Russia's single-aisle ambitions have reached new heights with the MC-21

New arrivals

Part one of our annual review of the world's commercial aircraft programmes begins with mainliner offerings

CRAIG HOYLE LONDON

Huge order backlogs – particularly for narrowbody products – are keeping the commercial aircraft industry's biggest two producers working at a record pace, as Airbus and Boeing also make the transition from long-established models to revamped variants.

Airbus's first re-engined A320neos were handed over in 2016, with output now increasing and deliveries of the larger A321neo having commenced earlier this year. Boeing, meanwhile, has placed its 737 Max 8 into service, with a first example having gone to Lion Air Group carrier Malindo Air in May 2017, and 28 were transferred during the first nine months of this year.

Between them, the "big two" have combined firm order backlogs for almost 8,900 of their new-generation products with carriers around the globe – sufficient to keep them both building the single-aisle types for many years to come.

Another recent arrival, Bombardier's CSeries, continues to increase in fleet size, with Air Baltic and Swiss having received additional examples in 2017 since the CS100 and CS300 were introduced last year. However, Bombardier's largest deal with a so-called "marquee" customer – Delta Air Lines' 2016 commitment for 75 CS100s, plus 50 options – remains the focus of bitter trade disputes between the company, Boeing and Embraer.

POWER SHIFT

In a surprise move, Airbus on 16 October announced its intention to take a controlling stake in the CSeries programme, in a step which will link its portfolio and sales activities with Bombardier's. "Harmonising" their products could safeguard the CS100/CS300, and mark the end of the A319neo.

With a poor sales trend over recent years, the travails of the ultra-large aircraft (ULA) sector are highlighted by Boeing having delivered the last of its commercial-variant 787-8Is on order this year, with the freighter variant -8F now responsible for the jumbo jet's modest backlog. While the A380 recently overtook the 747 as the commercial ULA fleet-leader, Airbus is reducing its annual output to 12, and its backlog is set to fall below 100 units.

More positive signs are evident elsewhere in the mainliner category, however, with the first nine months of 2017 having included flights by a pair of new types: China's Comac C919 and Russia's Irkut MC-21. Several new variants also have flown for the first time, including the A319neo, 737 Max 9 and stretched 787-10. The re-engined A330-900neo also got airborne for the first time, on 19 October.

This year's directory for the first time includes the CR 929: a family of widebody twinjets that will be the output of a new programme formally launched by China and Russia. The activity will combine the skills of their respective industries, building on lessons learned via their C919 and MC-21 projects. ■

All data from Flight Fleets Analyzer or manufacturers, to 30 September 2017

Irkut

Airbus A320 family

Deliveries of the re-engined A320neo family began in 2016, with Lufthansa the first to introduce the type to revenue service. Flight Fleets Analyzer shows that 154 examples had been delivered by the end of September, including 14 shipped during that month – the highest so far. Of this number, 150 have been A320neos, and the remainder A321neos.

On 16 October, Airbus provided a delivery split which showed that 30 customers have now received Neos, with 55% powered by CFM International Leap-1A engines, and 45% equipped with Pratt & Whitney PW1100G geared turbofans.

The smallest member of the re-engined single-aisle family made its first flight this year, with the A319neo getting airborne on 31 March using Leap engines. The milestone means the company has now flown all but one of its eventual six Neo variants, leaving just the P&W-powered A319neo to make its debut.

By June, the currently five-variant flight-test fleet had accumulated more the 4,000h, Airbus says. Certifications for the A320neo and A321neo have been completed, and approvals for the A319neo models will follow next year. Airbus currently has a backlog of only 47 of the 140- to 160-seat variant.

Airbus's current order backlog for A320ceo-family members stands at 473 units, versus 5,029 for the Neo-standard. This sees the European manufacturer having 1,169 more orders for its re-engined narrowbodies than for rival Boeing's 737 Max family.

To keep pace with demand, Airbus plans to increase its monthly production rate for the A320 family from 50 to 60 units. It will achieve this using its current four final assembly lines, in Hamburg and Toulouse, plus Mobile, Alabama and Tianjin, China.

In the first three quarters of this year, the company delivered a combined 264 Ceo-variant twinjets, including A319s, A320s and A321s. It no longer produces the smaller A318 model for commercial operators, and is not offering a re-engined version of the type, just 60 of which were manufactured for airline operators.

The announcement on 16 October that it will take a controlling stake in Bombardier's CSeries programme will see Airbus seeking business for the Canadian type's two variants: capable of seating 108-135 and 130-160 passengers, respectively. This could also see it call time on the struggling A319neo. ■

Airbus A320 family orders and deliveries

	A318	A319	A320	A321	A319neo	A320neo	A321neo
First flight	15/01/2002	25/08/1995	220/02/1987	11/03/1993	31/03/2017	25/09/2014	09/02/2016
Net orders (all-time/2017)	60/0	1,409/0	4,712/30	1,796/55	47/0	3,679/107	1,457/83
Deliveries (total/2017)	60/0	1,385/3	4,494/128	1,565/133		150/82	4/4
Backlog	0	24	218	231	47	3,529	1,453

Airbus A320 family specifications

	A318	A319	A320	A321	A319neo	A320neo	A321neo
MTOW (t)	68	75.5	78	93.5	75.5	79	95
Seats (two-class/max)	107/132	124/156	150/180	185/236	140/160	165/189	206/240
Range (nm)	3,110	3,750	3,300	3,220	3,750	3,500	4,000

SAS operates A320neos with Leap-1A engines

James Mellon/FlightGlobal

Airbus A330

Orders for the legacy Airbus A330 are tailing off, with only six added so far during 2017, against deliveries of 46. The backlog stands at a combined 93 of the -200/F and -300.

On 20 September 2017, the first A330 to be handed over in China was transferred to its customer, Tianjin Airlines. The -200-model twinjet was produced in a two-class configuration with 260 seats in Toulouse, before underdoing completion in Tianjin. Airbus also has commenced deliveries of the twin-aisle type to Iran Air.

On 19 October, Airbus completed a delayed first flight of an A330neo from its Toulouse site. The -900-model example was rolled out minus its Rolls-Royce Trent 7000 engines in December 2016, and production deliveries will commence with lead customer TAP Portugal. Seating is between 287 and 440 passengers, while its range increases to 6,550nm (12,100km): 200nm further than the -300.

The A330-900neo has secured a total of 204 orders, but the company's smaller -800neo continues to struggle, with a net reduction of four units this year leaving its order total at just six aircraft; all for Hawaiian Airlines. Airbus expects to commence final assembly of its first A330-800 before year-end, and to fly the variant in 2018.

Meanwhile, assembly of the first A330-based Beluga XL cargo aircraft is progressing in Toulouse. Power-on is scheduled for late this year, ahead of a flight debut around mid-2018 and entry into service the following year. Airbus will eventually operate a five-strong fleet, replacing its current A300-600STs.

Although not included in this listing, the A330-200 also is the basis for a multi-role tanker transport adaptation made by Airbus Defence & Space in Getafe, Spain. ■

Airbus A330 orders and deliveries

	A330-200	A330-200F	A330-300	A330-800neo	A330-900neo
First flight	13/08/1997	05/11/2009	02/11/1992		19/10/2017
Net orders (all-time/2017)	597/6	42/0	782/0	6/-4	204/0
Deliveries (total/2017)	574/12	38/2	716/32		
Backlog	23	4	66	6	204

Airbus A330 specifications

	A330-200	A330-200F	A330-300	A330-800neo	A330-900neo
MTOW (t)	242	233	242	242	242
Seats (two-class/max)	247/406		277/440	257/406	287/440
Payload (t)		70			
Range (nm)	7,270	4,100	6,350	7,500	6,550

210

Firm orders for re-engined A330neo variants

Airbus A350

After a difficult first two years of production, during which Airbus last year fell just short of its targeted 50-unit goal – largely due to problems with supply chain items – the company delivered another 50 in the first nine months of 2017. This leaves a further 25 to hit its objective in the remainder of the calendar year.

Flight Fleets Analyzer shows 114 of the baseline -900 model have now been delivered to 15 airlines, with Qatar Airways, Cathay Pacific and Singapore Airlines having the largest fleets, at 21, 19 and 18 units, respectively.

Deliveries of the larger A350-1000 are due to begin with Qatar by the end of 2017, with the model's Rolls-Royce Trent XWB-97 – with a maximum output of 97,000lb-thrust (431kN) – having gained European certification in February 2017.

Qatar has 21 A350-900s in operation

James Mellon/FlightGlobal

Airbus's firm backlog for the twinjet stands at 742 aircraft, including 557 -900s: an overall drop of 19 units from this point last year. Recent switches to the most popular version by Cathay and also United Airlines have seen the number of -1000s on order fall by 18 over same period, to 177.

It is unclear whether a possible further stretch, the A350-2000, could advance, but the future of its smallest family member, the -800, seems in doubt. Only eight examples remain on order, for Asiana Airlines, after Aeroflot late last year axed a commitment for an equal number of the 8,200nm (15,200km)-range variant. ■

Airbus A350 orders and deliveries

	A350-800	A350-900	A350-1000
First flight		14/06/2013	24/11/2016
Net orders (all-time/2017)	8/0	671/39	177/1
Deliveries (total/2017)		114/50	
Backlog	8	557	177

Airbus A350 specifications

	A350-800	A350-900	A350-1000
MTOW (t)	259	280	308
Seats (two-class/max)	276/440	325/440	366/440
Range (nm)	8,245	8,100	7,950

Deliveries of the A330-200 to Iran Air commenced recently

AirTeamImages

Airbus A380

In common with its ultra-large rival the Boeing 747, the A380 has seen its order prospects diminish, and Airbus is slowing its production rate to reach only 12 per annum from 2018.

This year marks the 10th anniversary of the superjumbo's entry into service with Singapore Airlines (SIA), but it also has seen the first two of the carrier's A380s, from early leased examples, returned to their lessor. Suggestions they could be parted out seem to have become more distant, with Portuguese operator Hi Fly potentially interested in taking two from German asset manager Dr Peters Group. The first SIA example – 9V-SKA (MSN 3) – was parked on 10 June.

Another early taker of the type, Malaysia Airlines, will replace its six A380s with smaller-capacity A350-900s from next year, passing its superjumbos to a subsidiary for use during religious pilgrimage flights.

In another setback, France's BEA accident investigation authority is probing the cause of an uncontained engine failure on an Air France A380 on 30 September 2017. No-one was injured during the incident involving one of the aircraft's Engine Alliance GP7200s, and its crew diverted the flight to Goose Bay in Canada.

PLUS POINTS

Airbus continues to resist calls from lead A380 operator and the type's largest customer, Emirates Airline, to invest in a re-engined A380neo, instead using June's Paris air show to detail a proposed A380plus package of enhancements. Featuring large winglets, which Airbus expects to deliver a 4% improvement in fuel burn, the enhancement also has its maximum take-off weight increased by 3t, to 578t, either increasing range by 300nm (555km), to 8,500nm, or enabling it to carry 80 more passengers to its current maximum range. It also has layout changes including 11-abreast economy seating and modified forward and aft staircases.

4%

Expected fuel-burn saving offered by A380plus enhancement package

Service entry for the A380plus could occur in 2020, if the concept advances beyond the development study phase.

In early October, the operational fleet of A380s passed that of the 747 in its passenger standard, at 213 units, but the Airbus type's backlog was poised to drop below 100.

Net orders so far in 2017 having dipped into the black, with a deficit of two through the first nine months. Emirates will take 44 of the current outstanding total of 101 aircraft, with these examples to be powered by Rolls-Royce Trent 900 engines. ■

Proposed A380plus was displayed at Paris air show

Airbus

Airbus A380 orders and deliveries

	A380-800
First flight	27/04/2005
Net orders (all-time/2017)	317/-2
Deliveries (total/2017)	216/9
Backlog	101

Airbus A380 specifications

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

Boeing 737


Early recipients of the 737 Max include Southwest Airlines

AirTeamImages

At Boeing's Renton site in Washington, the company is running at a production rate of 47 737s per month from three assembly lines. This record pace could be increased further, to 52 or even 57 per month, to enable the company to keep pace with a massive order backlog.

With deliveries of the 737 Max series having commenced to Lion Air Group carrier Malindo Air in May 2017, the company is increasing its output of the type, in conjunction with its NG-series twinjets. Other early recipients have included Flydubai, Norwegian Air International and Southwest Airlines, and a combined 28 had been delivered by 30 September.

Exclusively powered by CFM International Leap-1B engines, the Max is designed to deliver a 20% increase in efficiency over the NG model, which entered service in 1998. Other enhancements include new winglets and a redesigned landing gear.

The Max programme will deliver an eventually five-strong family – the 737-7, -8, -9, -10 and -8-200. With a 200-seat capacity, the -8-200 has so far attracted a combined 210 firm orders from low-cost carriers Ryanair and VietJet Air.

Boeing's 3,860-unit backlog for 90 customers adds to more than 6,500 deliveries made since the 737-100 was first flown in April 1967.

This year saw the first flight of the 737-9, and the formal launch of the stretched 737-10. Boeing secured a significant number of orders for this model at June's Paris air show, although a high proportion of these represented airlines switching variant from the smaller -8. ■

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		29/01/2016	13/04/2017		
Net orders (all-time/2017)	1,147/65	5,062/23	563/44	65/0	2,286/37	121/8	267/53	1,149/193
Deliveries (total/2017)	1,145/3	4,592/305	492/28		28/28			
Backlog	2	470	71	65	2,258	121	267	1,149

* Includes 737 Max 8-200

Boeing 737 specifications

	737-700	737-800	737-900	737 Max 7	737 Max 8	737 Max 8-200	737 Max 9	737 Max 10
MTOW (t)	70.1	79	85.1	72.3	82.2	82.2	88.3	
Seats (two-class/max)	126/149	162/189	178/220	138/172	162/189	200	178/220	188/230
Range (nm)	3,010	2,935	2,950	3,825	3,515		3,515	3,215

Boeing 747

Boeing's "queen of the skies", the 747, looks likely to have reached the end of its production life as a passenger aircraft, with the manufacturer's commercial backlog for the -8I variant now standing at zero, following a net six cancellations in the first nine months of this year.

Deliveries of a final three examples were made earlier this year, with Flight Fleets Analyzer showing the last units as having gone to Korean Air. The modest order book for 14 of the quad-jets is now made up entirely of -8F freighters.

The annual production rate for the 747 has been reduced to just six units at Boeing's Everett plant in Washington. Thirteen of the on-order -8Fs are for parcel delivery company UPS Airlines, which will accept its first examples this year. The remaining freighter is for Qatar Airways, to follow a lead example delivered in late September.

LIMITED DEMAND

Despite offering a 30% increase in fuel efficiency over the earlier 747-400 variant, largely due to its GE Aviation GEnx engines, the -8I failed to entice enough customers at a time when many airlines have switched their long-range operations to big twinjets, such as the 777-300ER and 787-9. Only three buyers were secured for the new model, with Air China, Korean Air and Lufthansa having received a combined 36.

One potential boost for the programme eventually came to nothing with the confirmation that a US Air Force presidential fleet renewal deal will be satisfied using a pair of stored 747-8Is already manufactured for the defunct Russian carrier Transaero.

While the future looks fairly bleak for the jumbo jet, Boeing remains optimistic that it will be able to secure further commitments for the -8F. Its long-term market outlook forecasts that demand for large freighters will pick up from 2020, and having slowed production, the airframer intends to be able to respond if fresh demand comes in for the cargo asset's 137t-capacity.

Among the aircraft now on the assembly line is the 1,544th example of the 747, which represents a production record for a commercial widebody jet. However, this distinction will rapidly be passed to the 777 programme, which is currently delivering 60 aircraft per year. ■

Boeing 767

The future of Boeing's first widebody twinjet, the 767, appears to be solely as a commercial freighter and military tanker/transport, with the company having delivered its final -300ER model airliner more than three years ago, to Air Astana.

Assembly continues at Everett, Washington at a rate of 2.5 aircraft per month, against a backlog of 63 767-300Fs for FedEx. Flight Fleets Analyzer shows the operator as having 48 767 freighters in use today, including -300Fs introduced from September 2013. Its fleet is powered by GE Aviation CF6-80C2 engines.

Boeing delivered its 100th dedicated 767 freighter in mid-2015, and a market is also emerging for passenger-to-freighter conversions performed by the company and third parties. Israel Aerospace Industries' Bedek unit and its partner Mexicana MRO Services in June 2017 commenced work on their first such project, to adapt a -300 for Kalitta Air.

Meanwhile, a 767-2C derivative forms the basis for the US Air Force's KC-46A Pegasus tanker. The service is due to receive its first examples early next year, under a programme covering an eventual 179 aircraft not included in our commercial orders listing. Deliveries of the Pratt & Whitney PW4062-powered model are expected to run until at least 2028, with export deals to potentially keep the Everett line running even longer. ■

2.5

Monthly production rate for the 767 at Boeing's Everett facility; including US Air Force tankers

FedEx has 63 767-300F freighters to come for its logistics fleet

Air Teamlmages

Boeing 767 orders and deliveries

	767-300ER	767-300F
First flight	09/12/1986	20/06/1995
Net orders (all-time/2017)	579/0	192/0
Deliveries (total/2017)	579/0	129/7
Backlog	0	63

Boeing 767 specifications

	767-300ER	767-300F
MTOW (t)	186.9	185
Seats (three-class/max)	218/351	
Payload (t)		52.5
Range (nm)	5,980	3,255

Last three -8I examples of the "queen of the skies" were delivered to Korean Air

James Mellon/FlightGlobal

Boeing 747 orders and deliveries

	747-8I	747-8F
First flight	20/03/2011	08/02/2010
Net orders (all-time/2017)	36/-6	88/0
Deliveries (total/2017)	36/3	74/5
Backlog	0	14

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

14

Total backlog for 747-8: all are freighters

69
Firm order backlog for 777-300ER

KLM received its 29th and final ordered example of the twinjet during September

Boeing

Boeing 777

With Boeing now preparing for its re-engined and re-winged 777X, its production rate for the current 777-300ER and F-model freighter has been reduced from 8.3 to five units per month.

Flight Fleets Analyzer records a combined 58 examples as having been delivered from its Everett line in Washington in the first nine months of this year. This total includes the 29th and last 777-series aircraft for KLM, which also completed overall orders of 99 for the Air France-KLM Group.

Each 777-300ER or 777F spends 46 days on the final assembly line in Everett, and this will be reduced on the X. The combined order backlog for current models has just dipped below 100, including 69 -300ERs and 30 freighters for customers including Eva Air and FedEx. Boeing Commercial Airplanes chief executive Kevin McAllister says the models are "sold out" for 2018, and "in great shape" for 2019 also.

STRONG SALES

Lifetime orders for the big twin now exceed 1,600 aircraft, including across the 777X programme's two variants. Flight-testing with the 777-9 will start in 2019, with Boeing expecting to deliver the first example during 2020, and a longer-range -8 model one year later.

The first test wing for the 777X programme entered final assembly at Everett in September. The composite structure is 7m (23ft) longer than the current model's, at 71.8m, and includes an unique wing-fold mechanism of 3.5m on each side to let the twinjet continue accessing existing airports without being reclassified.

Combined with GE Aviation GE9X engines, each with an output in the 100,000lb-thrust (445kN) class, the 777X's new wing will play a key part in delivering a 20% reduction in fuel burn for the new model over the -300ER.

DESIGN ENHANCEMENTS

The 777-9 is also 2.1m longer, and capable of carrying 18 more passengers, thanks in part to design enhancements that have reduced the width of the cabin wall by 2in on each side, to enable a 10-abreast seating configuration. Range increases to 7,600nm (14,060km), from 7,370nm.

Flight Fleets Analyzer shows that Boeing has secured firm orders for 326 of the aircraft – 263 -9s, 53 -8s and 10 with the variant as-yet unconfirmed – since launching the 777X programme in November 2013. Its customers are All Nippon Airways, Cathay Pacific, Emirates Airline, Etihad Airways, Lufthansa and Qatar Airways. ■

Boeing 777 orders and deliveries

	777-200LR	777-300ER	777F	777-8	777-9	777X (variant TBC)
First flight	08/03/2005	24/02/2003	14/07/2008			
Net orders (all-time/2017)	57/0	825/22	161/1	53/0	263/0	10/10
Deliveries (total/2017)	57/0	756/56	131/2			
Backlog	0	69	30	53	263	10

Boeing 777 specifications

	777-200LR	777-300ER	777F	777-8	777-9
MTOW (t)	347.5	351	349.7	351	351
Seats (three-class/max)	301	336/550		350/375	400/425
Payload (t)			102		
Range (nm)	8,555	7,370	4,970	8,700	7,600

Boeing 787

The Dreamliner's -10 variant made its flight debut in March 2017

Boeing

September brought the sixth anniversary of the first Dreamliner delivery – to All Nippon Airways – and Boeing is now close to handing over its 600th production example of the 787.

Assembly rate for the 787 family has been increased to a combined 12 per month from Everett, Washington, and North Charleston, South Carolina, and is due to climb to 14.

Major parts of the aircraft arrive already equipped from key suppliers, meaning that each Dreamliner spends only 15 days on the assembly line in Everett.

The 787-8 and -9 are the current in-production models, with the -10 – a 5.5m (18ft) stretch of the -9 – coming soon. A first example made its flight debut on 31 March 2017, and assembly is under way, in North Charleston only. The new model is due for delivery in May 2018, starting with Singapore Airlines.

To date, 69 airlines have ordered the Dreamliner, and its sales total stands at 1,265 units. The most popular variant is the -9 – 680 of this total – followed by the baseline -8, with 417 units, and the -10, at a current 168.

Flight Fleets Analyzer shows Boeing as having secured new orders for a combined 106 units in the first nine months of this year, versus only 65 during the same period last year.

The 787 is offered with either GE Aviation GEnx or Rolls-Royce Trent 1000 engines, with Fleets Analyzer showing almost 62% of the operational fleet as using the GE powerplant.

A proposed New Mid-market Airplane could fill a niche between the 737 Max 10 and 787-8, and Boeing has appointed former Dreamliner vice-president and general manager Mark Jenks to head its programme office. ■

Boeing 787 orders and deliveries

	787-8	787-9	787-10
First flight	15/12/09	17/09/13	31/03/17
Orders (all-time/2017)	417/7	680/80	168/19
Deliveries (total/2017)	339/21	252/77	
Backlog	78	428	168

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

Bombardier CSeries family

Following the CS100 variant's entry into service in July 2016, Bombardier began delivering the CSeries' larger CS300 model last November.

By the end of the third quarter of 2017, it had transferred a combined total of 18 of the twinjets: 12 to launch operator Swiss, and six to Air Baltic. Eleven of these deliveries took place this calendar year until 30 September, but problems with the type's Pratt & Whitney PW1500G geared turbofan engines have slowed Bombardier's progress. Despite this, it remains optimistic that it will deliver close to 30 aircraft through 2017.

Following an investigation into the April 2016 sale of 75 CS100s to Delta Air Lines for delivery from next year, the US Department of Commerce has recommended import tariffs totalling 220-300% of the aircraft's purchase price. The World Trade Organisation also is considering a Brazilian appeal against state loans, after complaints from Embraer.

Flight Fleets Analyzer shows 355 CSeries jets have been ordered to date, with no new commitments made so far during 2017. Of this total, 242 aircraft are in the up-to 160-seat CS300 version, and 113 in the smaller CS100 model, which takes 108-135 passengers.

Airbus on 16 October provided a surprise lift for the embattled programme, announcing its intention to take a controlling stake in the CSeries and seek new sales alongside its own narrowbody products. ■

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CSeries family orders and deliveries

	CS100	CS300
First flight	16/09/2013	27/02/2015
Orders (all-time/2017)	113/0	242/0
Deliveries (total/2017)	8/3	10/8
Backlog	105	232

CSeries specifications

	CS100	CS300
MTOW (t)	60.8	67.6
Seats (two-class/max)	108/135	130/160
Range (nm)	3,100	3,300

Air Baltic has expanded its operations with the CS300 since late last year

Julia Loris/AirBaltic

Comac C919

Beijing's ambitions to develop a Chinese rival to Airbus and Boeing's narrowbody champions the A320neo and 737 Max met with initial success in 2017, with the Comac C919 having made its first flights.

On 5 May, the first of six prototypes completed a 1h 19min debut sortie from Shanghai Pudong airport, five months after the aircraft – B-001A – had been rolled out to great fanfare.

While Comac described the first flight event as a success, the twinjet did not return to the air until 28 September, when it completed a 2h 30min second flight, reaching an altitude of 10,000ft and retracting its landing gear for the first time. A goal of transferring the lead C919 to Xian by September slipped to at least late October.

The programme's second aircraft cleared its power-on milestone in late July, at which time the Chinese airframer indicated that its flight debut was due before the end of this year.

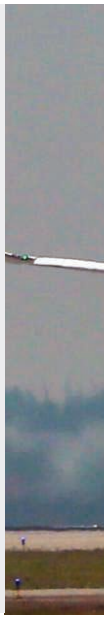
Comac's flight-test campaign for the CFM International Leap-1C-engined single-aisle will be extensive: it earlier this year outlined a plan which it expects to eventually total 4,200 flight hours. It also aims to offer the C919 with CJ-1000A powerplants developed by the AVIC Commercial Engine Corporation.

Beijing's determination to develop its aerospace industry into a genuine power is underscored by a desire to see its carriers operate domestically-developed and produced airliners, instead of relying on Western-built types. While Comac has struggled to secure business with its ARJ21 regional jet, Flight Fleets Analyzer shows it now has firm orders for 305 C919s: an increase of 23 over the past 12 months.

Firm orders have been placed by several of China's leading carriers. These include Hainan Airlines and Sichuan Airlines, with 20 each, and Air China, China Eastern and China Southern Airlines, which will each take an initial five. Deliveries should start in 2020, with China Eastern.

Additional commitments and letters of intent have boosted the type's potential backlog to 723 units, including a September development covering 130 aircraft for four Chinese lessors.

A planned enhanced variant will retain the basic model's 156-174 passenger capacity, but have a 3,000nm (5,550km) range: an increase of 800nm. ■



CRAIC CR 929

Beijing and Moscow have formally joined forces to work on a widebody product, which is expected to enter service around 2025.

In May 2017, the partners agreed to establish a new joint venture – the China-Russia Commercial Aircraft Corporation (CRAIC) – to jointly design and develop the aircraft, working from facilities in Moscow and Shanghai. China's Comac will manufacture the twinjet's fuselage and perform final assembly, while its Russian partner Irkut will provide its composite wing and empennage, plus its tail.

Oliver Santa

Joint widebody project will complement Russia and China's narrowbody developments

THREE VARIANTS

Named the CR 929, the new type is planned in three variants, with seating capacities of between 250 and 320 passengers. A baseline -600 model will have a 280-seat limit, and a range of up to 6,480nm (12,000km). A larger -700 will seat 320 passengers and fly 5,400nm, while a -500-model shrink will accommodate 250 passengers and have a range of 7,560nm.

Supplier decisions could be taken before the end of this year, with a key question being which Western supplier will provide the CR 929's engines for its entry into service. Possible contenders include GE Aviation and Rolls-Royce.

Meanwhile, a memorandum of co-operation was initiated by Russia's United Engine (UEC) and China's AECC Commercial Engine in September 2017, with the aim of developing a "world-class" powerplant for the CR 929. This activity is expected to build on UEC's PD-35 project, which itself draws on the experience it gained while developing the Aviadvigatel PD-14 for the Irkut MC-21.

UEC says test activities on a new engine should commence during 2022, with certification targeted for 2027.

In a move related to the CR 929 programme, Moscow has approved the production of a small batch of Ilyushin Il-96-400Ms. A 9.65m (31.6ft) stretch to the -300's fuselage and with Aviadvigatel PS-90A1 engines, this should fly in 2019. It has a 370-seat, single-class capacity and a range of 4,370nm (8,080km). ■

CRAIC CR 929 specifications

	CR 929-500	CR 929-600	CR 929 -700
MTOW (t)			
Seats (three-class)	250	280	320
Range (nm)	7,560	6,480	5,400

320

Maximum seating capacity of CR 929-700 variant

Comac aims to offer the C919 with a domestically-produced powerplant

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Comac C919 orders and deliveries

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

Comac C919 specifications

	C919
MTOW (t)	77.3
Seats (two-class/max)	156/174
Range (nm)	2,200

2020

Entry-into-service target for twinjet with China Eastern

Irkut MC-21

Russia's eagerly-awaited MC-21 was flown for the first time on 28 May 2017, rising from Irkut's assembly site in Irkutsk, Siberia, almost exactly one year after it had been rolled-out in the presence of prime minister Dimitry Medvedev.

Powered by Pratt & Whitney PW1400G geared turbofan engines, the MC-21-300 made a 30min debut, achieving 162kt (300km/h) and reaching an altitude of almost 3,300ft. A further eight flights were conducted during a first test phase, which drew to a close on 23 June. The activity included assessments of the type's stability, controls and systems functionality.

Irkut's first prototype then underwent adaptations including the integration of strain gauges to measure airframe loading, before taking off again on 13 September. The 2h flight marked the start of a second test phase, to further expand the type's operating envelope.

Irkut president Yuri Slyusar says the twinjet has so far been flown to 33,000ft and attained 485kt. In mid-October, it completed a 6h flight from Irkutsk to Moscow Ramenskoye airport, covering 2,430nm (4,500km).

A second prototype is expected to take to the air before the end of this year, Irkut says.

Despite these successes, Flight Fleets Analyzer shows Irkut has failed to add to its firm order backlog for the type in the year since our last directory. This remains at 175, the bulk of which – 142 units – are in the larger -300-model, which has a capacity of up to 211 seats. Just 33 of the shorter-fuselage and longer-range -200, which can accommodate 132-165 passengers, are on order.

Service entry for the MC-21-300 is expected in 2019, with customers including Aeroflot, Red Wings and UTair, plus Russian lessors Ilyushin Finance, Sberbank Leasing and VEB Leasing. Irkut says further current commitments have the potential to increase sales to 270 aircraft, but parent company United Aircraft has yet to commit to the potential production of a larger variant, leaving the notional -400 effectively on hold.

Work towards offering the MC-21 with a Russian alternative to the PW1400G is advancing at United Engine (UEC), with Aviadvigatel's PD-14 having been flown using an Ilyushin Il-76 testbed. UEC previously identified a certification target of April 2018. ■

Ikut's first prototype of the twinjet made its flight debut on 28 May 2017

Irkut

175

Firm order total secured by MC-21 programme for Irkut

Irkut MC-21 orders and deliveries

	MC-21-200	MC-21-300
First flight		28/05/2017
Net orders (all-time/2017)	33/0	142/0
Deliveries (total/2017)		
Backlog	33	142

Irkut MC-21 specifications

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