



Airbus and Boeing passenger aircraft

# Aircraft Market Chartbook

(March 2016)

ALAFCO Aviation Lease and Finance Co. K.S.C.P.

Disclaimer

This material (the “Material”) is provided to you solely for informational purposes. It is not to be construed as advice or recommendations to you specifically. ALAFCO does not make any warranties or representations as to the accuracy or completeness of the Material. You should do your own independent evaluation of the Material.

Neither ALAFCO nor its affiliates are responsible for any damages or losses arising from any use of the Material. Reproduction of any portion of the Material or the information or data contained in any form is prohibited except with our prior written permission consent.

## Table of Contents

---

<b>Introduction and explanatory note</b>	<b>3</b>
<b>Single-aisle Market</b>	
- <i>In-service narrow-body aircraft</i>	4
- <i>In-service A320 family aircraft by engine type</i>	4
- <i>On-order narrow-body aircraft</i>	5
- <i>On-order A320 family aircraft by engine type</i>	5
- <i>In-service narrow-body aircraft by region</i>	6
- <i>On-order narrow-body aircraft by region</i>	6
- <i>In-service narrow-body aircraft by operator</i>	7
- <i>On-order narrow-body aircraft by operator</i>	7
<b>Twin-aisle Market</b>	
- <i>In-service wide-body aircraft</i>	8
- <i>In-service wide-body aircraft by engine type</i>	8
- <i>On-order wide-body aircraft</i>	9
- <i>On-order wide-body aircraft by engine type</i>	9
- <i>In-service wide-body aircraft by region</i>	10
- <i>On-order wide-body aircraft by region</i>	10
- <i>In-service wide-body aircraft by operator</i>	11
- <i>On-order wide-body aircraft by operator</i>	11
<b>Airbus and Boeing passenger aircraft specifications</b>	<b>12</b>
<b>Comparison of aircraft by range and seat capacity</b>	<b>14</b>

---

## Introduction and explanatory note

The following report examines the aircraft market for Airbus and Boeing passenger aircraft. The report divides the market into two sections: single-aisle market (i.e. narrow-body aircraft) and twin-aisle market (i.e. wide-body aircraft).

There are approximately 21,000 passenger jet aircraft in-service today, of which more than 80% are Airbus and Boeing aircraft. In regards to orders of passenger jet aircraft, Airbus and Boeing make up almost 90% of the 14,000 new orders. The report will therefore focus on Airbus and Boeing passenger aircraft, and exclude other smaller manufacturers.

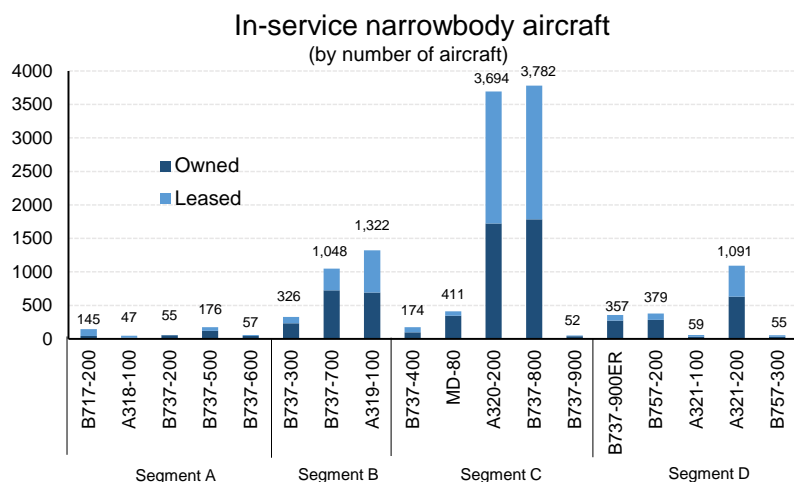
Each market has been divided into segments according to size. Narrow-body aircraft have been categorized into four segments: segment A refers to aircraft that hold less than 140 passengers in a high-density configuration, segment B aircraft carry up to 160, segment C have a maximum seat capacity of 190 and segment D aircraft can seat over 200 passengers. Wide-body aircraft have been divided into three segments: small-sized aircraft refers to capacity of up to 350 seats in a two-class configuration, medium-sized aircraft hold a maximum of 425 seats, and large-sized wide-bodies can accommodate 500 passengers and above.

The charts will illustrate the Airbus and Boeing aircraft that are currently in-service and the engine types associated with the aircraft, as well as new orders of Airbus and Boeing aircraft and the preferred engine option of customers. The report will also highlight the regional distribution of fleet, for both in-service and on-order aircraft, as well as the number of operators for each aircraft type.

The final section of the report compares the different Airbus and Boeing aircraft in terms of seat capacity and range, for currently in-service aircraft and for new aircraft that have not entered into service yet.

## Single-Aisle Market

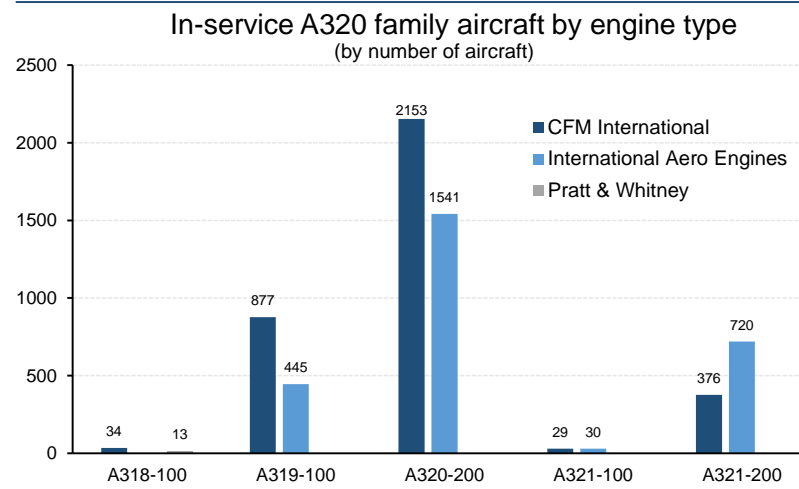
### B737-800 and A320-200 dominant single-aisle market



Source: Ascend (as of December 2015)

- There are around 13,500 Airbus and Boeing narrow-bodies in-service today, of which around 45% are leased.
- The B737-800 and A320-200 aircraft combined account for 57% of narrow-body aircraft that are currently in-service. The two aircraft are considered the most liquid single-aisles on the market, with low availability and a very active leasing market.
- The B737-800 offers a higher seat capacity over its rival (additional 9 seats), though recent developments (Space-Flex) have enabled the A320 to match B737 capacity.
- Despite eventual replacement by newer technology aircraft, large fleet of the A320-200 and B737-800 are not expected to be significantly replaced until the mid to late 2020s.

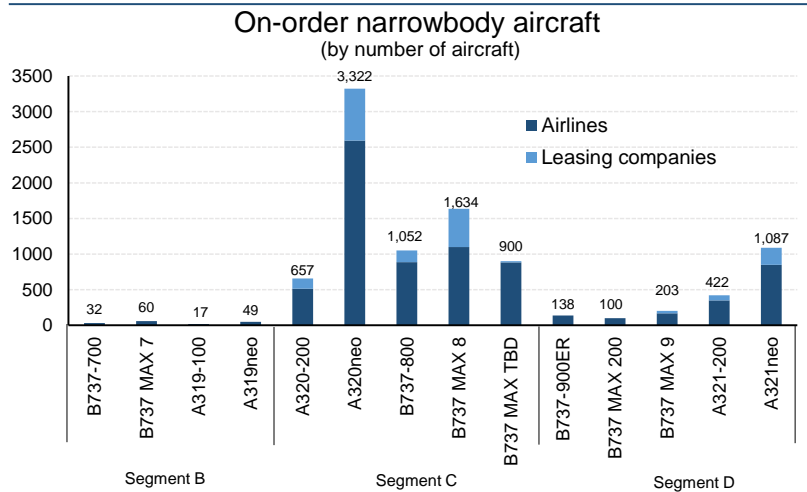
### Most single-aisle aircraft powered by CFM engines



Source: Ascend (as of December 2015)

- Boeing's B737 aircraft offer a single engine type – CFM. Meanwhile, Airbus offers two engine choices for the A320ceo (current engine option) aircraft, of which more than half are powered by CFM engines.
- CFM International is a joint venture involving General Electric, while International Aero Engines is a joint-venture involving Pratt & Whitney.
- CFM engines are favored more on the A319 and A320 aircraft, while the larger A321 model favor IAE engines – two-thirds of A321s are powered by IAE.
- In the CEO variants of the A320 family aircraft, the Pratt & Whitney engines are only offered on the smaller A318 model.

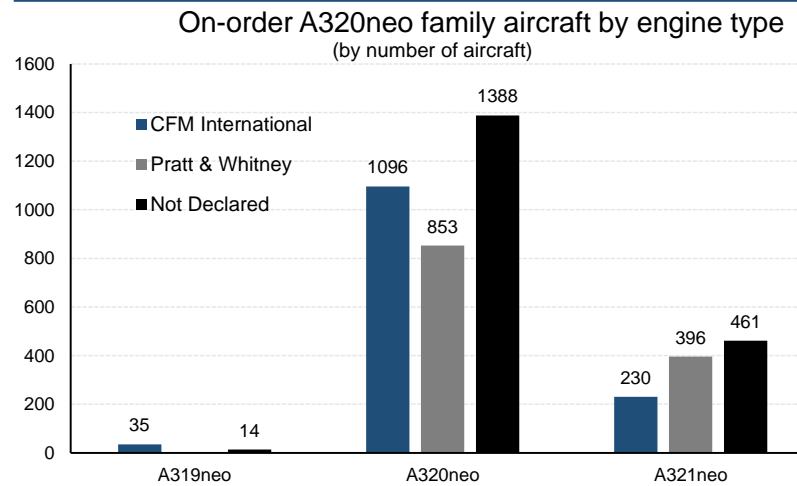
### A320neo and B737Max8 account for half of all new orders



Source: Ascend (as of December 2015)

- Of the 9,670 orders of Airbus and Boeing narrow-bodies, 80% are placed by airlines and 20% by leasing companies.
- More than three-quarters of all orders are for new technology aircraft. The A320ceo and B737NG fleet will eventually be replaced by newer variants – the A320neo and B737Max. From 2018, all A320 production will be of the Neo variant.
- The A320neo is the most popular model on order, accounting for one-third of all new orders. This is followed by the B737 Max8, which is due to enter service in 3Q2017 – almost 2 years behind its key rival the A320neo.
- The narrow-body market is moving to a preference for larger models. The A319neo and B737Max7 have seen very limited orders. The A321neo is most popular in its segment as it offers higher capacity over the competing Max9/Max200.

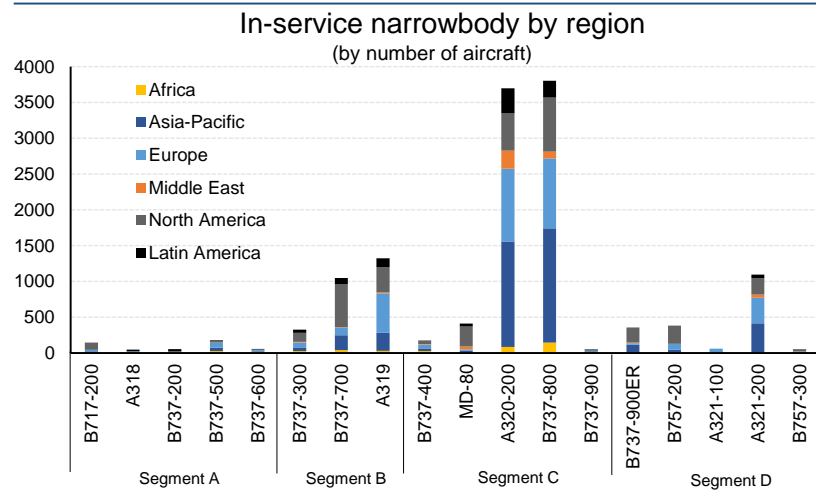
### A320neo family orders balanced between CFM and P&W



Source: Ascend (as of December 2015)

- The newer technology B737Max will continue to offer only CFM engines. Meanwhile, the A320neo (new engine option) aircraft offer two options – CFM and Pratt & Whitney (PW).
- The new technology aircraft use the latest generation engine choices – Leap from CFM International and Geared Turbofan (GTF) from PW – offering airlines 15-20% more fuel-savings.
- To date, orders for the A320neo family aircraft have been more or less balanced between CFM and PW, though there are still 40% of orders with undetermined engine choice. The CFM engine is favored more on the A320neo model, while PW is the more preferred option for the A321neo model.
- Engine issues on the recently inducted A320neo – powered with PW engines – cause the engine to run idle for 3 minutes before taxi. End-2015 delivery was thus slightly delayed.

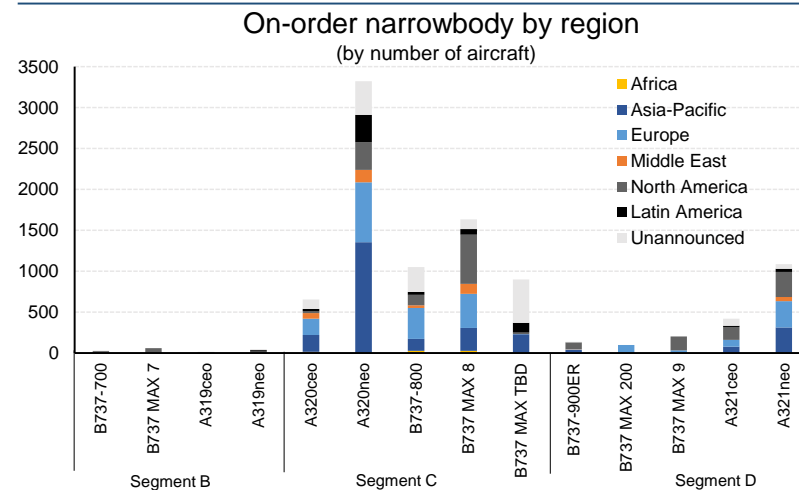
## Asia Pacific holds one-third of the world's narrow-bodies



Source: Ascend (as of December 2015)

- The Asia-Pacific region accounts for around one-third of the world's single-aisle aircraft, while North America and Europe each account for around one-quarter of the world's narrow-bodies.
- An overwhelming 40-45% of the world's most popular narrow-bodies – the A320-200 and B737-800 aircraft – are held by Asian carriers. This is followed by Europe. The two regions combined account for about two-thirds of these aircraft. The larger A321 model is also prevalent in these two regions.
- In some regions, there are clear preferences towards Boeing or Airbus narrow-bodies. In North America, around 70% of narrow-bodies are Boeing aircraft. Meanwhile, Airbus aircraft account for around two-thirds of narrow-bodies in the Middle East. The Asia-Pacific region, on the other hand, holds a fairly balanced amount of both aircraft.

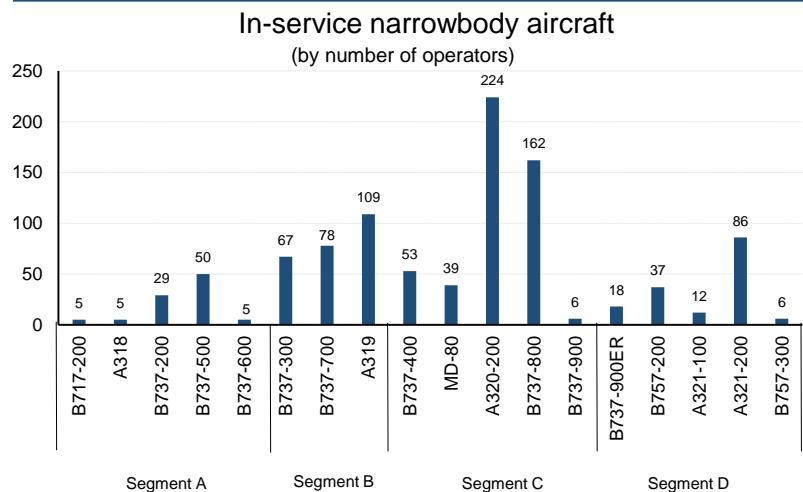
## Asia main customer for Neo, and North America for Max



Source: Ascend (as of December 2015)

- 27% of new orders of narrow-body aircraft are placed by Asian operators, followed by European and North American operators at 24% and 20% respectively.
- New technology aircraft are placed predominantly by Asian operators, while European operators have the highest order for current technology narrow-bodies.
- More than one-third of A320neo family orders are placed by operators in the Asia-Pacific region, while North America holds the largest order for the B737Max fleet.
- There are some exceptions to the above. For example, orders for the Max200 (a higher seating-capacity version of the Max8) have been placed by one European carrier – Ryanair, while the A321neo has seen an equal amount of orders from Asia, Europe and North America.

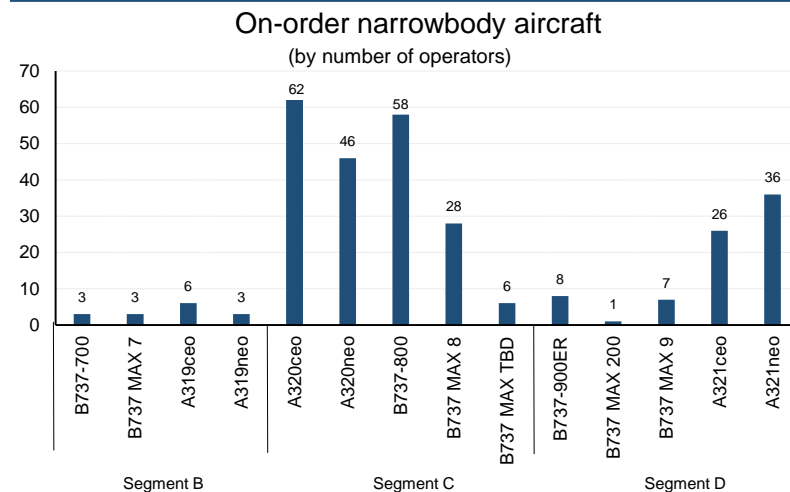
### Southwest and American largest B737/A320 operators



Source: Ascend (as of December 2015)

- American Airlines is the world's largest operator of the A320 family aircraft, while Southwest Airlines is the world's largest operator of the B737 family aircraft.
- The A320-200 and B737-800 have a large customer base, as evident by the high number of operators.
- The largest operators of the popular A320-200 are China Eastern Airlines, JetBlue Airways and China Southern Airlines, who operate over 100 of this aircraft. Meanwhile, the largest operators of the B737-800 are Ryanair and American Airlines, each operating over 200 of this aircraft.
- The A319 has the largest number of operators amongst small-sized narrow-bodies (EasyJet and American Airlines operate over 100 A319 aircraft), while the A321 has the highest number of operators amongst large-size narrow-bodies.

### Lufthansa and Southwest launch customers of Neo/Max



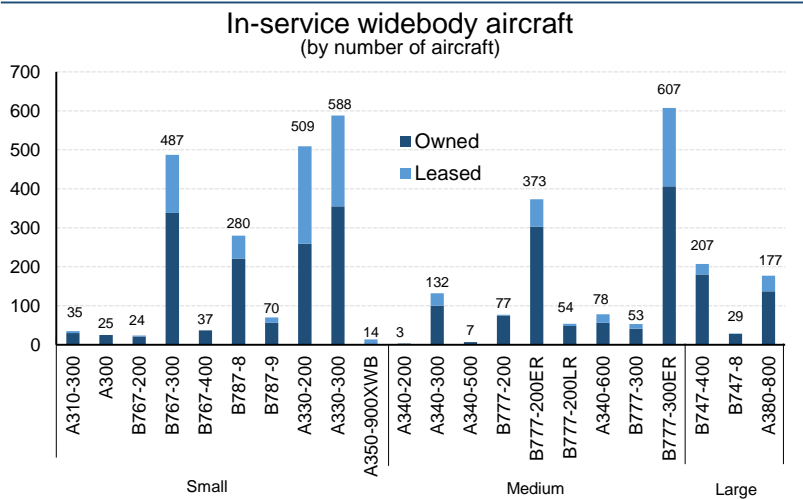
Source: Ascend (as of December 2015)

- Lufthansa was the launch customer of the A320neo which entered commercial service in January 2016, followed by Indian carrier IndiGo in March. The A320neo has won key orders from large low cost-carriers including IndiGo, AirAsia, EasyJet, Lion Air and Wizz Air.
- Major North American carriers – Southwest Airlines, American Airlines and United Airlines – have selected the Max for their fleet renewal program. Southwest Airlines will launch the Max program with the B737Max8 in the second half of 2017. The B737Max also has key orders with large low-cost carriers including Lion Air, Norwegian and Ryanair.
- Although orders for new technology aircraft are more than three times larger than orders for current technology aircraft, they have a narrower customer base, i.e. orders of new technology aircraft are concentrated with fewer operators.



## Twin-Aisle Market

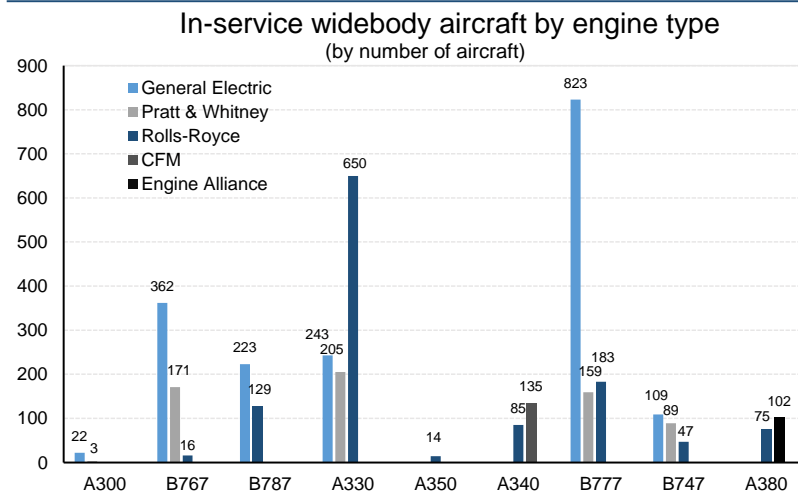
### B777s and A330s account for almost 60% of wide-bodies



Source: Ascend (as of December 2015)

- There are approximately 3,900 Airbus and Boeing wide-body aircraft in-service today, of which 30% are leased.
- The B777-300ER and the A330 (-300 and -200) are the most popular wide-body variants, accounting for almost 45% of the twin-aisle market. Most types of widebodies that are currently in-service are now out-of-production (A300, A310, B767, A340, B777-200 and B747-400).
- New wide-bodies introduced in recent years include the B787 Dreamliner (entered service in October 2011), and more recently the A350XWB (inaugurated in January 2015).
- Large wide-bodies account for only 11% of the twin-aisle market, with half comprising of the outdated B747-400.

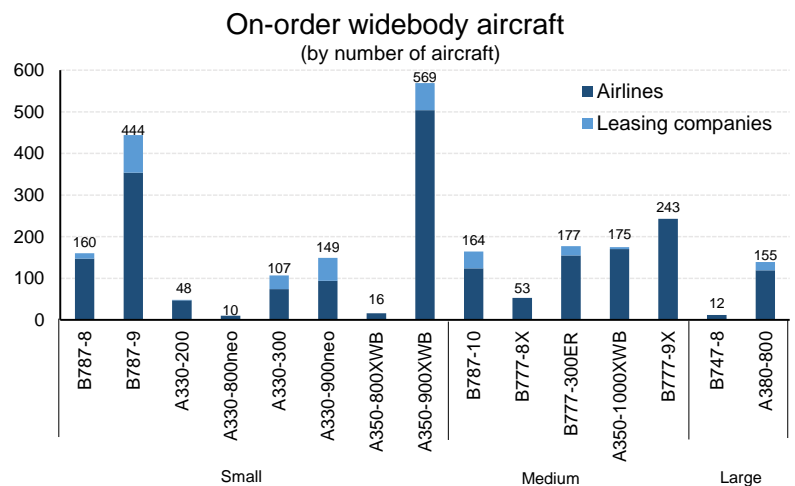
### Nearly half of wide-body aircraft powered by GE engines



Source: Ascend (as of December 2015)

- General Electric (GE) engines are the most prominent type of engines in the twin-aisle market comprising 46% of market share. This is followed by Rolls-Royce engines (31%), and Pratt & Whitney (16%).
- The popular B777 and A330 aircraft drive this trend. GE engines account for 71% of B777s, while Rolls-Royce (RR) engines power 59% of A330s.
- On newer wide-bodies, both GE and RR engines are offered on the B787, while the A350XWB offers only RR engines.
- In total, more than half of Airbus wide-body aircraft hold Rolls-Royce engines, while an overwhelming two-thirds of Boeing wide-bodies carry GE engines.

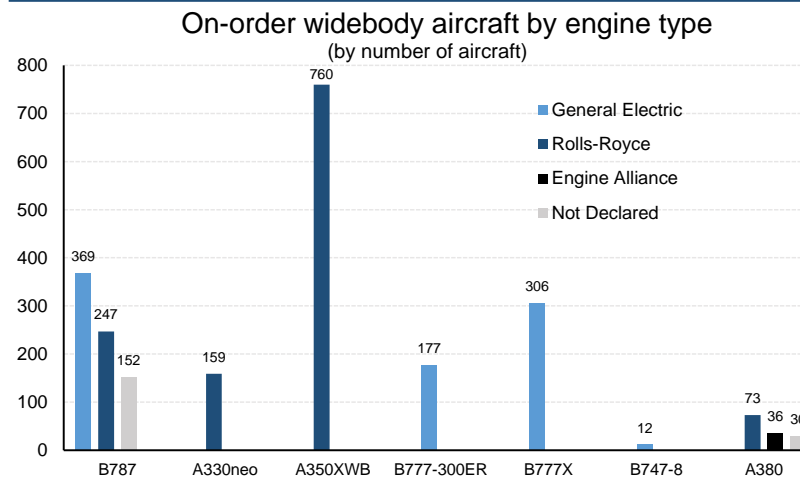
### A350XWB and B787 most popular wide-bodies on-order



Source: Ascend (as of December 2015)

- Of the 2,460 orders of Airbus and Boeing wide-body aircraft today, about 15% have been placed by leasing companies.
- The B787 Dreamliner and the A350XWB aircraft each hold around 30% of all wide-body orders. The A350-900 variant holds the largest orders, while the A350-800 variant will likely be dropped in favor of the A330neo. The once popular A330 aircraft has seen less significant orders.
- The continued shift towards smaller wide-bodies is evident in the high orders placed for smaller widebodies like the B787 and A350XWB – as opposed to B777, B747 and A380 aircraft.
- The B777 is most popular among larger widebodies on-order. B777-300ER will soon be replaced by the B777X (entry into service in 2020-22). The A350-1000, to enter service in 2017, is targeted to compete with the B777 – though lags in orders.

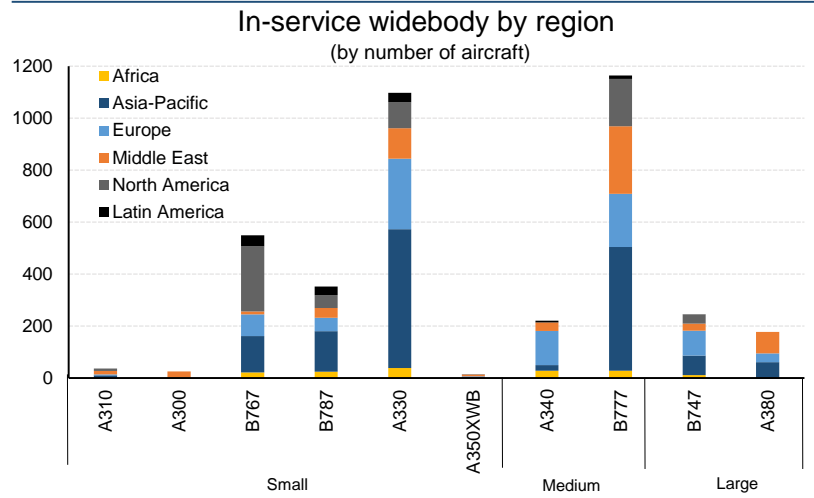
### Rolls-Royce to power more than half of new wide-bodies



Source: Ascend (as of December 2015)

- Rolls Royce engines are the most popular choice for new orders of wide-body aircraft, chosen to power 53% of wide-body aircraft on-order. This is followed by GE engines at 36%.
- This is due to the popularity of the A350XWB aircraft, which offers only Rolls Royce engines. Unlike the A330ceo, the A330neo will also offer only Rolls Royce engines.
- New orders for the B777 and B747 will offer only GE engines – as opposed to multiple engine choices on previous variants. The B787 is more skewed towards GE engines than RR.
- In general, Rolls Royce engines dominate new Airbus wide-bodies, accounting for almost 90% of orders. Meanwhile, GE engines account for around two-thirds of new orders for Boeing widebodies.

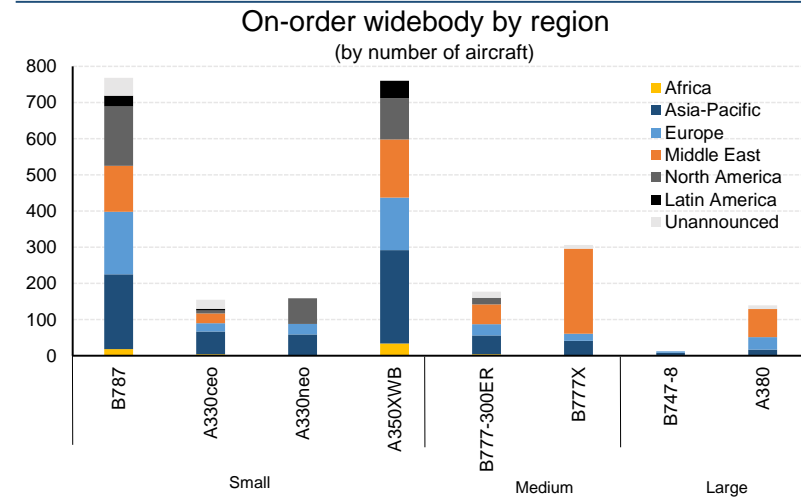
### Asia and Europe operate 60% of in-service wide-bodies



Source: Ascend (as of December 2015)

- The Asia Pacific region hold the largest share of in-service wide-body aircraft (38%), followed by Europe (23%). The Middle East and North America each hold a 16% share.
- Asian carriers operate half of the world’s A330 aircraft, and around 40-45% of B777 and B787 aircraft.
- Europe holds the majority of the world’s outdated wide-bodies – European carriers hold 60% of A340s and 37% of B747-400 aircraft. Meanwhile, North American operators hold the majority of the outdated B767 aircraft.
- There are 14 newly launched A350XWB aircraft in-service, half of which operate in the Middle East. Additionally, the Middle East region holds around 45% of the world’s A380 aircraft – Emirates is by far the largest operator of this aircraft.

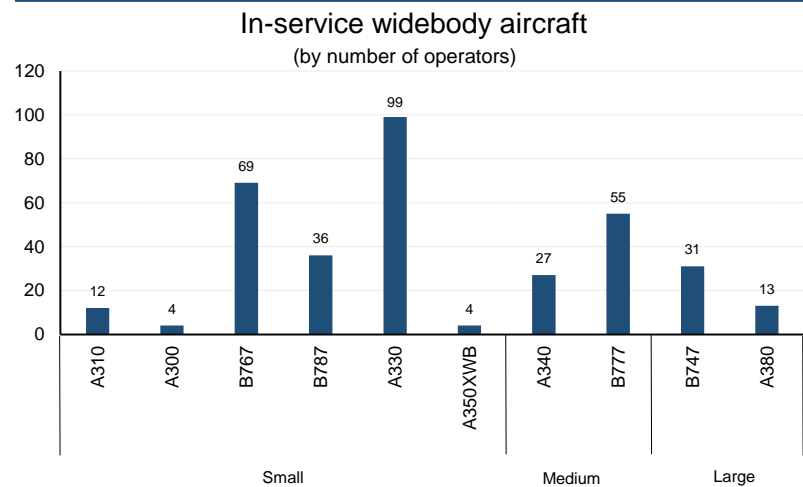
### Asian and Middle East operators drive wide-body orders



Source: Ascend (as of December 2015)

- New orders for wide-body aircraft are driven by the Asia Pacific and Middle East regions, each accounting for around 30% of total orders.
- The most popular wide-bodies on-order – the A350XWB and B787 – have seen large orders from across the regions, led by Asia Pacific. 34% of A350XWB orders have been placed by Asian operators, followed by Middle East carriers (21%) and European carriers (19%).
- Meanwhile, the B787 has seen more balanced orders – Asia, Europe and North America each hold around 25% of orders.
- The Middle East region holds the highest orders of larger sized wide-bodies; around three-quarters of orders for the B777X and more than half of A380 orders are placed by Middle East operators.

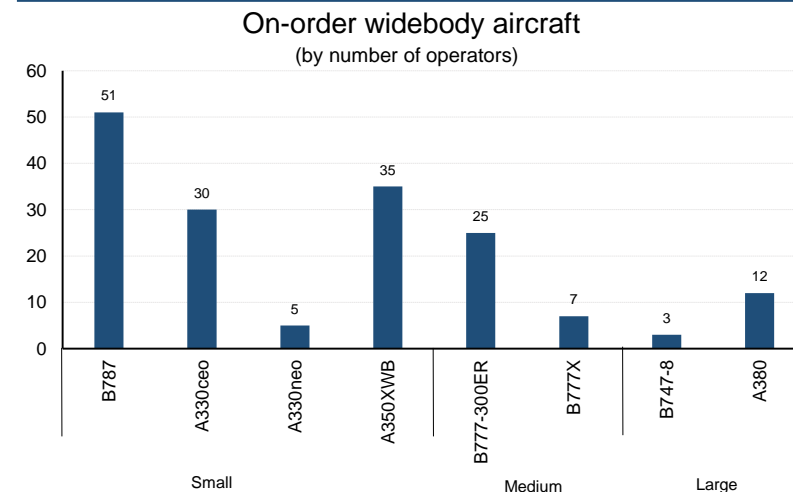
## All Nippon and Qatar largest operators of B787 and A350



Source: Ascend (as of December 2015)

- The A330 has the largest number of operators for in-service wide-bodies, followed by the B767. Three US operators – Delta Airlines, American Airlines and United Airlines – operate one-third of all B767 aircraft.
- The B777 aircraft has the third largest number of operators, though the top ten carriers account for more than 50% of in-service B777s – led by Emirates, United and Cathay Pacific.
- Launch customer, All Nippon Airways, is the largest operator of the B787 with 44 aircraft in-service. Other large operators include United, Qatar and Japan Airlines (25 aircraft each).
- There are currently 4 operators for the recently inducted A350XWB aircraft. Qatar Airways was the launch operator, followed by Vietnam Airlines, Finnair and TAM Linhas Aereas.
- Three carriers – British Airways, Lufthansa and United Airlines – account for almost 40% of the world's B747 aircraft.

## Etihad and Lufthansa launch customers of B777 8X/9X



Source: Ascend (as of December 2015)

- The B787 is the most dispersed wide-body on order, with more than 50 carriers placing orders for this aircraft. Etihad and All Nippon alone account for 15% of B787 orders.
- The A350XWB has orders placed by 35 different operators. Qatar Airways, Singapore Airlines, Etihad and Cathay Pacific account for more than one-third of A350XWB orders.
- Although there are more orders for the B777X than the B777-300ER, the new X variant is concentrated with a fewer number of operators. More than 75% of B777X orders have been placed by Middle East carriers Emirates, Qatar and Etihad.
- Only 5 operators have placed orders for the A330neo, which is expected to enter into service in 2018, 50% of which have been placed by AirAsia X and 25% by Delta Airlines.
- Emirates Airlines, already the world's largest A380 operator, holds more than half of all orders for the A380 aircraft.

## Airbus and Boeing passenger aircraft specifications

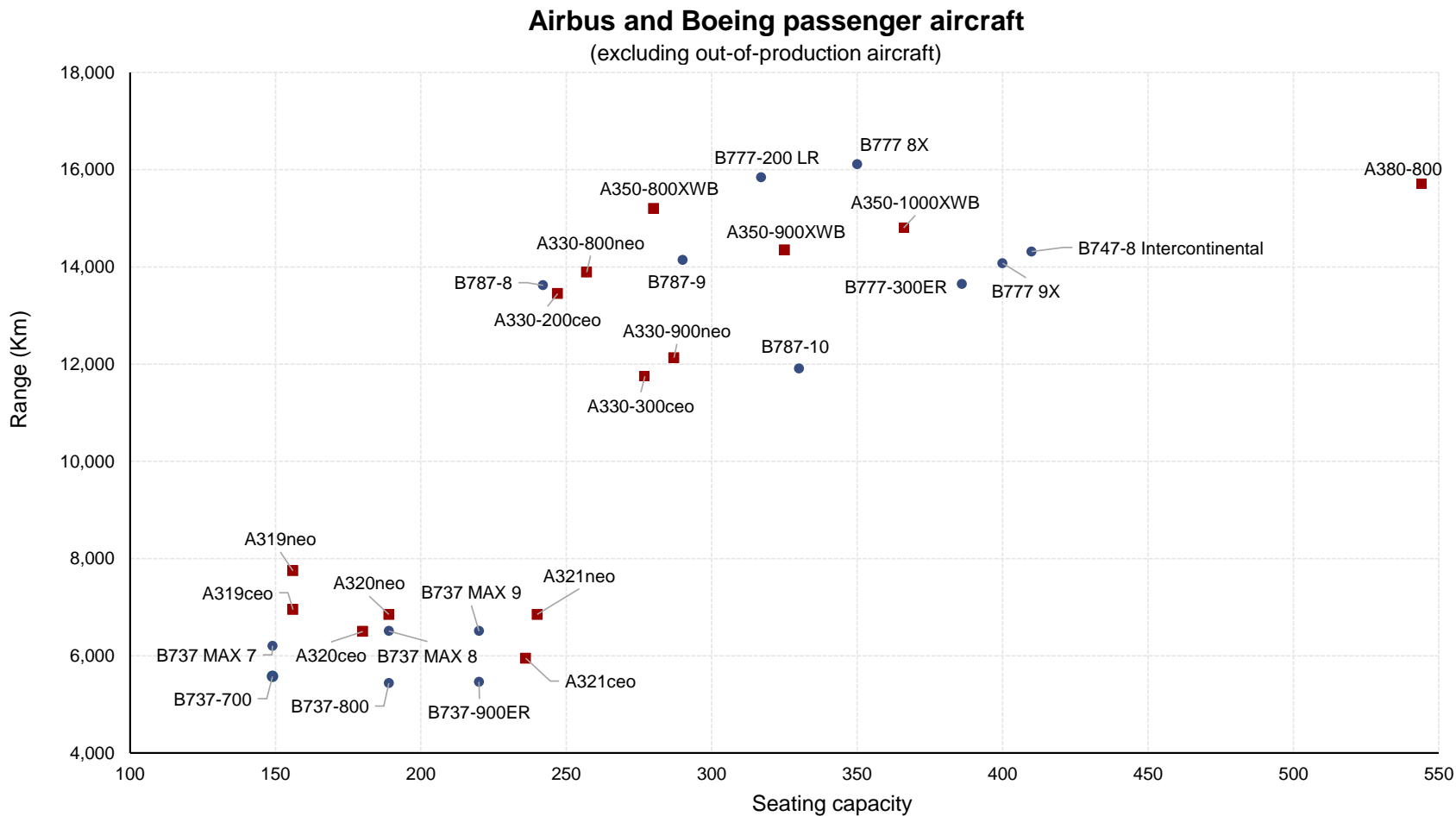
Aircraft	Engine option	Seat capacity	Max. range (km)	Status	Competitor
<b>Airbus</b>					
<b>A300-600</b>	PW / GE	266 (2-class)	7,540	out-of-production	
<b>A310-300</b>	PW / GE	218 (2-class)	9,600	out-of-production	
<b>A320 Family</b>		2-class – high density			
A318ceo	CFM / PW	107 - 132	5,750	out-of-production	
A319ceo	CFM / IAE	124 - 156	6,950	in-production	B737-700
A320ceo	CFM / IAE	150 - 180	6,500	in-production	B737-800
A321ceo	CFM / IAE	185 - 236	5,950	in-production	B737-900ER
A319neo	CFM / PW	124 - 156	7,750	Entry-into-service 1H2017	B737 MAX 7
A320neo	CFM / PW	150 - 189	6,850	in-production	B737 MAX 8
A321neo	CFM / PW	185 - 240	6,850	Entry-into-service 2H2016	B737 MAX 9
A321neo LR	CFM / PW	206 (2-class)	7,400	Entry-into-service 2019	-
<b>A330 Family</b>		3-class – high density			
A330-200ceo	GE/PW/RR	247 - 406	13,450	in-production	B787
A330-300ceo	GE/PW/RR	277 - 440	11,750	in-production	B787
A330-800neo	RR	257 - 406	13,900	Entry-into-service 2018	B787
A330-900neo	RR	287 - 440	12,100	Entry-into-service 2018	B787
<b>A340 Family</b>		3-class – high density			
A340-200	CFM	261 - 420	12,400	out-of-production	
A340-300	CFM	277 - 440	13,500	out-of-production	
A340-500	RR	293 - 375	16,670	out-of-production	
A340-600	RR	326 - 475	14,450	out-of-production	
<b>A350 XWB Family</b>		3-class – high density			
A350-800	RR	280 - 440	15,200	project on-hold	
A350-900	RR	325 - 440	14,350	in-production	B777-200 LR / B787-10
A350-1000	RR	366 - 440	14,800	Entry-into-service mid-2017	B777-300ER / B777 8X
<b>A380</b>		4-class – high density			
<b>A380-800</b>	EA / RR	544 - 853	15,200	in-production	B747-8
<b>Boeing</b>					
<b>B717-200</b>	RR	106 (2-class)-134 (max)	2,991	out-of-production	
<b>B737 Family</b>		2-class – high density			

B737-200	PW	102 - 136	4,300	out-of-production	
B737-300 (Classic)	CFM	126 - 149	4,056	out-of-production	
B737-400 (Classic)	CFM	147 - 174	3,694	out-of-production	
B737-500 (Classic)	CFM	110 - 138	4,297	out-of-production	
B737-600 (NG)	CFM	110 - 138	5,260	out-of-production	A318ceo
B737-700 (NG)	CFM	126 - 149	5,574	in-production	A319ceo
B737-800 (NG)	CFM	162 - 189	5,436	in-production	A320ceo
B737-900ER (NG)	CFM	178 - 220	5,463	in-production	A321ceo
B737 MAX 7	CFM	126 - 149	6,204	Entry-into-service 2019	A319neo
B737 MAX 8	CFM	162 - 189	6,510	Entry-into-service 3Q2017	A320neo
B737 MAX 200	CFM	200 (1-class)	5,000	Entry-into-service 2019	-
B737 MAX 9	CFM	178 - 220	6,510	Entry-into-service 2018	A321neo
<b>B757 Family</b>		2-class			
B757-200	PW / RR	195	7,408	out-of-production	
B757-300	PW / RR	234	6,313	out-of-production	
<b>B767 Family</b>		2-class			
B767-200ER	GE / PW	192	11,908	out-of-production	
B767-300ER	GE / PW	229	10,353	out-of-production	
B767-400ER	GE / PW	267	9,936	out-of-production	
<b>B787 Family</b>		2-class			
B787-8	GE / RR	242	13,621	in-production	A330
B787-9	GE / RR	290	14,140	in-production	A330
B787-10	GE / RR	330	11,908	Entry-into-service 2018	A350-900XWB / A330
<b>B777 Family</b>		2-class			
B777-200	GE/RR/PW	355	7,852	out-of-production	
B777-200ER	GE/RR/PW	313	13,084	out-of-production	
B777-200LR	GE	317	15,844	in-production	A350-900XWB
B777-300	GE/RR/PW	425	9,343	out-of-production	
B777-300ER	GE	396	13,649	in-production	A350-1000XWB
B777 8X	GE	350 (3 class)-375 (2 class)	16,110	Entry-into-service 2020-22	A350-1000XWB
B777 9X	GE	400 (3 class)-425 (2 class)	14,075	Entry-into-service 2020-22	-
<b>B747 Family</b>		3-class			
B747-400	GE/RR/PW	344	13,500	out-of-production	
B747-400ER	GE / PW	344	14,050	out-of-production	
B747-8 Intercontinental	GE	410	14,800	in-production	A380-800

Sources: Airbus / Boeing / various sources.

Note: GE (General Electric), PW (Pratt & Whitney), RR (Rolls-Royce). CFM is a GE/SNECMA joint-venture, IAE (International Aero Engines) is a PW/Japanese Aero Engine Corporation and MTU Aero Engines joint venture, and EA (Engine Alliance) is a GE/PW joint-venture.

### Comparison of aircraft by range and seat capacity\*



\* Note: A320 and B737 aircraft displayed in high-density configuration. A330, A350XWB, B777, B747 and A380 aircraft displayed in 3-class configuration (except B787 displayed in 2-class configuration).

Sources: Airbus / Boeing / various sources.