Airline Maintenance Cost Executive Commentary

FY2022 Data

FY2022 Data Highlight – 31 Airlines

Active Aircraft	2,815	Parked/Stored Aircraft	204
Maintenance Cost ($/FH)	1,345	Parking/Storage Mtc Cost ($K/AC)	262
Maintenance Cost ($/FC)	3,083	Parking/Storage (MH/AC)	2,921
Average Utilization (hrs/day)	7.3	Parking/Storage Fees ($K/AC)	34

FEBRUARY 2024

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Foreword

Dear MCX Member Airlines,

IATA and I are grateful that you elected to join the IATA Maintenance Cost Data Exchange (MCX) Program. This is the first report of the new program based on the Maintenance Cost Technical Group (MCTG) data collection.

The MCX program was introduced as a successor to the MCTG data collection as we needed to have in place an adequate and reliable legal framework that would enable us to handle the data provided by you, but at the same time ensure that your data and its usage are well protected. To achieve this, we had to invite you to sign up to an agreement with IATA that would guarantee the program success.

As you review this report, you will notice that we spared no efforts to cover all potential areas you may be interested in, including slicing the data into the most granular levels to provide insights that you can utilize to improve your maintenance costs.

We are looking forward to 2024 as we embark on a new journey toward developing more insights for you through an updated industry dashboard with new features and capabilities. In addition, we shall be developing an operator benchmarking dashboard that will enable you to not only see the industry performance on maintenance costs, but also be able to benchmark your performance across the same metrics.

Through the new dashboard which we plan to launch at the end of the year, we believe we can drive decision making on maintenance costs for you and our industry through actionable insights.

I finally want to thank you for choosing MCX as your trusted partner and custodian for your maintenance costs data and we look forward to growing this program with your continued support.

Chantal Berthiaume

Director Business Systems and Performance, IATA
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Introduction

Dear Member Airlines,

The MCX Team is pleased to share with you the Airline Maintenance Cost Executive Commentary, a comprehensive analysis of the maintenance cost data that you have submitted for the year 2022. This report provides valuable insights into the trends, drivers and benchmarks of airline maintenance costs across different regions, aircraft types and airline groups.

The publication of this report took longer than usual due to the onboarding of the new MCX member airlines and the signature of the GADM Agreement. We appreciate your patience and understanding as we worked to implement the new MCX operation.

We would like to thank you for your continued participation and support in this initiative, which is essential for enhancing the efficiency and competitiveness of the airline industry. We hope that you will find this report useful and informative for your business decisions and strategies.

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Disclaimer

This study provides high level benchmarks and does not provide direct cost comparisons. Every Airline operates in a unique environment, e.g., in terms of geographic location, network schedule, fleet type, aircraft age, fleet size, proximity to major OEMs, currency exchange rates, etc. Cost Benchmark is not a science, and no existing normalization is available that allows any form of direct comparisons. In addition, our sample includes Airlines of different size, aircraft size, and operational profile.

Every effort has been made to ensure this report, including the collection of data and publication of the results, complies strictly with all relevant competition laws. This report is only available to the Airlines which participated in the data collection Any use of this report by third parties must first be cleared with IATA.

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Preliminary Remarks

As part of the Aircraft Maintenance Cost Data eXchange (MCX) program, we collect data from airlines worldwide on an annual basis. The goals of MCX are to provide the tools, methodology and definitions to be able to determine how much it costs an airline to maintain its fleet and be able to use the data in cases of new fleet introduction or expansion, "make vs. buy" decisions, year-over-year trends, etc.

This report is exclusively distributed to airlines that provided data for 2022 as of 31st December 2023. IATA MCX continually endeavors to present meaningful analysis and we encourage you to provide feedback to this report so we can enrich further in the coming years. MCX data collection is open to all commercial airlines worldwide that would like to benchmark their fleet maintenance costs. MCX membership is not restricted to IATA or non-IATA member airlines or major, domestic, international, low-cost, regional airlines, etc.

The importance of data quality

It takes a fair amount of time for MCX airlines to gather and submit their data, and it takes equally a lot of effort to validate this data in order to deliver the most relevant benchmarking analysis. We often need to contact airlines and ask for clarifications when numbers do not meet the quality checks set. For this initiative to remain viable and reliable, it is critical to focus on the best possible data quality.

We would like to remind you of the importance of ensuring your data is accurate before submitting it. For that purpose, built-in checks are included in the data collection form (on three tabs: Summary Tables, Summary Graphs and P&O Graphs) in order to help you get an idea of the main metrics (e.g. maintenance cost per flight hour, per flight cycle or per aircraft). Unscheduled events can cause dramatic impact on maintenance spend, that is why we need also as many comments to explain unusually high or low costs.

The importance of reporting operational data

The focus of MCX is on maintenance costs, however operational data (e.g. flight hours, cycles, ASK, fleet size and fleet age), personnel and overheads data (e.g. number of mechanics and overhead staff, time breakdown, overhead costs, etc.) are very important to calculate unit costs and KPIs. We would like to draw your attention on the importance of reporting accurate cost data and operational data in order to get accurate benchmarking and analysis for the benefit of the airline industry and your own airline.

The importance of data treatment

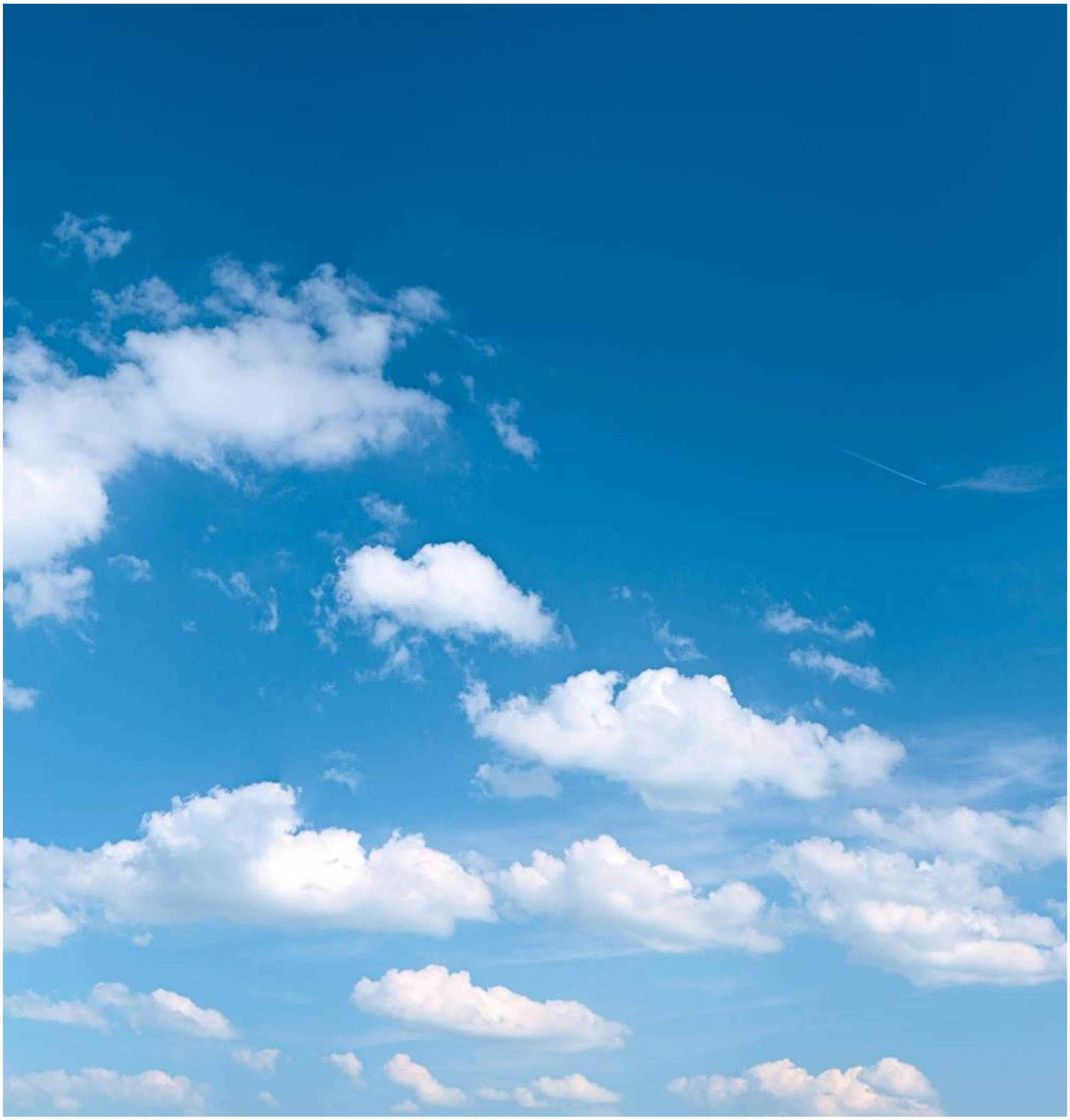
All the MCX analyses presented in this report use maintenance cost data as they were provided by the airlines through the standardized IATA toolset. No attempt was made to normalize the data based on any parameters such as operational severity (hours to cycle ratio, utilization, harsh environment, etc.), aircraft ageing, fleet size and commonality, labor rate, etc.

Additionally, it should be noted that the analysis is done in USD (US Dollars) as most of the aircraft parts are marketed in USD; therefore, currency exchange rates may play a significant role in benchmarking maintenance costs, especially when substantial foreign exchange fluctuations and/or currency devaluation take place.

Finally, the aircraft delivery schedule and the periodicity of the maintenance program can strongly influence costs, especially when many aircraft were delivered within a short timeframe.

The acceptance of data

This report analyzes data from 31 airlines. Due to some late submissions and delays in the GADM Agreement signing process, the publication of this report has been delayed compared to previous reports



Data and Analysis Methodology

IATA's Aircraft Maintenance Cost Data eXchange (MCX) program collects maintenance cost data from airlines worldwide on an annual basis. MCX Airlines are the carriers who participate in the annual data collection. Thirty five (35) airlines reported data for FY2022, however four (4) airlines were excluded from this report, as they have not signed the GADM agreement or were not able to finalize their datasets at the closing time for completion of this report.

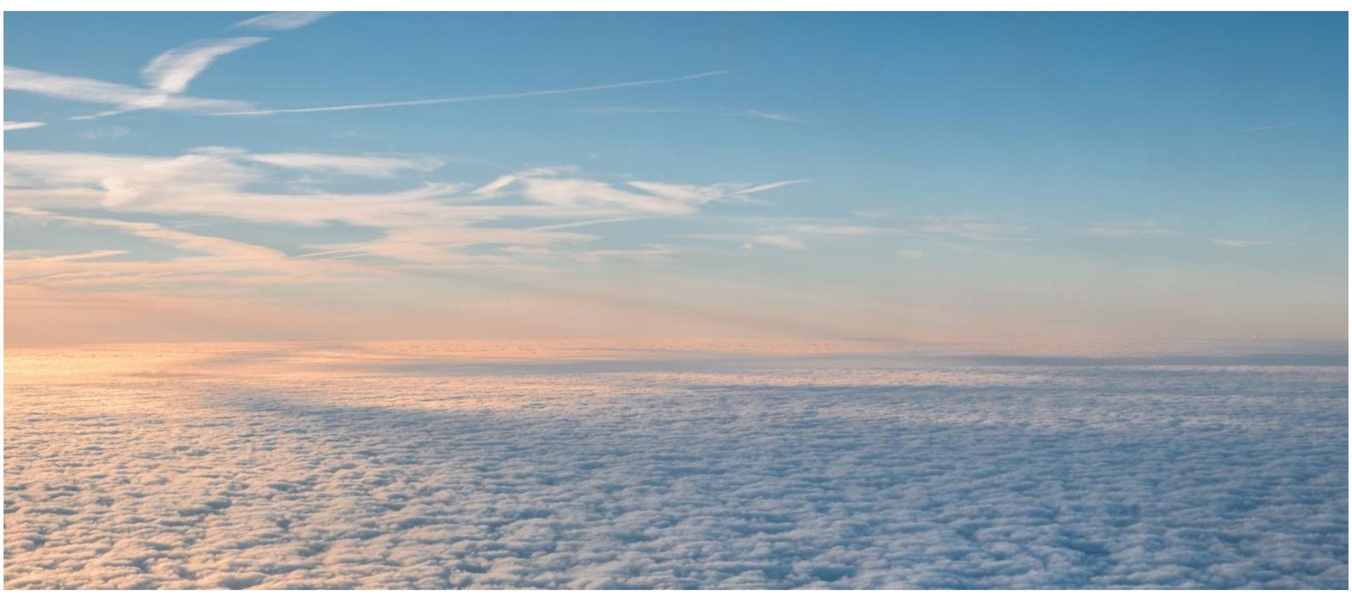
The data contained herein has been coded (operators are deidentified) and used as reported (i.e. without any normalization) to create this benchmark report.

All airline data have been consolidated then analyzed while considering the aircraft type, fleet and engine size and models, fleet age, maintenance market segments (line, components, engines, heavy checks and MOD) and elements (labor, material, subcontracted work), flight hours, cycles and geography.

All data presented in this report are de-identified. The two-digit airline codes shown in this report are unique codes given to the participating airlines for de-identification purposes. Although some of these codes may match real IATA airline codes, this is merely a coincidence. If you do not know your airline's code, please contact us at mcx@iata.org.

Typical metrics used include cost per flight hour, cost per departure, cost per aircraft. The cost data unit is USD and the length unit is Kilometer.

In addition, for 2020 to 2022 data, new sections were added to the data collection and analysis to capture the impact of the COVID crisis on the maintenance costs and better understand the measures that the airlines put in place to mitigate this crisis.



Definitions & Acronyms

Term or Acronym	Definition
AC	Aircraft
AFI	Africa
Aircraft Category	NB, WB, RJ, TP (defined below)
Aircraft Family	Aircraft communalities (e.g. A320 Family includes A318, A319, A320, A321; 737 NG includes 737-600/700/800/900)
Aircraft Sub-Category	NB, WB2, WB3+, RJ, TP (defined below)
AL	Airline
APU	Auxiliary Power Unit
ASK	Available-Seat Kilometers
ASPAC	Asia Pacific
Cost Elements	Material, labor, engine life limited parts and outside repairs (or outsourced, used interchangeably)
Cost Segments	Line, base, component and engine maintenance
Currency	All amounts in this report are in US$, unless specified otherwise.
DMC	Direct Maintenance Costs
ESV	Engine Shop Visit
EUR	Europe
FC	Flight Cycle
FH	Flight Hour
FTK	Freight Ton Kilometers
ICA	Instructions for Continued Airworthiness
IFE	In-Flight Entertainment
LATAM	Latin America & The Caribbean
LG	Landing Gear
LLP	Life Limited Part
MCTF	Maintenance Cost Task Force (predecessor of MCTG)
MCTG	Maintenance Cost Technical Group
MCX	Maintenance Cost data eXchange program
MENA	Middle East & North Africa
MR	Maintenance Reserves
MRO	Maintenance, Repair and Overhaul
MTBR	Mean Time Between Removals
NAM	North America
NB	Narrow-body single aisle aircraft with more than 100 seats (excludes Embraer 190/195)
PLF	Passenger Load Factor
PTF	Passenger-to-Freighter

Regions	Africa (Sub-Saharan Africa) ASPAC (Asia Pacific) MENA (Middle East & North Africa) Americas (North & South America) Europe (includes CIS) N. Asia (China, Hong Kong, Macao, Taiwan, Mongolia)
RJ	Regional jets up to 100 seats (includes Embraer 190/195)
RPK	Revenue-Passenger Kilometers
RTS	Return to Service
Supply Chain	Includes all maintenance activities performed by third party (also called “contract maintenance” or “outsourcing”) and the cost of material purchased to do work in-house
TCPC	Transportation of Cargo in the Passenger Compartment
Total Maintenance Costs	DMC plus overhead costs
TP	Turboprops
TR	Thrust Reversers
Units	K ($#,000) Thousand Mill. ($#,000,000) Million Bill. ($#,000,000,000) Billion
USM	Used Serviceable Material
Utilization	Number of flight hours per aircraft per day (= FH / AC / 365 days)
WB	Wide-body aircraft with more than one aisle or equivalent freighter, combination of WB2 and WB3+
WB2	Wide body aircraft equipped with two engines
WB3+	Wide body aircraft equipped with three or more engines

1. Global Picture

This chapter provides some context to the MCX analysis by presenting an overview of the airline industry, the global fleet count and MRO spend for 2022 as well as a focus on the airline supply chain challenges.

In 2022, the world fleet count was **32,070** aircraft, **78%** of which were in service. Globally, airlines spent **$76.8 Billion** on MRO, representing around **10.9%** of total airline operational costs ($722 Billion) and **10.5%** of their total revenue ($732 Billion).

1.1. Airline Industry Landscape in 2022

Over the course of 2022, global air passenger travel, measured in revenue passenger-kilometers (RPKs), continued its steady recovery, propelled by pent-up demand and the reopening of air travel markets. Passenger traffic recovered from **41.7%** of 2019 volumes in 2021 to **68.5%** in 2022 (Fig. 1).

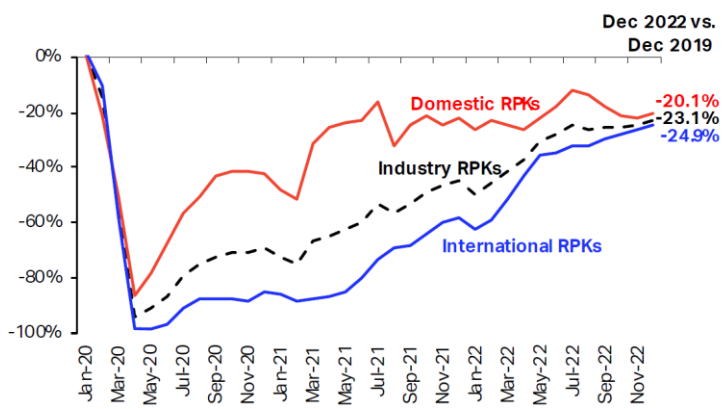


Figure 1 - Global RPKs (January 2020 to December 2022)
Source: IATA Economics

At the industry level, passenger demand was met by available seat capacity, as available seat-kilometers (ASKs) recovered to **71.9%** of their 2019 levels, while maintaining industry-wide passenger load factors of **78.7%.** (Fig. 2)

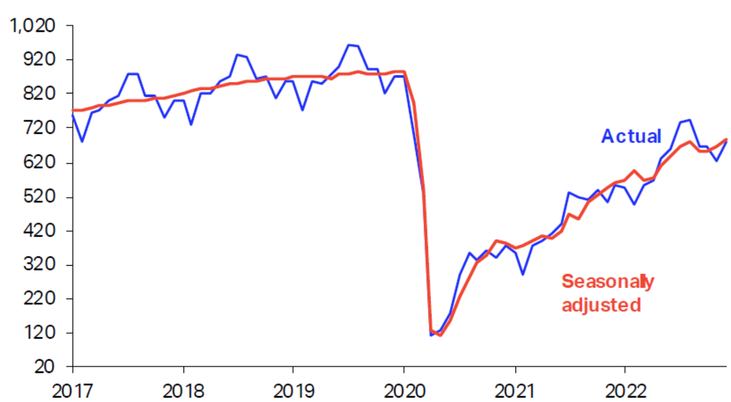


Figure 2 - Global ASKs in billion per month (2017-2022)
Source: IATA Economics

Airline financial performance continued to recover from the massive losses recorded in 2020. The industry revenues went up 44% vs 2021, however the industry net result was a $3.6 B loss. The rise in fuel price from $77.8/barrel in 2021 to $135.6/barrel in 2022 certainly contributed to the 30.5% increase of the total expenses. (Table 1)

	2019	2020	2021	2022
REVENUES, USB bn	**838**	**384**	**509**	**732**
% Change year-on-year	3.2%	-54.4%	32.3%	44%
EXPENSES, USD bn	**795**	**495**	**554**	**722**
% Change year-on-year	3.7%	-37.9%	11.8%	30.5
RPK growth, % change year-on-year	4.1%	-65.8%	21.9%	64.2%
Passenger numbers, billion	607	189	239	430
Break-even weight load factor, % ATK	66.4%	76.7%	67.2%	65.9%
Weight load factor achieved, % ATK	70.0%	59.5%	61.7%	66.8%
Passenger load factor, % ASK	82.6%	65.2%	66.9%	78.7%
Passenger yield, % change year-on-year	-3.7%	-9.1%	3.7%	9.8%
Cargo yield, % change year-on-year	-8.2%	54.7%	25.9%	7.4%
Jet kerosene price, USD/barrel	79.7	46.6	77.8	135.6
Non-fuel unit cost (cents per ATK)	39.2	48.3	45.2	41.7
Non-fuel unit costs, % change year-on-	-0.3%	23.3%	-6.5%	-7.8%
OPERATING PROFIT, USD bn	**43.2**	**-110.8**	**-45.1**	**10.1**
Operating margin, % revenue	5.2%	-28.8%	-8.9%	1.4%
NET PROFIT, USD bn	**26.4**	**-137.7**	**-41.9**	**-3.6**
Return on Invested Capital, %	5.8%	-19.3%	-8.0%	1.3%

Table 1 - Airline Industry Performance (2019-2022) - Source: IATA Economics

1.2. Global Fleet

In 2022, the world fleet consisted of a total of **32,070** aircraft (active and parked). This includes western built aircraft in commercial operations (Passenger, Cargo, Combi), consisting of narrowbody, widebody, regional jets and turboprops (ATR42/72 and Q300/400 only). Twenty percent (20%) of the fleet was parked or stored compared to 31% in 2020 and 10% on average in the past decade. (Fig. 3)

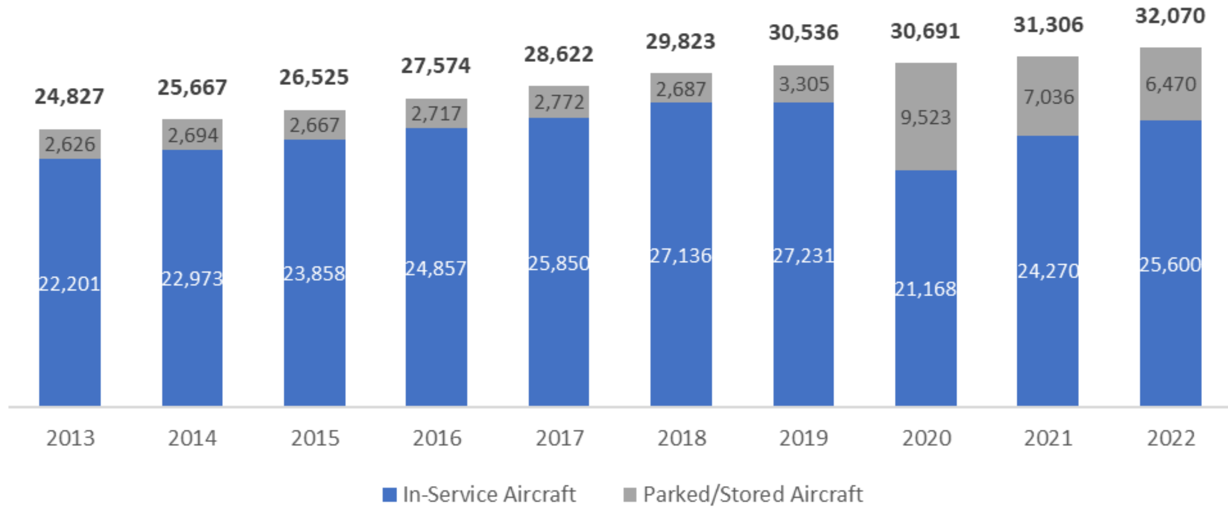


Figure 3 - World Fleet (2013-2022) - Source: Cirium

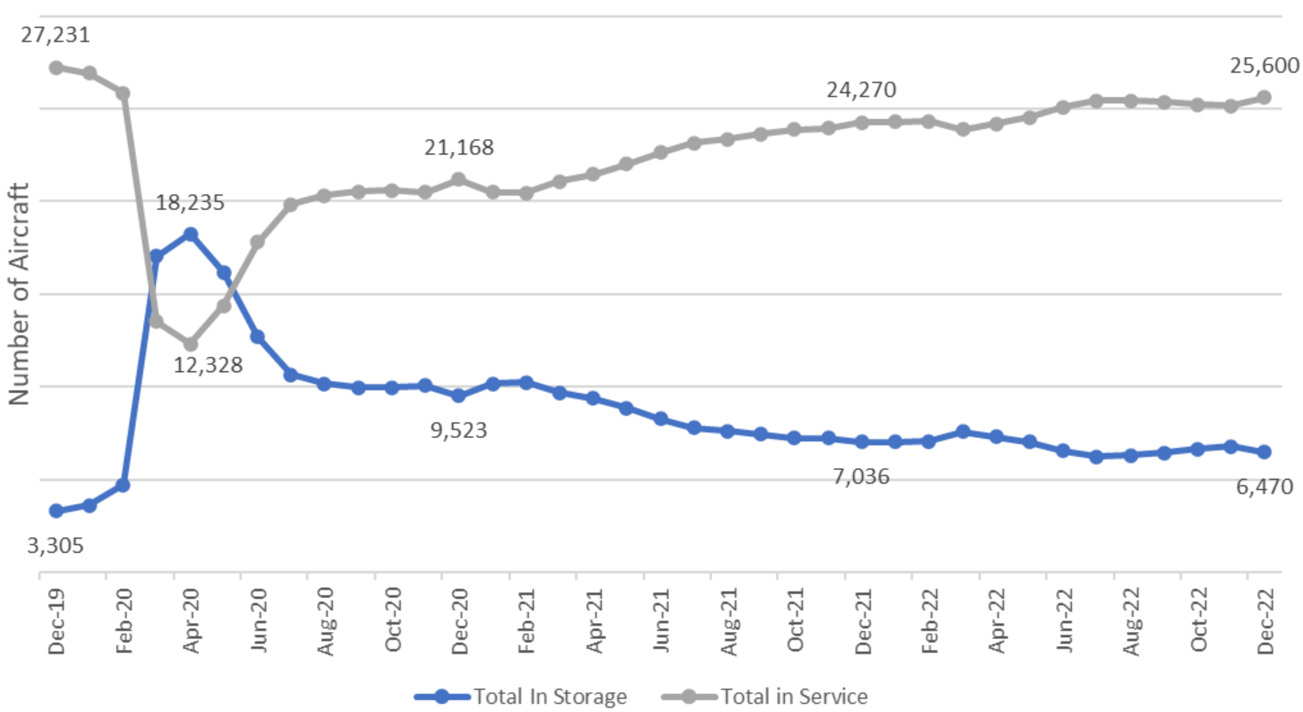
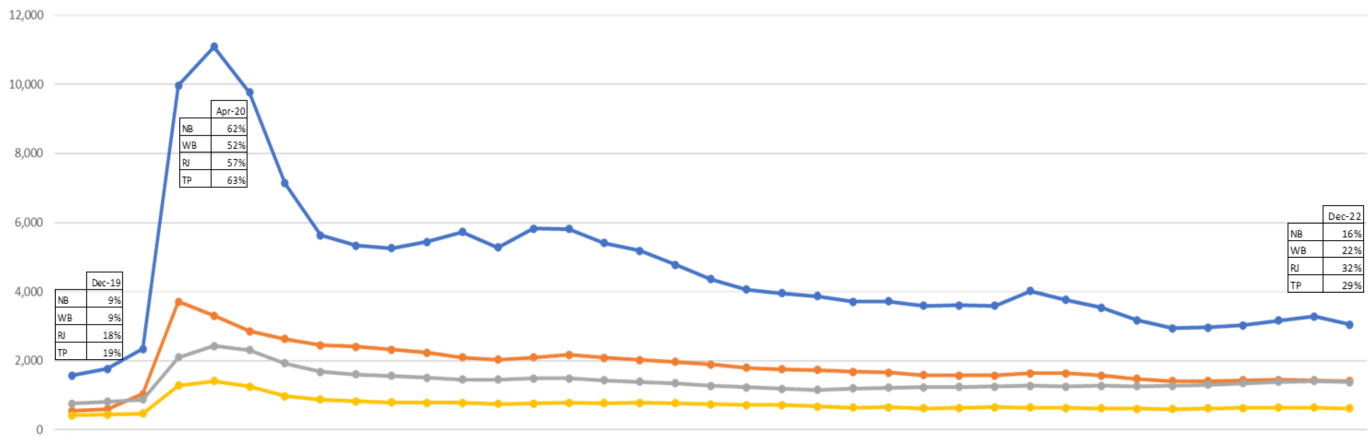


Figure 4 - Parked/Stored Aircraft vs In-Service Aircraft (Dec 2019-Dec 2022) – Source: Cirium

Although the number of parked aircraft has significantly decreased since 2020, it remains high compared to pre-covid levels. The in-service fleet was dominated by narrowbody aircraft. Some widebody aircraft returned to service as full passenger aircraft when traffic started picking up again. However, demand for widebodies remains low with 22% of the fleet parked at the end of 2022 vs 9% pre-covid. (Fig. 5)



	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21
NB	1,570	1,762	2,340	9,965	11,086	9,762	7,143	5,632	5,332	5,264	5,438	5,732	5,278	5,830	5,813	5,404	5,185	4,783	4,363
WB	546	606	1,041	3,708	3,310	2,855	2,635	2,452	2,407	2,322	2,234	2,102	2,035	2,095	2,173	2,091	2,020	1,972	1,897
RJ	764	820	881	2,101	2,425	2,310	1,927	1,681	1,605	1,569	1,514	1,457	1,461	1,494	1,486	1,440	1,398	1,346	1,278
TP	425	439	472	1,285	1,414	1,251	978	885	824	799	784	784	749	762	786	775	780	773	742

	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
NB	4,061	3,957	3,871	3,715	3,725	3,596	3,599	3,594	4,020	3,768	3,540	3,178	2,939	2,962	3,030	3,165	3,286	3,044
WB	1,794	1,757	1,734	1,678	1,656	1,584	1,570	1,572	1,640	1,643	1,575	1,481	1,410	1,414	1,431	1,447	1,440	1,416
RJ	1,231	1,194	1,161	1,205	1,223	1,236	1,244	1,249	1,273	1,259	1,279	1,268	1,280	1,312	1,350	1,394	1,412	1,385
TP	725	725	675	645	654	620	639	655	650	640	629	611	607	619	639	650	649	625

Figure 5 - Parked/Stored Aircraft by Category (Dec 2019-Dec 2022) – Source: Cirium

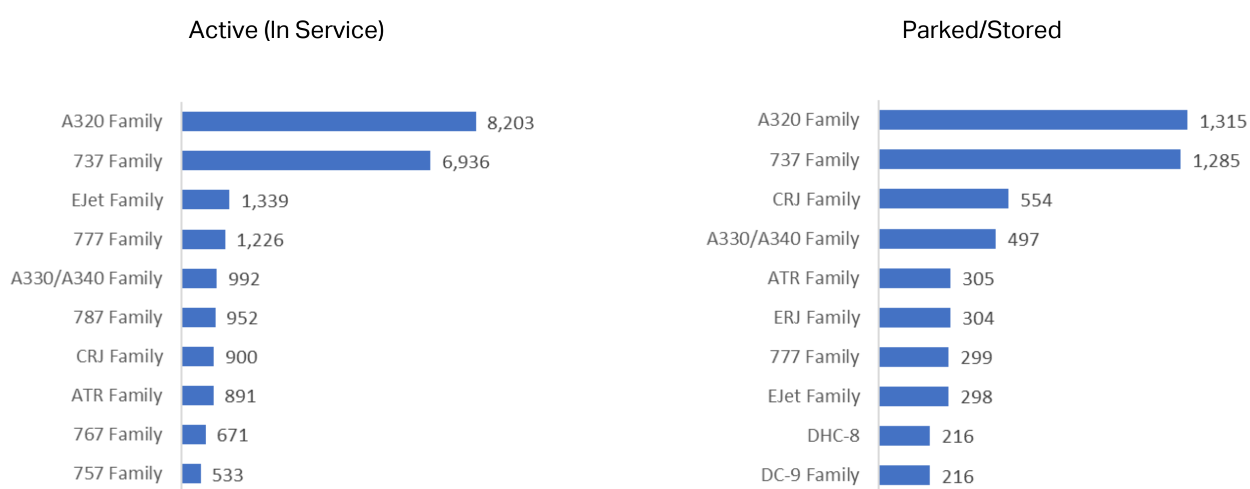


Figure 6 - Top 10 Aircraft Families (2022) - Source: Cirium

The fleet statistics (flight hours per aircraft, flight cycles per aircraft and aircraft utilization) maintained their upward trend in 2022, with the aircraft utilization reaching an encouraging 7 hours per day compared to 5.6 hours in 2020. However, they remained below the pre-covid levels. (Fig. 7)

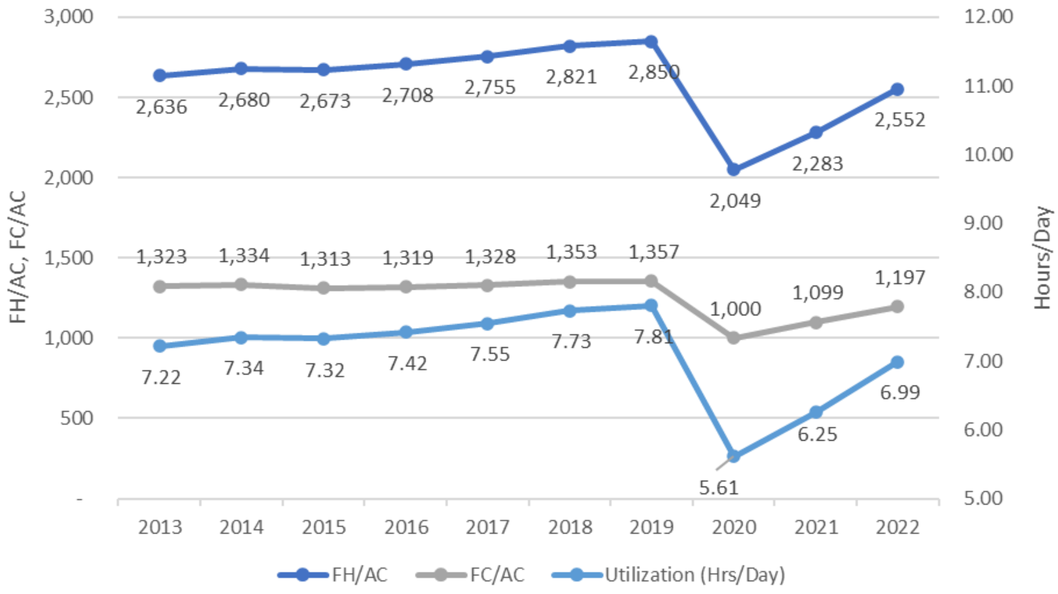


Figure 7 - Global Fleet Statistics (2013 - 2022) - Source: Cirium

1.3. Global Maintenance, Repair & Overhaul (MRO) Market

Global MRO spend in 2022 was valued at $78.6 Billion (Fig. 8), which represented 11% of the airlines operational costs. (Table 2)

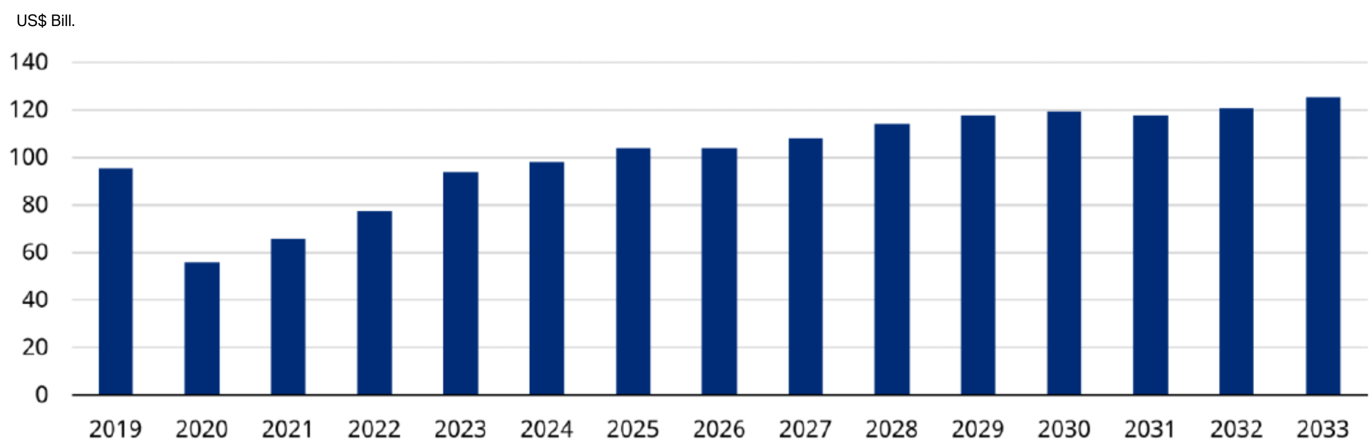


Figure 8 - Global MRO Spend Forecast (2019-2033) - Source: Oliver Wyman

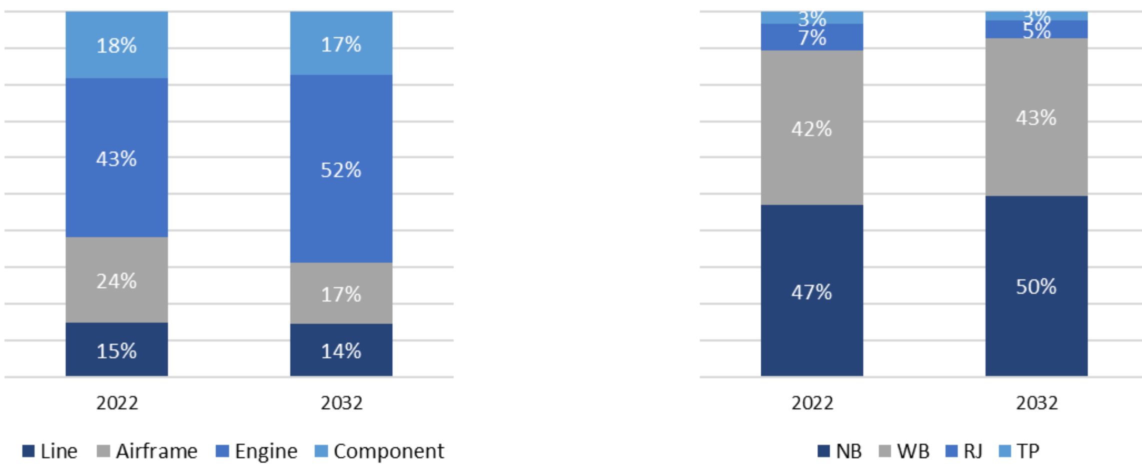


Figure 9– Global MRO Spend by Segment and by Aircraft Category (2022E-2032F) - Source: Oliver Wyman

	2019	2020	2021	2022
Global MRO Spend (US$ Bill.)	95	56	66	79
% of Global Expenses	12%	11%	12%	11%
% of Global Revenues	11%	15%	13%	11%

Table 2 - Global MRO Spend vs Total Expenses and Revenues
Source: IATA Economics, Oliver Wyman

1.4. Airline Supply Chain Challenges

Airline Supply Chain Challenges accelerate in the Post-COVID Era; impact on new aircraft deliveries and MRO services

The aviation industry, a crucial driver of global connectivity, has found itself navigating through turbulent skies over the last couple of years. The onset of the COVID-19 pandemic has led to unprecedented supply chain issues concerning aircraft parts, significantly impacting the operations of airlines worldwide. These challenges extend beyond mere logistical concerns, affecting the delivery schedules of new aircraft and engines and creating a domino effect that trickles down to Maintenance Repair and Overhaul (MRO) services. Consequently, airlines are grappling with extended delays, uncertainties, and a scarcity of aircraft capacity, casting shadows over the impending summer season and beyond.

A multitude of factors has converged to create this perfect storm within the airline supply chain for aircraft parts. One of the early but prominent contributors was the shortage of electronics-related equipment, particularly microchips. The global semiconductor crisis has disrupted supply chains across industries, amplifying the challenges faced by the aviation sector. A geopolitical risk has been identified resulting from scarcity of microchips in essential components that will have a cascading effect on aircraft manufacturing, avionics and testing electronic devices used for MRO services.

Additionally, the scarcity of several raw materials, especially those sourced from regions like Russia, has further tightened the grip on the airline MRO supply chain. Materials such as Titanium, vital for aircraft manufacturing, are subject to geopolitical challenges, disrupting the seamless flow of resources required for the industry's smooth operation. Steel, much needed for certain aircraft parts and the heavy machinery that produces parts, has also been affected due to prevailing economic sanctions.

Compounding the issue, there have been significant delays in logistics and shipments, particularly emanating from Asia. The pandemic-induced disruptions to transportation systems and port operations have reverberated throughout the supply chain, exacerbating the challenges faced by airlines. These delays have far-reaching consequences, affecting not only the timely delivery of new aircraft but also the scheduling and execution of essential MRO services. Conflicts in Eastern Europe and the Middle East have not imposed disruptions similar to those experienced in the maritime industry, however, they have affected the efficiency and costs of airline shipments penalizing flight times and costs induced by the avoidance of flying over large conflict zones.

Single-sourcing of parts and exclusive sourcing agreements have emerged as significant bottlenecks in the supply chain. OEMs (Original Equipment Manufacturers) and airlines find themselves vulnerable to the risks associated with relying on a single supplier for critical components, as disruptions in the supply chain of one entity can have widespread repercussions. Similarly, the dependency of parts' production on a single factory and geographical location has raised concerns about mitigating risks emanating from such business models.

Decisions about parts allocation have become a critical aspect of OEMs' customer service. Choosing between installations on a new aircraft and aftermarket solutions, managing parts under control, extending operational limits, developing repairs, increasing inventories are examples of dilemmas that the industry is facing on a daily basis. These decisions demand a delicate balance to ensure the safety and reliability of aircraft while mitigating the impact of supply chain disruptions and ensuring the viability or the airlines.

Lack of visibility regarding the availability of parts and MRO services compounds the challenges faced by airlines. The uncertainty surrounding the procurement of essential components hampers effective planning, leading to further delays and operational inefficiencies. Airlines are adding inventories to protect themselves against operational disruptions leading to locked in capital and resources.

Several Tier 1 and many Tier 2 companies have been affected by significant escalations on the payment terms that reach 120 days after parts delivery. While large OEMs have the financial strength to last for some time, smaller companies may not be able to finance themselves during such long periods. providing alternate parts and approved repairs face severe setbacks. Restricted access to capital, exacerbated by high-interest rates, hinder the ability of these companies to meet the demands of the disrupted supply chain, further accentuating the industry's challenges.

A critical aspect contributing to the predicament is the departure of large numbers of experienced personnel due to COVID-related factors. The industry has grappled with challenges in attracting, training, and retaining new employees, compounded by tight job markets for highly skilled individuals. The loss of seasoned professionals has created a void in expertise, impacting the efficiency and effectiveness of MRO services. While certain countries had innovative ways to support employment at low production rates, many states relied on unemployment benefits leading to many workers exiting the aviation industry and transferring their highly technical skills to other industries.

The inefficiencies in sourcing parts and services reveal systemic weaknesses in the airline MRO supply chain. Addressing these inefficiencies necessitates a comprehensive re-evaluation of procurement processes, supplier relationships, and strategic planning to enhance the resilience of the supply chain.

Moreover, manufacturing of aircraft and parts has been affected by heightened scrutiny on regulatory compliance issues. Recognizing and rectifying these compliance issues on production lines is essential for restoring confidence in the safety and reliability of aircraft, albeit at the cost of additional time and resources.

In conclusion, the airline MRO supply chain is grappling with multifaceted challenges that have arisen in the aftermath of the COVID-19 pandemic. From semiconductor and personnel shortages, geopolitical disruptions to single-sourcing vulnerabilities, these challenges necessitate a holistic and collaborative approach. Industry stakeholders, including manufacturers, suppliers, and regulatory bodies, must work in tandem to fortify the resilience of the supply chain, ensuring the seamless operation of airlines in the face of unprecedented disruptions. Only through concerted efforts and strategic interventions can the aviation industry weather the storm and soar to new heights in the post-COVID era.

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2. 2022 Snapshot

Thirty-one (31) airlines contributed data to the FY2022 cycle. Their fleet comprised a total of **3,020** aircraft for a total spend of **$13.04 Billion**.

In the following sections, we detail the fleet structure, the maintenance costs including the COVID-related costs, personnel and overhead costs, spares and inventory levels as well as aircraft leasing and maintenance reserves.

2.1. Fleet Overview

In this section, we differentiate the total fleet (i.e. all the aircraft in the airlines' fleets) from the active fleet (i.e. the aircraft in operations).

2.1.1 Total Fleet

In 2022, the MCTG fleet had a total of 3,020 aircraft, which represented 9% of the global fleet. The fleet size of MCTG airlines ranged from 1 to over 300+ aircraft.

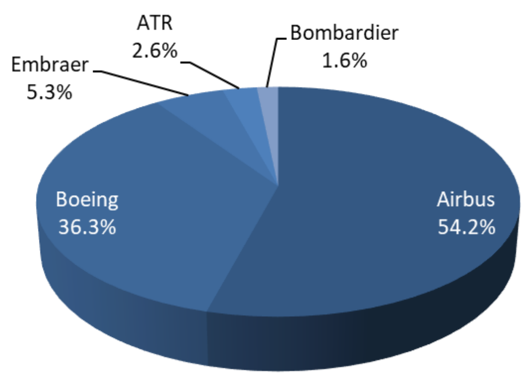


Figure 10 – Total Fleet Distribution by Manufacturer
(2022 – 31 Airlines; 3,020 Aircraft)

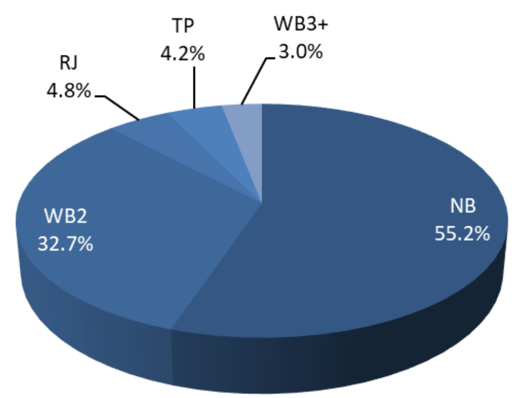


Figure 11 – Total Fleet Distribution by Aircraft Category
(2022 – 31 Airlines; 3,020 Aircraft)

Ten (10) airlines out of 31 reported both passenger and freighter aircraft. The ratio passenger and freighter aircraft was 94% and 6% respectively

2.1.2 Active vs Parked Aircraft

In 2022, less than 7% of the fleet were parked vs 20% in the global fleet. The parked aircraft were mainly passenger aircraft as the cargo market was less impacted by aforementioned restrictions. More than 50% of the parked fleet were WB aircraft from ASPAC and North Asia, which were the last regions to lift the travel restrictions post-COVID.

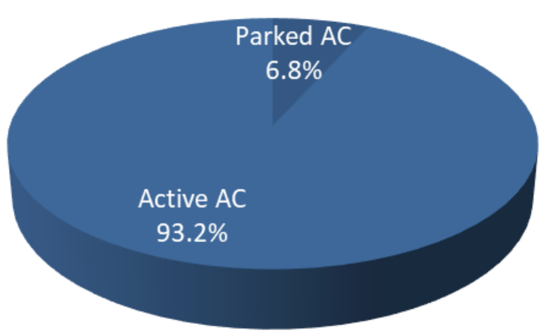


Figure 12 - Active vs Parked Aircraft
(2022 – 31 Airlines; 3,020 Aircraft)

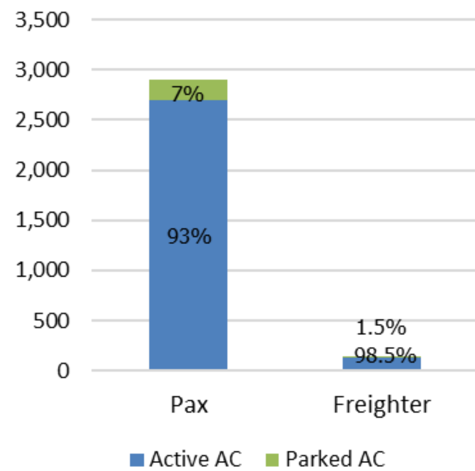


Figure 13 - Active vs Parked Aircraft by Role
(2022 – 31 Airlines; 3,020 Aircraft)

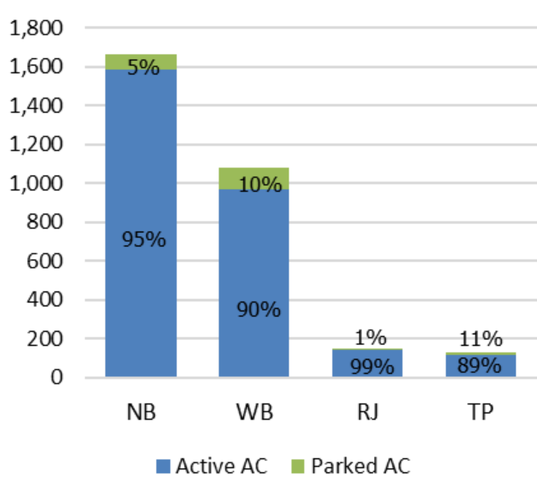


Figure 14 - Active vs Parked Aircraft by Category
(2022 – 31 Airlines; 3,020 Aircraft)

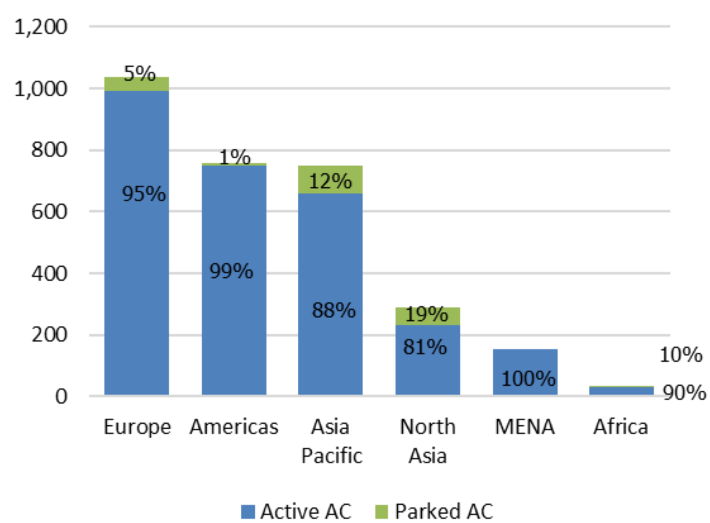


Figure 15 - Active vs Parked Aircraft by Region
(2022 – 31 Airlines; 3,020 Aircraft)

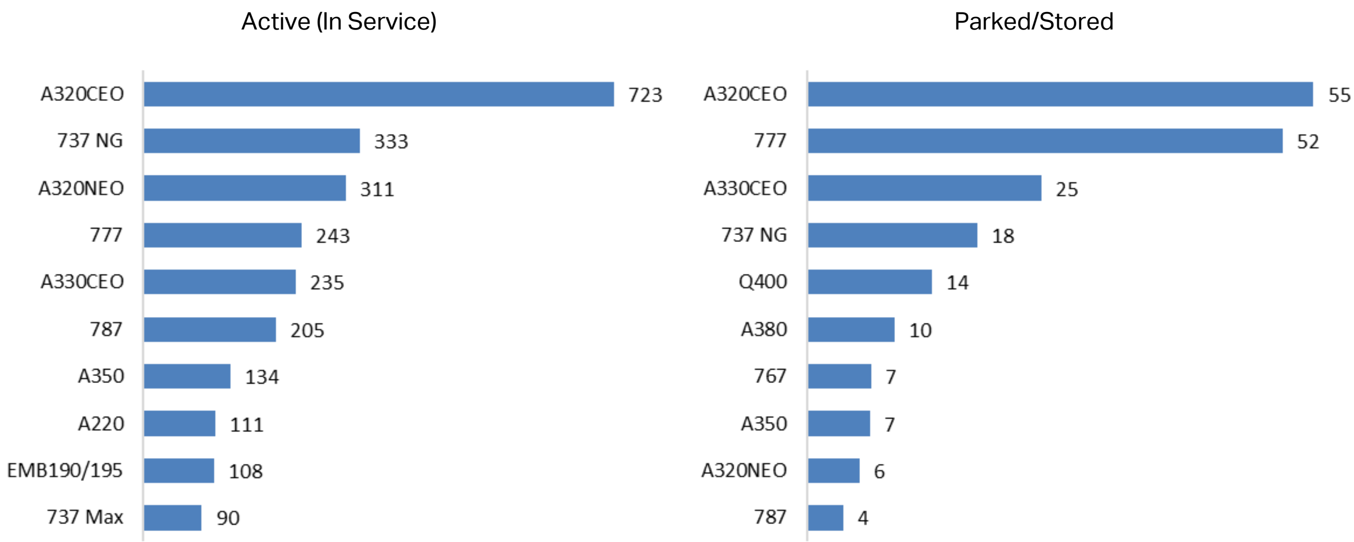
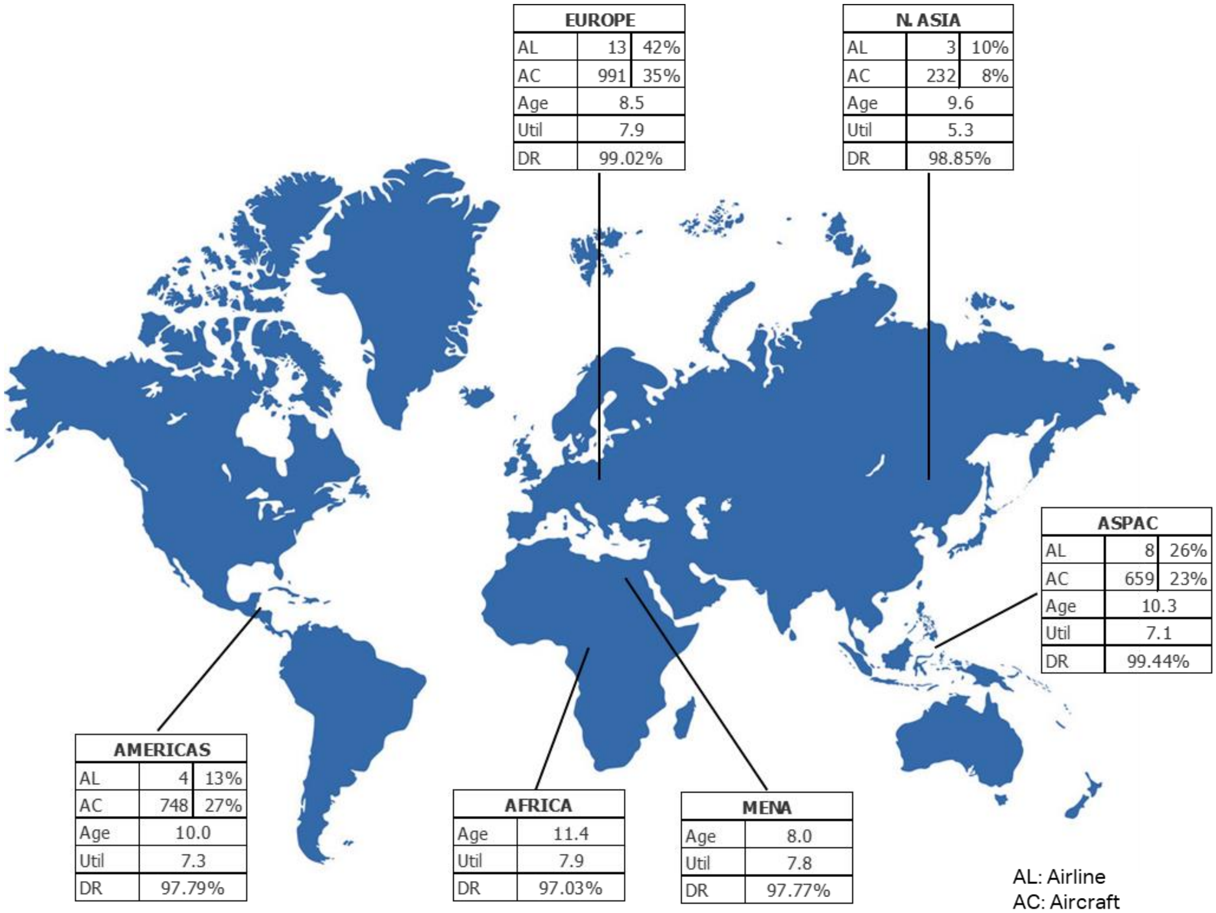


Figure 16 - Top 10 Aircraft Families (2022 – 31 Airlines; 3,020 Aircraft)

2.1.3 Active Fleet

In 2022, the MCTG fleet had 2,815 aircraft in service with a daily utilization of 7.3 hours and a dispatch reliability of 98.69% on average. They flew a total of 7.5 million flight hours, and 3.2 million flight cycles. Ten (10) airlines operated both passenger and freighter aircraft.



AL: Airline
AC: Aircraft
Age: Average Fleet Age (years)
Util: Utilization (Hours / Day)
DR: Dispatch Reliability

Figure 17 - Fleet Distribution by Region (2022 – 31 Airlines; 2,815 Active Aircraft)

More details on MCTG fleet vs Global Fleet in Annex I.

MCTG airlines operated 21 different aircraft families in 2022. Figure 18 represents the Top 14 aircraft families with a minimum of 3 operators and 5 aircraft, and a total of 2,710 aircraft (96% of MCTG active fleet). Some aircraft types well represented in the world fleet have been removed from this graph because they did not meet the '3 operators/5 aircraft' rule in the MCTG fleet.

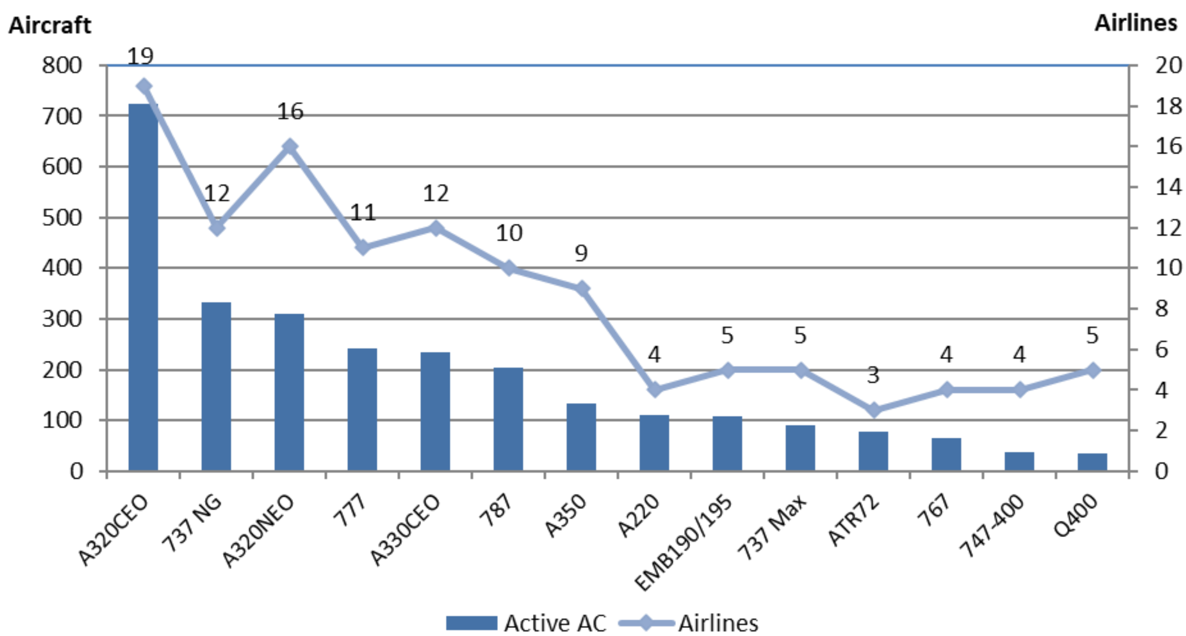


Figure 18 - Fleet Demographics (2022 – 31 Airlines; 2,815 Active Aircraft)

Aircraft Category	Active Aircraft	Airlines	Avg Age	Utilization (hrs/day)	Dispatch Reliability	FH/AC	FC/AC	FH/FC
NB	1,587	31	9.2	6.6	98.97%	2,409	1,389	1.73
WB2	893	19	9.3	9.1	98.25%	3,316	648	5.12
RJ	143	5	11.1	6.2	98.58%	2,265	2,005	1.13
TP	114	8	8.2	3.9	98.18%	1,407	1,411	1.00
WB3+	78	4	14.3	8.6	98.72%	3,138	609	5.16
	2,815	**31**	**9.4**	**7.3**	**98.69%**	**2,669**	**1,165**	**2.29**

Table 3 - Operational Data by Aircraft Category (2022 – 31 Airlines; 2,815 Active Aircraft)

2.2. Maintenance Cost Analysis

In this section, we analyze separately the different categories of costs for the FY2022:

- The direct maintenance costs – the regular maintenance costs, as a total and by aircraft category
- COVID-related costs including the additional parking/storage maintenance costs generated by the grounding of part of the fleet due to COVID restrictions and the parking/storage fees,
- The personnel and overhead costs with focus on staff levels and the productivity indicators.
- The costs of inventory as well as the maintenance reserves for leased aircraft.

The MCTG airlines reported costs totaling $13.04B which included:

- $10.11B for the "regular" direct maintenance of their aircraft in operations,
- $2.90 B on overheads,
- $32.51M for the additional maintenance of parked/stored aircraft,
- $211K for parking/storage fees

The direct maintenance and parking/storage maintenance costs ($10.11B) represented 13% of the global MRO spend for 9% of the global fleet. This can be attributed to the structure of the MCTG fleet that has a higher share of NB and WB than the global fleet.

2.2.1 Direct Maintenance Spend

The 31 MCTG airlines reported $10.11B in direct maintenance costs for their active aircraft. The average maintenance cost was $326M per airline and $2.9M per aircraft.

The unit costs continued to decrease in 2022 compared to the peak of the COVID period in 2020, however they remained high ($1,345 per flight hour, $3,083 per flight cycle on average) as many aircraft were reactivated and required some maintenance prior to returning to service.

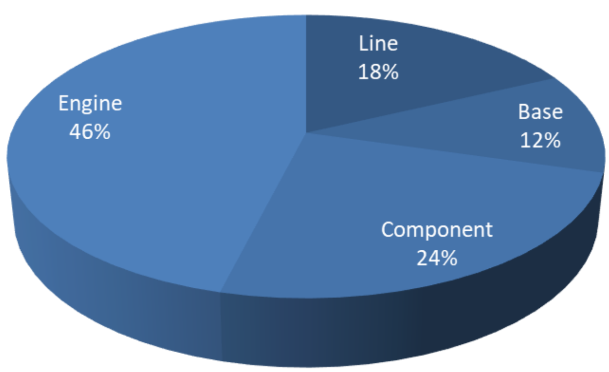


Figure 19 - Direct Maintenance Cost Structure by Segment (2022 – 31 Airlines; 2,815 Active Aircraft)

Engines and components remained the highest cost segments at 37% and 26% of maintenance costs respectively (Fig. 19).

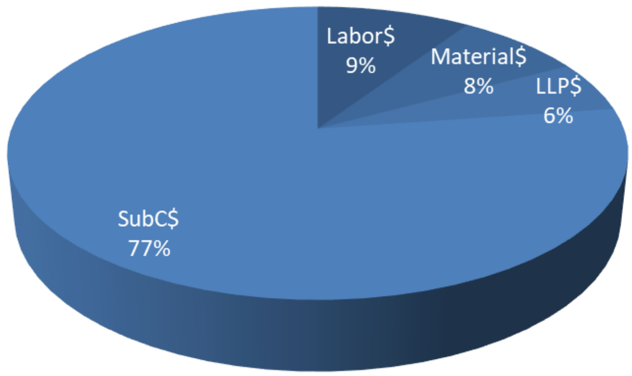


Figure 20 - Direct Maintenance Cost Structure by Element (2022 – 31 Airlines; 2,815 Active Aircraft)

Note: For a number of years, airlines have been tasked to report their LLP costs in a separate field, and these have been included in the calculation of Engine Mtc costs. However, in cases where these were not isolate costs, they were reported either in their Subcontracted costs or Material costs. We recommend exercising caution when interpreting this data, especially the share of LLPs.

The rest of this report is only available to participating airlines.

If your airline would like to join the MCX program, please contact us at mcx@iata.org.

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