

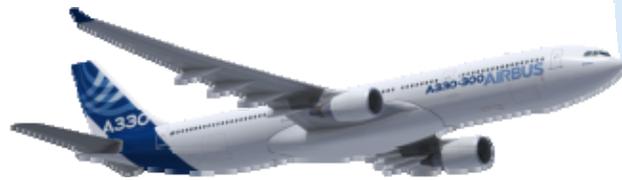


AIRPORT PAVEMENT WORKING GROUP MEETING, April 15, 16, 17 - 2013

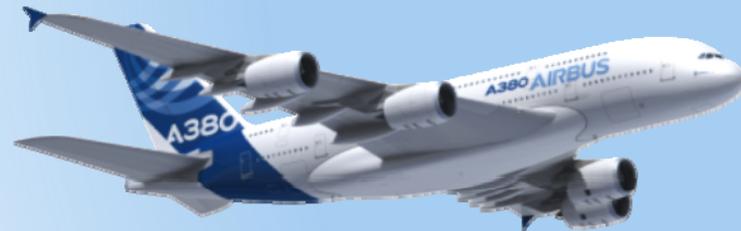
## ***AIRBUS Aircraft Overview/R&D Needs***

Presented by  
Cyril FABRE / Head of Airfield Pavement

# The Airbus Family today



**A330 Family**



**A380 Family**



**A320 Family**



**A350 XWB**

**>12,400  
orders**

**>7,600  
deliveries**

**380  
operators**

**>20,000  
flights daily**

End January 2013



# Order backlogs

## Airbus

A320ceo 1,856

A320neo 1,864

A330 301

A350 XWB 592

A380 165

            
**4,768**

## Boeing

737NG 1,980

737 MAX 1,164

767/777 427

787 841

747-8 28

747-8F 39

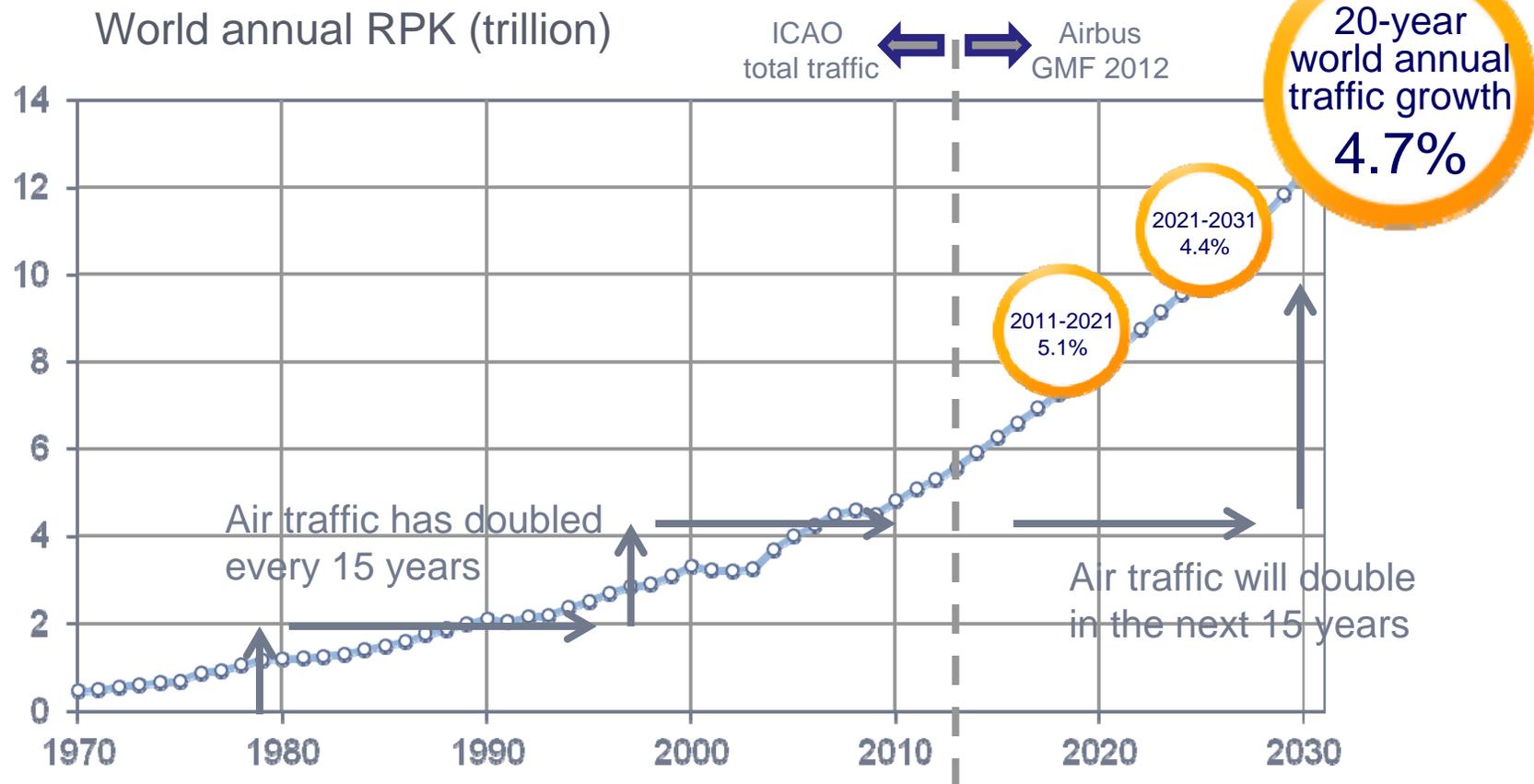
**4,477**

**Combined backlog of 9,245 aircraft**

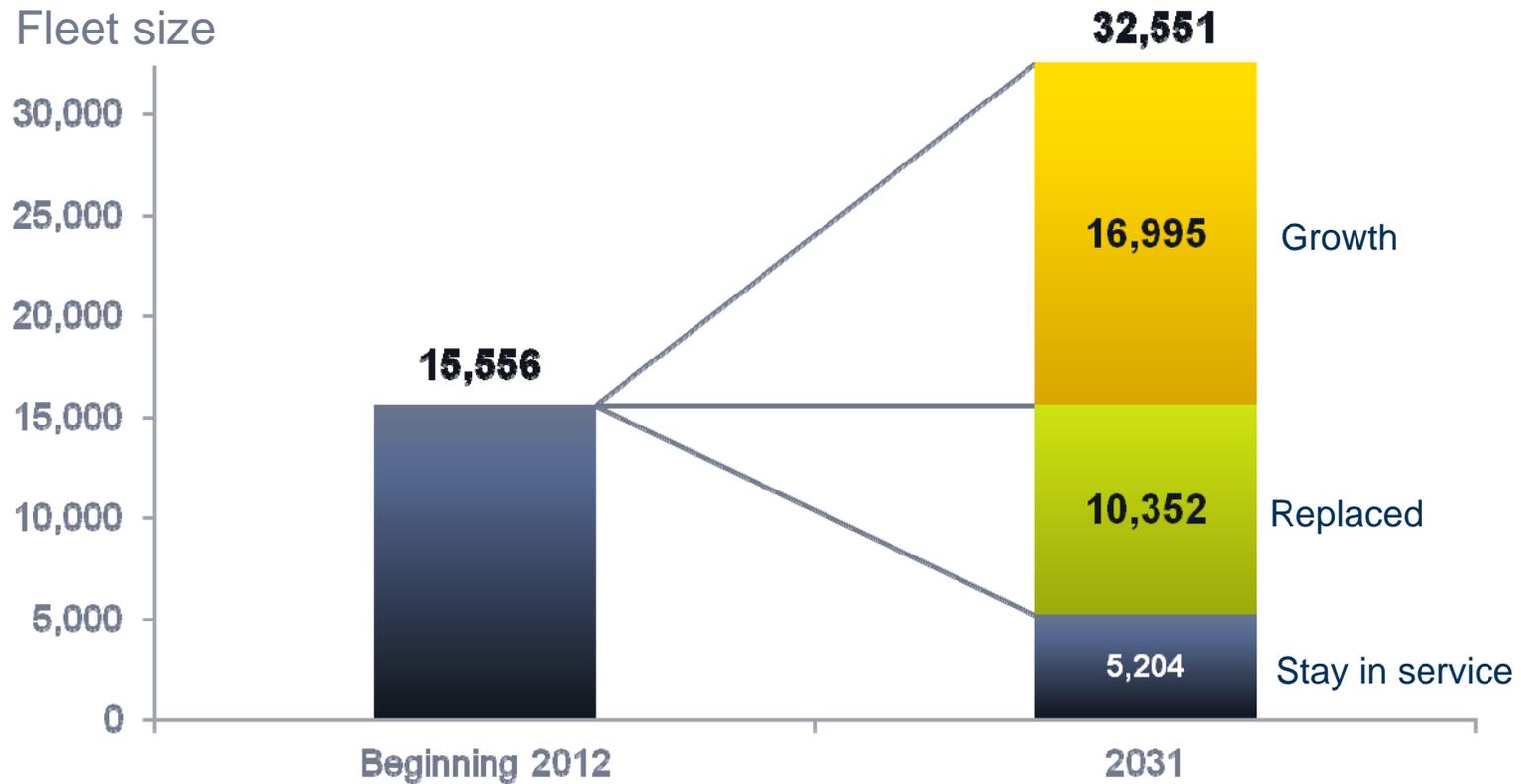
To end January 2013 plus 143 Boeing aircraft ordered by AAL



# Air travel remains a growth market



# Demand for 27,350 new passenger aircraft by 2031



Passenger aircraft above 100 seats



# Airport Regulations – FAA and major CAAs

- National CAAs contributing to ICAO, certifying airports and reporting deviations to standards (Circulars for ICAO, MoS for FAA....)
- **FAA** is most powerful Civil Aviation Authority
- They have their own **standards** (ex: AC 150/5300-13, similar to Annex 14 but US specific) and **operations procedures** (Modification Of Standards, Engineering Briefs,...)
- They are based on US Regions and Technical Centres
- Other major or contributing CAAs (relevant to airports) include EASA (Europe), CAAC (China), CASA (Australia), JCAB (Japan), DGAC (France), CAA-UK, LBA (Germany), CAA-Netherlands and CAA-Norway

# ICAO Aerodrome reference code (Annex 14)

- ICAO Annex 14, Aerodromes. Volume 1 – Aerodrome design and Operations

Design code	Wingspan (m)	Outer Main Landing Gear Width (m)	Example aircraft
A	<15	<4.5	All single engine aircraft, some business jets
B	15 to <24	4.5 to <6	Commuter aircraft, large business jets (EMB-120, Saab 2000, Saab 340, etc)
C	24 to <36	6 to <9	Single aisle - Medium range aircraft (A320 family, 727, 737 family, MD-80)
D	36 to <52	9 to <14	Wide body aircraft (A300, 757, 767)
E	52 to <65	9 to <14	Long range aircraft (A330, A340, A350, 747, 777, 787)
F	65 to <80	14 to <16	A380, 747-8

# FAA - Airplane design group (ADG) classification

- FAA AC 150/5300-13, Airport Design

Design group	Wingspan	Tail height	Representative aircraft type
I	<49' (15m)	<20' (6.1m)	Single engine aircraft, some business jets
II	49' (15m) - <79' (24m)	20' (6.1m) - <30' (9.1m)	Commuter aircraft, large business jets
III	79' (24m) - <118' (36m)	30' (9.1m) - <45' (13.7m)	A320, 727, 737, DC9, MD80
IV	118' (36m) - <171' (52m)	45' (13.7m) - <60' (18.3m)	A300, 767, 757, DC10, MD11
V	171' (52m) - <214' (65m)	60' (18.3m) - <66' (20.1m)	A330, A340, A350, 777, 747, 787
VI	214' (65m) - <262' (80m)	66' (20.1m) - <80' (24.4m)	A380, 747-8

# A320 Family

**9,142** firm orders

**5,432** deliveries

**3,710** firm order backlog (1,856 ceo, 1,864 neo)



**A take-off or landing every 2.5 seconds, with 99.8% reliability**

End January 2013



# One type, four equally spaced models

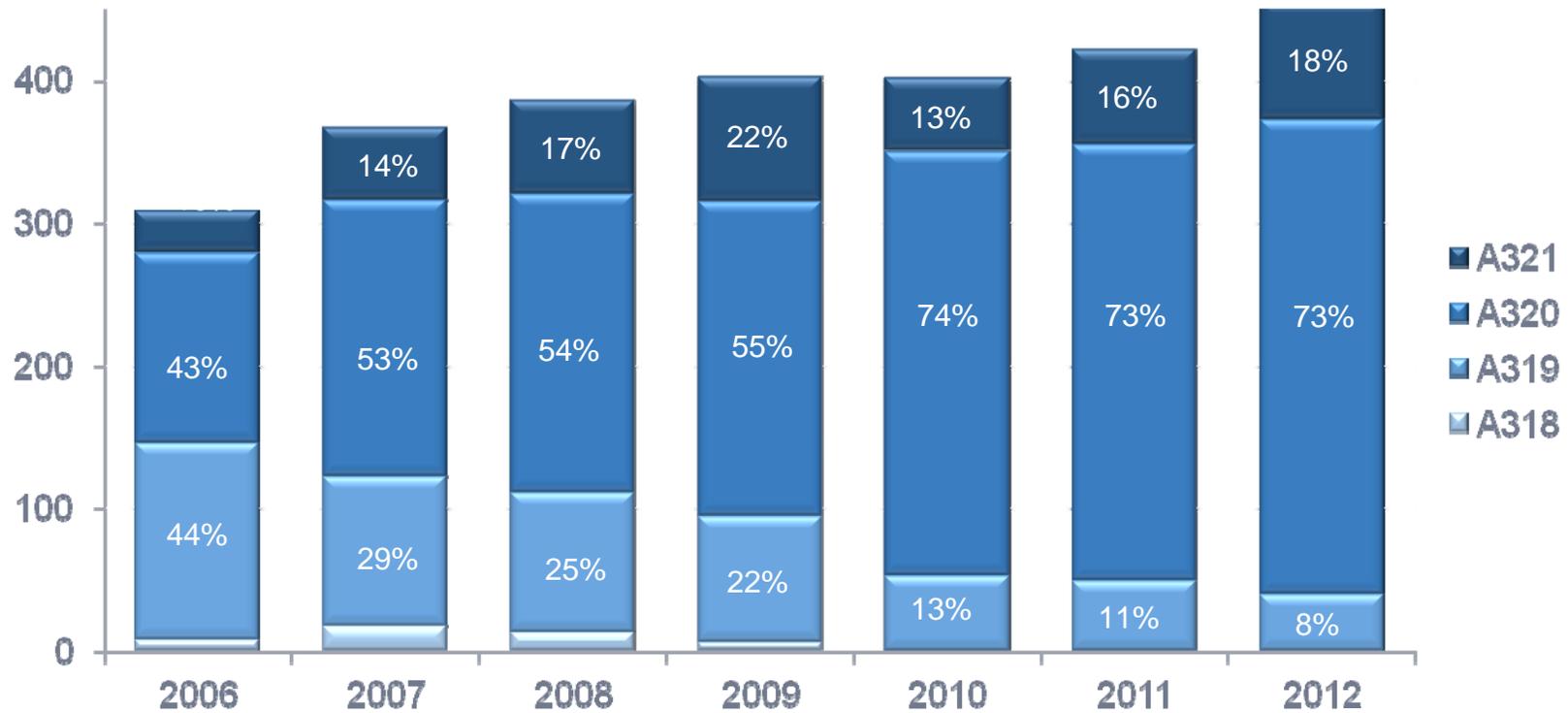


The A320 Family offers the most efficient and comprehensive coverage of the single aisle market

\* Typical two-class and high-density seat counts

# The market is moving to bigger aircraft

A320 Family deliveries (% units)



Clear demand for larger and more efficient aircraft

Data to end 2012, Source: Airbus Orders & Deliveries



# The A320 Family operates from some of the world's most challenging airports



A320 Family operations from 2010 OAG



# The best keeps getting better – ‘Sharklets’

- ✓ Sharklet A320 CFM certified in November 2012
- ✓ Flight test results show fuel-burn savings up to 4%
- ✓ 1st delivery in December 2012



Better range, payload, performance and fuel efficiency

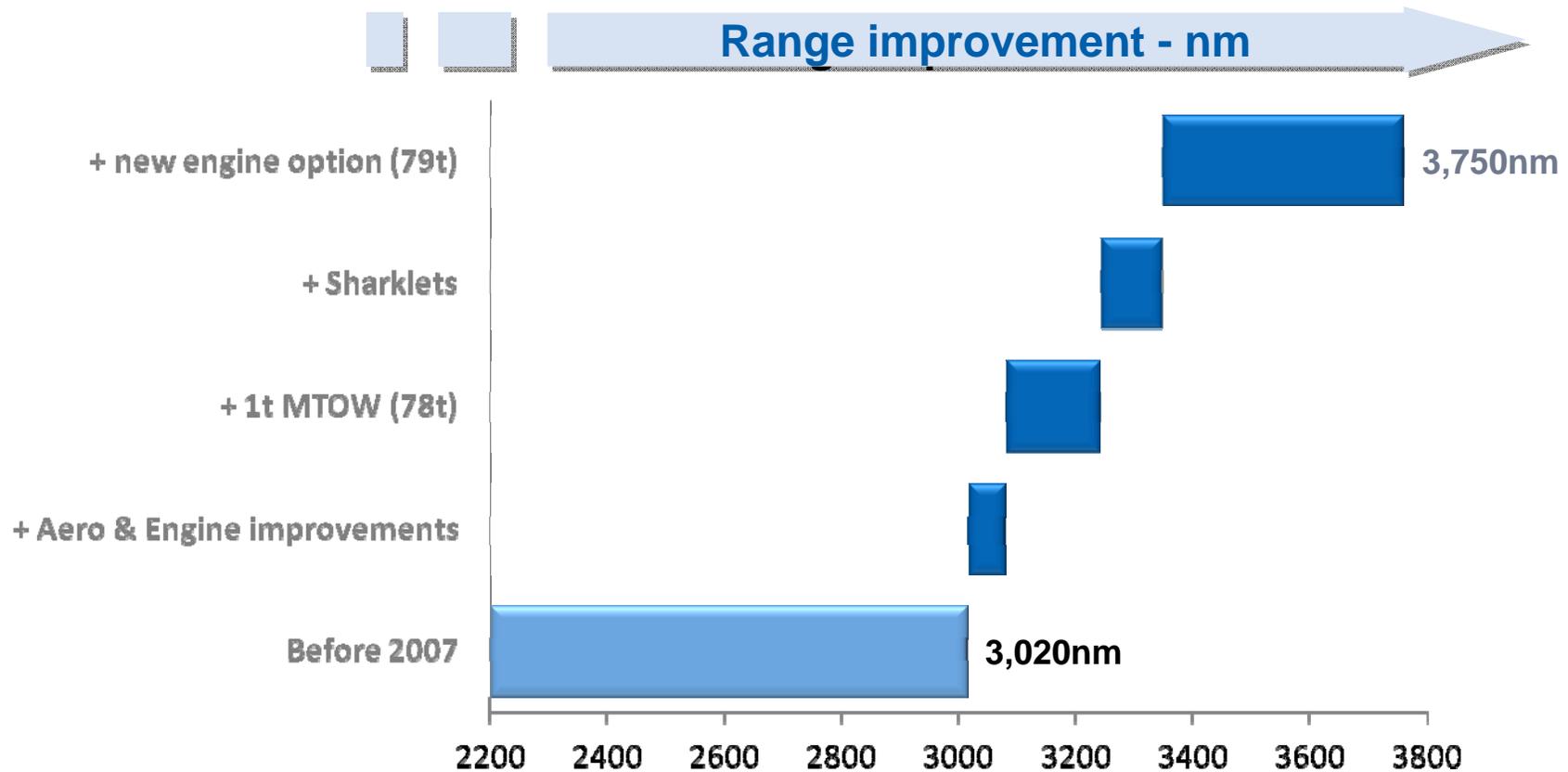
# A320ceo/A320neo compared



First neo engine to market is the PW1100G-JM in October 2015

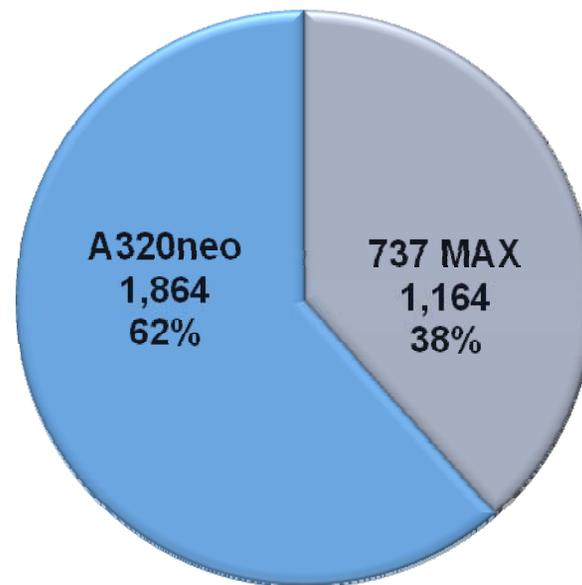


# A320 Range evolution to reach new markets



Continuous range improvement to match market needs

# Firm order backlog – NEO leads MAX

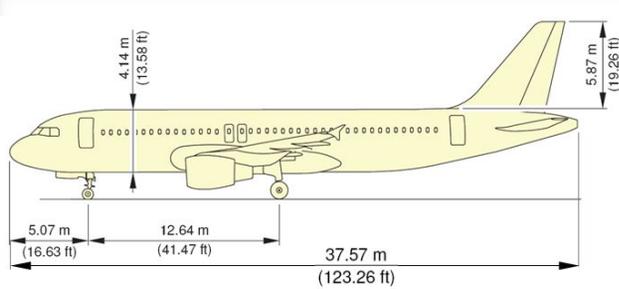


3,028  
firm orders

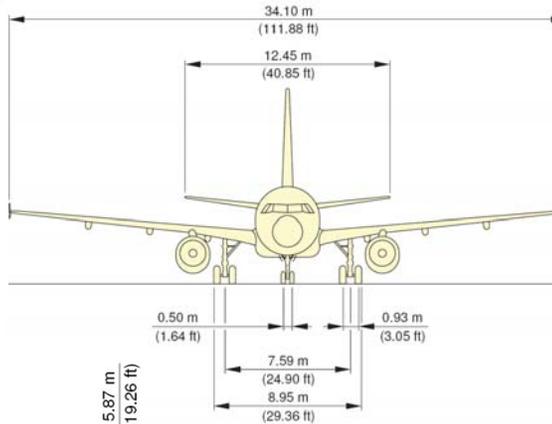
To end January 2013, including AAL order for 100 MAX



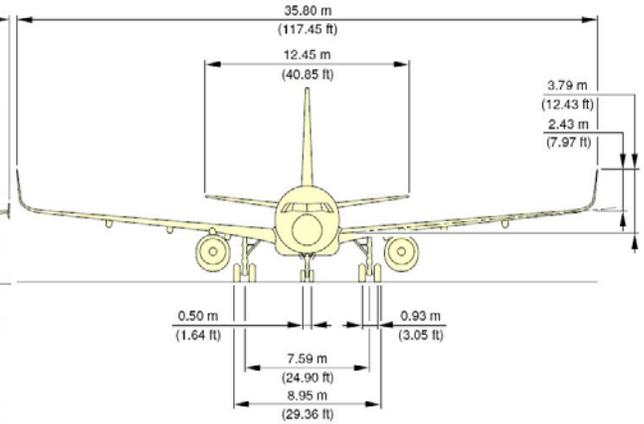
# A320 & A321 main geometrical characteristics



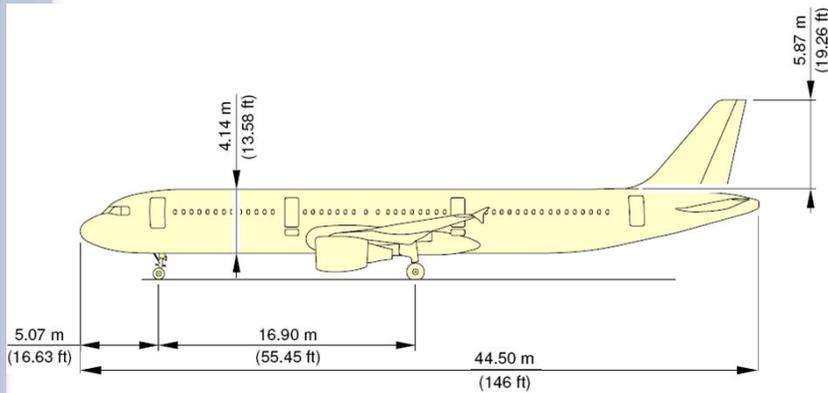
A320-200



A320/A321



A320/A321  
Sharklets



A321-200

Aircraft type	MRW	ACN FB	ACN RB
A320-200	78.4t	43	49
A321-200	93.9t	56	64

	Without sharklets	With sharklets	
Outer MG width	8.95m (29.36ft)		ICAO code C
Wingspan	34.10m (111.88ft)	35.80m (117.45ft)	
Tail height	12m (39ft)		FAA ADG III
MLG type		D	

# A330 Family

**1,244** firm orders

**943** deliveries

**301** backlog



**A take-off or landing every 25 seconds, with 99.0% reliability**

To end January 2013



# The versatile A330 Family

**A330-300**

300 passengers\*



**A330-200**

246 passengers\*



**A330-200F**

70t payload



**ACJ330**

VIP



**A330 MRTT**

Tanker Transport



\*two-class layout



# 2015 A330 Enhancements

Increase to 242t MTOW

Aerodynamic package  
Fuel burn reduction 1%

Load Alleviation  
Function



Engine fuel burn  
improvement 1%\*

A330-300 Fuel capacity  
increased to 139,090L  
(optional)

2012

2013

2014

2015

EIS  
A330-300

EIS  
A330-200

2016

Design  
studies

Detailed Design

Integration & Qualification

\*TBC



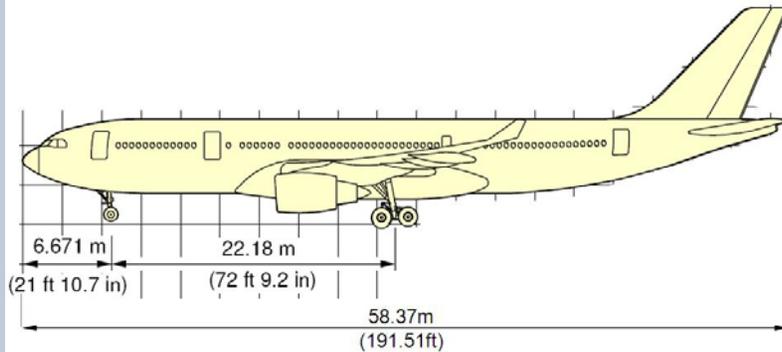
# A330 and Airbus commonality benefits



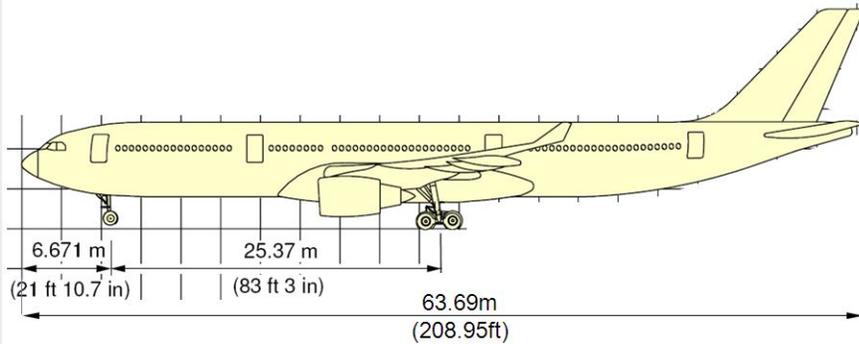
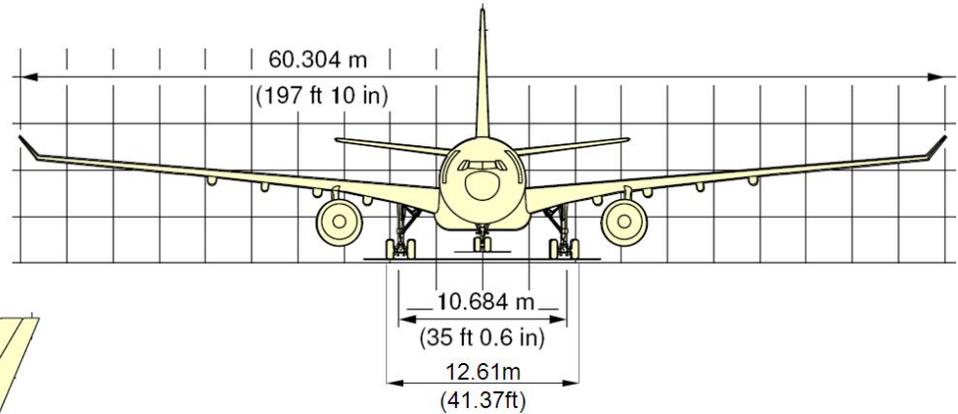
CTR rejected and subject to approval from the Aviation Authorities



# A330 family main geometrical characteristics



A330-200



A330-300

Aircraft type	MRW	ACN FB	ACN RB
A330-200	238.9t	63	62
A330-300	235.9t	63	63

Outer MG width	12.61m (41.37ft)	ICAO Code E
Wingspan	60.30m (197.85ft)	
Tail height	17m (56ft)	FAA ADG V
MLG type	2D	

# A350 XWB

**592** firm orders

**34** customers

**592** backlog



To end January 2013

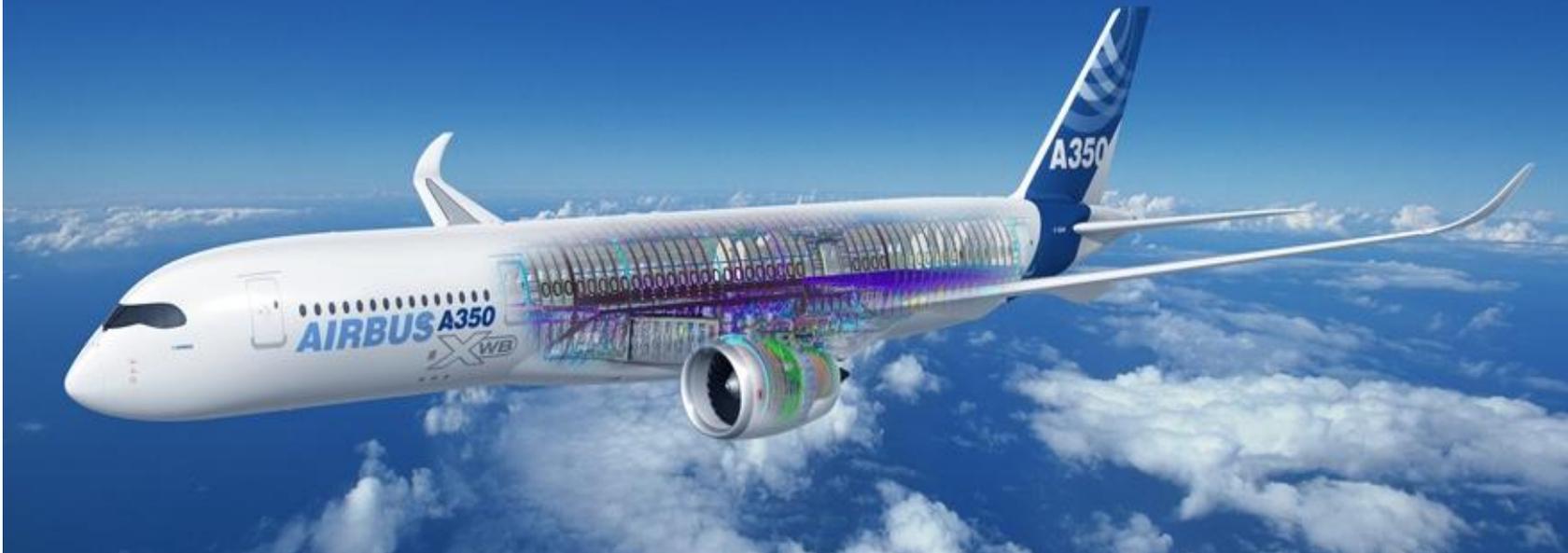


# 2012 – a year of A350 XWB achievement



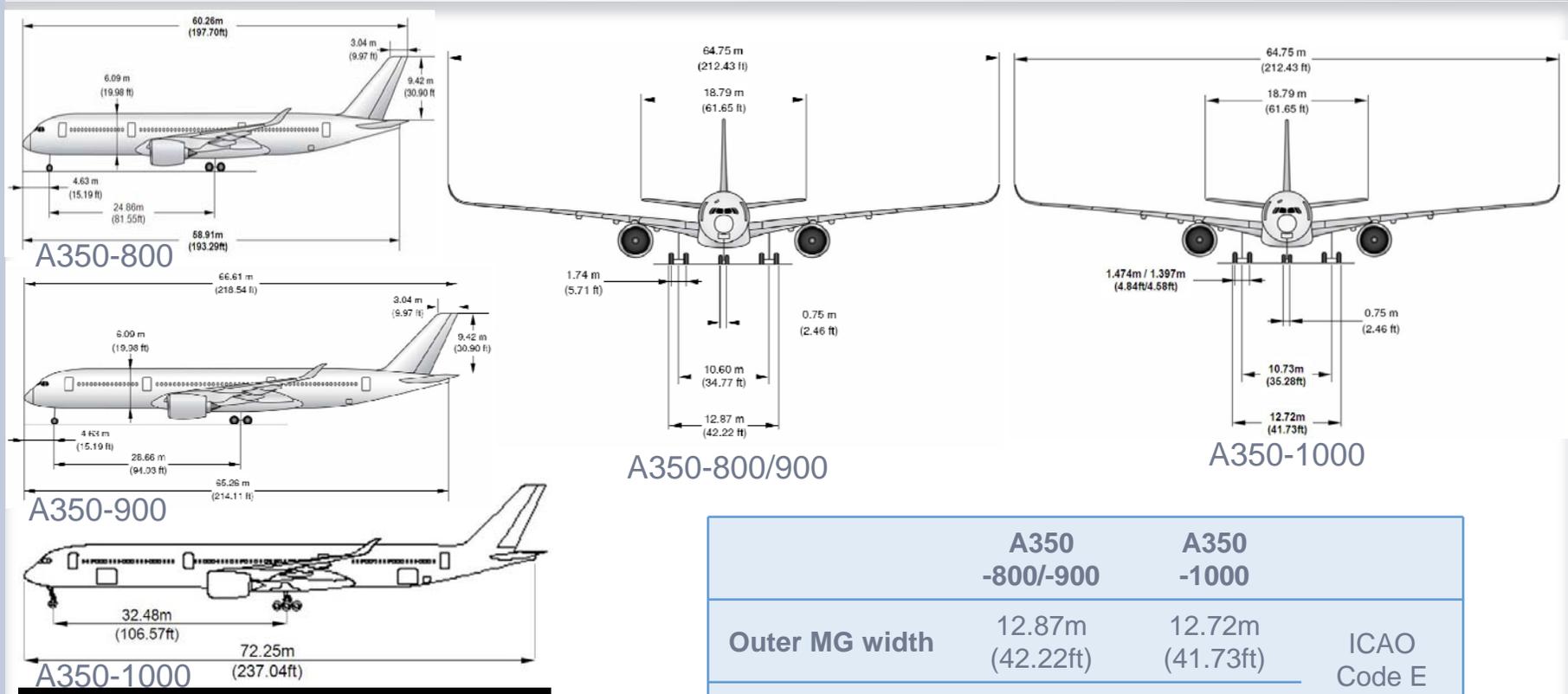
# A350 XWB: Efficiency by design

- Airframe with advanced materials (53% composite)
- State-of-the-art aerodynamics (M0.85 cruise speed)
- Simple, efficient systems
- Latest generation engines



An all new design for a step change in economic efficiency

# A350 XWB family main geometrical characteristics



Aircraft type	MRW	ACN FB	ACN RB
A350-800	248.9t	62	62
A350-900	268.9t	70	71
A350-1000	308.9t	62	73

	A350 -800/-900	A350 -1000	
Outer MG width	12.87m (42.22ft)	12.72m (41.73ft)	ICAO Code E
Wingspan	64.75m (212.43ft)	64.75m (212.43ft)	
Tail height	17.1m (56.1ft)	17.1m (56.1ft)	FAA ADG V
MLG type	2D	3D	

# A380

**262** firm orders  
**20** customers  
**165** backlog



A take-off or landing every 6 minutes  
98.3% reliability

OR data last 25 aircraft, June 2012  
Other data at end January 2013



# Nine airlines now operate 97 A380s



Carrying more passengers in more comfort to more and more destinations

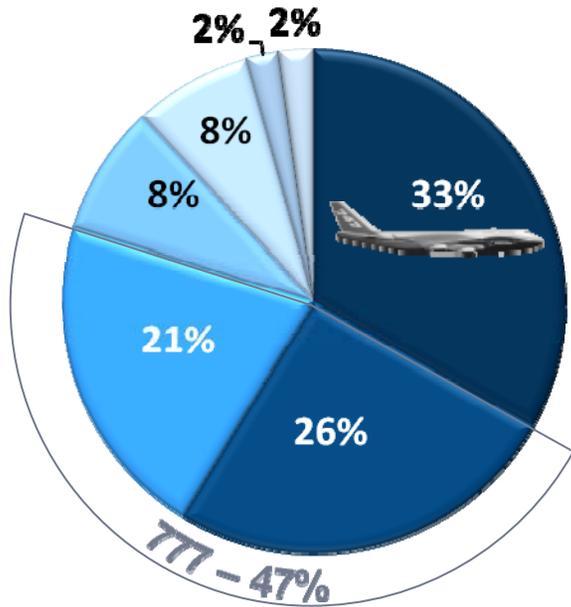
In-service fleet as of December 31st 2012



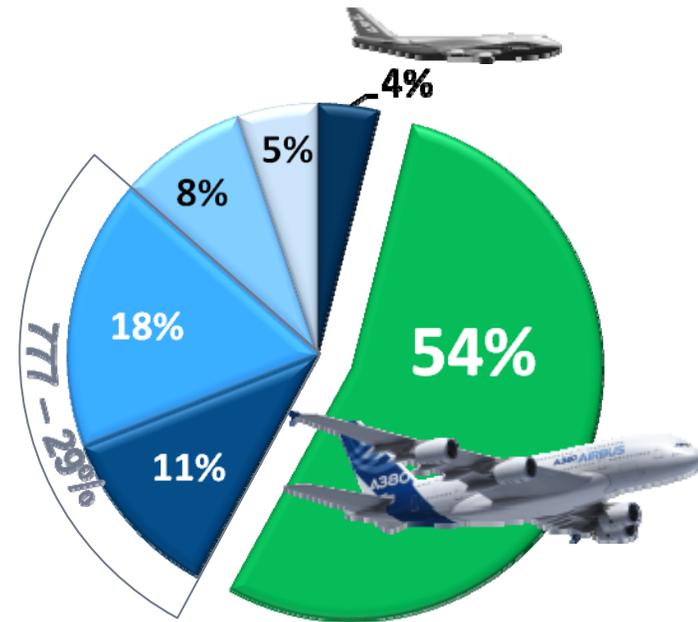
# The A380 has replaced 747s, and displaced 777s

All A380 routes\*: frequencies split by aircraft type

October 2007



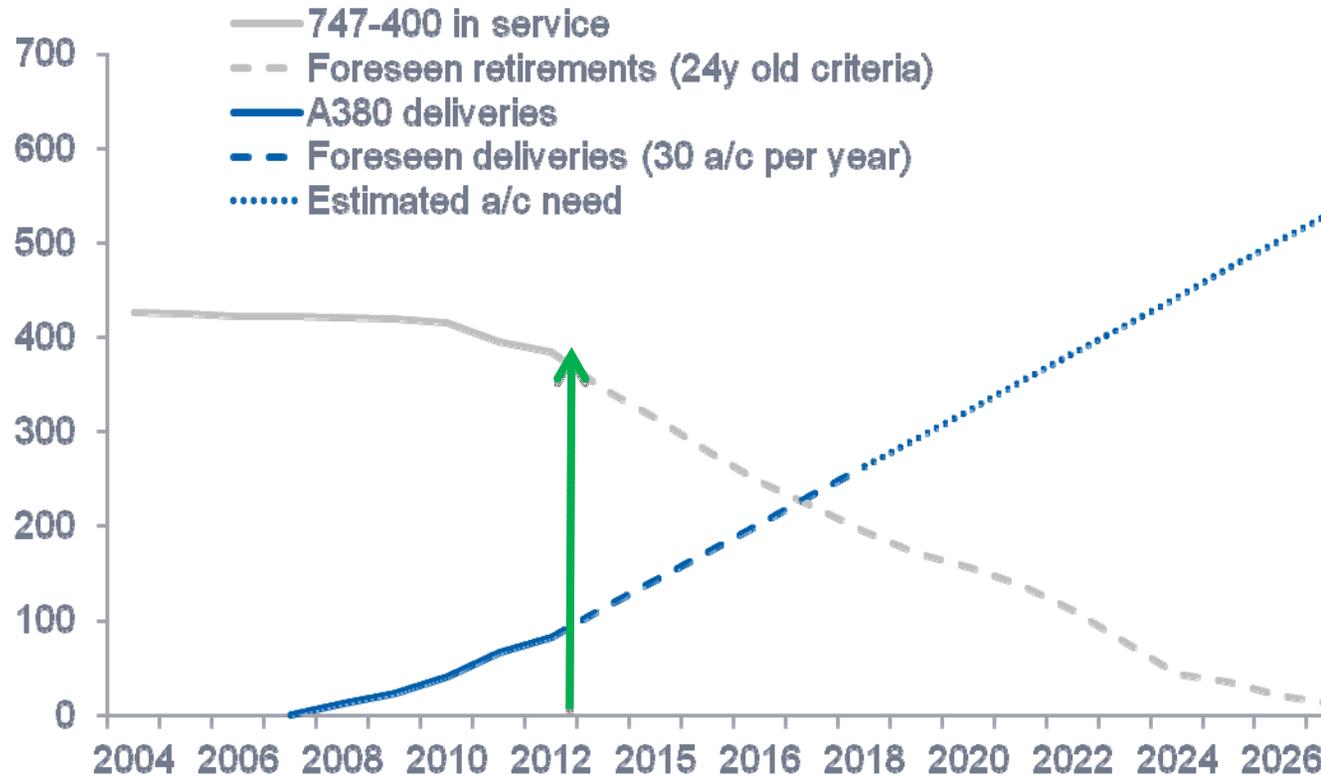
February 2013



\* - based on February 2013 schedule. Source: OAG



# Almost 350 747-400s still to be replaced



747-400 :Top 15 Passenger Operators (2012)	
British Airways	52
Lufthansa	27
Qantas	25
United	24
Transaero	19
Cathay Pacific	18
Korean Air	16
Delta	16
China Airlines	13
Virgin Atlantic	13
Thai	12
Saudia	11
Malaysia	9
Air France	7
EI AI	6
...	...
<b>Total</b>	<b>345</b>

Substantial A380 market potential

Source: Ascend



# A380 fleet operations – around the world

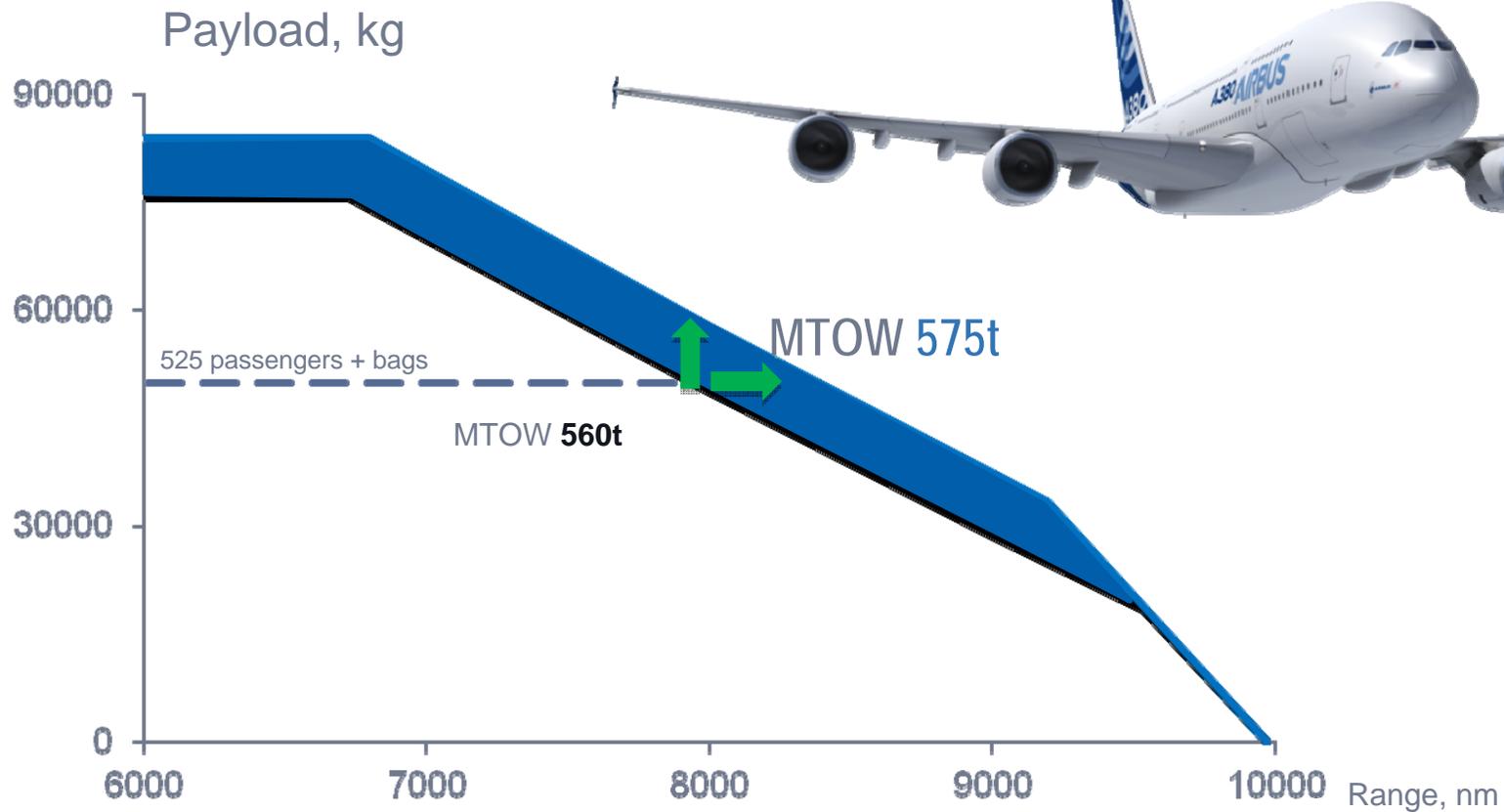


Nearly 35 million passengers have enjoyed the A380 experience

As of 1<sup>st</sup> January 2013



# A380 - a great aircraft gets even better



From 2013: 500nm more range or 8t more payload

JAR reserves, ISA  
Nominal performance



# A380: Facilitating sustainable growth

## Emissions



- State of the art engines for lower emissions and better local air quality
- The lowest fuel burn of any large aircraft, reducing CO<sub>2</sub> emissions significantly

## Noise



- A friendly neighbour: half the noise of a 747-400 with 40% more passengers
- Even quieter than much smaller aircraft

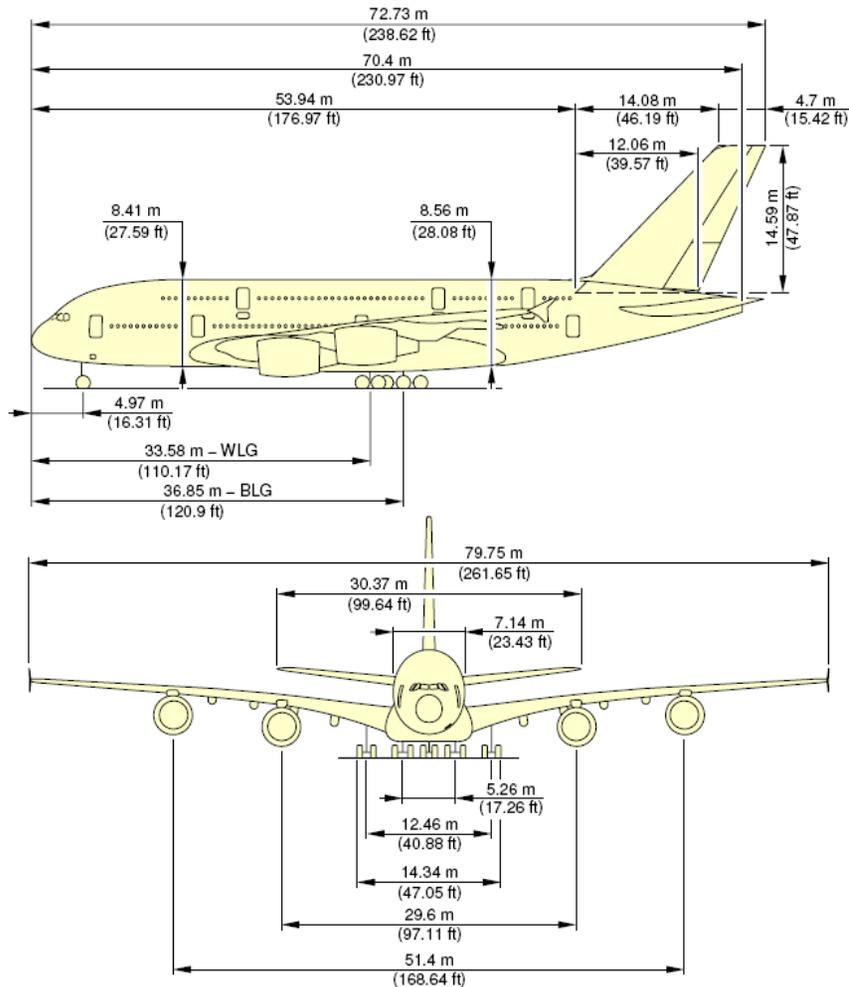
## Congestion



- More passenger per flight = growth with no extra flights
- The easiest solution for growth at congested airports around the world

**The A380 is part of the solution**

# A380 main geometrical characteristics



<b>Outer MG width</b>	14.34m (47.05ft)	ICAO Code F
<b>Wingspan</b>	79.75m (261.65ft)	
<b>Tail height</b>	24.1m (79.1ft)	FAA ADG VI
<b>MLG type</b>	2D/3D2	

Aircraft type	MRW	ACN FB	ACN RB
A380-800	577t	65	70

## Airbus today

**A320ceo** Sharklets deliveries underway after on-time EIS end 2012

**A320neo** firm orders exceed 1,800, EIS October 2015

**A330** has 800 sales since 787 launch, improved models for 2015

**A350 XWB** final assembly line running, > 600 firm orders

**A380** has obsoleted the 747 and is “a firm passenger favourite”





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