

Dream performers

Our annual review of the world's commercial aircraft programmes takes off with an assessment of mainliner types above 100 seats

CRAIG HOYLE LONDON

Continuing consolidation of the commercial aircraft industry is firmly on show in this year's World Airliner Directory, with Bombardier having exited our first instalment, which covers mainliner types with a minimum seating capacity for greater than 100 passengers.

What was once the Canadian airframer's flagship CSeries has been subsumed under the Airbus banner, now opening our listing as the A220. While some were doubtful of the European giant's motives in assuming control of the Bombardier product, early fresh commitments under its leadership and a first delivery to a US carrier – Delta Air Lines – mean that the single-aisle's prospects are on the up.

Boeing's 737 Max programme has also started during 2018, with deliveries steadily accelerating from its Renton assembly line, where combined output for the re-engined

type and outgoing NG model now stands at a rate of 52 per month.

The rush of Boeing narrowbodies has, however, placed increased pressure on the company's supply chain, including the provision of CFM International Leap-1B engines. However, such disruption has been more harshly felt by its European rival, Airbus. With monthly output approaching 60 A320-family aircraft from its four assembly lines in France, Germany, the USA and China, the company has suffered problems in both the performance and supply of Pratt & Whitney PW1100G engines.

GOING THE DISTANCE

Highlights so far this year have included first deliveries of the 787-10 and an ultra-long-range version of the A350-900 – both to Singapore Airlines – and the Dreamliner's non-stop debut between Perth and London Heathrow for Qantas.

Going up in scale, Airbus received a top-up, 20-unit order for the A380 from its biggest

proponent, Emirates, and has seen a first secondhand example, previously leased by SIA, enter use with Portuguese wet-lease operator Hi Fly. And while Boeing's 747-8I appears to have reached the end in terms of airliner orders, its freighter variant, the -8F, has secured crucial backing from UPS Airlines, with a deal for 14 safeguarding production through the end of the decade.

Meanwhile, new versions of top-selling models are advancing, with the A330neo ready to enter service in its -900 guise and the 777-9 having entered static testing ahead of a flight debut during 2019.

Airbus (718) and Boeing (763) delivered almost a combined 1,500 commercial aircraft last year, and their firm backlogs represent around nine and seven years of production each, continuing a downturn-defying trend. Our data shows how airline commitments are shared between them and other manufacturers. ■

All data from Flight Fleets Analyzer or manufacturers, to 30 September 2018



The 787-9 has demonstrated endurance on nonstop Perth-London Heathrow route

Airbus A220

One of the most noticeable changes to our directory this year came into effect on 1 July, when Airbus assumed control of the former Bombardier CSeries programme. Acquired for no fee, its 50.01% stake sees it working with the Canadian airframer and Investissement Québec via the CSeries Aircraft Limited Partnership.

Airbus swiftly rebranded the twinjet as the A220, while retaining the same -100 and -300 model designations as Bombardier's previous CS prefix. The pair can accommodate 108-135 and 130-160 passengers, respectively.

The A220's transition into the Airbus portfolio had been threatened by a Boeing complaint against Bombardier, and the threat of

swingeing tariffs being imposed on deliveries made into the US market. However, these hurdles were cleared in February, when a US International Trade Commission panel rejected the US firm's complaints over a 75-unit CS100 sale to Delta Air Lines.

FRESH COMMITMENTS

On the same day that it revealed the A220 branding, Airbus announced a memorandum of understanding with US carrier JetBlue Airways for 60 -300s. At the Farnborough air show a week later, it announced an identical commitment from JetBlue founder David Neeleman, to equip his proposed start-up airline.

By the end of September, a total of 397 A220s had been sold: a net increase of 42 over a 12-month period. Additions during this time include a 12-unit deal for -300s confirmed with

EgyptAir in November 2017.

Deliveries had reached 45 aircraft by the end of the third quarter, representing a year-on-year rise of 27. This means that the Pratt & Whitney PW1500G-powered type's production backlog stands at 352: a climb of 15 since our last directory.

In a major milestone for the programme, Delta took delivery on 26 October of its first example in Mirabel, Montreal, less than three weeks after the aircraft had made its flight debut from the site. The type's first US recipient – which follows Air Baltic, Korean Air and Swiss – will introduce it into service next January, in a 109-seat, two-class configuration.

Meanwhile, Airbus plans to commence US final assembly of the A220 at its Mobile site in Alabama in 2020, with total output of the type likely in time to exceed 100 units per year. ■

Airbus A320 family

As global demand for narrowbody airliners continues to soar, Airbus is in the enviable position of having the dominant single-aisle product, in sales terms.

Thirty years after its original A320 took to the air, the company is in the latter stages of transitioning production from the legacy Ceo models to its re-engined Neo standard.

Flight Fleets Analyzer shows that Airbus's firm order backlog for the A320neo family stood at 5,661 units at the end of September: a year-on-year increase of 632. The transition to the Neo family is gathering pace - our data shows that net sales during the first three quarters were for 451 of the type, versus only 14 across its Ceo variants. The backlog for the latter models has almost halved over the last year, to stand at just 240.



From a production standpoint, shipments of A320neo and A321neo jets totalled 219 aircraft, against 170 for legacy versions. This brought total deliveries of CFM International Leap-1A- or Pratt & Whitney PW1100G-powered Neos to 468.

Considerable teething problems continue to affect the A320neo programme, however, most evidently with the supply of Leap engines and an issue with a knife-edge seal in the high-pressure compressor of the PW1100G that required the

powerplants on some aircraft to be replaced. This hurt Airbus's ability to keep pace with historically high output - rising in 2019 to a combined 60 aircraft per month - from its four assembly lines in France, Germany, the USA and China, leaving some completed aircraft parked without engines. The company opted to halt deliveries of P&W-powered jets for several weeks from February, to address the issue.

With its first A319neo test aircraft having flown for the first time in March 2017, Airbus has yet to make its first delivery of the family's smallest member, only 52 of which are on order. After only 60 A318s were produced over the life of the programme, it opted against developing a re-engined version. ■

Airbus A320 family orders and deliveries

	A319	A320	A321	A319neo	A320neo	A321neo
First flight	25/08/1995	22/02/1987	11/03/1993	31/03/2017	25/09/2014	09/02/2016
Orders (all-time/2018)	1,414/5	4,753/7	1,800/2	52/26	4,092/282	1,985/143
Deliveries (total/2018)	1,395/3	4,642/92	1,690/75		383/154	85/65
Backlog	19	111	110	52	3,709	1,900

Airbus A320 family specifications

	A319	A320	A321	A319neo	A320neo	A321neo
MTOW (t)	75.5	78	93.5	75.5	79	97
Seats (typical/max)	124/156	150/180	185/220	140/160	165/194	206/244
Range (nm)	3,750	3,350	3,200	3,700	3,400	4,000

5,661

A320neo-family order backlog



Airbus A220 orders and deliveries

	A220-100	A220-300
First flight	16/09/2013	27/02/2015
Orders (all-time/2018)	118/0	279/18
Deliveries (total/2018)	8/0	37/21
Backlog	110	242

Airbus A220 specifications

	A220-100	A220-300
MTOW (t)	60.8	67.6
Seats (typical/max)	116/135	141/160
Range (nm)	2,950	3,200

397

Sales total for rebranded A220 models

Delta Air Lines will introduce rebranded A220-100 to operational fleet in January

Airbus A330

TAP Air Portugal is due to introduce the first re-engined Neo variant of the A330 before year-end, from an 18-unit commitment. This follows Airbus's receipt in late September of type certification from the European Aviation Safety Agency for its -900 model.

Flight Fleets Analyzer shows the Lisbon-based carrier's lead example of the Rolls-Royce Trent 7000-engined type has a passenger capacity of 304, with 32 business-, 96 premium-economy- and 176 economy-class seats.

Having made a solid start following its launch at the Farnborough air show in July 2014, the A330neo has enjoyed little recent sales progress. The number of -900s on firm order at the end of September was 224: a rise of only 20 from the same month a year earlier.

At the same time, confirmed commitments for its -800 model had dipped to zero, follow-

ing the removal of a six-aircraft order for Hawaiian Airlines. An earlier sale to TransAsia Airways for the 406-seat, 8,150nm (15,100km)-range twinjet had previously also evaporated. However, Kuwait Airways and Uganda Airlines have each shown recent interest in potentially taking eight and two examples, respectively.

BULKING UP

Airbus has increased its maximum take-off weight for both Neo models from 242t to 251t. Its first -800 test aircraft was in early November poised to make a debut flight, following the installation of its engines.

The backlog for the A330's legacy -200 and -300 models totalled a combined 56 aircraft at the end of September. Net orders during the first nine months were for only three examples, while 26 were delivered.

The -200 remains the baseline for Airbus Defence & Space's multi-role tanker/transport, but no A330-200F freighters are on order, with the last of 39 deliveries made in 2017.

July saw the first flight of the BelugaXL: an outsize freighter officially named the A330-700L. Five will be introduced in support of Airbus's logistics operation, with each capable of carrying a pair of A350 wings. ■

251t

Maximum take-off weight for A330neo variants



Airbus hopes -900's service entry will open TAP for more Neo orders

Airbus A330 orders and deliveries

	A330-200	A330-300	A330-800neo	A330-900neo
First flight	13/08/1997	02/11/1992		19/10/2017
Orders (all-time/2018)	602/2	787/1	0/6	224/10
Deliveries (total/2018)	582/8	751/18		
Backlog	20	36		224

Airbus A330 specifications

	A330-200	A330-300	A330-800neo	A330-900neo
MTOW (t)	242	242	251	251
Seats (typical/max)	247/406	277/440	257/406	287/440
Range (nm)	7,250	6,350	8,150	7,200

Airbus A350

Deliveries of the A350 have quietly moved beyond 200 of the twinjets, which are exclusively powered by Rolls-Royce Trent XWB engines. Following initial production issues, Airbus is making smoother progress with the type, with Flight Fleets Analyzer data showing that 88 were handed over through the 12-month period until the end of September.

Recent milestones have included the first delivery of an A350-900 in its ultra-long-range guise for launch customer Singapore Airlines. The carrier received aircraft 9V-SGA on 22 September, five months after its first flight, and will employ the 9,700nm (17,900km)-range

model on services to Los Angeles, Newark and San Francisco.

Of the 202 examples shipped by the end of the third quarter, all but seven were in the base-line -900 model, with the remainder being in the longer-range -1000 standard.

HEALTHY BACKLOG

The firm production backlog for the A350 stood at 687 at the end of the third quarter: a decrease of 55 from the same point a year earlier, but 35 greater than Boeing's for the more heavily produced 787.

Notably, Airbus has seen its lone commitment for a planned -800 model, from Asiana Airlines, shifted to the -900 instead. The 259t variant had been offered with a seating capacity of 276-440

passengers, and a range of 8,200nm, but had yet to be flown.

Net orders through the first three quarters of this year were for 36 -900s, while deliveries during the same period totalled 60 units. Airbus says it has so far shipped the twin-aisle to 22 airline customers. ■

Airbus A350 orders and deliveries

	A350-900	A350-1000
First flight	14/06/2013	24/11/2016
Orders (all-time/2018)	721/36	168/0
Deliveries (total/2018)	195/53	7/7
Backlog	526	161

Airbus A350 specifications

	A350-900	A350-1000
MTOW (t)	280	316
Seats (typical/max)	325/440	366/440
Range (nm)	8,100	8,400

202

Total number of A350s delivered through end of September

Singapore Airlines' recent arrival was first ultra-long-range model



Airbus A380

In July, Portuguese wet-lease specialist Hi Fly took the first secondhand A380 into use, and saw early success with the ex-Singapore Airlines superjumbo for customers including Norwegian and Thomas Cook Airlines Scandinavia. It revealed a marine conservation livery at the Farnborough air show.

At the end of September, the A380's firm order backlog stood at 101 units: identical to that recorded 12 months earlier, thanks to a February deal with Emirates for another 20

examples. The commitment is part of a planned top-up of 36 of the ultra-large type, which should see deliveries continuing for the carrier until at least 2029.

Emirates has yet to confirm whether its additional aircraft will have Engine Alliance GP7200s or Rolls-Royce Trent 900s, both of which are in use with its current fleet. It says the new arrivals – coming from 2020 – will feature a raft of cabin enhancements, including new lighting, bathrooms and spas, to be available from 2021.

Other developments during 2018 included the formal removal of a long-dormant commitment from Virgin Atlantic to take six examples,

with the carrier instead focusing on the use of A350s and Boeing 787s.

All Nippon Airways will add the A380 to its operations early next year, with its first example having been flown from Toulouse to Hamburg in September for interior installation work.

Airbus is producing the A380 at a rate of one aircraft per month, but reducing this to six per year by 2020. The company in 2017 outlined proposals for an enhanced A380plus model, which would feature winglets, interior design enhancements and an increased maximum take-off weight of 578t. Users could carry additional passengers, or extra fuel for extended-range operations. ■

Airbus A380 orders and deliveries

	A380-800
First flight	27/04/2005
Orders (all-time/2018)	331/14
Deliveries (total/2018)	230/8
Backlog	101

Airbus A380 specifications

	A380-800
MTOW (t)	575
Seats (four-class/max)	544/853
Range (nm)	8,200

Lead exponent Emirates has ordered a further 20 superjumbos



Boeing 737 family

Boeing is in the advanced stages of transitioning its 737 programme to the re-engined Max family, having handed over its first example of the CFM International Leap-1B-engined narrowbody in May 2017.

The company's firm order backlog for its new models totalled 4,528 aircraft at the end of September, 1,462 of which had yet to have a specific variant confirmed. Compared to the total recorded in our directory one year ago, this was up by 668 units, with orders for a net 455 examples recorded during the first three quarters of 2018.

The penultimate member of the Max family – the 737-7 – made its flight debut on 16 March, leaving only the -10 as still to take to the air. Launched at the Paris air show in June 2017, the latter will feature a landing gear supplied by United Technologies Aerospace Systems. With a fuselage roughly 1.6m (5ft 3in) longer than the -9, it will be capable of carrying up to 230 passengers, and have a range of 3,215nm (5,950km). Boeing has so far attracted orders for 446 examples.

MAX TRANSITION

Deliveries of a combined 216 Max-series jets to date have been primarily of the -8 (206), and also the larger -9.

Data from Flight Fleets Analyzer shows that a combined 142 737-8/9s were delivered during the first three quarters of this year, against 243 from the previous NG series. Its backlog for the older-

generation aircraft is fast dwindling for commercial operators, standing at just 144 aircraft – predominantly -800s – in late September.

Faced with a huge order backlog, the company's Renton site near Seattle is currently operating at a rate of 52 deliveries per month. This marks a rise from 47 in 2017, but is on schedule to hit 57 per month during 2019.

As with its main rival Airbus, Boeing has encountered problems with smoothly ramping up its output, with supplier shortages having seen some completed aircraft parked while awaiting their Leap engines. But in a sign of recovery, the company delivered 61 737s to customers during September.

Boeing chief executive Dennis Muilenburg believes it could in the future break the 60 unit per-month limit, potentially from as soon as during 2020. ■

Boeing 737 orders and deliveries

	737-700	737-800	737-900	737 Max 7	737 Max 8*	737 Max 9	737 Max 10	737 Max (variant TBC)
First flight	09/02/1997	31/07/1997	03/08/2000	16/03/2018	29/01/2016	13/04/2017		
Orders (all-time/2018)	1,133/0	5,013/-32	557/-5	63/0	2,629/205	144/0	446/3	1,462/247
Deliveries (total/2018)	1,133/2	4,903/219	523/22		206/132	10/10		
Backlog	0	110	34	63	2,423	134	446	1,462

* includes 737 Max 8-200

Boeing 737 specifications

	737-700	737-800	737-900	737 Max 7	737 Max 8	737 Max 9	737 Max 10
MTOW (t)	70.1	79	85.1	72.3	82.2	88.3	
Seats (two-class/max)	126/149	162/189	178/220	138/172	162/189/210*	178/220	188/230
Range (nm)	3,010	2,935	2,950	3,825	3,515	3,515	3,215

* capacity for 737 Max 8-200

144

Remaining number of NG-standard 737s still in Boeing's order backlog

Recent recipients of the 737-8 include Kazakhstan-based operator SCAT



Boeing believes long-term demand will sustain the 747-8F's production



Cargolug@Air

Boeing 747

While Boeing is still offering its 747-8I as a commercial airliner, it has delivered no examples in 2018 and has none in its backlog, with the last three of 36 produced examples delivered to Korean Air last year.

The company sees long-term prospects as

6

Current annual output of 747-8, as dedicated freighter

existing to continue building the -8F dedicated freighter. Indeed, its backlog now stands at 21 units; up from 14 at the same point in 2017. This is largely the result of a February order from UPS Airlines for 14 -8Fs, plus a deal for five in July from Russia's Volga-Dnepr.

Production of the 747 continues at a rate of six per year, with the UPS deal having safeguarded activities into the next decade. Boeing hopes to pick up additional orders for the type as the

demand for global cargo services increases. Five 747-8Fs were delivered during the first nine months of this year – all to UPS.

Flight Fleets Analyzer shows the global fleet of operational 747s as totalling more than 460 aircraft, including freighters. But commercial operations with the “queen of the skies” are in decline, with the largest single airline user of the type remaining British Airways, which has 36 -400s, aged between 19 and 28 years. ■

Boeing 747 orders and deliveries

	747-8I	747-8F
First flight	20/03/2011	08/02/2010
Orders (all-time/2018)	36/0	103/14
Deliveries (total/2018)	36/0	82/5
Backlog	0	21

Boeing 747 specifications

	747-8I	747-8F
MTOW (t)	448	448
Seats (three-class/max)	410/605	
Payload (t)		137.7
Range (nm)	8,000	4,120

Boeing 767

Production of the 767 is currently being healthily sustained by the twinjet's role as a dedicated freighter, and as the basis for the US Air Force's new KC-46A Pegasus tanker/transport.

A last example for use by a commercial airline – a -300ER – was handed over to Air Astana at Boeing's Everett site near Seattle earlier this decade. Our data shows that a total of 491 aircraft were built in this production standard.

In early February, UPS Airlines added a further four GE Aviation CF6-80C2-powered 767-300Fs to Boeing's order backlog, which as of the end of September totalled 67 units; also

including aircraft for FedEx.

While some have suggested that Boeing could potentially fill a perceived niche for a twin-aisle to replace in-service 757s with an updated 767-300ER, rather than launching a New Mid-market Airplane product, the company has played down such an idea. Speaking in March, Boeing Commercial Airplanes' vice-president marketing Randy Tinseth concluded: “I just don't see it.”

Flight Fleets Analyzer shows that there are around 750 in-service examples of the 767, including dedicated freighters and a small number of military derivatives. The latter tally will rise significantly over the coming years, with the USAF expected to later this month accept its first KC-46A from a 179-unit production run. ■

Air Astana was last to get passenger example of versatile twinjet

4

UPS Airlines' latest commitment to 767-300F

Boeing 777

The Boeing 777 twinjet is the most successful widebody of all time, having attracted lifetime orders in excess of 1,600 units. The airframer is looking to add considerably to this total over the coming years, as it works towards introducing updated models with a new composite wing and more efficient engines.

A first static test aircraft for the 777X programme recently emerged from assembly at Boeing's Everett site near Seattle, and two flight-test examples are in production. Testing of the -8/-9's GE Aviation GE9X engine is gathering pace, with the design having been flown on a 747 testbed.

GENERATION X

Boeing says the lead 777-9 is on track to achieve service entry during 2020, following first flight next year.

In addition to its more efficient wing and GE9X engines, the 777X also features an innovative folding wingtip design, which will decrease the aircraft's 71.8m (235ft) span by 7m when ma-

Sales this year included three more 777Fs for Turkish Airlines



Turkish Airlines

noeuving on the ground, and matching the same footprint as its previous build standard.

At the end of September, the backlog for the current 777-300ER and 777F stood at a combined

91: eight fewer than 12 months earlier. Sales in 2018 have included a trio of additional 777Fs for Turkish Airlines, which received its first example of the freighter late last year.

The new -8 and -9 developments have a combined backlog of 326; unchanged from our directory listing a year ago. This includes 10 with no confirmation of the specific variant involved.

Boeing still offers the 777-200LR, but has none in its backlog, having produced a total of 57 examples. ■

Boeing 777 orders and deliveries

	777-300ER	777F	777-8	777-9	777X (variant TBC)
First flight	24/02/2003	14/07/2008			
Orders (all-time/2018)	830/-5	200/32	53/0	263/0	10/0
Deliveries (total/2018)	793/28	146/8			
Backlog	37	54	53	263	10

Boeing 777 specifications

	777-300ER	777F	777-8	777-9
MTOW (t)	351	349.7	351	351
Seats (two-class/max)	336/550		350-375	400-425
Payload (t)		102		
Range (nm)	7,370	4,970	8,700	7,600

2020

Entry-into-service date for 777-9, following a first flight next year

Boeing 767 orders and deliveries

	767-300F
First flight	20/06/1995
Orders (all-time/2018)	300/20
Deliveries (total/2018)	233/13
Backlog	67

Boeing 767 specifications

	767-300F
MTOW (t)	185
Payload (t)	52.5
Range (nm)	3,255



AirTeamImages

Qantas has employed Dreamliner on nonstop Perth-Heathrow route



Boeing 787

Flight Fleets Analyzer shows that Boeing delivered a combined 101 Dreamliners through the first nine months of this year. Of this total, 89 were in the programme's most popular, -9 variant, along with six each of the smaller -8 and increased-capacity -10.

Singapore Airlines took delivery of the first -10 example in March, with the milestone also seeing it become the first carrier to field all three variants of the Dreamliner. All five subsequent shipments of the 330-seat type this year have also gone to SIA.

Another headline-grabbing moment came in March, when Qantas used a -9 for a first nonstop service between Perth in Western Australia and London Heathrow, covering an official distance of 7,837nm (14,498km) with 200 passengers in 17h.

Boeing's firm order backlog for the 787 stood at 652 units at the end of September, while total deliveries had reached 728 by the same point.

Several operators continue to feel the effects of reliability problems with the Rolls-Royce Trent 1000 engine: one of the power options for the type, along with GE Aviation's GENx. Issues have included having to remove aircraft from service while awaiting replacement Trent powerplants.

Final assembly of the three-model 787 family is

running at a combined rate of 12 aircraft per month from Everett, near Seattle, and North Charleston, South Carolina. However, Boeing has pledged to increase this further next year, for a total output of 168: 14 per month.

Due to the size of the -10 model, which is a 5.5m (18ft 1in) stretch of the -9 fuselage, assembly of all examples is performed in North Charleston.

Fleets Analyzer shows that total sales of the Dreamliner had reached 1,377 units by the end of the third quarter, with firm commitments in 2018 totalling 144. Some 56% of total sales have been for the -9, followed by 32% for the -8 and 12% in the -10 model. ■

Boeing 787 orders and deliveries

	787-8	787-9	787-10
First flight	15/12/2009	17/09/2013	31/03/2017
Orders (all-time/2018)	439/29	770/115	168/0
Deliveries (total/2018)	349/6	373/89	6/6
Backlog	90	397	165

Boeing 787 specifications

	787-8	787-9	787-10
MTOW (t)	227.9	250.8	250.8
Seats (two-class)	242	290	330
Range (nm)	7,355	7,635	6,430

Comac C919

A second prototype of Comac's C919 was flown in December 2017, following lead aircraft B-001A's milestone debut of May last year.

In June, the programme's two jets were reported to have been involved in work to assess their systems and flight stability. The following month, Comac announced that a static test airframe had been subjected to loads that bent its wing by almost 3m (10ft) for 3s, simulating the effects of a 2.5g manoeuvre, and 150% of ultimate wing loading.

Planned for certification and service entry in

the 2020-2021 timeframe, the narrowbody has a stated capacity for 158-168 passengers. Comac says it will have a range performance of between 2,200nm (4,070km) and 3,000nm, depending on the configuration chosen.

Initial examples are to be powered by CFM International Leap-1C engines, although Beijing plans for this powerplant to in time be joined by an indigenous alternative, dubbed the CJ-1000AX.

As of the end of September, Comac's firm order backlog for the C919 stood at 305 aircraft: unchanged from 12 months earlier.

Once ready for operational use, the C919 will be used by an array of local carriers, including Air

China, China Eastern Airlines, China Southern Airlines, Hainan Airlines and Sichuan Airlines.

However, the type's adoption could expand significantly over time, with options in place for up to 45 additional units and letters of intent covering a potential 658 more. ■

305

Firm order backlog for C919 narrowbody

CRAIC CR929

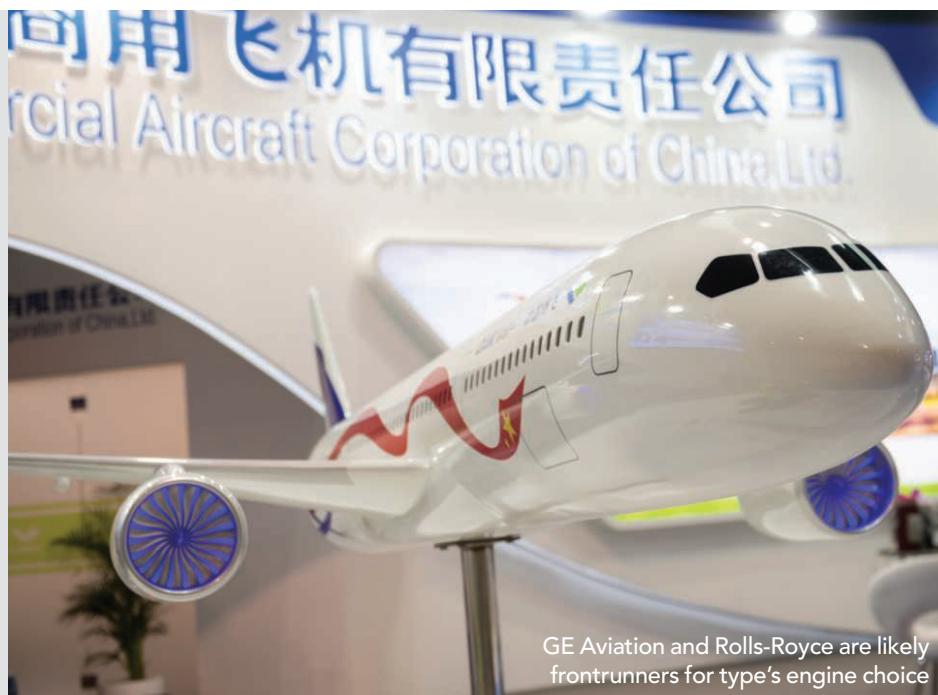
An ambitious joint widebody project between China's Comac and Russia's United Aircraft continues to make progress, with the CRAIC joint venture nearing crucial decisions on key elements of their CR929.

By mid-2019, CRAIC expects to reach a so-called "Gate 3" programme milestone, at which point major systems will have been selected. A previous request for information from prospective engine suppliers led to responses from seven foreign and domestic parties. Leading candidates appear likely to be GE Aviation and Rolls-Royce, both of which have products capable of meeting power output and schedule requirements. Russia's United Engine is also working on a PD-35-1 demonstrator, which it expects to be prepared by 2023. This has a rating of around 70,000lb-thrust (312kN).

WESTERN SUPPORT

Other recent developments have included the partners in July issuing a request for an undercarriage supplier. Leonardo, meanwhile, is offering to work in partnership with China's Kangde Investment Group during "the development, production and assembly of composite materials components for the CR929".

Certification will be sought from Russia's Rosaviatsia agency and the Civil Aviation



GE Aviation and Rolls-Royce are likely frontrunners for type's engine choice

Administration of China, with service entry expected during the late 2020s.

Three versions are planned, with a baseline -600 model to carry up to 280 passengers over a distance of 6,480nm (12,000km). A -500 shrink would have a 250-seat capacity and an increased range of 7,560nm, while a 320-seat -700 variant would be able to cover 5,400nm. CRAIC has yet to identify potential buyers.

Meanwhile, a project to give Russian industry interim widebody production experience looks to

have faltered. Initial funds for a pair of modernised Ilyushin Il-90-400M quadjets were earlier this year diverted to the Il-114-300 regional turboprop. ■

2019

Main supplier decisions to be announced for CR929 widebody

CRAIC CR929 specifications

	CR929-500	CR929-600	CR929-700
MTOW (t)			
Seats (two-class)	250	280	320
Range (nm)	7,560	6,480	5,400

Second example of narrowbody was flown for first time in December 2017



Comac C919 orders and deliveries

	C919
First flight	05/05/2017
Orders (all-time/2018)	305/0
Deliveries (total/2018)	
Backlog	305

Comac C919 specifications

	C919
MTOW (t)	77.3
Seats (two-class)	158/168
Range (nm)	2,200

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Irkut MC-21

Flight testing of the Irkut MC-21-300 is making solid progress, with the first two examples – the latter of which made its debut sortie in May – having been moved from its Irkutsk production site to the Zhukovsky test centre near Moscow.

Notable work performed this year has included first night landings, and the commencement of flights involving personnel from the European Aviation Safety Agency, from which the Russian airframer is seeking to secure type certification.

Initial parts for the programme's first serial production aircraft have also recently entered the manufacturing process.

The programme's lead test aircraft and early production examples will be powered by Pratt & Whitney PW1400G geared turbofan engines. But in September, certification for a Russian alternative – Aviadvigatel's PD-14 – was approved by the nation's Rosaviastia regulator, with European approval expected to follow next year. First deliveries of the PD-14 should occur before the end of 2018, with engines set for use on two more development aircraft.

In June, Aeroflot shareholders voted in support of a proposed 50-unit lease deal, after the carrier revealed its interest in the -300 model four months earlier. Deliveries are expected to occur during the 2020-2026 period, and at

least half of its examples will use PW1400G engines. The aircraft will be sourced via lessor Aviakapital-Servis and Aeroflot values the arrangement at over \$5 billion.

VARIANT SWITCH

Irkut's firm order total has remained unchanged at 175 since our last directory, although commitments for the proposed smaller -200 variant have contracted from 33 units to just 18. With

capacity for between 132 and 165 passengers, this model is intended to have a range of 3,460nm (6,400km), 220nm further than for the up-to 211-seat -300.

Other confirmed buyers include IrAero, Red Wings Airlines and Utair, plus several Russian lessors. Beyond the current firm order total, Flight Fleets Analyzer shows that additional expressions of interest in the MC-21 could push sales to 327 units. ■

Programme's latest prototype debuted from Irkutsk during May



Irkut MC-21 orders and deliveries

	MC-21-200	MC-21-300
First flight		28/05/2017
Orders (all-time/2018)	18/0	157/0
Deliveries (total/2018)		
Backlog	18	157

Irkut MC-21 specifications

	MC-21-200	MC-21-300
MTOW (t)	72.5	79.2
Seats (two-class)	132/165	163/211
Range (nm)	3,460	3,240

50

Aeroflot fleet commitment to MC-21-300 twinjet