Airline Maintenance Cost Executive Commentary

FY2021 Data

FY2021 Data Highlight – 37 Airlines

Active Aircraft	3,542	Parked/Stored Aircraft	502
Maintenance Cost ($/FH)	1,340	Parking/Storage Mtc Cost ($K/AC)	163
Maintenance Cost ($/FC)	3,230	Parking/Storage (MH/AC)	2,695
Average Utilization (hrs/day)	6.4	Parking/Storage Fees ($K/AC)	169

DECEMBER 2022

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Foreword

Dear Member Airlines,

The COVID crisis persisted in 2021 and affected our industry's recovery. COVID strained supply chains everywhere, these effects were seen as shortages of material and parts in all industries, with aviation not being immune to them. Uncertainty, labor shortages and oil prices have exacerbated the challenges that the industry faced. This context led to inflation and affected transportation and labor costs; these costs had an impact on the MRO industry.

In 2021, the industry activity remained below pre-COVID levels and MRO facilities experienced slot availability issues for aircraft and engine heavy visits. Another challenge was related to the shortage of personnel. As a result of the COVID crisis, many engineers and mechanics retired while others left the industry forever. This has created a skilled personnel shortage that MROs are trying to address via cultural changes to better understand the needs and motivations of individuals and, by designing and implementing automated processes that remove unnecessary work, reduce bureaucracies and improve efficiency.

MCTG data collection has been impacted as airlines have lost staff and this is a volunteer effort. Despite the difficult times, we had a 20% increase in airline participation since last year. At the same time, the reporting active fleet increased 80% (thanks also to the industry's recovery after COVID). Soon, we hope to introduce certain functionalities to be able to collect and submit the data to us in a more efficient way. In addition, newly hired personnel need time to adapt to the challenges and the complexity of aircraft maintenance costs. However, it remains important that we are able to continue collecting and analyzing such maintenance cost data to monitor trends in the industry. In addition, we have been working with the industry to assist in promoting digitalization. The newly published Aircraft Operational Availability (2^{nd} Ed) provides the industry basic definitions to understand certain airline processes and their practical implications. The white paper on Aircraft Health Monitoring is a first effort to provide insights to the industry on new maintenance concepts.

Best regards,

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Preliminary Remarks

The Maintenance Cost Technical Group (MCTG) collects maintenance cost data from airlines worldwide on an annual basis. The goals of MCTG 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 2021. We are doing our best to present meaningful analysis and we encourage you to provide feedback on this report so we can enrich it again next year. We regularly send out a survey to airlines in order to gather their advice on how to improve this report and its content. MCTG data collection is open to all commercial airlines worldwide that would like to benchmark their cost to maintain their fleet. MCTG does not discriminate between IATA and non-IATA member airlines. MCTG does not discriminate between major, domestic, international, low-cost, regional airlines, etc.

The importance of data quality

It takes a fair amount of time for MCTG airlines to gather and submit data, and it takes a lot of effort to validate this data in order to deliver the most relevant benchmark 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.

That's why we would like to remind you of the importance of making sure your data are 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 MCTG is clearly on maintenance costs, however operational data (e.g. flight hours, cycles, ASK, fleet size and fleet age) and personnel & overhead 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 the best benchmark data and analysis possible for the benefit of the airline industry and your own airline.

The importance of data treatment

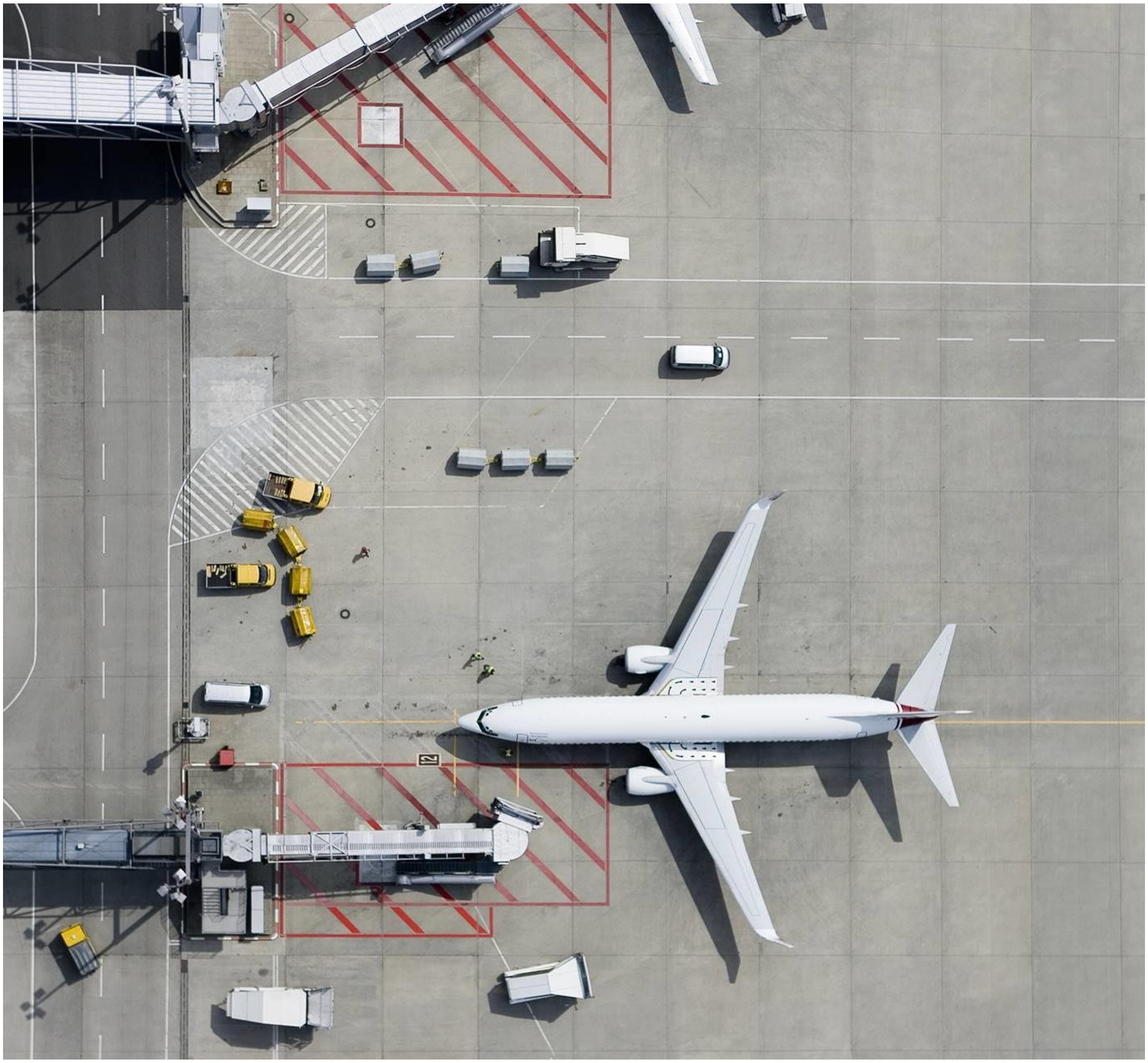
All the MCTG analyses presented in this report use maintenance cost data as they were provided by the airlines through the standardized IATA toolset. No attempt was used to normalize the data based on any parameters such as operational severity (hours to cycle ratio, utilization, harsh environment, etc.),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

Additionally, it should be noted that the analysis is done in USD 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 period of time.

The acceptance of data

This report analyzes and comments data from 37 airlines. Due to some late submissions and limited resources, the publication of this report has been delayed compared to pre-COVID years.



Data and Analysis Methodology

IATA's Maintenance Cost Technical Group (MCTG) collects maintenance cost data from airlines worldwide on an annual basis. MCTG Airlines are the carriers which participate in the annual data collection. Thirty-seven (37) airlines reported data for FY2021.

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

All airline data are consolidated and then analyzed considering 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 mctg@iata.org.

Typical metrics include cost per flight hour, cost per departure, cost per aircraft. The cost data unit is US dollar, and the length unit is kilometer.

In addition, for 2020 and 2021, 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~~ne~~ 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
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 MCTG analysis by presenting an overview of the airline industry, the global fleet count and MRO spend for 2021 as well as a focus on the freighter fleet and an article on parts traceability.

In 2021, the world fleet count was 31,321 aircraft, 78% of which were in service. Globally, airlines spent $62 Billion on MRO, representing around 11.2% of total airline operational costs.

1.1. Airline Industry Landscape in 2021

The airline industry has started its recovery in 2021 but at a very slow pace due to repeated COVID-19 waves and travel restrictions.

COVID-19 is the biggest and longest shock to hit aviation. Previous shocks cut 5 to 20% from RPKs and were recovered after 6 to 18 months. (Fig. 1)

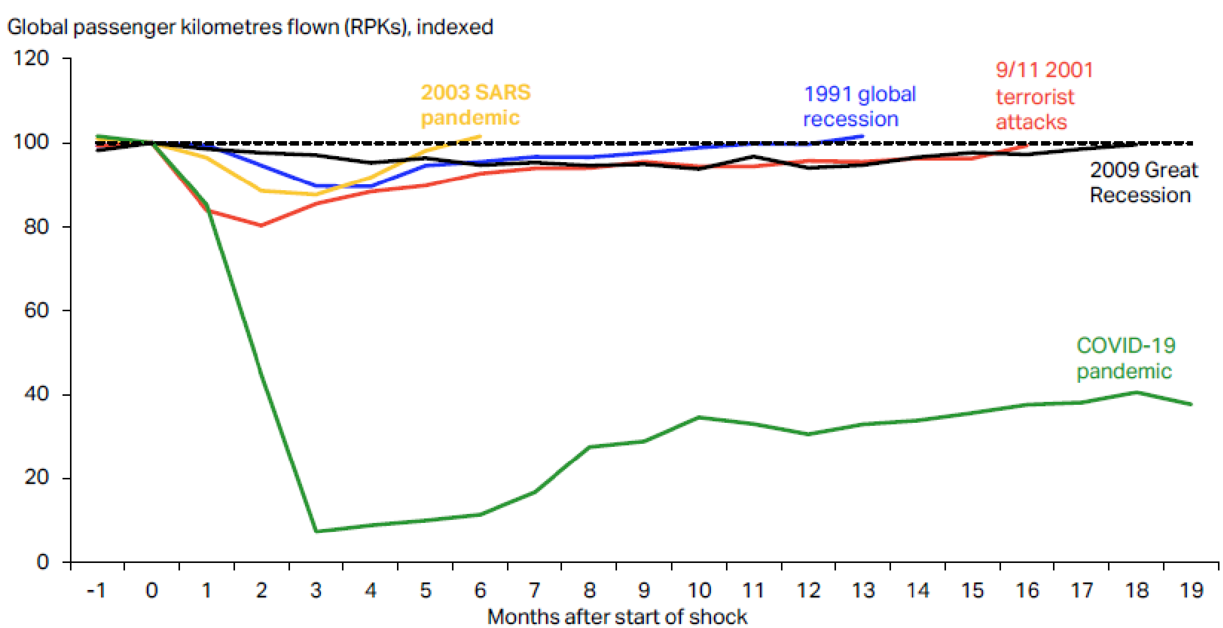


Figure 1 -Global Passenger Kilometers Flown (RPKs) - Data is adjusted for seasonality.
Source: IATA Economics

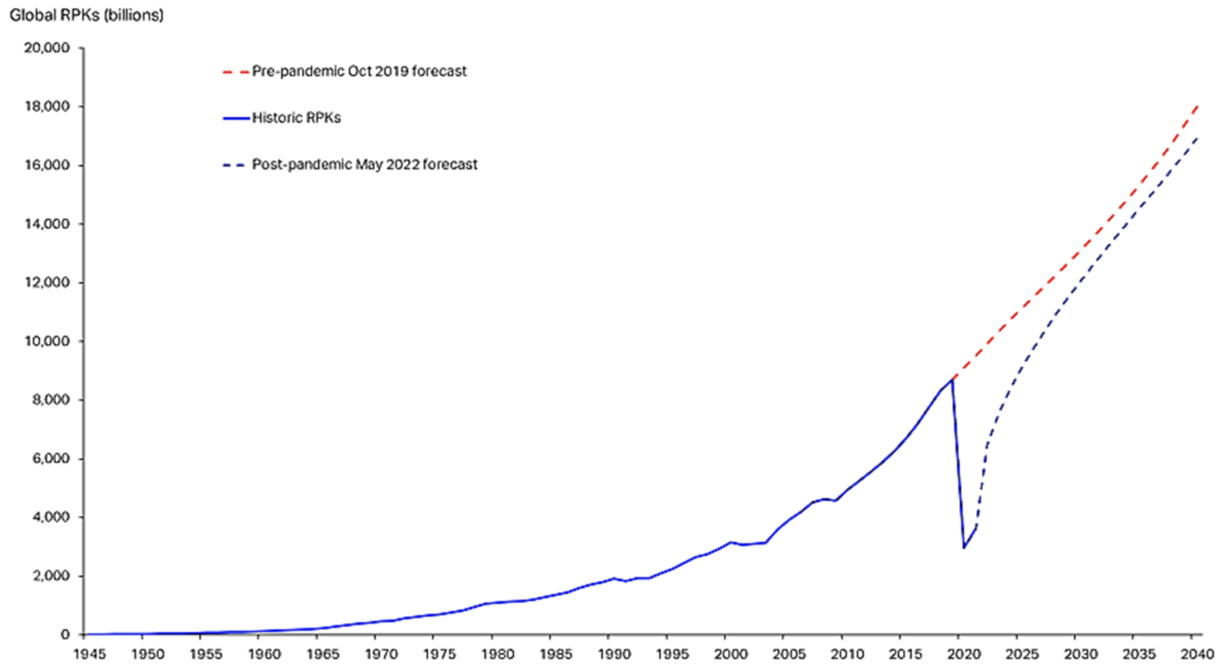


Figure 2 - Global Annual Passenger Kilometers Flown (RPKs) 1945-2040F
Source: IATA Economics

If IATA's current forecast is realized, traffic in 2040 would still be 6% below the pre-pandemic forecast. (Fig. 2)

Airlines were still on life support and have received $243 Bill. of financial aid from governments worldwide since the beginning of the pandemic. (Fig. 3)

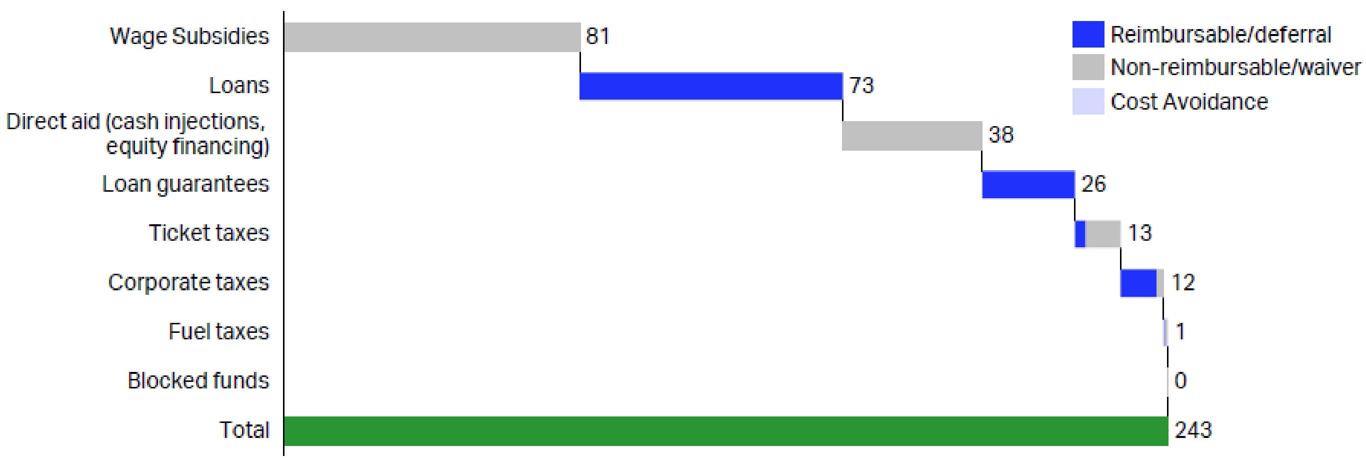


Figure 3 - Financial Aid Made Available to Airlines due to COVID-19, by type (US$ Bill.)
Source: IATA Economics

Despite the financial aid and significant pent-up travel demand following the reopening of the US and Europe, the performances of the airline industry were still significantly below 2019 levels. The PLF went from 65.9% in 2020 to 67% in 2021 and the net result was a $42.1 Bill. loss, down from $137.8 Bill. in 2020. The price of fuel has increased to $77.8 vs $46.6 in 2020, becoming an additional challenge for buyers whose local currencies have dropped vs the US dollar. (Table 1)

	2019	2020	2021
REVENUES, USB bn	838	382	506
% Change year-on-year	3.2%	-54.4%	32.4%
EXPENSES, USD bn	795	493	552
% Change year-on-year	3.7%	-37.9%	11.8%
RPK growth, % change year-on-year	4.1%	-65.8%	21.9%
Scheduled passenger numbers, billion	4.5	1.8	2.2
Break-even weight load factor, % ATK	66.4%	76.8%	67.2%
Weight load factor achieved, % ATK	70.0%	59.5%	61.7%
Passenger load factor, % ASK	82.6%	65.2%	67.0%
Passenger yield, % change year-on-year	-3.7%	-9.1%	3.8%
Cargo yield, % change year-on-year	-8.2%	52.5%	24.2%
Fuel price, USD/barrel	79.7	46.6	77.8
Non-fuel unit cost (cents per ATK)	39.2	48.1	44.9
Non-fuel unit costs, % change year-on-year	-0.3%	22.7%	-6.7%
OPERATING PROFIT, USD bn	43.2	-110.8	-45.2
Operating margin, % revenue	5.2%	-29.0%	-8.9%
NET PROFIT, USD bn	26.4	-137.7	-42.1
Return on Invested Capital, %	5.8%	-19.3%	-8.0%

Table 1 - Airline Industry Performance (2019-2021) - Source: IATA Economics

1.2. Global Fleet

In 2021, the world fleet consisted of a total of 31,321 aircraft. This includes western built aircraft in commercial operations (Passenger, Cargo, Combi), with narrowbody, widebody and regional jets and turboprops (ATR42/72 and Q300/400 only). Twenty two percent (22%) of the fleet was parked or stored compared to 31% in 2020 and 10% on average in the past decade. It remains unclear of what the future brings from a large number of aircraft that still remain parked (about 7,000 aircraft; Fig 5). Will they retire permanently or return to operation? Will a number of them enter the P2F conversion market? How many will eventually be available for part-outs?

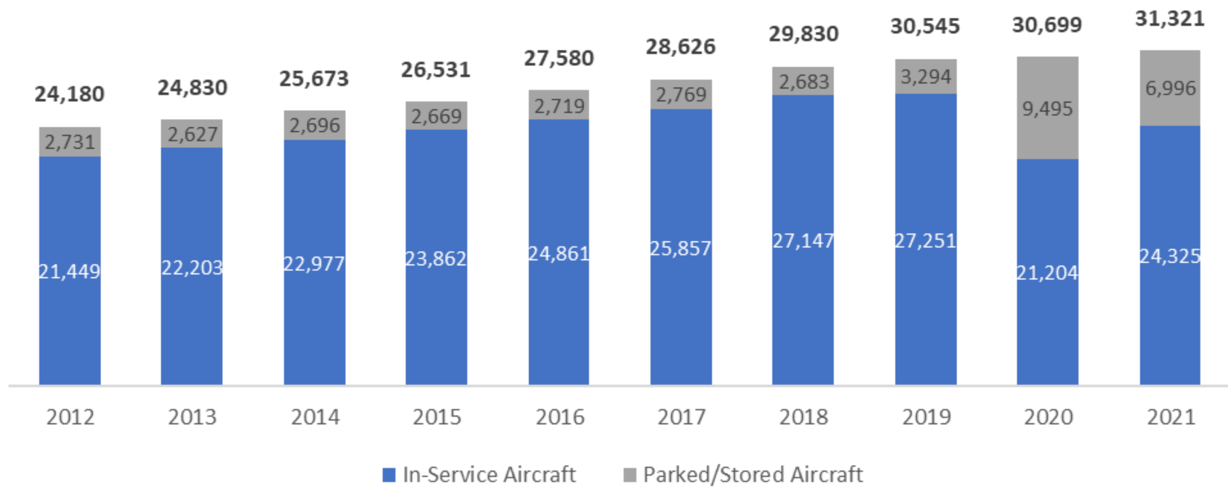


Figure 4 - World Fleet (2012-2021) - Source: Cirium

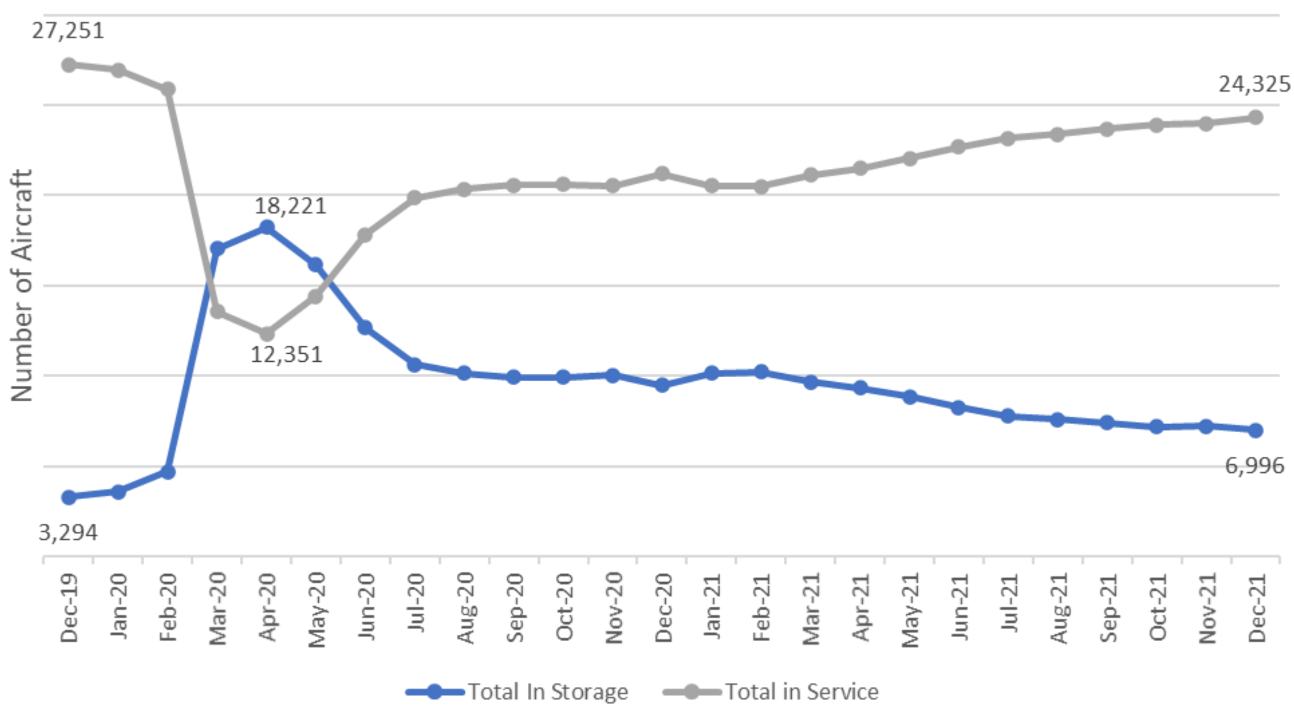
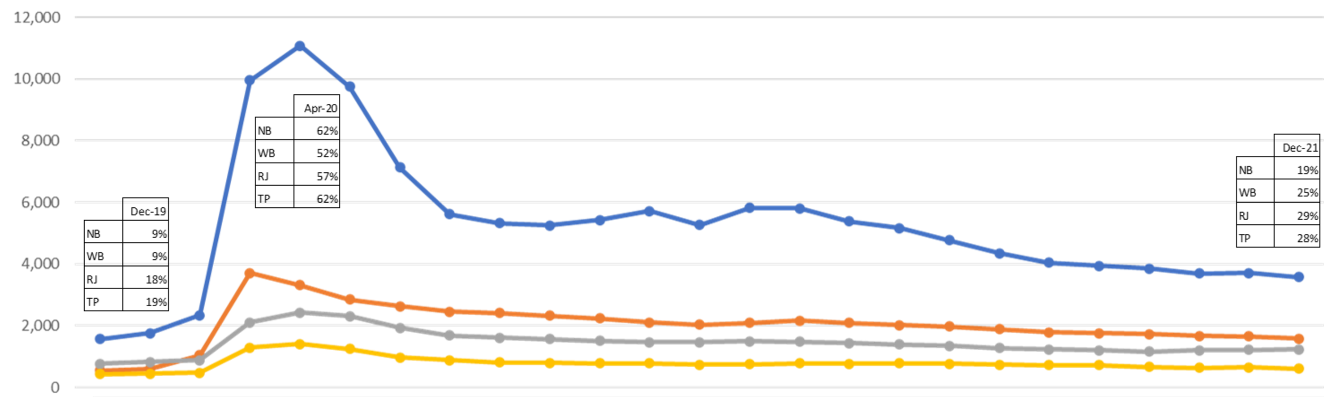


Figure 5 - Parked/Stored Aircraft vs In-Service Aircraft (Dec 2019-Dec 2021) – Source: Cirium

Even if the number of parked aircraft has significantly decreased, it stays high compared to pre-pandemic levels. The in-service fleet was dominated by narrow-body aircraft. Some wide-body aircraft returned to service as full passenger aircraft as traffic started picking up. However, demand for widebodies remains soft with 25% of the fleet parked at the end of 2021vs 9% before COVID. (Fig. 6)

Aircraft utilization also increased significantly over the year before as the industry started recovering from COVID. (Fig. 8)



	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	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
NB	1,561	1,753	2,331	9,956	11,076	9,752	7,133	5,621	5,321	5,251	5,426	5,721	5,265	5,817	5,799	5,389	5,170	4,765	4,348	4,044	3,939	3,851	3,693	3,700	3,575
WB	546	605	1,039	3,706	3,308	2,852	2,631	2,449	2,404	2,319	2,231	2,099	2,031	2,091	2,168	2,087	2,017	1,969	1,892	1,789	1,752	1,731	1,673	1,650	1,580
RJ	764	820	881	2,102	2,426	2,311	1,928	1,682	1,605	1,568	1,514	1,457	1,460	1,492	1,485	1,439	1,397	1,345	1,279	1,233	1,196	1,161	1,204	1,222	1,233
TP	423	437	468	1,282	1,411	1,247	969	874	812	789	775	775	740	753	777	767	773	766	734	717	716	664	635	645	610

Figure 6 - Parked/Stored Aircraft by Category (Dec 2019-Dec 2021) – Source: Cirium

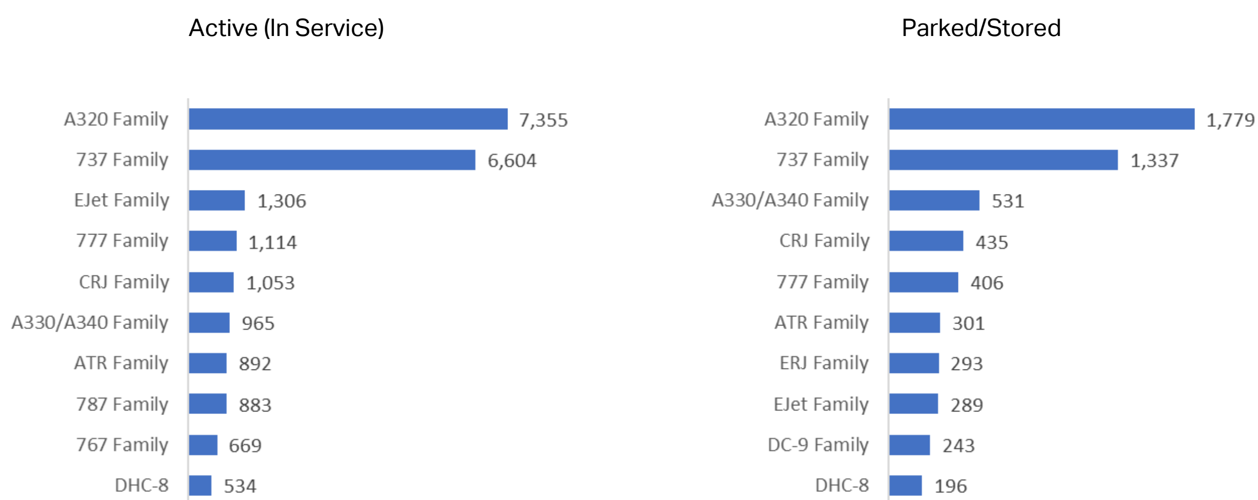


Figure 7 - Top 10 Aircraft Families (2021) - Source: Cirium

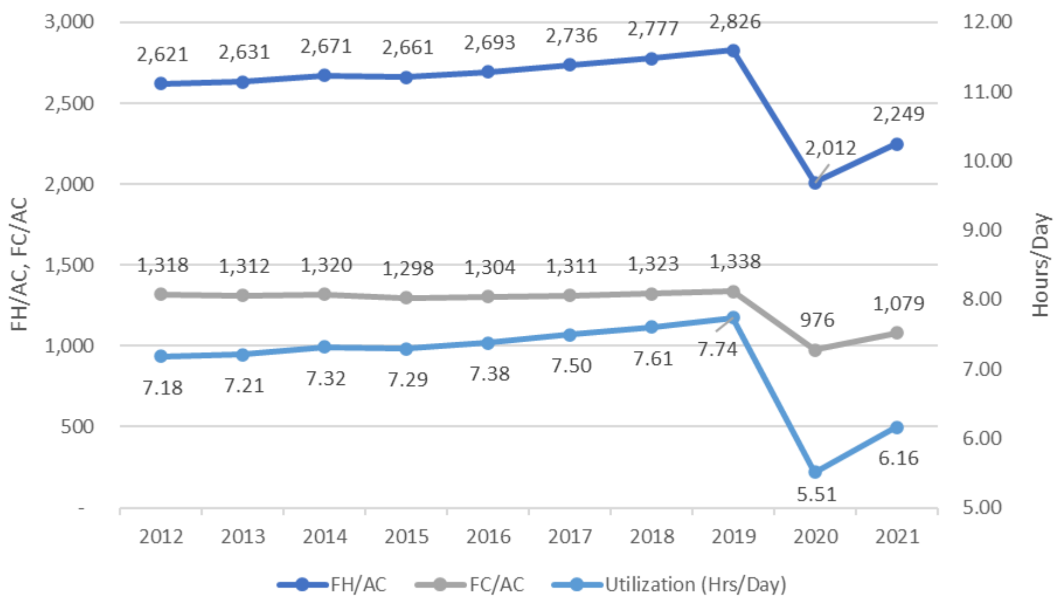


Figure 8 - World Fleet Statistics (2012 - 2021) - Source: Cirium

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

Global MRO spend in 2021 was valued at $62 Billion (-35% vs the pre-COVID forecast). This represented 11.2% of airlines operational costs. (Fig. 9)

Maintenance costs have increased due to higher demand and shortage of parts, raw material and labor, prompting airlines to rethink their supply chain in order to lower the risks (dual sourcing, nearshoring).

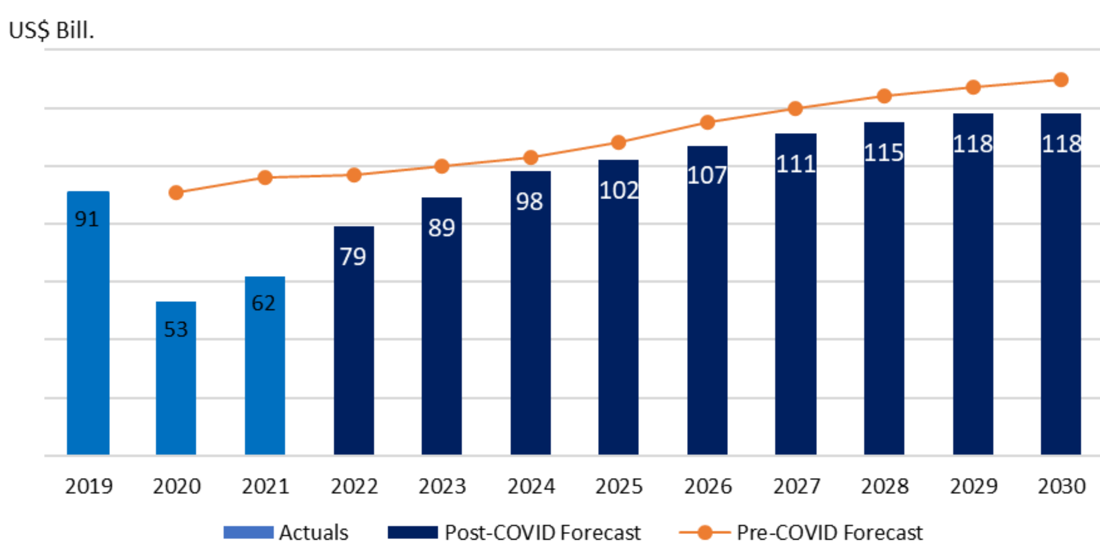


Figure 9 - Global MRO Spend Forecast (2020-2030) - Source: Oliver Wyman

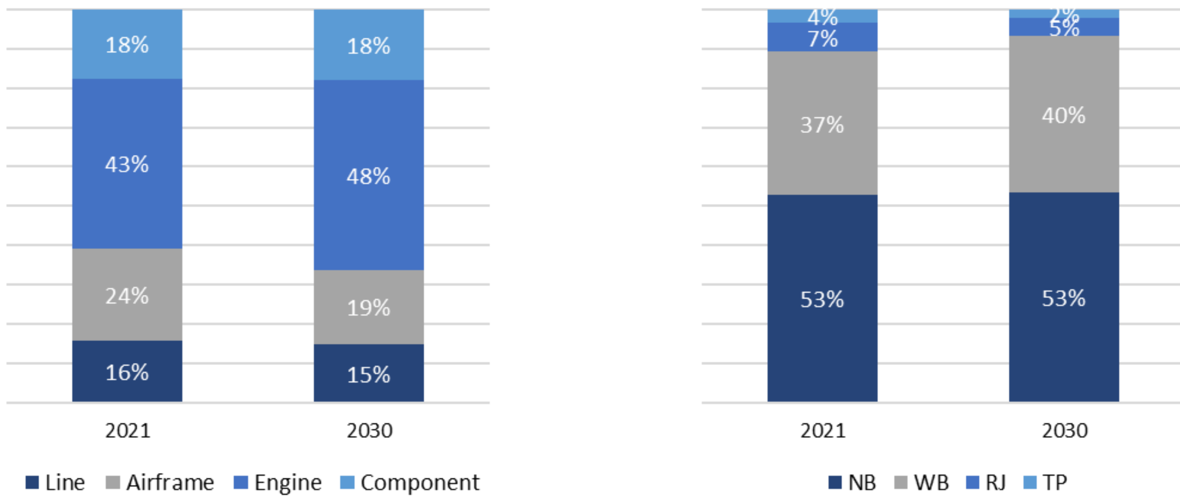


Figure 10– Global MRO Spend by Segment and by Aircraft Category (2021E-2030F) - Source: Oliver Wyman

1.4. Freighter Fleet

Cargo demand has been trending upwards since the beginning of the pandemic. It allowed airlines to generate revenues when the passenger traffic was very much struggling. With this robust and rising demand, we have seen a significant increase in the global freighter fleet even though the number of freighters in storage remained practically the same (Fig. 11). This is attributed not only to new freighter deliveries but to a large number of passenger-to-freighter conversions. At the same time, the regulatory exemptions enabling TCPC operations began to expire, and such aircraft returned to passenger service. The number of PTF conversions has reached a high in a decade (Fig.12) and the freighter market is expected to continue to grow the coming decade with PTF conversions as well as factory-built cargo aircraft (Fig.13).

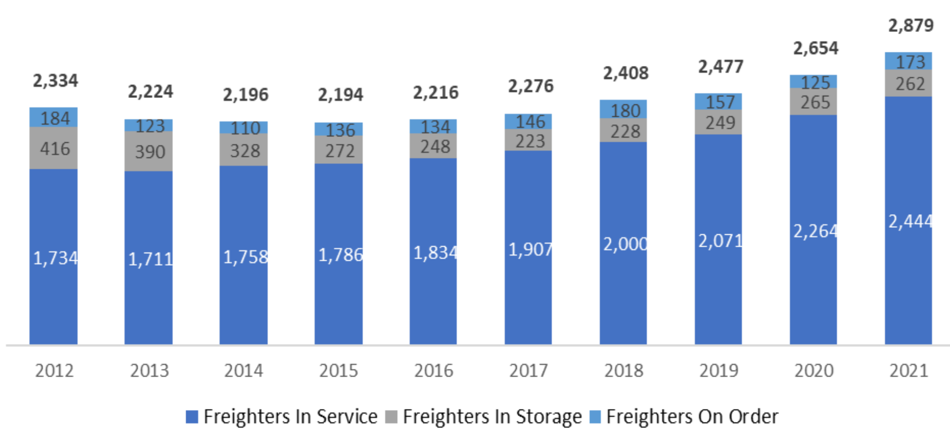


Figure 11 - Freighter Global Fleet (2012-2021) - Source: Cirium

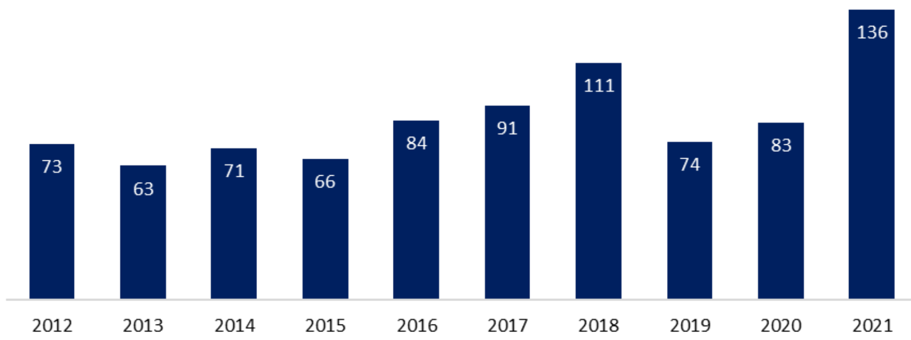


Figure 12 - Passenger to Freighter Conversions (2012-2021) - Source: Cirium

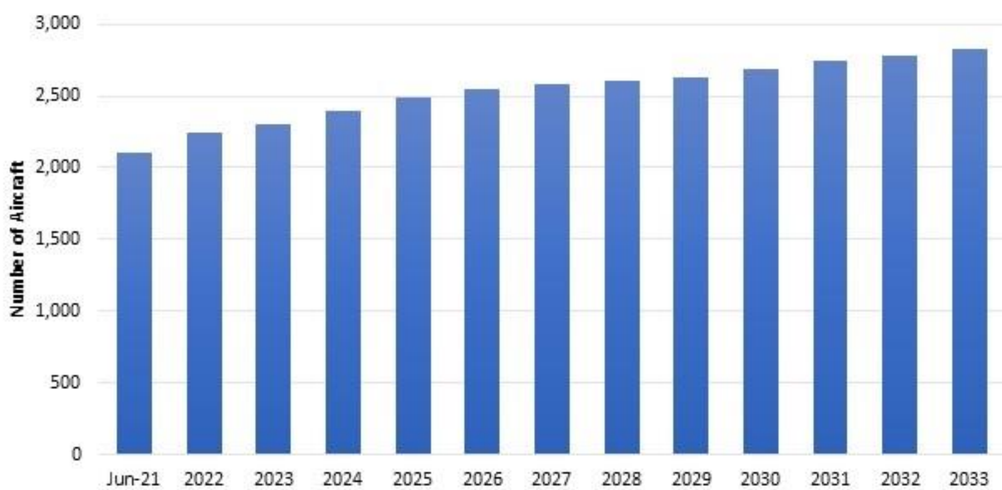


Figure 13 - Freighter Market Forecast 2021-2033 – Source: IBA/Yocova

1.5. Parts Traceability

In last year's MCTG annual report, we devoted a section on Parts and Materials. We used data from IATA's MRO Smart Hub Platform to determine the impact of COVID in the Parts and Materials aftermarket and the price volatility experienced in the Used Serviceable Material (USM) Aircraft Parts Market.

In the past two years, we started seeing the importance of USM in controlling aircraft material costs. USM offers a significant alternative to new parts. It is critical, however, that the industry understands the importance of traceability of such used material. While the regulatory framework is clearly understood, the industry has developed certain practices that vary significantly among the trading partners and lead to loss of asset value, unnecessary bureaucracy and frustration. We reproduce up to the end of this section the text - published by Aviation Week in August 2022 – to raise the industry's awareness towards the development and adaptation of industry standards necessary to improve efficiency in the industry.

Back-to-birth traceability of aircraft parts is an issue that numerous industry organizations have been facing for a long time. That is because the transfer of aircraft parts between industry stakeholders is inherently linked to regulations and commercial contract provisions around the maintenance history of those parts. However, the lack of a common industry approach to traceability creates unnecessary bureaucracy and interminable negotiations between the trading partners, all conducive to frustration, time wastage and significant loss of asset value.

Digitalization allows us to maintain parts traceability far more efficiently than paper-based processes. Interestingly, the pandemic has dramatically reduced opportunities for face-to-face exchanges but greatly accelerated the drive toward digitalization and development of innovative data-exchange concepts. Equally important is the recognition and acceptance by the International Civil Aviation Organization and key aviation safety regulators of digital documentation for aircraft parts.

Now it is time to take the next step and fully enable the industry to track and trace an aircraft and its parts around the world and throughout time using digital technology.

Digital cradle-to-grave parts traceability will help to address multiple situations, such as aircraft and parts subjected to sanctions, regulatory and commercial requirements, internal company policies and procedures and other cases. Beyond airworthiness assessment, traceability can assist in the financial evaluation of the asset.

An industry standard is essential so that requirements can be set to trace the history of aircraft parts properly from their production to delivery and throughout their operational and repair activities.

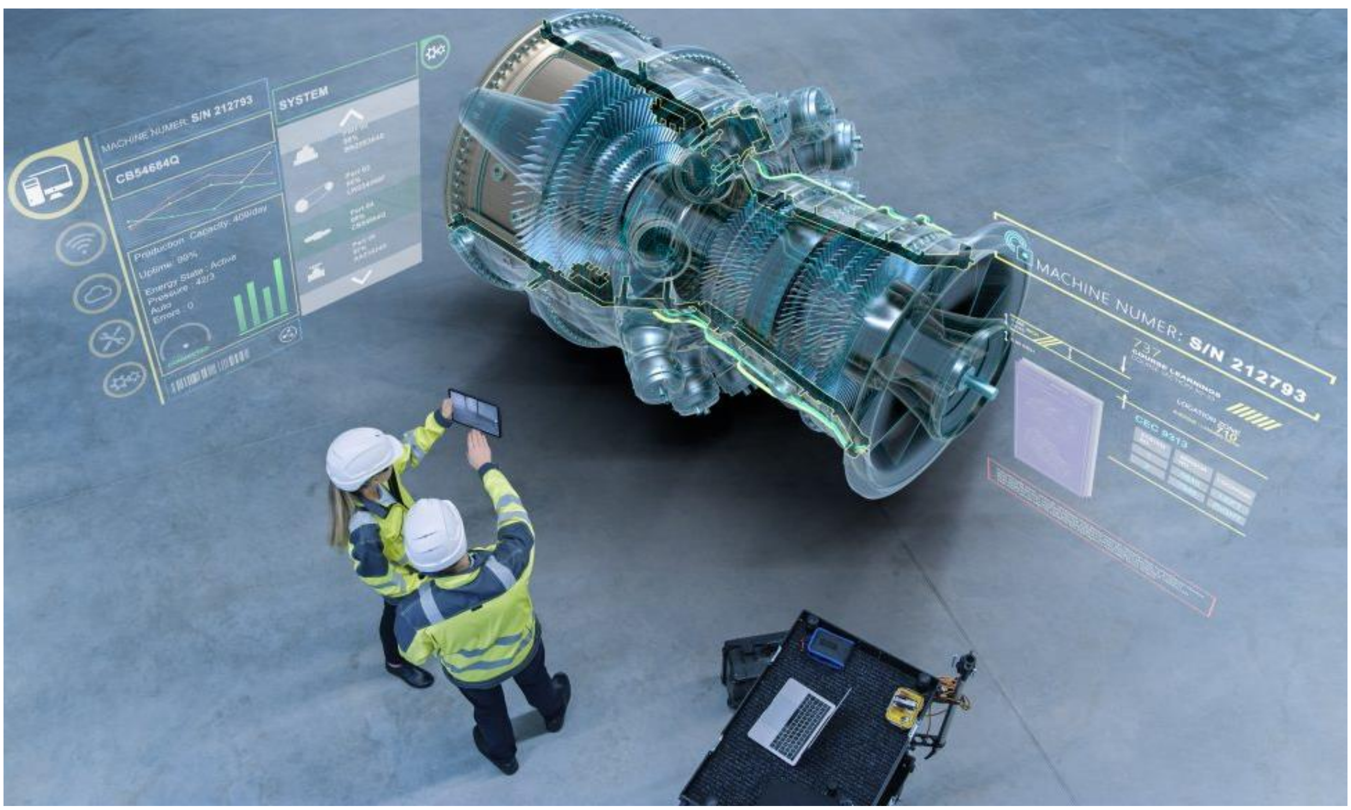
In the absence of such a standard, an understanding of the differences among various regulatory and commercial needs—as well as the ability to exchange data and information efficiently among parties—would be a significant step. No such common understanding of traceability requirements exists among all the industry stakeholders trading aircraft parts. This issue affects a sector of the industry that represents approximately two-thirds of the annual $90 billion MRO market.

At least two aspects must be addressed to facilitate parts traceability. The first is an industry agreement that allows for the creation of a "digital twin" of the physical part—basically, a digital folder that contains the history of the part and its events, movements and transactions. The current operator (and owner, if different) has full access to the aircraft part and should have access to and control of its digital twin, including the ability to add any additional information generated about the part during operation.

The challenge will be for the industry to agree on the type and format of data that needs to be traced from the part's production to the end of the part's useful life—a task like the development of an e-ticketing standard that facilitates passenger traceability across the airline industry. Blockchain is a technology that can be employed to ensure data immutability, a critical property to ensure the need for trust among participating entities. Cloud technology with proper governance rules can allow access to data as needed.

The second challenge arises from the inherent need to link the physical part with its digital twin through auto-ID technology, such as machine-read laser etching, QR code or RFID tag. The uniqueness of a digital identity for the part itself and for the individuals and the entities linked to the part must be addressed as critical elements enabling data exchanges among systems.

The infusion of new digital technologies using commonsense standards will lead to a solution that addresses the operational, supply chain and cost challenges associated with back-to-birth parts traceability. As the so-called "digital natives" enter the aviation workforce in greater numbers and the industry resets aft er COVID-19, the time has come to align on a shared vision for the most efficient use of digitalization to support this vital requirement.



2. 2021 Snapshot

Thirty-seven (37) airlines contributed data to the FY2021 cycle. Their fleet comprised a total of 4,045 aircraft for a total spend of $12.99 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 2021, the MCTG fleet had 4,045 aircraft, which represented 13% of the global fleet. The fleet size of MCTG airlines ranged from 3 to over 600+ aircraft.

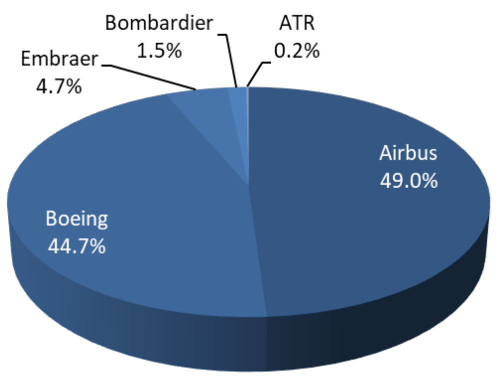


Figure 14 – Total Fleet Distribution by Manufacturer
(2021 – 37 Airlines; 4,045 Aircraft)

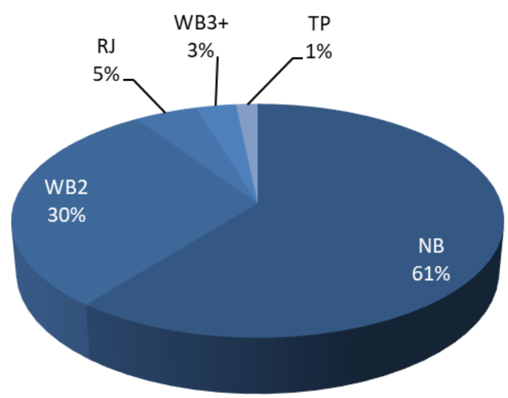


Figure 15 – Total Fleet Distribution by Aircraft Category
(2021 – 37 Airlines; 4,045 Aircraft)

Eleven (11) airlines out of 37 reported both passenger and freighter aircraft, one (1) airline is freighter only. The ratio passenger/freighter aircraft was 94% / 6%.

2.1.2 Active vs Parked Aircraft

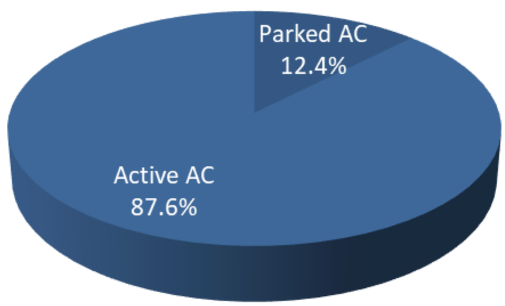


Figure 16 - Active vs Parked Aircraft
(2021 – 37 Airlines; 4,045 Aircraft)

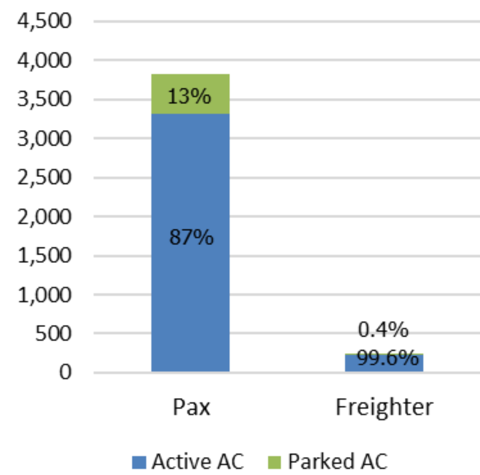


Figure 17 - Active vs Parked Aircraft by Role
(2021 – 37 Airlines; 4,045 Aircraft)

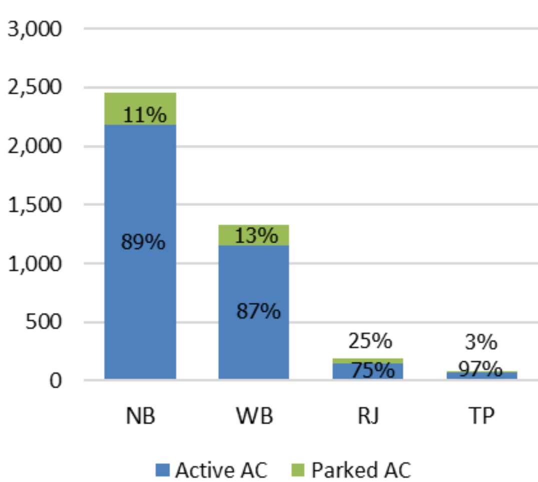


Figure 18 - Active vs Parked Aircraft by Category
(2021 – 37 Airlines; 4,045 Aircraft)

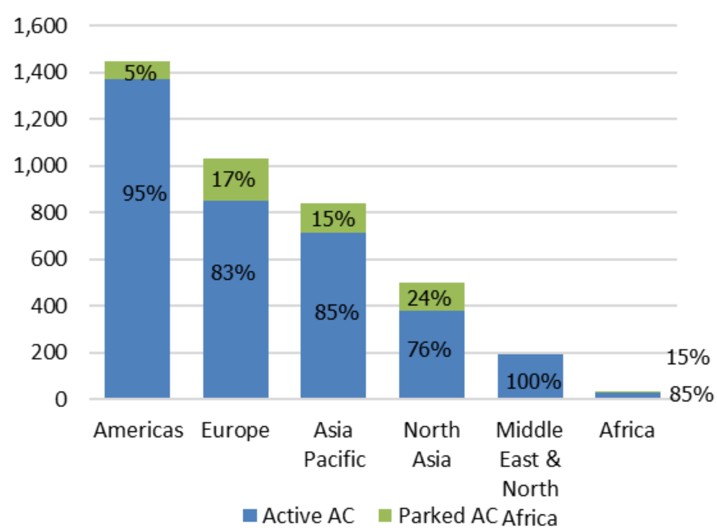


Figure 19 - Active vs Parked Aircraft by Region
(2021 – 37 Airlines; 4,045 Aircraft)

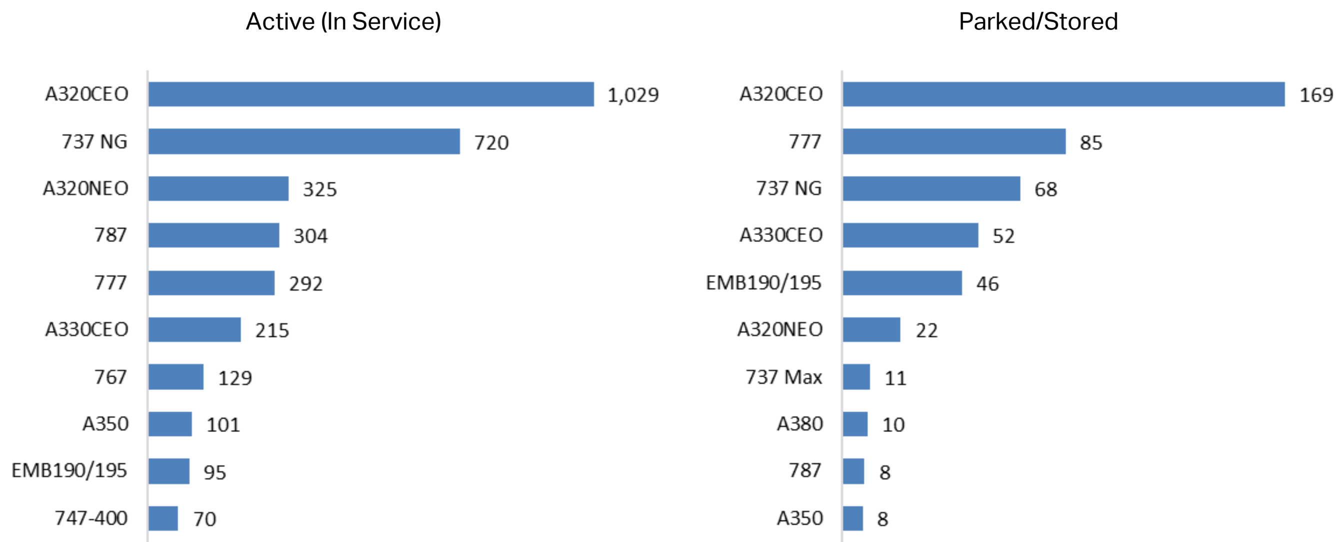


Figure 20 - Top 10 Aircraft Families (2021 – 37 Airlines; 4,045 Aircraft)

2.1.3 Active Fleet

In 2021, the MCTG fleet had 3,542 aircraft in service with a daily utilization of~~n~~ 6.4 hours and a dispatch reliability of 97.99% on average. They flew a total of 8.2 million flight hours, and 3.4 million flight cycles. Eleven airlines operated both passenger and freighter aircraft. One airline had freighters only.

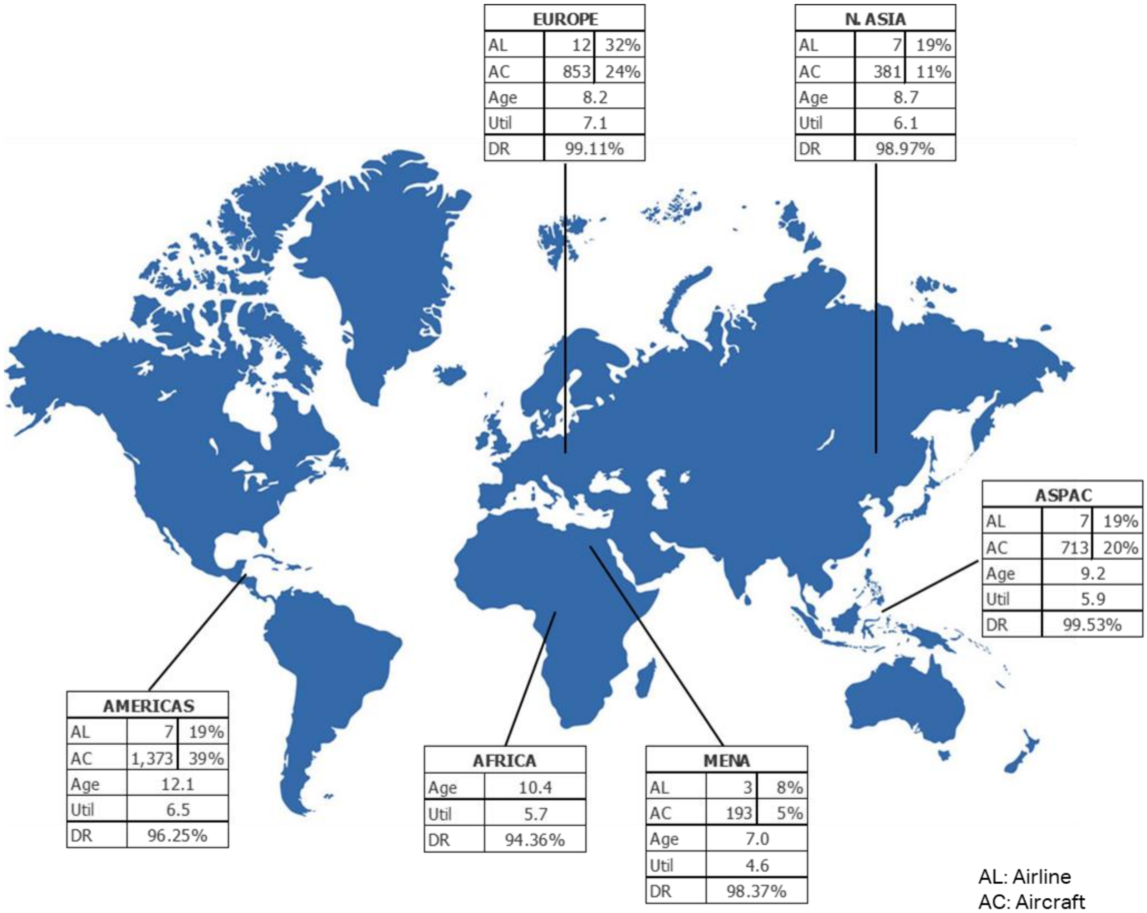


Figure 21 - Fleet Distribution by Region (2021 – 37 Airlines; 3,542 Aircraft)

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

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

MCTG airlines operated 20 different aircraft families in 2020. Figure 24 represents the Top 14 aircraft families with a minimum of 3 operators and 5 aircraft, and a total of 3,488 aircraft (98% 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.

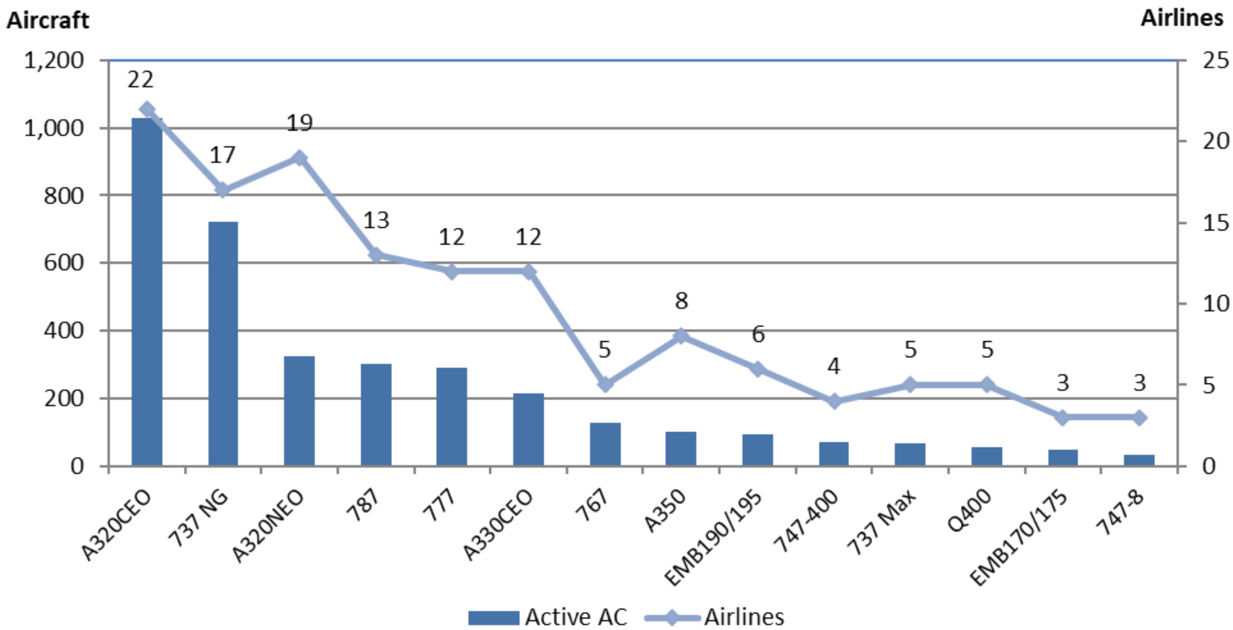


Figure 22 - Fleet Demographics (2021 – 37 Airlines; 3,488 aircraft)

Aircraft Category	Active Aircraft	Airlines	Avg Age	Utilization (hrs/day)	Dispatch Reliability	FH/AC	FC/AC	FH/FC
NB	2,181	34	9.7	5.9	97.80%	2,166	1,132	1.91
WB2	1,047	24	9.6	7.2	98.34%	2,635	545	4.84
RJ	144	7	10.6	4.9	98.85%	1,796	1,453	1.24
WB3+	106	5	16.2	10.5	96.84%	3,850	710	5.42
TP	64	6	12.0	3.8	98.51%	1,389	1,449	0.96
	3,542	**37**	**9.9**	**6.4**	**97.99%**	**2,326**	**965**	**2.41**

Table 2 - Operational Data by Aircraft Category (2021 – 37 Airlines; 3,542 Aircraft)

2.2. Maintenance Cost Analysis

In this section, we analyze separately the different categories of costs for FY2021:

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

We also address the costs of inventory as well as the maintenance reserves for leased aircraft.

The MCTG airlines reported cost for a total of $12.99B. this includes:

- $11.04B for the "regular" direct maintenance for their aircraft in operations,
- $1.86B for overhead,
- $53.5M for the additional maintenance for the parked/stored aircraft,
- $23.62M for parking/storage fees

The direct maintenance and parking/storage maintenance costs ($11.09B) represented 18% of the world MRO spend for 13% of the world fleet. This can be attributed to the structure of the MCTG fleet that has more NB and WB than RJs and TPs.

2.2.1 Direct Maintenance Spend

The 37 MCTG airlines reported $11.04B for the direct maintenance costs of their active aircraft, the average maintenance cost was $234M per airline and $3.12M per aircraft.

The unit costs decreased compared to 2020 but remained high ($1,340 per flight hour, $3,230 per flight cycle) due to the aircraft low utilization (only 6.4hrs/day).

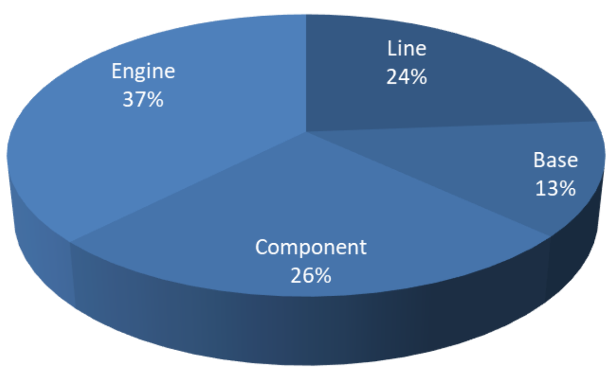


Figure 23 - Direct Maintenance Cost Structure by Segment (2021 – 37 Airlines; 3,542 active aircraft)

Engines and components remain the highest cost segments with respectively 37% and 26% of maintenance costs (Fig. 23).

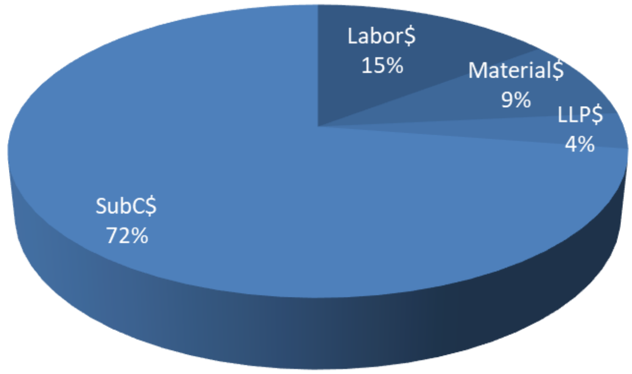


Figure 24 - Direct Maintenance Cost Structure by Element (2021 – 37 Airlines; 3,542 active aircraft)

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

If your airline would like to participate in the next maintenance costs data collection, please contact us at mctg@iata.org

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