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Airbus triumphs as Max takes a hit

A320neo family tops the charts in *Airfinance Journal*'s investors' poll.

It was a bad year for narrowbodies and, unsurprisingly, the 2019 investors' poll rating reflected the Boeing 737 Max situation at the US aircraft manufacturer.

On 17 December, Boeing opted to halt production temporarily, and while it may seem like a painful step for the embattled US manufacturer, appraisers are of the view that the decision was a logical, probably needed step, and should not have a major detrimental impact on the programme.

The question among those who took part in the survey was more of how big of a hit the Max family takes.

The Max 8 was the most impacted variant of the three-aircraft family and scored 3.73 points, versus 4.32 in the 2018 poll. The Max 10 was 0.43 points down year-on-year, while the Max 9 dropped 0.49 points over the 12-month period.

"Operational success," one of the four criteria in the *Airfinance Journal*'s investors' poll, showed where the Max family was (predictably) mostly impacted. In 2019, the Max 8 scored 2.92 points, or 1.29 points less than the previous year.

"Marketability" also impacted the Max 8 model for those taking part in the survey. In 2019, the Max 8 scored 3.86 points, or 0.72 points less than the previous year.

"Residual value" and "value for money" were understandably the least impacted because the consensus agrees the aircraft is a good investment. In 2018, the Max 8 scored 4.33 points for residual value, behind the Airbus A320neo (4.45), the 737-800 (4.48) and the A321neo (winner in this category with 4.52). In 2019, its residual value was 4.08, not much more than the A320 and the A321 models (4.00 points each), while the 737-800 was 4.18 and the A320/321neo aircraft scored 4.42.

Appraiser firms Ascend by Cirium and IBA do not believe the suspension will necessarily have a negative impact on 737 Max values, but neither do they rule it out given the varied factors and events that could impact on values over time.

"I don't feel there will be any impact on residual values for the Max. In fact, it will probably provide comfort that Boeing will get on top of the situation in a more sensible way," says IBA's Stuart Hatcher after the Boeing announcement to suspend production.

Airbus A321neo

For Hatcher, values are impacted if the demand for the model changes and, in particular, if there are large-scale cancellations. To date, this has not occurred with the Max.

It will be interesting to see how long the suspension of production lasts. Some industry observers talked about three to six months in the wake of the December announcement.

Single-aisles

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
A321neo	4.42	4.53	4.39	4.44	**4.45**	**4.38**	0.07
A320neo	4.42	4.26	4.26	4.47	**4.36**	**4.24**	0.12
737-800	4.18	3.95	4.24	4.18	**4.14**	**4.57**	-0.43
A320	4.00	4.05	4.24	4.05	**4.08**	**4.36**	-0.28
A321	4.00	3.91	4.14	4.00	**4.01**	**4.26**	-0.25
A220-300	3.77	3.93	3.71	3.64	**3.76**	**3.43**	0.33
737 Max 8	4.08	4.07	2.92	3.86	**3.73**	**4.32**	-0.59
737 Max 10	3.27	3.58	N/A	3.27	**3.37**	**3.80**	-0.43
737-900ER	3.00	3.29	3.14	2.95	**3.10**	**3.16**	-0.06
737 Max 9	3.00	3.36	2.55	2.85	**2.94**	**3.43**	-0.49
737-700	2.88	2.82	3.19	2.82	**2.93**	**3.06**	-0.13
A319	2.85	2.86	3.40	2.52	**2.91**	**2.97**	-0.06
737 Max 7	2.42	2.42	N/A	2.27	**2.37**	**2.55**	-0.18
A319neo	2.27	2.33	2.27	2.20	**2.27**	**2.30**	-0.03

Twin-aisles

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
A350-900	3.93	4.07	4.13	3.73	**3.97**	**3.86**	0.11
767-300ER	3.81	3.81	4.20	3.81	**3.91**	**3.37**	0.54
787-9	3.81	4.13	3.88	3.56	**3.84**	**4.23**	-0.39
787-10	3.40	3.64	3.64	3.43	**3.53**	**3.34**	0.19
777-9	3.09	3.60	N/A	3.30	**3.33**	**3.32**	0.01
777-300ER	2.84	3.32	3.89	2.79	**3.21**	**3.21**	0.00
A330-900neo	3.13	3.44	3.27	3.00	**3.21**	**3.07**	0.14
A330-300	2.80	3.38	3.70	2.81	**3.17**	**3.40**	-0.23
A350-1000	3.00	3.27	3.40	3.00	**3.17**	**3.17**	0.00
787-8	2.94	3.44	3.31	2.94	**3.16**	**3.45**	-0.29
777-8	2.64	2.80	N/A	2.70	**2.71**	**2.84**	-0.13
A330-200	2.26	2.85	3.37	2.30	**2.70**	**2.78**	-0.08
777-200ER	2.05	2.61	3.29	2.11	**2.52**	**2.16**	0.36
A330-800neo	2.47	2.67	N/A	2.40	**2.51**	**2.32**	0.19
747-400	1.81	2.38	3.53	1.75	**2.37**	**2.05**	0.32
777-200LR	2.07	2.71	2.50	2.07	**2.34**	**2.06**	0.28
747-8 pax	1.67	2.00	2.13	1.80	**1.90**	**1.80**	0.10
A380	1.25	1.88	2.75	1.38	**1.81**	**1.90**	-0.09
A350-800	1.80	1.70	N/A	1.56	**1.68**	**2.38**	-0.70
A340-500	1.31	1.56	1.56	1.56	**1.50**	**1.14**	0.36
A340-600	1.13	1.47	1.87	1.40	**1.47**	**1.23**	0.24

The other point is clearing the backlog. In 2016, the 737 production rate was 42 aircraft a month. It climbed to 47 aircraft a month in 2017 and 52 a month in 2018. Boeing anticipated 57 aircraft a month for 2019, but the year was at about 42 a month on average. Still, there are about 400 aircraft awaiting delivery.

In the single-aisle category, the A321neo and A320neo models were the highest-rated in 2019, with their average up from the previous year.

The A321neo scored 4.45 points, versus 4.38 the previous year. The A320neo model benefited from the Max problems and scored 4.36 points in 2019, versus 4.24 a year earlier.

The A320neo-family aircraft, though, was subject to delays because of engine issues, affecting monthly production rates.

The current environment has shifted to new-technology aircraft and the 737-800 model has lost its crown. It had topped the charts for many years as the market continued to favour current-technology narrowbody aircraft. The first A320neo aircraft are entering their fourth year of service, while the Max 8 would now have been at about 30 months of service.

Even so, the 737-800 remains among the most remarketable assets of the current-technology aircraft, beating the A320 and the A321 models.

The A220-300 recorded the best improvement of any single-aisle aircraft, perhaps because the market is more accepting of the model. Financing of the A220-300 has broadened over the 12 months and more customers have committed to the type, including leasing companies.

The A319neo and 737 Max 7 models continue to get rated at the same level.

Demand for the 737-700 remains mainly for part-out purposes, with the -7B engine still in high demand because of fewer -800 part-outs than expected. The market is closely watching the Southwest -700 fleet and its future use.

Demand has also been high for -5B engines, although one engine trading source says it has started to soften.

Widebodies

Investors' appetite clearly remains in "mainstream" aircraft, and few investors would venture outside the popular widebody types such as the A350/787 models.

The poll shows the A350-900 topping the widebody charts in 2019, beating the 787-9 in three of the four criteria: residual value, operational performance and remarketing potential.

In 2019, the A350-900 scored better than the previous year in three of the four categories and benefited from a drop in scores for the 787-9. One voter says the 787-9 remains the main sweet spot in the 787 market but engine issues have penalised the model. The A350-1000 and 787-10 models are gaining more

The Airbus A350-900 model topped the widebody category

acceptance with operators but not much traction with operating lessors.

"The 787-10 is a good aircraft but aircraft price has considerable variance (circa $30 million spread). It has slightly better marketing prospects than A350 but still a tough market (for lessors with forward orders)," says another source.

The availability of A350 and 787 aircraft is impacting the secondary leasing market and residual values, observes one source. The former favourite aircraft, the 777-300ER and A330-300 models, had a stable year. There is a lot of activity in this market but transition costs, at times, can prove difficult to move aircraft. The issue for both models is the number of aircraft hitting the market over the next few years.

The 767-300ER continues to enjoy some resurgence in residual value and remarketability because of freighter demand, according to one trader.

The A330-900neo is gaining more acceptance in the marketplace and this was reflected in the scoring. The in-service fleet was about 40 aircraft at the end of 2019 and, apart from one aircraft going back to the Toulouse factory for a few days, operators seem to be comfortable with the aircraft type's missions.

There has been a range of financial structures backing the model from operating lease, purchase and leaseback, export credit agency-backed cover and finance lease. Lessors accounted for 77 of the 285 direct firm orders for the A330-900 model, but none of the 14 A330-800 orders.

The four-engine models continue to score at the lowest levels. There is no positive prospect for the models, although some aircraft still find applications in the charter/ACMI market.

Regional aircraft

The ATR72-600 maintained its position at the top in the regional aircraft market category scoring 3.74 overall, a small increase over the previous year.

Turboprops have been struggling but the ATR72-600 is widely seen as the stronger player in the market. It benefits from a much higher customer base than the De Havilland of Canada Dash8 and more appetite from the leasing community.

The ATR72-600 variant is approaching 10 years of service and its predecessor, the ATR72-500, is finally seeing more conversions into freighters. De Havilland of Canada announced a fair number of sales at the November Dubai air show, and this will be welcome news for the Dash8 model.

The Bombardier CRJ900 dropped a couple of ranks in the regional table. Backlog is relatively low and the model's future may lie in the hands of Mitsubishi.

A year after introducing the Embraer E190-E2 and the E195-E2 models, the Brazilian manufacturer performed the first flight of its final E2 model, the E175-E2, last month. Both types are featured amongst the best improvers year-on-year. The E190/E195-E2 models are expected to continue their ascension towards the top of the table next, as more airlines operate the types.

Meanwhile, sales for the E175 continue and this is reflected in the investor survey: the E175 model scored higher in all four criteria, and was 0.39 points up overall, ending third in the rankings. The E190 model gained three places in the overall table, scoring higher in all four criteria.

Regionals

Aircraft type	Residual value	Value for money	Operational success	Remarketing potential	Overall score	Last year's score	Difference
ATR72-600	3.75	3.78	3.94	3.50	**3.74**	**3.40**	0.34
Dash 8-400	3.44	3.47	3.69	3.27	**3.47**	**3.22**	0.25
E175	3.36	3.36	4.00	3.00	**3.43**	**3.04**	0.39
ATR42-600	3.25	3.53	3.50	3.31	**3.40**	**2.84**	0.56
ATR72-500	2.97	3.47	3.68	3.24	**3.34**	**3.13**	0.21
E190	3.03	3.03	3.77	2.91	**3.18**	**2.83**	0.35
ATR42-500	2.93	3.13	3.27	3.20	**3.13**	**2.87**	0.26
CRJ900	2.86	3.14	3.43	2.96	**3.10**	**3.04**	0.06
E195-E2	2.82	3.09	3.19	3.14	**3.06**	**2.66**	0.40
E190-E2	2.91	3.14	3.15	3.00	**3.05**	**2.68**	0.37
A220-100	2.92	3.23	2.92	2.85	**2.98**	**2.88**	0.10
CRJ700	2.69	3.00	3.23	2.88	**2.95**	**2.45**	0.50
E195	2.73	3.00	3.29	2.70	**2.93**	**2.53**	0.40
CRJ200	1.75	2.67	3.25	2.46	**2.53**	**2.15**	0.38
ERJ145	1.87	2.67	3.21	2.27	**2.50**	**2.03**	0.47
E175-E2	2.27	2.68	N/A	2.33	**2.42**	**2.18**	0.24
E170	2.23	2.46	2.50	2.31	**2.38**	**2.13**	0.25
CRJ1000	1.83	2.42	2.50	1.92	**2.17**	**2.38**	-0.21
M100	1.88	2.00	N/A	1.86	**1.91**	**N/A**	N/A
M90	1.63	1.43	N/A	1.43	**1.49**	**1.76**	-0.27
SSJ100	1.25	1.42	1.25	1.08	**1.25**	**1.34**	-0.09

The **numbers**

The following pages include key data for current production commercial aircraft. Aircraft that have not yet entered service are not included, because the information available has not been confirmed by in-service experience.

Technical characteristics
The maximum take-off weight (MTOW) shows the maximum option available for the type in question. There may be lower weight versions available. The operating empty weight (OEW) is based on the manufacturers' figures. Airline weights are likely to be higher than those quoted.

Fuels and times
The figures shown for fuels and times are *Airfinance Journal*'s estimates based on a variety of sources. They are intended to reflect 60% passenger load factors, international standard atmosphere (ISA) conditions en-route, zero winds and optimum flight levels.

Indicative maintenance costs
The maintenance figures are intended as a guide to the order of magnitude of reserves associated with the various aircraft types. The figures are intended to reflect mature costs with no account taken of warranty effects and other reductions associated with new aircraft.

The C-check and heavy-check reserves are based on typical check costs and intervals. No allowance is made for cabin refurbishment. The cost quoted for component overhaul excludes inventory support.

Engine maintenance cost estimates are based on figures quoted in the *Airfinance Journal guide to financing and investing in engines 2019, page 32*. Unless stated, the engine costs refer to the most common engine type for the aircraft model in question.

The information used to estimate the indicative maintenance reserves has been collected from a wide variety of sources. While *Airfinance Journal* has made every effort to normalise the data, direct comparisons between aircraft types may be misleading.

It should also be noted that maintenance costs of a particular type are highly dependent on the route structure, operating environment and maintenance philosophy of the airline with which the aircraft is in service. As such our estimates are difficult to reconcile with the numbers provided by manufacturers.

Seating/range
The numbers quoted for seating capacity are based on the manufacturers' selling standards. Large variations are possible, particularly for widebody aircraft. The operational ranges shown are for still-air conditions, optimum flight levels and are based on the typical seating figure and the operating empty weight quoted by the manufacturer. Ranges in airline operation are likely to be significantly less than the figures quoted.

Fleet information
Data is based on *Airfinance Journal*'s Fleet Tracker as of 1 December, 2019.

Aircraft data index

Aircraft **data**

Airbus A220-100

SEATING/RANGE	
Max seating	133
Typical seating	108
Maximum range	3,400nm (6,300km)
TECHNICAL CHARACTERISTICS	
MTOW	63.1 tonnes (option 60.8)
OEW	33.3 tonnes
MZFW	50.3 tonnes
Fuel capacity	22,040 litres
Engines	PW1521G/1524G/1525G
Thrust	21,000lbs to 23,3000lbs
FUELS AND TIMES	
Block fuel 200nm	1,330kg
Block fuel 500nm	2,450kg
Block fuel 1,000nm	4,380kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service:	36
Operators (current and planned)	8
In storage	5
On order	63
Build peak year (2019)	24
Estimated production 2020	20
Average age (years)	0.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$55-60 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$95-100 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per propeller hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on similar aircraft types pending in-service confirmation of manufacturer claims.

Airbus A220-300

SEATING/RANGE	
Max seating	160
Typical seating	140
Maximum range	3,350nm (6,200km)
TECHNICAL CHARACTERISTICS	
MTOW	69.9 tonnes
OEW	34.3 tonnes
MZFW	50.3 tonnes
Fuel capacity	22,040 litres
Engines	PW1521G/1524G/1525G
Thrust	21,000lbs to 23,3000lbs
FUELS AND TIMES	
Block fuel 200nm	1,370kg
Block fuel 500nm	2,510kg
Block fuel 1,000nm	4,490kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service:	57
Operators (current and planned)	22
In storage	4
On order	384
Build peak year (2018)	30
Estimated production 2019	65
Average age (years)	1.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$55-60 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per propeller hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on similar aircraft types pending in-service confirmation of manufacturer claims.

Airbus A319neo

SEATING/RANGE	
Max seating	156
Typical seating	140
Typical range	3,700nm (6,850km)
TECHNICAL CHARACTERISTICS	
MTOW	75.5 tonnes
OEW	43 tonnes
MZFW	60.3 tonnes
Fuel capacity	26,730 litres
Engines	LEAP-1A/PW1100G
Thrust	24,100lbs (107kN)
FUELS AND TIMES	
Block fuel 200nm	1,450kg
Block fuel 500nm	2,670kg
Block fuel 1,000nm	4,780kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING CORPORATE JET VERSIONS)	
Entry into service (planned)	2020
In service:	none
Operators (current and planned)	5
In storage	none
On order	35
Built peak year	Not applicable
Estimated production 2020	Unknown
Average age (years)	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$100-105 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are based on A319 current engine model pending confirmation of manufacturer's claimed reductions for new engine model.

Airbus A320

SEATING/RANGE	
Max seating	180
Typical seating	150
Typical range (with sharklets)	3,500nm (6,500km)
TECHNICAL CHARACTERISTICS	
MTOW	73.5 tonnes/78 tonnes
OEW	42 tonnes
MZFW	61 tonnes/62.5 tonnes
Fuel capacity	24,210 litres/27,200 litres
Engines	CFM56-5B/V2500
Thrust	25,000lbs (120kN)
FUELS AND TIMES	
Block fuel 200nm	1,850kg
Block fuel 500nm	3,390kg
Block fuel 1,000nm	6,080kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING CORPORATE JET VERSIONS)	
Entry into service	1988
In service:	4,188
Operators (current and planned)	278
In storage	131
On order	49
Built peak year (2013)	352
Estimated production 2020	20
Average age (years)	10.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 per flight hour

Airbus A320neo

SEATING/RANGE	
Max seating	194
Typical seating	150-165
Typical range	3,400nm (6,300km)
TECHNICAL CHARACTERISTICS	
MTOW	79 tonnes
OEW	44.5 tonnes
MZFW	62.8 tonnes/64.3 tonnes
Fuel capacity	26,730 litres
Engines	LEAP-1A/PW1100G
Thrust	27,000lbs (120kN)
FUELS AND TIMES	
Block fuel 200nm	1,570kg
Block fuel 500nm	2,880kg
Block fuel 1,000nm	5,170kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2016
In service:	786
Operators (current and planned)	106
In storage	4
On order	3,082
Built peak year (2019)	295
Estimated production 2020	300
Average age (years)	0.7
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$105-110 per engine flight hour
Engine LLP	$120-125 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are based on A320 current engine model pending confirmation of manufacturer's claimed reductions for new engine model

Airbus A321-200

SEATING/RANGE	
Max seating	220
Typical seating	185
Maximum range	3,200nm (5,950km)
TECHNICAL CHARACTERISTICS	
MTOW	93.5 tonnes
OEW	48 tonnes
MZFW	73.8 tonnes
Fuel capacity	30,030 litres
Engines	CFM56-5B/V2500
Thrust	27,000-33,000lbs (120-148kN)
FUELS AND TIMES	
Block fuel 200nm	2,310kg
Block fuel 500nm	4,230kg
Block fuel 1,000nm	7,590kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET (INCLUDING -100S)	
Entry into service	1996
In service:	1,600
Operators (current and planned)	103
In storage	49
On order	105
Built peak year (2013)	215
Estimated production 2020	10
Average age (years)	7.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$60-65 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 per flight hour

Airbus A321neo

SEATING/RANGE	
Max seating	244
Typical seating	206
Maximum range	3,995nm (7,400km)
TECHNICAL CHARACTERISTICS	
MTOW	97 tonnes
OEW	50.1 tonnes
MZFW	73.3 tonnes/75.6 tonnes
Fuel capacity	30,030 litres
Engines	LEAP-1A/PW1100G
Thrust	32,000lbs (143kN)
FUELS AND TIMES	
Block fuel 200nm	1,960kg
Block fuel 500nm	3,600kg
Block fuel 1,000nm	6,450kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2017
In service:	249
Operators (current and planned)	88
In storage	0
On order	2,116
Build peak year (2019)	127
Estimated production 2020	400
Average age (years)	1.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$60-65 per flight hour
Higher checks reserve	$55-60 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$120-130 per cycle
APU	$75-80 per APU hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are based on A321 current engine model pending confirmation of manufacturer's claimed reductions for new engine model.

Airbus A330-200

SEATING/RANGE	
Max seating	406
Typical seating	210-250
Maximum range	7,270nm (13,450km)
TECHNICAL CHARACTERISTICS	
MTOW	230 tonnes/242 tonnes
OEW	121 tonnes
MZFW	168 tonnes/170 tonnes
Fuel capacity	139,090 litres
Engines	PW4000/CF6-80E1/Trent 700
Thrust	68,000-72,000lbs (303-316kN)
FUELS AND TIMES	
Block fuel 1,000nm	12,720kg
Block fuel 2,000nm	23,710kg
Block fuel 4,000nm	45,680kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service	1998
In service:	498
Operators (current and planned)	93
In storage	55
On order	11
Build peak year (2013)	51
Estimated production 2020	5
Average age (years)	10.4
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$265-270 per engine flight hour
Engine LLP	$245-250 per engine cycle
Landing gear refurbishment	$150-155 per cycle
Wheels brakes and tyres	$375-380 per cycle
APU	$105-110 per APU hour
Component overhaul	$420-425 per flight hour

Airbus A330-200 Freighter

SEATING/RANGE	
Max Payload	65 tonnes
Maximum range	4,000nm (7,400km)
TECHNICAL CHARACTERISTICS	
MTOW	233 tonnes
OEW	115 tonnes
MZFW	178 tonnes
Fuel capacity	97,530 litres
Engines	RR Trent700/PW4000
Thrust	68,000-72,000lbs (302-320kN)
FUELS AND TIMES	
Block fuel 1,000nm	12,720kg
Block fuel 2,000nm	23,710kg
Block fuel 4,000nm	45,680kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service	2010
In service:	40
Operators (current and planned)	10
In storage	1
On order	1
Build peak year (2012)	8
Estimated production 2020	4
Average age (years)	6.3
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$265-270 per engine flight hour
Engine LLP	$245-250 per engine cycle
Landing gear refurbishment	$150-155 per cycle
Wheels brakes and tyres	$375-380 per cycle
APU	$105-110 per APU hour
Component overhaul	$420-425 per flight hour

Airbus A330-300

SEATING/RANGE	
Max seating	440
Typical seating	250-290
Maximum range	6,340nm (11,750km)
TECHNICAL CHARACTERISTICS	
MTOW	230 tonnes/242 tonnes
OEW	121 tonnes
MZFW	173 tonnes/175 tonnes
Fuel capacity	97,530 litres
Engines	PW4000/CF6-80E1/Trent 700
Thrust	68,000-72,000lbs (303-316kN)
FUELS AND TIMES	
Block fuel 1,000nm	13,120kg
Block fuel 2,000nm	24,460kg
Block fuel 4,000nm	47,120kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service	1993
In service:	696
Operators (current and planned)	74
In storage	30
On order	18
Build peak year (2014)	74
Estimated production 2020	10
Average age (years)	8.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$265-270 per engine flight hour
Engine LLP	$245-250 per engine cycle
Landing gear refurbishment	$150-155 per cycle
Wheels brakes and tyres	$375-380 per cycle
APU	$105-110 per APU hour
Component overhaul	$420-425 per flight hour

Airbus A330-800neo

SEATING/RANGE	
Max seating	406
Typical seating	220-260
Typical range	8,150nm (15,090km)
TECHNICAL CHARACTERISTICS	
MTOW	251 tonnes
OEW	110 tonnes
MZFW	176 tonnes
Fuel capacity	139,090 litres
Engines	Trent 7000
Thrust	68,000lbs (303kN)
FUELS AND TIMES	
Block fuel 1,000nm	10,940kg
Block fuel 2,000nm	20,390kg
Block fuel 4,000nm	39,290kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service (planned)	2020
In service	none
Operators (current and planned)	1
In storage	none
On order	10
Built peak year	Not applicable
Estimated production 2019	3
Average age	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100/flight hour
Engine overhaul	$265-270/engine flight hour
Engine LLP	$245-250/engine cycle
Landing gear refurbishment	$150-155/cycle
Wheels, brakes and tyres	$375-380/cycle
APU	$105-110/APU hour
Component overhaul	$420-425/flight hour

Maintenance reserves are based on A330-300 model pending confirmation of manufacturer's claimed reductions for new engine model.

Airbus A330-900neo

SEATING/RANGE	
Max seating	440
Typical seating	260-300
Maximum range	7,200nm (13,330km)
TECHNICAL CHARACTERISTICS	
MTOW	251 tonnes
OEW	115 tonnes
MZFW	181 tonnes
Fuel capacity	139,090 litres
Engines	Trent 7000
Thrust	68,000lbs (303kN)
FUELS AND TIMES	
Block fuel 1,000nm	11,280 kg
Block fuel 2,000nm	21,040 kg
Block fuel 4,000nm	40,520 kg
Bock time 1,000nm	184 minutes
Block time 2,000nm	299 minutes
Block time 4,000nm	529 minutes
FLEET	
Entry into service	2018
In service:	35
Operators (current and planned)	24
In storage	none
On order	247
Build peak year (2019)	32
Estimated production 2020	50
Average age (years)	Less than 1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$265-270 per engine flight hour
Engine LLP	$245-250 per engine cycle
Landing gear refurbishment	$150-155 per cycle
Wheels brakes and tyres	$375-380 per cycle
APU	$105-110 per APU hour
Component overhaul	$420-425 per flight hour

Maintenance reserves are based on A330-300 model pending confirmation of manufacturer's claimed reductions for new engine model.

Airbus A350-900

SEATING/RANGE	
Max seating	440
Typical seating	300-350
Maximum range	8,100nm (15,000km)
TECHNICAL CHARACTERISTICS	
MTOW	280 tonnes
OEW	116 tonnes
MZFW	195 tonnes
Fuel capacity	138,000 litres
Engines	Trent XWB
Thrust	84,000lbs (374kN)
FUELS AND TIMES	
Block fuel 1,000nm	11,810kg
Block fuel 2,000nm	22,010kg
Block fuel 4,000nm	42,410kg
Bock time 1,000nm	179 minutes
Block time 2,000nm	291 minutes
Block time 4,000nm	512 minutes
FLEET	
Entry into service	2014
In service:	293
Operators (current and planned)	53
In storage	none
On order	495
Build peak year (2019)	80
Estimated production 2020	90
Average age (years)	2.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$295-300 per engine flight hour
Engine LLP	$270-275 per engine cycle
Landing gear refurbishment	$150-155 per cycle
Wheels brakes and tyres	$375-380 per cycle
APU	$105-110 per APU hour
Component overhaul	$420-425 per flight hour

Airbus A350-1000

SEATING/RANGE	
Max seating	440
Typical seating	350-410
Maximum range	8,700nm (16,100km)
TECHNICAL CHARACTERISTICS	
MTOW	316 tonnes
OEW	129 tonnes
MZFW	223 tonnes
Fuel capacity	159,000 litres
Engines	Trent XWB
Thrust	97,000lbs (432kN)
FUELS AND TIMES	
Block fuel 1,000nm	13,860kg
Block fuel 2,000nm	25,840kg
Block fuel 4,000nm	49,770kg
Bock time 1,000nm	179 minutes
Block time 2,000nm	291 minutes
Block time 4,000nm	512 minutes
FLEET	
Entry into service	2018
In service:	31
Operators (current and planned)	14
In storage	4
On order	144
Build peak year (2018 estimated)	Not applicable
Estimated production 2019	30
Average age (years)	Less than 1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$105-110 per flight hour
Higher checks reserve	$95-100 per flight hour
Engine overhaul	$315-320 per engine flight hour
Engine LLP	$290-295 per engine cycle
Landing gear refurbishment	$150-155 per cycle
Wheels brakes and tyres	$375-380 per cycle
APU	$105-110 per APU hour
Component overhaul	$420-425 per flight hour

Maintenance reserves are based on A350-900 model pending confirmation of manufacturer's claimed reductions for new engine model.

Airbus A380

SEATING/RANGE	
Max seating	853
Typical seating	544 (four class)
Maximum range	8,700nm (15,200km)
TECHNICAL CHARACTERISTICS	
MTOW	575 tonnes
OEW	277 tonnes
MZFW	369 tonnes
Fuel capacity	320,000 litres
Engines	GP7200/Trent 900
Thrust	70,000lbs (311kN)
FUELS AND TIMES	
Block fuel 1,000nm	26,590kg
Block fuel 2,000nm	50,580kg
Block fuel 4,000nm	104,290kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET	
Entry into service	2007
In service:	233
Operators (current and planned)	16
In storage	6
On order	50
Build peak year (2012)	30
Estimated production 2020	10
Average age (years)	6.3
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$160-165 per flight hour
Higher checks reserve	$145-150 per flight hour
Engine overhaul	$195-200 per engine flight hour
Engine LLP	$200-205 per engine cycle
Landing gear refurbishment	$200-205 per cycle
Wheels brakes and tyres	$565-570 per cycle
APU	$155-160 per APU hour
Component overhaul	$575-580 per flight hour

ATR42-600

SEATING/RANGE	
Max seating	50
Typical seating	48
Maximum range	720nm (1,330km)
TECHNICAL CHARACTERISTICS	
MTOW	18.6 tonnes
OEW	11.7 tonnes
MZFW	17.0 tonnes
Fuel capacity	5,700 litres
Engines	PW127M
Thrust	2,160 shp
FUELS AND TIMES	
Block fuel 100nm	340kg
Block fuel 200nm	560kg
Block fuel 500nm	1,210kg
Bock time 100nm	33 minutes
Block time 200nm	55 minutes
Block time 500nm	122 minutes
FLEET	
Entry into service	2012 (1996 for -500)
In service:	48 (265 all versions)
Operators (current and planned)	18
In storage	none
On order	17
Build peak year (2019)	10
Estimated production 2020	10
Average age (years)	4.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$35-40 per flight hour
Higher checks reserve	$25-30 per flight hour
Engine overhaul	$100-105 per engine flight hour
Engine LLP	$30-35 per engine cycle
Landing gear refurbishment	$20-25 per cycle
Wheels brakes and tyres	$35-40 per cycle
APU	$15-20 per propeller hour
Component overhaul	$115-120 per flight hour

ATR72-600

SEATING/RANGE	
Max seating	78
Typical seating	72
Maximum range	825nm (1,526km)
TECHNICAL CHARACTERISTICS	
MTOW	23.0 tonnes
OEW	14 tonnes
MZFW	21.0 tonnes
Fuel capacity	6,370 litres
Engines	PW127M
Thrust	2,475 shp
FUELS AND TIMES	
Block fuel 100nm	370kg
Block fuel 200nm	610kg
Block fuel 500nm	1,310kg
Bock time 100nm	36 minutes
Block time 200nm	58 minutes
Block time 500nm	125 minutes
FLEET	
Entry into service	2011 (1998 for -500)
In service:	474 (832 all versions)
Operators (current and planned)	94
In storage	45
On order	191
Build peak year (2015)	79
Estimated production 2020	80
Average age (years)	3.3
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$35-40 per flight hour
Higher checks reserve	$25-30 per flight hour
Engine overhaul	$100-105 per engine flight hour
Engine LLP	$30-35 per engine cycle
Landing gear refurbishment	$20-25 per cycle
Wheels brakes and tyres	$35-40 per cycle
APU	$15-20 per propeller hour
Component overhaul	$125-130 per flight hour

Boeing 737-800

SEATING/RANGE	
Max seating	189
Typical seating	162
Maximum range (with winglets)	3,115nm (5,767km)
TECHNICAL CHARACTERISTICS	
MTOW	79 tonnes
OEW	41.1 tonnes
MZFW	61.7 tonnes
Fuel capacity	26,020 litres/40,580 litres
Engines	CFM56-7B
Thrust	27,300lbs (121kN)
FUELS AND TIMES	
Block fuel 200nm	2,000kg
Block fuel 500nm	3,530kg
Block fuel 1,000nm	6,190kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	1998
In service:	4,845
Operators (current and planned)	225
In storage	74
On order	38
Build peak year (2016)	408
Estimated production 2019	30
Average age (years)	8.8
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$45-50 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$80-85 per APU hour
Component overhaul	$210-220 per flight hour

Boeing 737 Max 8

SEATING/RANGE	
Max seating	200
Typical seating	162-172
Maximum range	3,515nm (6,510km)
TECHNICAL CHARACTERISTICS	
MTOW	82.2 tonnes
OEW	45.1 tonnes
MZFW	65.9 tonnes
Fuel capacity	25,810 litres
Engines	LEAP-1B
Thrust	26,780lbs (119kN)
FUELS AND TIMES	
Block fuel 200nm	1,720kg
Block fuel 500nm	3,040kg
Block fuel 1,000nm	5,320kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2017
In service:	None (Fleet grounded)
Operators (current and planned)	93
Grounded	355
On order	3,482
Build peak year (2018)	194
Estimated production 2020	Under review
Average age (years)	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$65-70 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$120-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$45-50 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$80-85 per APU hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on 737-800 model pending in-service feedback and confirmation of claimed savings.

Boeing 737 Max 9

SEATING/RANGE	
Max seating	220
Typical seating	178-193
Maximum range	3,215nm (5,960km)
TECHNICAL CHARACTERISTICS	
MTOW	88.3 tonnes
OEW	45.1 tonnes
MZFW	71.0 tonnes
Fuel capacity	25,810 litres
Engines	LEAP-1B
Thrust	27,300 (121kN)
FUELS AND TIMES	
Block fuel 200nm	1,790kg
Block fuel 500nm	3,150kg
Block fuel 1,000nm	5,520kg
Bock time 200nm	54 minutes
Block time 500nm	94 minutes
Block time 1,000nm	160 minutes
FLEET	
Entry into service	2018
In service:	None (Fleet grounded)
Operators (current and planned)	15
Grounded	28
On order	324
Build peak year (2018)	20
Estimated production 2020	Under review
Average age (years)	Not applicable
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$70-75 per flight hour
Higher checks reserve	$50-55 per flight hour
Engine overhaul	$20-125 per engine flight hour
Engine LLP	$125-130 per engine cycle
Landing gear refurbishment	$45-50 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$80-85 per APU hour
Component overhaul	$210-220 per flight hour

Maintenance reserves are estimates based on 737-900 model pending in-service feedback and confirmation of claimed savings.

Boeing 747-8F

SEATING/RANGE	
Max Payload	137.7 tonnes
Maximum range	4,120nm (7,630km)
TECHNICAL CHARACTERISTICS	
MTOW	447.7 tonnes
OEW	197 tonnes
MZFW	329.8 tonnes
Fuel capacity	226,180 litres
Engines	GEnx-2B
Thrust	66,500 (296kN)
FUELS AND TIMES	
Block fuel 1,000nm	20,730kg
Block fuel 2,000nm	38,760kg
Block fuel 4,000nm	79,910kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET	
Entry into service	2010
In service:	90
Operators (current and planned)	15
In storage	0
On order	17
Build peak year (2013)	20
Estimated production 2019	6
Average age (years)	5.7
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$155-160 per flight hour
Higher checks reserve	$115-120 per flight hour
Engine overhaul	$170-175 per engine flight hour
Engine LLP	$260-265 per engine cycle
Landing gear refurbishment	$160-165 per cycle
Wheels brakes and tyres	$750-755 per cycle
APU	$105-110 per APU hour
Component overhaul	$505-510 per flight hour

Boeing 767F

SEATING/RANGE	
Max Payload	52 tonnes
Maximum range	3,250nm (6,020km)
TECHNICAL CHARACTERISTICS	
MTOW	187 tonnes
OEW	81 tonnes
MZFW	133 tonnes
Fuel capacity	91,380 litres
Engines	GE CF6-80C
Thrust	63,300lbs (276kN)
FUELS AND TIMES	
Block fuel 1,000Nm	10,560kg
Block fuel 2,000nm	19,760kg
Block fuel 4,000 Nm	37,910kg
Bock time 1,000Nm	184 minutes
Block time 2,000Nm	301 minutes
Block time 4,000Nm	536 minutes
FLEET	
Entry into service	1995
In Service:	169
Operators (current and planed)	16
In Storage	none
On order	56
Built peak year (2019)	18
Estimated production 2020	12
Average age	8.4 years
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$100-105 per flight hour
Higher checks reserve	$75-80 per flight hour
Engine overhaul	$165-170 per engine flight hour
Engine LLP	$255-260 per engine cycle
Landing gear refurbishment	$65-70 per cycle
Wheels brakes and tyres	$70-75 per cycle
APU	$105-110 per APU hour
Component overhaul	$250-260 per flight hour

Boeing 777F

SEATING/RANGE	
Max Payload	102 tonnes
Maximum range	4,120 nm (7,630km)
TECHNICAL CHARACTERISTICS	
MTOW	348 tonnes
OEW	144 tonnes
MZFW	248 tonnes
Fuel capacity	181,280 litres
Engines	GE 90
Thrust	110,000lbs (489 kN)
FUELS AND TIMES	
Block fuel 1,000Nm	14,140 kg
Block fuel 2,000nm	26,350 kg
Block fuel 4,000 Nm	50,780 kg
Bock time 1,000Nm	152 minutes
Block time 2,000Nm	277 minutes
Block time 4,000Nm	525 minutes
FLEET	
Entry into service	2009
In Service:	178
Operators (current and planed)	25
In Storage	none
On order	55
Built peak year	Not applicable
Estimated production 2018	12
Average age	5.6 years
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$125-130 per flight hour
Higher checks reserve	$90-95 per flight hour
Engine overhaul	$290-295 per engine flight hour
Engine LLP	$450-455 per engine cycle
Landing gear refurbishment	$160-165 per cycle
Wheels brakes and tyres	$480-485 per cycle
APU	$105-110 per APU hour
Component overhaul	$400-410 per flight hour

Boeing 777-300ER

SEATING/RANGE	
Max seating	550
Typical seating	365 (three class)
Maximum range	7,370nm (13,650km)
TECHNICAL CHARACTERISTICS	
MTOW	351.5 tonnes
OEW	168 tonnes
MZFW	238 tonnes
Fuel capacity	181,280 litres
Engines	GE90-115BL
Thrust	115,300lbs (504kN)
FUELS AND TIMES	
Block fuel 1,000nm	15,610kg
Block fuel 2,000nm	29,840kg
Block fuel 4,000nm	60,900kg
Bock time 1,000nm	152 minutes
Block time 2,000nm	277 minutes
Block time 4,000nm	525 minutes
FLEET	
Entry into service	2003
In service:	759
Operators (current and planned)	47
In storage	12
On order	32
Build peak year (2016)	89
Estimated production 2020	12
Average age (years)	7.5
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$125-130 per flight hour
Higher checks reserve	$90-95 per flight hour
Engine overhaul	$295-300 per engine flight hour
Engine LLP	$450-455 per engine cycle
Landing gear refurbishment	$160-165 per cycle
Wheels brakes and tyres	$480-485 per cycle
APU	$105-110 per APU hour
Component overhaul	$410-415 per flight hour

Boeing 787-8

SEATING/RANGE	
Max seating	359
Typical seating	248
Maximum range	7,300nm to (13,530km)
TECHNICAL CHARACTERISTICS	
MTOW	227.9 tonnes
OEW	120 tonnes
MZFW	172 tonnes
Fuel capacity	126,920 litres
Engines	GEnx/Trent 1000
Thrust	64,000lbs (280kN)
FUELS AND TIMES	
Block fuel 1,000nm	10,170kg
Block fuel 2,000nm	18,970kg
Block fuel 4,000nm	36,540kg
Bock time 1,000nm	178 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	510 minutes
FLEET	
Entry into service	2011
In service:	358
Operators (current and planned)	48
In storage	10
On order	57
Build peak year (2014)	104
Estimated production 2020	12
Average age (years)	4.3
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-115 per flight hour
Higher checks reserve	$80-85 per flight hour
Engine overhaul	$300-310 per engine flight hour
Engine LLP	$305-310 per engine cycle
Landing gear refurbishment	$75-80 per cycle
Wheels brakes and tyres	$100-105 per cycle
APU	$105-110 per APU hour
Component overhaul	$315-320 per flight hour

Boeing 787-9

SEATING/RANGE	
Max seating	408
Typical seating	296 (two class)
Maximum range	7,530nm (13,950km)
TECHNICAL CHARACTERISTICS	
MTOW	252.7 tonnes
OEW	120 tonnes
MZFW	181 tonnes
Fuel capacity	138,700 litres
Engines	GEnx1B/Trent 1000
Thrust	71,000lbs (320kN)
FUELS AND TIMES	
Block fuel 1,000nm	10,480kg
Block fuel 2,000nm	19,500kg
Block fuel 4,000nm	37,630kg
Bock time 1,000nm	178 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	510 minutes
FLEET	
Entry into service	2014
In service:	502
Operators (current and planned)	65
In storage	1
On order	332
Build peak year (2018)	120
Estimated production 2020	120
Average age (years)	1.6
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$110-115 per flight hour
Higher checks reserve	$85-90 per flight hour
Engine overhaul	$310-315 per engine flight hour
Engine LLP	$320-325 per engine cycle
Landing gear refurbishment	$75-80 per cycle
Wheels brakes and tyres	$100-105 per cycle
APU	$125-130 per APU hour
Component overhaul	$320-325 per flight hour

Boeing 787-10

SEATING/RANGE	
Max seating	440
Typical seating	336
Maximum range	6,345nm (11,750km)
TECHNICAL CHARACTERISTICS	
MTOW	254.0 tonnes
OEW	135.0 tonnes
MZFW	192.7 tonnes
Fuel capacity	126,370 litres
Engines	GEnx-1B/Trent 1000
Thrust	76,000 (340kN)
FUELS AND TIMES	
Block fuel 1,000nm	11,310kg
Block fuel 2,000nm	21,080kg
Block fuel 4,000nm	40,620kg
Bock time 1,000nm	146 minutes
Block time 2,000nm	265 minutes
Block time 4,000nm	501 minutes
FLEET	
Entry into service	2018
In service:	44
Operators (current and planned)	14
In storage	0
On order	153
Build peak year (2019)	29
Estimated production 2020	50
Average age (years)	Less than 1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$120-125 per flight hour
Higher checks reserve	$90-95per flight hour
Engine overhaul	$315-320 per engine flight hour
Engine LLP	$320-325 per engine cycle
Landing gear refurbishment	$75-80 per cycle
Wheels brakes and tyres	$105-110 per cycle
APU	$125-130 per APU hour
Component overhaul	$330-335 per flight hour

Bombardier CRJ900

SEATING/RANGE	
Max seating	90
Typical seating	88
Maximum range	1,550nm (2,871km)
TECHNICAL CHARACTERISTICS	
MTOW	38.3 tonnes
OEW	21.8 tonnes
MZFW	32.1 tonnes
Fuel capacity	10,990 litres
Engines	CF34-8C5
Thrust	14,510lbs (64.5kN)
FUELS AND TIMES	
Block fuel 200nm	1,240kg
Block fuel 500nm	2,100kg
Block time 200nm	45 minutes
Bock time 500nm	88 minutes
FLEET	
Entry into service	2003
In service:	460
Operators (current and planned)	31
In storage	11
On order	33
Build peak year (2008)	59
Estimated production 2020	12
Average age (years)	8.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$50-55 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	$75-80 per engine flight hour
Engine LLP	$105-110 per engine cycle
Landing gear refurbishment	$30-35 per cycle
Wheels brakes and tyres	$50-55 per cycle
APU	$60-65 per APU hour
Component overhaul	$160-165 per flight hour

Bombardier CRJ1000

SEATING/RANGE	
Max seating	104
Typical seating	100
Maximum range	1,425nm (2,640km)
TECHNICAL CHARACTERISTICS	
MTOW	40.8 tonnes
OEW	23.2 tonnes
MZFW	35.2 tonnes
Fuel capacity	10,990 litres
Engines	CF34-8C5A1
Thrust	13,3600lbs (59kN)
FUELS AND TIMES	
Block fuel 200nm	1,320kg
Block fuel 500nm	2,200kg
Block time 200nm	45 minutes
Bock time 500nm	88 minutes
FLEET	
Entry into service	2011
In service:	62
Operators (current and planned)	8
In storage	2
On order	5
Build peak year (2011)	17
Estimated production 2019	5
Average age (years)	5.1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$50-55 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	$75-80 per engine flight hour
Engine LLP	$105-110 per engine cycle
Landing gear refurbishment	$30-35 per cycle
Wheels brakes and tyres	$50-55 per cycle
APU	$60-65 per APU hour
Component overhaul	$160-165 per flight hour

De Havilland of Canada Dash 8-400

SEATING/RANGE	
Max seating	90
Typical seating	74
Maximum range	1,100nm (2,040km)
TECHNICAL CHARACTERISTICS	
MTOW	30.5 tonnes
OEW	17.8 tonnes
MZFW	29.0 tonnes
Fuel capacity	6,700 litres
Engines	PW150A
Thrust	5,070shp
FUELS AND TIMES (LR cruise)	
Block fuel 100nm	480kg
Block fuel 200nm	740kg
Block fuel 500nm	1,550kg
Bock time 100nm	44 minutes
Block time 200nm	65 minutes
Block time 500nm	126 minutes
FLEET	
Entry into service	1999
In service:	521
Operators (current and planned)	62
In storage	35
On order	44
Build peak year (2007)	42
Estimated production 2020	16
Average age (years)	9.4
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$34-35 per flight hour
Engine overhaul	$150-155 per engine flight hour
Engine LLP	$45-50 per engine cycle
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$45-50 per cycle
APU	$55-60 per propeller hour
Propeller	$15-20 per flight hour
Component overhaul	$145-150 per propeller hour

Embraer E175

SEATING/RANGE	
Max seating	88
Typical seating	78
Maximum range	2,000nm (3,706km)
TECHNICAL CHARACTERISTICS	
MTOW	40.4 tonnes
OEW	22.0 tonnes
MZFW	32.0 tonnes
Fuel capacity	11,670 litres
Engines	CF34-8E
Thrust	13,800lbs (60kN)
FUELS AND TIMES	
Block fuel 200nm	1,180kg
Block fuel 500nm	2,390kg
Block time 200nm	45 minutes
Bock time 500nm	81 minutes
FLEET	
Entry into service	2005
In service:	623
Operators (current and planned)	26
In storage	3
On order	179
Build peak year (2016)	84
Estimated production 2020	60
Average age (years)	5.9
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	$75-80 per engine flight hour
Engine LLP	$105-110 per engine cycle
Landing gear refurbishment	$30-35 per cycle
Wheels brakes and tyres	$50-55 per cycle
APU	$55-60 per APU hour
Component overhaul	$150-160 per flight hour

Embraer E190-E2

SEATING/RANGE	
Max seating	114
Typical seating	106
Maximum range	2,850nm (5,280km)
TECHNICAL CHARACTERISTICS	
MTOW	56.4 tonnes
OEW	33 tonnes
MZFW	46.7 tonnes
Fuel capacity	16,500 litres
Engines	Pratt & Whitney PW1919
Thrust	19,000lbs (85kN)
FUELS AND TIMES	
Block fuel 200nm	1,140kg
Block fuel 500nm	2,300kg
Block time 200nm	46 minutes
Bock time 500nm	83 minutes
FLEET	
Entry into service	2018
In service:	10
Operators (current and planned)	6
In storage	none
On order	37
Build peak year (2019)	7
Estimated production 2020	17
Average age (years)	Less than 1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40 per flight hour
Engine overhaul	No data
Engine LLP	No data
Landing gear refurbishment	$35-40 per cycle
Wheels brakes and tyres	$55-60 per cycle
APU	$70-75 per APU hour
Component overhaul	$18-185 per flight hour

Maintenance reserves are estimates based on E190 model pending in-service feedback and confirmation of claimed savings.

Embraer E195-E2

SEATING/RANGE	
Max seating	146
Typical seating	132
Typical range	2,600nm (4,800km)
TECHNICAL CHARACTERISTICS	
MTOW	61.5 tonnes
OEW	35.7 tonnes
MZFW	51.8 tonnes
Estimated fuel capacity	16,5000 litres
Engines	Pratt & Whitney PW1919
Thrust	19,000lbs (85kN)
FUELS AND TIMES	
Block fuel 200nm	1,140kg
Block fuel 500nm	2,300kg
Bock time 200nm	46 minutes
Block time 500nm	83 minutes
FLEET	
Entry into service	2019
In service	4
Operators (current and planned)	6
In storage	none
On order	122
Built peak year	Not applicable
Estimated production 2019	20
Average age (years)	Less than 1
INDICATIVE MAINTENANCE RESERVES	
C-check reserve	$45-50 per flight hour
Higher checks reserve	$35-40/flight hour
Engine overhaul	No data
Engine LLP	No data
Landing gear refurbishment	$35-40/cycle
Wheels, brakes and tyres	$55-60/cycle
APU	$70-75/APU hour
Component overhaul	$180-185/flight hour

Maintenance reserves are estimates based on E195 model pending in-service feedback and confirmation of claimed savings.

Sukhoi SSJ100

SEATING/RANGE	
Max seating	108
Typical seating	98
Maximum range (basic version)	1,645nm (3,048km)
Maximum range (LR version)	2,470nm (4,578km)
TECHNICAL CHARACTERISTICS	
MTOW (basic version)	45.8 tonnes
MTOW (LR version)	48.5 tonnes
OEW (basic version)	24.3 tonnes
OEW (LR version)	25.1 tonnes
MZFW (basic version)	36.6 tonnes
MZFW (LR version)	37.4 tonnes
Fuel capacity	13,135 litres
Engines	PowerJet SaM146-1S17/8
Thrust	17,800lbs with automatic power reserve
FUELS AND TIMES	
Block fuel 200nm	1,150kg
Block fuel 500nm	2,340kg
Block time 200nm	46 minutes
Bock time 500nm	83 minutes
FLEET	
Entry into service	2011
In service:	116
Operators (current and planned)	31
In storage	44
On order	134
Build peak year (2018)	28
Estimated production 2020	12
Average age (years)	4.7
INDICATIVE MAINTENANCE RESERVES	
Insufficient data available	

New aircraft market values ($ million)

Model	Avitas view	CV view	IBA view	MBA view	Oriel view	Average
Airbus						
A220-100	31.9	33.0	33.2	32.8	36.7	**33.5**
A220-300	37.0	39.0	39.0	36.9	43.5	**39.1**
A320	44.6	45.0	44.5	43.4	44.6	**44.4**
A320neo	50.9	52.0	51.9	48.4	50.1	**50.7**
A321	50.2	51.0	52.0	51.9	52.8	**51.6**
A321neo	59.4	59.0	58.7	56.1	57.2	**58.1**
A330-200	84.6	82.0	76.5	83.6	-	**81.7**
A330-300	94.7	90.0	86.0	96.7	93.7	**92.2**
A330 900neo	109.4	112.0	118.0	107.9	110.8	**111.6**
A350-900	154.7	158.0	155.0	145.7	150.3	**152.7**
A350-1000	167.5	173.0	170.5	161.8	169.6	**168.5**
A380	209.6	244.0	227.1	190.8	174.4	**209.2**
Boeing						
737-800	45.3	46.0	47.0	46.2	-	**46.1**
737 Max 8	50.9	-	50.9	-	50.3	**50.7**
737 Max 9	53.9	-	52.8	-	53.5	**53.4**
777-300ER	157.4	155.0	156.3	147.3	136.0	**150.4**
787-8	119.9	120.0	120.0	117.5	112.2	**117.9**
787-9	149.6	146.0	149.2	140.5	140.3	**145.1**
787-10	157.1	156.0	155.2	142.9	154.4	**153.1**
ATR						
ATR42-600	16.6	16.5	16.0	15.1	16.3	**16.1**
ATR72-600	20.9	21.0	20.8	19.1	18.2	**20.0**
Bombardier						
CRJ900	27.2	23.0	24.8	27.1	25.1	**25.4**
CRJ1000	28.7	-	27.4	-	27.5	**27.9**
De Havilland of Canada (ex-Bombardier)						
Dash 8-400	22.2	22.5	19.6	20.4	19.2	**20.8**
Embraer						
E175	29.6	28.0	28.2	29.4	27.3	**28.5**
E190-E2	35.8	32.0	32.5	-	34.4	**33.7**
E195	36.1	32.0	33.7	30.2	29.2	**32.2**
Sukhoi						
SSJ100	25.1	21.0	20.2	17.3	17.6	**20.2**

New aircraft lease rates ($'000s per month)

Model	Avitas view	CV view	IBA view	MBA view	Oriel view	Range
Airbus						
A220-100	220-260	230	238	220-236	270	**220-270**
A220-300	270-310	275	256	247-265	290	**247-310**
A320	300-340	320	295	290-312	330	**290-340**
A320neo	310-350	350	331	324-348	350	**310-350**
A321	335-375	360	339	347-373	380	**335-380**
A321neo	355-395	385	383	376-403	430	**355-430**
A330-200	645-685	600	612	484-520	-	**484-685**
A330-300	680-720	650	668	560-630	740	**560-740**
A330 900neo	720-760	775	853	640-700	830	**640-853**
A350-900	1,000-1,100	1,100	1,004	844-950	1,000	**844-1,100**
A350-1000	1,100-1,200	1,150	1,285	937-1,006	1,250	**937-1,285**
A380	1,620-1,720	1,950	1,862	1,105-1,186	1,400	**1,105-1,950**
Boeing						
737-800	300-340	335	-	309-332	-	**300-340**
737 Max 8	280-320	330	315	-	350	**280-350**
737 Max 9	310-350	335	330	-	380	**310-380**
777-300ER	1,050-1,150	1,150	1,146	853-995	995	**853-1,150**
787-8	830-870	875	850	681-731	820	**681-875**
787-9	955-995	1,000	985	813-873	940	**813-1,000**
787-10	1,050-1,150	1,100	1,193	828-889	1,080	**828-1,193**
ATR						
ATR42-600	115-135	145	135	119-128	145	**115-145**
ATR72-600	155-175	185	165	151-163	160	**151-185**
Bombardier						
CRJ900	190-210	205	193	215-230	210	**190-230**
CRJ1000	210-230	-	208	-	225	**208-230**
De Havilland of Canada (ex-Bombardier)						
Dash 8-400	160-180	195	165	162-174	170	**160-195**
Embraer						
E175	210-230	210	220	233-250	225	**210-250**
E190-E2	255-275	265	248		255	**248-275**
E195	240-260	230	253	246-264	235	**230-264**
Sukhoi						
SSJ100	160-180	170	175	137-147	150	**137-180**

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