Commercial Aviation: Asia Pacific
Fleet & MRO Forecast

Intelligence & Data Services | Aviation Week Network

MRO Asia
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For more information, contact:

Paul Burton
Managing Director, Asia
paul.burton@aviationweek.com
+65 9182 3480
The economic downturn caused by COVID-19 will be significantly worse than after the 2008 financial crisis.

- Downturn is projected to be significantly worse than the one which followed the Global Financial Crisis.
- Global GDP is expected to contract by between 4-6% in 2020.
- Extent of the economic impact varies by region but all will see GDP fall.

Source: IMF
Utilization – The beginnings of a recovery?

Seven day average of growth in flight hours suggests Chinese, European and US utilization has made steady gains since late April but recovery remains tentative

- Chinese utilization saw a recovery in mid-to-late February but has plateaued since that time
- Rate of decline in US and European utilization reached its peak in late March
- US and European utilization has seen a steady recovery since late April.
- Large increase in European utilization in early July driven by LCCs.

Source: Flight Tracking Data, Aviation Week Intelligence Network, Copyright 2020

Note: Day-on-day % change, 7-day average utilization rate through end of August
In-Service Fleet - Analysis

Annual count of active commercial aircraft, historical & forecasted

- 2.4% CAGR expected after 2.9% historical fleet growth.
- In-service fleet in 2020 is expected to fall to 27,370 aircraft – below 2015 levels - losing 3,200 aircraft vs. 2019.
- Narrowbodies are key growth driver over decade.

Aircraft Retirements - Analysis

Annual retirements historical & forecasted

• Retirements peak in 2020 at 719.
• Retirement projections continue to increase peaking at 1,122 in year 2028.
• Historic high percentage of fleet rates dominate the decade.
• Used spare parts/green time engines will flood markets for popular legacy types depressing pricing.
• ~2,060 737s, ~1,951 A320s retiring in next 10-years.

Information Classification: General
New Deliveries - Analysis

Annual deliveries historical & forecasted

- 16,200 new deliveries over 10-years.
- Deliveries 30% lower than previous expectations.
- Narrowbodies lead recovery efforts, 71% share.

Most valuable programmes, 2021-2030 – by family

$2 trillion worth of aircraft to be delivered over the next decade with $1 trillion spent on MRO

Boeing 737
Retail value: $563 billion
MRO demand: $203 billion

Airbus A320
Retail value: $613 billion
MRO demand: $259 billion

Airbus A350
Retail value: $267 billion
MRO demand: $47 billion

Boeing 787
Retail value: $267 billion
MRO demand: $88 billion

Boeing 777
Retail value: $140 billion
MRO demand: $129 billion

MRO Demand - Analysis

MRO aftermarket and the impacts from the pandemic

- MRO grows at 3.6% CAGR 2021-30, worth $878 billion.
- Engine MRO demand is $405 billion over decade and grows the fastest at 4.9% CAGR.
- Component demand grows at 3.9% CAGR, $175 billion demand.

Engines

In-service fleet trends by engine size category

- Engine fleet claws back at 2.2% CAGR.
- The key driver of growth, narrowbody engines, grows at 3.8% CAGR.
- Narrowbody engines comprise a 61% fleet share by 2030.
- LEAP surpasses CFM56 by 2029.


Information Classification: General
Engine MRO

MRO service events (overhauls vs. LLPs), demand and trends

• Demand grows at above average 4.9% CAGR.
• $405B in demand is expected.
• Engine MRO comprises 46% of all MRO demand.
• Nearly 116,000 engine service events needed over the decade.
• Turbofan LLP events grow at 5.6% CAGR.

$405 billion in $ Demand
4.9% Dollar Demand CAGR

Heavy Airframe Demand

Heavy airframe maintenance demand will be driven by the timing of checks when aircraft return to service.

- $52 billion will be spent on heavy airframe maintenance by operators over the next decade.
- Around 46% of demand relates to maintenance on the Airbus A320 Boeing 737.
- COVID-19 groundings have created a bow-wave of calendar checks which will drive short term demand.
• Around half of the aircraft stored in the early stages of the pandemic are expected to return to service by 2023.
• Through the first three years of the forecast, a total of over 2,200 aircraft are expected to return from storage.
• Over half of the aircraft returning from storage in the forecast period will return by the end of 2021.
Asia-Pacific 2021-2030: Regional MRO Market compared to Global Market


Information Classification: General
Asia-Pacific 2021-2030: 
Fleet and MRO Demand: Regional Markets

Fleet vs. MRO Demand

- India: 8.6% CAGR (Aircraft In-Service) Regional, 0.3% CAGR (MRO Demand) Regional
- Asia Pacific: 10.4% CAGR (Aircraft In-Service) Regional, 4.5% CAGR (MRO Demand) Regional
- China: 4.9% CAGR (Aircraft In-Service) Regional, 3.3% CAGR (MRO Demand) Regional

Aircraft In-Service Fleet

- Asia Pacific: 4,622 Aircraft In-Service Min Year, 7,188 Aircraft In-Service Max Year
- China: 4,126 Aircraft In-Service Min Year, 5,504 Aircraft In-Service Max Year
- India: 784 Aircraft In-Service Min Year, 1,543 Aircraft In-Service Max Year

MRO Demand

- Asia Pacific: $14.0 B MRO Demand Min Year, $21.7 B MRO Demand Max Year
- China: $11.0 B MRO Demand Min Year, $16.9 B MRO Demand Max Year
- India: $2.0 B MRO Demand Min Year, $5.0 B MRO Demand Max Year

Asia-Pacific 2021-2030: MRO Events

<table>
<thead>
<tr>
<th>Total MRO Events</th>
<th>Airframe Heavy Maint Major Events</th>
<th>Airframe Heavy Maint Minor Events</th>
<th>Engine Overhaul Events</th>
<th>Engine LLP Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>9,635</td>
<td>33,276</td>
<td>31,364</td>
<td>10,102</td>
</tr>
<tr>
<td>10%</td>
<td>[Breakdown of MRO events]</td>
<td>[Breakdown of MRO events]</td>
<td>[Breakdown of MRO events]</td>
<td>[Breakdown of MRO events]</td>
</tr>
</tbody>
</table>

Annual MRO Event Forecast

Asia-Pacific 2021-2030: China Fleet Forecast


Information Classification: General
Asia-Pacific 2021-2030: China MRO Forecast

### MRO Growth Rate (CAGR)
- 5.0%

### Total MRO Demand
- $127.6 B

### Total MRO Events
- 34,380

### Average Annual Engine Utilization
- 2,899 FH

### Average Annual Aircraft Utilization
- 2,895 FH

<table>
<thead>
<tr>
<th>Event Type</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
<th>2028</th>
<th>2029</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airframe Heavy Maint Major</td>
<td>4,152</td>
<td>4,200</td>
<td>4,250</td>
<td>4,300</td>
<td>4,350</td>
<td>4,400</td>
<td>4,450</td>
<td>4,500</td>
<td>4,550</td>
<td>4,600</td>
</tr>
<tr>
<td>Airframe Heavy Maint Minor</td>
<td>12,850</td>
<td>13,000</td>
<td>13,150</td>
<td>13,300</td>
<td>13,450</td>
<td>13,600</td>
<td>13,750</td>
<td>13,900</td>
<td>14,050</td>
<td>14,200</td>
</tr>
<tr>
<td>Engine Overhaul Events</td>
<td>12,698</td>
<td>12,840</td>
<td>13,000</td>
<td>13,160</td>
<td>13,320</td>
<td>13,480</td>
<td>13,640</td>
<td>13,800</td>
<td>13,960</td>
<td>14,120</td>
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<tr>
<td>Engine LLP Events</td>
<td>4,680</td>
<td>4,740</td>
<td>4,800</td>
<td>4,860</td>
<td>4,920</td>
<td>4,980</td>
<td>5,040</td>
<td>5,100</td>
<td>5,160</td>
<td>5,220</td>
</tr>
</tbody>
</table>

**Source:** 2021 Commercial Aviation Fleet & MRO Forecast, Aviation Week Network, Copyright 2020.

Information Classification: General
Asia-Pacific 2021-2030:
Vietnam Fleet Forecast

### Aircraft In Service

<table>
<thead>
<tr>
<th>Year</th>
<th>Single Aisle</th>
<th>Turboprop</th>
<th>Twin Aisle - Long Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>2021</td>
<td>229</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2022</td>
<td>254</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2023</td>
<td>281</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2024</td>
<td>310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2025</td>
<td>363</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2026</td>
<td>419</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2027</td>
<td>482</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2028</td>
<td>496</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2029</td>
<td>508</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2030</td>
<td>521</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Aircraft Forecast

- **In Service**: 521
- **Growth Rate**: 9.6%
- **Retail Deliveries**: $39.4 B
- **Deliveries**: 318
- **Retirements**: 4
- **Total Aircraft Utilization**: 11.2 M
- **Average Annual Aircraft Utilization**: 2,893 FH

### Top In Service By Aircraft Group

- A321NEO: 140
- 737-MAX8: 120
- A321: 87
- 737-MAX10: 80
- A320: 35
- 787: 24
- A350-900: 14
- 787-10: 8
- A320NEO: 7
- ATR72: 6


Information Classification: General
## Asia-Pacific 2021-2030: Vietnam MRO Forecast

<table>
<thead>
<tr>
<th>MRO Growth Rate (CAGR)</th>
<th>Total MRO Demand</th>
<th>Total MRO Events</th>
<th>Average Annual Engine Utilization</th>
<th>Average Annual Aircraft Utilization</th>
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<tr>
<td>10.6%</td>
<td>$7.4 B</td>
<td>1,803</td>
<td>2,893 FH</td>
<td>2,893 FH</td>
</tr>
</tbody>
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<p>| | | | | |
|                      |                   |                   |                                   |                                   |</p>
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<tbody>
<tr>
<td></td>
<td>168</td>
<td>945</td>
<td>556</td>
<td>134</td>
</tr>
</tbody>
</table>

### Total MRO Events

- **52%** Airframe Heavy C Check
- **30%** Airframe Heavy D Check
- **9%** ATA 72 Engine LLP
- **7%** ATA 72 Engine Shop Visit
- **1%** ATA 72T Engine LLP
- **1%** ATA 72T Engine Shop Visit

### Annual MRO Event Forecast


Information Classification: General
Asia-Pacific 2021-2030: South Korea MRO Forecast

MRO Growth Rate (CAGR) | Total MRO Demand | Total MRO Events | Average Annual Engine Utilization | Average Annual Aircraft Utilization
---|---|---|---|---
1.6% | $15.8 B | 2,872 | 3,207 FH | 3,168 FH

Airframe Heavy Maint Major Events | Airframe Heavy Maint Minor Events | Engine Overhaul Events | Engine LLP Events
---|---|---|---
363 | 1,181 | 1,042 | 286


Information Classification: General
Asia-Pacific MRO: 
Key Observations

• Heavy maintenance revenues falling faster than projected

• Drop in demand as technology improves

• Bustling marketplace, lower labour costs and service charges from cheaper market entrants mean that quality and innovation are critical

• Workload balance changing....but will the new revenue blend last?