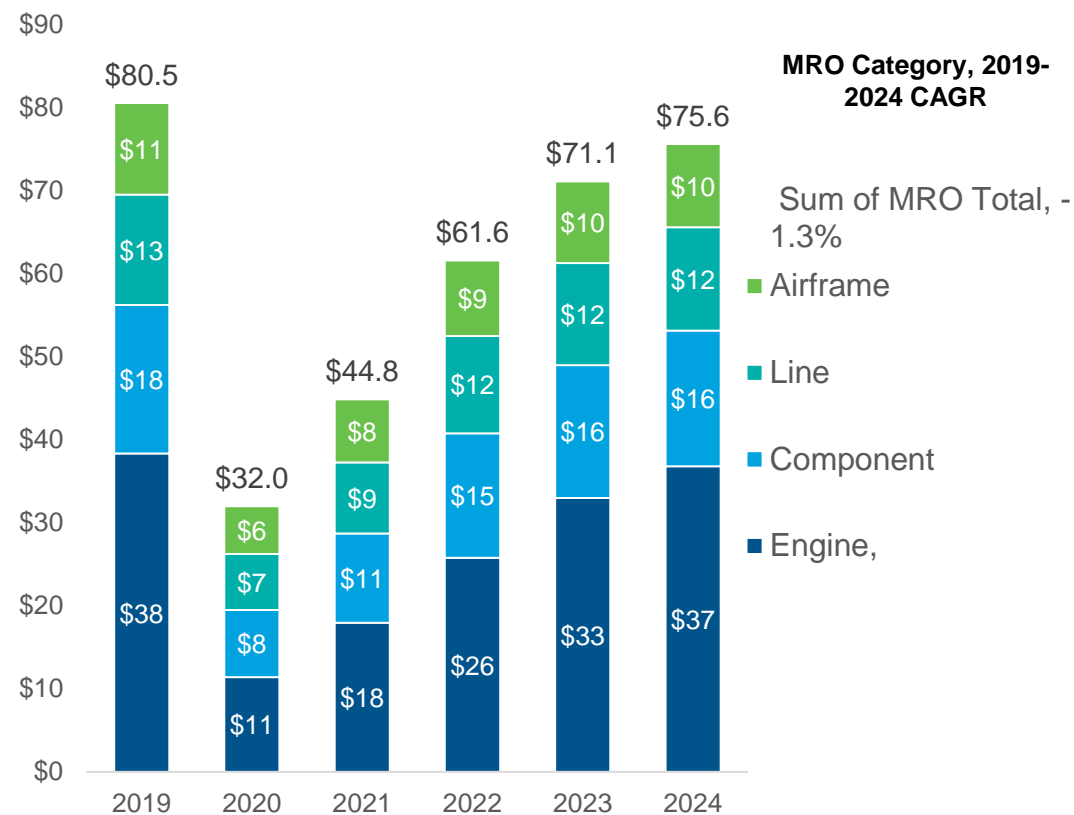


Agenda

- Fleet Outlook
- MRO Market Outlook and Trends

We have modelled multiple scenarios, but in our base case the MRO 2024 market could be worth \$5B less compared to 2019

Base Case: -1.3% CAGR



What are the structural drivers for shrinking MRO Market:

1. Newer planes (especially with less engines), need less maintenance
2. Engines can easily be removed from parked a/c to save SVs (but depending on PBH, lessor maintenance reserve provisions and lessor ABS)
3. Decisions on which individual aircraft to keep & fly heavily based on D checks
4. Component spend will be reduced by surplus parts (again depending on PBH) from torn down aircraft AND airlines expecting FH rate discounts, removal of minimum guarantee levels



What does this mean for airline MRO organisations?

MRO costs have sometimes been viewed at as a ‘non-controllable cost’ because of the historically heavy influence by airworthiness, safety and regulatory compliance.

- How much of that is now more *balanced* with Maintenance economics?
- Are airlines *equipped* to objectively examine and achieve that balance?
- Is the industry *ready* to recalibrate: People (including pay structures), Processes (change management), Systems (up front investment)?

So tell me some good news...



'Whether we're talking about socks or stocks, I like buying quality merchandise when it is marked down'



Thank you.

For questions regarding this presentation,
please contact:

Name : Martin Harrison

Title : VP

email martin.Harrison@icf.com





COVID-19 and the MRO Market

IATA Maintenance Cost Conference 2020 – September 23, 2020

Sonny Stern
VP Sales & Customer Service

Factors Impacting the MRO Market



Factors Impacting the MRO Market



Fleet Ramp Up & Variability

- How much capacity do you bring on? What fleets do you utilize?
- Challenges for maintenance planning



Return of Aircraft to Lessors
Revised Lease Structure

- Leased fleets being returned in favor of operating aircraft owned outright by the airline
- Operators requesting leniency from the lessor



Retirements, Furloughs & Personnel Changes

- Retirement, voluntary leave programs, and involuntary staff reductions
- Less manpower to support maintenance activity



Supply Chain Support

- Suppliers and aviation supply chain disruption
- Imports & exports stopped, production facilities shut down & reduced output, and review of contracts to determine where support is currently needed



Part Availability

- Are parts available to support required shop visits?
- Airlines taking the “down-time” to process part outs and make material available



Green-time Engines

- Assessment of swapping near end-of-life engines with green-time engines
- Are there enough green-time engines available?
- Is availability influenced by owners’ desire to keep assets whole to capture aircraft lease-out opportunities?

Fleet Adjustments & Manpower Impact

Fleet Ramp Up & Variability

- COVID-19 wave trends
- Local and international government regulations
- Early retirements
- Aircraft sale for liquidity



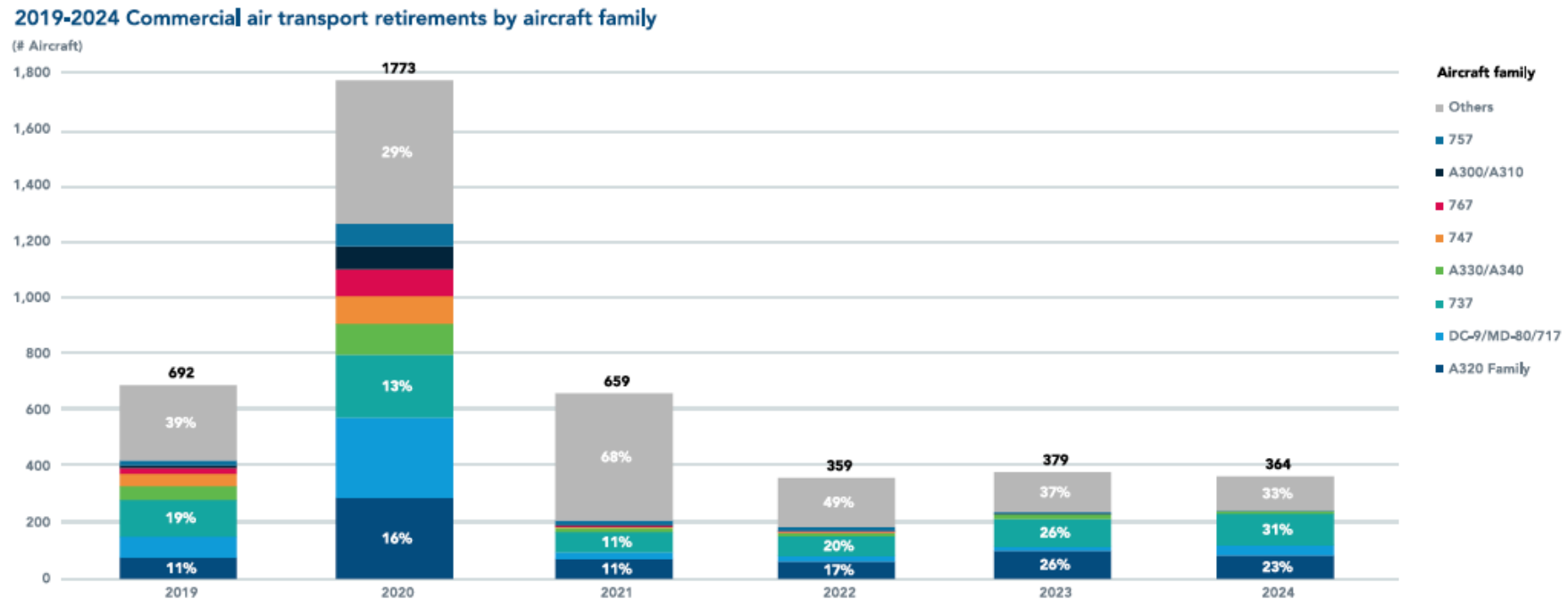
Retirements & Furloughs

- Less manpower = less shop availability
- Airline MROs no longer supporting 3rd party work
- Product line shifts & training



Green-time Engines

- With the aircraft retirement outlook decreasing to reflect recent and early retirements, and leases not being extended, will this support enough green-time engines in the market?
- Combined with the desire to keep assets whole and not separate engines from airframe, will there be green-time availability?



Source: ICF Report
 COVID-19: Fleet outlook and impact on lessors and MROs

“The Wright Brothers created the single greatest cultural force since the invention of writing. The airplane became the first World Wide Web, bringing people, languages, ideas, and values together.”

- Bill Gates

A commercial airplane is shown in flight, flying from left to right across the upper half of the image. The sky is a deep blue, transitioning to a lighter, hazy blue near the horizon. The lower half of the image shows a vast, layered mountain range, with the peaks of the mountains appearing as dark silhouettes against the lighter sky. The sun is low on the horizon, creating a bright glow and casting long, soft shadows across the landscape. The overall scene is serene and evocative of global connectivity.

Thank You!

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- Q&A -
MRO market

IATA COVID-19 Resources

The screenshot shows the IATA website header with navigation links: ABOUT US, CAREERS, CONTACT & SUPPORT, PROGRAMS, POLICY, PUBLICATIONS, SERVICES, TRAINING, EVENTS, PRESSROOM, and You & IATA. A search bar is also present. Below the header, there is a quote from Alexandre de Juniac, IATA's DG & CEO: "Stay strong. We will get through this crisis and keep the world connected." Below the quote is a link to "See latest media briefing". The main content area features several COVID-19 resource cards: "Resources for airlines and air transport professionals" (with a mouse cursor pointing to it), "Action Air Cargo", and "Recommendations for passengers". To the right, a financial data summary shows: TOTAL LOSSES (EST. 2020 US\$) of \$84.3 billion, DEMAND (RPK, 2020) down 54%, and FLIGHTS CANCELLED (JAN - JUL) of 7.5 million. Below that, it shows TOTAL REVENUE LOSSES (EST. 2020 US\$) of \$419 billion, down 50%, with a link to "More financial developments".

www.iata.org

www.iata.org/en/programs/covid-19-resources-guidelines

www.iata.org/en/pressroom/covid-19-news

airlines.iata.org/topic/covid-19

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Thank you for attending!

Any further questions?

Please email Geraldine Cros (cros@iata.org)

**Episode 3:
How COVID-19 is
reshaping the aircraft
leasing and MRO businesses?**



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**Episode 4:
The role of used serviceable
material (USM) in the
industry restart**

Wed. 30 September 2020 - 7:30-9:30am EDT

