

All Maxed out?

Flight International's annual review of global commercial airliner programmes begins with a look at mainline aircraft – and inevitably focuses on Boeing's troubled narrowbody type

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There can only be one starting point in reviewing the aircraft covered by this part of the 2019 World Airliner Directory – and that is the ongoing tribulations of the Boeing 737 Max family. With the whole fleet of the type grounded since 13 March, the prospects for the Max are currently a complete unknown.

Boeing is sticking to its statement that it expects to achieve clearance from the US Federal Aviation Administration (FAA) to allow the 737 Max to fly again during the fourth quarter. However, indications from the European Union Aviation Safety Agency (EASA) are that its approval will not come until early in 2020, following test flights with the body's own pilots.

Moreover, the pattern of one authority certificating aircraft and other authorities validating that decision almost "on the nod" has now become contentious, so if the FAA approves an aircraft, it may be that EASA, Transport Canada or Australia's Civil Aviation Safety Authority will want to do more than

trusting that all the necessary work was carried out properly. It will be interesting to see the approach taken on aircraft such as the in-development 777X family.

Whether the Max (*below in flight, production and during grounding*) does or does not fly this year, the length of the grounding and the visibility it has had with the travelling public could well affect how customers select their flights. Seasoned travellers know which aircraft they like and even the seats they prefer to occupy. We wait to discover if the Max grounding pushes some of them to seek other aircraft types for their journeys.

While Boeing was obviously involved at the beginning of the year in the investigation into the Lion Air accident of 29 October 2018, it was also rather buoyant when it reported that it had set a new annual record of 806 deliveries in 2018, while adding 893 net orders to its backlog. Its hopes of continuing that performance level came to an end in March.

In any other year, the key story would most likely have been the decision by Emirates to revise its orders for the Airbus A380. The carrier's

move to cull 39 of the type from its orderbook led the airframer to admit that the consequence – given the lack of orders from other airlines – was to announce the end of A380 deliveries in 2021. Although the Boeing 747-8 is still coming off the line, only freighter versions are left in the backlog. Barring a very unlikely turnaround, the era of jumbo and superjumbo jet production is now coming to a close.

While the flagship at the top of the fleet awaits its final bow, Airbus's acquisition of the former Bombardier CSeries as the smallest family in its line-up is looking like a wise move. Over the course of a year under Airbus control, there have been more than 230 commitments to the aircraft now known as the A220, a trend that has continued with recent orders by Air Austral and Czech Airlines.

At the end of September 2019, Airbus's backlog stood at 7,133, with Boeing's at 5,488. While production rates continue to fluctuate, each manufacturer has many years of work ahead. ■

All data from Cirium or manufacturers, to 30 September 2019



AirTeamImages



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Airbus A220

In 2019, 1 July once again brought a major milestone for the A220 family. While 1 July 2018 saw the transfer of control of the A220 programme from Bombardier to Airbus, this year the date brought another change in the organisation, with CSeries Aircraft Limited Partnership, the company in which Airbus took a 50.01% stake, becoming Airbus Canada Limited Partnership.

By the time the first anniversary under Airbus control was celebrated by this change, the number of orders and commitments for the family had risen by more than 230 aircraft. The Paris air show in June helped that figure considerably and brought increased lessor interest as Air Lease signed a letter of intent for 50 A220-300s, while Nordic Aviation Capital signed a memorandum of understanding for 20 A220s with the choice of model not specified.

In May 2019, Airbus announced performance improvements for both A220 variants, with increased maximum take-off weight (MTOW) and range being added. The former has been increased by 2,270kg (5,000lb), leading to new maximum range figures of 3,350nm (6,200km) for the A220-300 and 3,400nm for

Airbus is increasing maximum take-off weight and range for the A220



88

A220-family aircraft handed over since launch

the A220-100, each 450nm more than the original.

Deliveries with the new capabilities will begin during the first half of 2020.

Delta Air Lines, which ordered five additional A220-100s in June 2019 – taking its total orders of both the -100 and -300 to 95 – became the

first customer to sign up for the increased MTOW option.

Delta's fellow SkyTeam member, Air France-KLM, announced the signing of an MoU for 60 A220-300s in late July 2019. When these aircraft enter service with Air France, the carrier will be the third member of the SkyTeam alliance to operate the type, as Korean Air operates 10 A220-300s.

Meanwhile, Airbus began manufacturing the A220 in the USA in August, when work started at the company's Mobile, Alabama production facility. The first US-made A220 – an A220-300 – is scheduled for delivery to Delta in the third quarter of 2020. ■

Airbus A220 orders and deliveries

| | A220-100 | A220-300 |
|-------------------------|------------|------------|
| First flight | 16/09/2013 | 27/02/2015 |
| Orders (all-time/2019) | 90/2 | 421/-23 |
| Deliveries (total/2019) | 33/21 | 55/10 |
| Backlog | 57 | 366 |

Airbus A220 specifications

| | A220-100 | A220-300 |
|---------------------|----------|----------|
| MTOW (t) | 63.1 | 69.9 |
| Seats (typical/max) | 116/135 | 141/160 |
| Range (nm) | 3,400 | 3,350 |

Airbus A330

Following delays in its introduction, the first upgraded and re-engined A330neo – an A330-900 – was finally handed over to launch customer TAP Air Portugal in the fourth quarter of 2018, the first of three delivered last year. By September this year, a further 26 aircraft had entered service, operating for nine customers.

Orders for the Rolls-Royce Trent 7000-powered aircraft have continued to rise, albeit slowly. While the overall commitments for the more popular A330-900 showed a net increase by the end of September, the A330-800 – with no orders this time last year – has gained two new customers.

In October 2018, the orderbook was revived by a commitment for eight A330-800s from Kuwait Airways. This was followed in April by

Uganda Airlines signing for two A330-800s, firming up a tentative agreement announced at the 2018 Farnborough air show. Certification has slipped into 2020.

Among those that ordered A330-900s this

year was AirAsia X, which committed to an additional 12 aircraft, taking its total of A330neos ordered to 78. The airline took delivery of its first of the type, leased from Avolon, on 9 September.

Airbus A330 orders and deliveries

| | A330-200 | A330-200F | A330-300 | A330-800 | A330-900 |
|-------------------------|------------|------------|------------|------------|------------|
| First flight | 13/08/1997 | 05/11/2009 | 02/11/1992 | 06/11/2018 | 19/10/2017 |
| Orders (all-time/2019) | 599/-5 | 38/0 | 789/0 | 10/10 | 250/10 |
| Deliveries (total/2019) | 586/2 | 38/0 | 768/3 | | 29/26 |
| Backlog | 13 | 0 | 21 | 10 | 221 |

Airbus A330 specifications

| | A330-200 | A330-200F | A330-300 | A330-800 | A330-900 |
|---------------------|----------|-----------|----------|----------|----------|
| MTOW (t) | 242 | 233 | 242 | 251 | 251 |
| Seats (typical/max) | 247/406 | | 277/440 | 257/406 | 287/440 |
| Payload (t) | | 65 | | | |
| Range (nm) | 7,250 | 3,995 | 6,350 | 8,150 | 7,200 |

Airbus

A320 family

Another year, another increase in the Airbus A320neo family backlog, albeit by just 27, as the number rose to 5,688 from 5,661 in the 12 months to the end of September 2019, indicating the high rate of deliveries. However, it is looking likely that 2019 will be the first year since the A320 was launched that no order for the original Ceo variant will be placed, with all orders for A320neo-family models.

Moreover, Cirium fleets data also shows that only 88 Ceos remain in the backlog, so all A320-family deliveries will soon be Neos. As those deliveries move to the new variants, there has also been a noticeable shift between sales of the models within the family.

While the A321's percentage of sales within the original family reached 22.4%, the same

Percentage of sales represented by A321neo in new family's orderbook is now 41.6%



London Luton airport

2023

Projected service-entry date for A321XLR

figure for the A321neo is 41.6%. This figure may yet rise, with the introduction of the A321XLR.

In terms of range, the A321XLR will be able to fly up to 4,700nm (8,700km), which is 15%

further than the A321LR. The new model ended the Paris air show with 48 orders and 89 commitments, plus 112 conversions from existing A321neo orders.

The XLR has garnered some big name customers, including AirAsia X (30 firm), JetBlue Airways (13 firm, all converted), American Airlines (50 firm, including 30 conversions), IAG (eight for Iberia, six for Aer Lingus) and Qantas (36, including 26 conversions). Indigo Partners signed a memorandum of understanding for 50, including 18 conversions.

Deliveries are scheduled to begin in 2023. ■

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/2019) | 1,412/0 | 4,754/0 | 1,801/0 | 32/-8 | 3,855/502 | 2,774/665 |
| Deliveries (total/2019) | 1,404/4 | 4,726/44 | 1,749/35 | | 747/234 | 226/104 |
| Backlog | 8 | 28 | 52 | 32 | 3,108 | 2,548 |

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 |

At June's Paris air show, Cebu Pacific ordered 16 A330-900s, only firming the deal in November. Meanwhile, at the same event, Virgin Atlantic signed up for 14 A330-900s to replace its A330ceos from 2021. Eight of those form a firm order placed by the airline, while six will come via Air Lease.

January 2019 saw the European Union Aviation Safety Agency give approval for extended twin-engine operations (ETOPS) beyond 180min diversion time for the A330-900 – the basic specification.

However, an option for ETOPS of 285min was also approved, increasing the aircraft family's diversion distance to around 2,000nm (3,700km).

The backlog for the company's original A330s – the -200 and -300 – has now shrunk to just 34 aircraft at the end of September, including cancellations for the -200 creating a five-unit net loss in the 2019 sales figure. ■



Airbus

10

Orders for -800 variant placed over the last year

A further 26 of the larger version had entered service by September

Airbus A350

Now the largest aircraft that Airbus offers to customers, the A350 family has had a much quieter year so far in terms of increasing its orderbook, with just 15 net new orders compared with 36 during the respective period in 2018.

Cancellations and swaps have clearly played a major role in that. Orders this year include deals with Air China (20), Dubai Aerospace Enterprise (2), Lufthansa (20), and Starlux (17). However, a cancellation of 42 aircraft by Etihad at the start of the year largely offset these gains.

Deliveries this year have seen names such as Air France, British Airways, China Southern Airlines and Japan Airlines all become A350 operators. By the end of September, the family had 30 customers with a further 21 still awaiting their first A350.

A further development in the family is coming from the challenge laid down by Qantas, which wants to provide nonstop services to the Australian east coast from London and New York.

French carrier was one of several new operators of the type this year



The carrier is aiming to offer such flights by 2023. Airbus has responded to this test, known as Project Sunrise, by proposing a longer-range version of the A350-1000 to operate these ultra-long-haul routes.

The new variant, according to Airbus, would have a range of 8,700nm (16,100km) with a typical 375-passenger load. The

company has released material stating that the maximum take-off weight (MTOW) of this Project Sunrise contender will be 319t. Currently the A350 model with the highest MTOW of 316t has a range of about 8,400nm with 366 passengers.

The competing aircraft in Project Sunrise will be the Boeing 777-8. ■

Airbus A350

| | A350-900 | A350-1000 |
|-------------------------|------------|------------|
| First flight | 14/06/2013 | 24/11/2016 |
| Orders (all-time/2019) | 732/5 | 183/10 |
| Deliveries (total/2019) | 280/59 | 31/17 |
| Backlog | 452 | 152 |

Airbus A350 specifications

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

Airbus A380

After much speculation by observers and analysts over the A380's future, the result of a fleet review by Emirates announced in February finally brought the curtain down on sales for the double-deck type.

In its review, Emirates announced its intention to reduce its A380 orderbook from 162 to 123,

which led Airbus to state: "As a consequence and given the lack of order backlog with other airlines, Airbus will cease deliveries of the A380 in 2021."

Emirates' cancellations are not yet officially recorded in the Airbus backlog. However, it removed another 31 orders from its books during the year. Total orders for the A380 stand at 291, with 51 still to be delivered at end-September.

Meanwhile, All Nippon Airways became an A380 operator in March when it took delivery of

the first of three aircraft it had on order. Sporting a livery depicting the Hawaiian green sea turtle, the airline subsequently put the aircraft into service in late May on the Tokyo Narita-Honolulu route.

As the assembly line for the A380 moves towards delivery of the last aircraft, Airbus is in discussions with the affected employees over their future, including redeployment to other areas of the company. ■

All Nippon Airways received the first of its three superjumbos in March



291

Final A380 orderbook after programme axed

Airbus A380 orders and deliveries

| | A380-800 |
|-------------------------|------------|
| First flight | 27/04/2005 |
| Orders (all-time/2019) | 291/-31 |
| Deliveries (total/2019) | 240/6 |
| Backlog | 51 |

Airbus A380 specifications

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

Boeing 737

The grounding of the Boeing 737 Max family has been one of the commercial aviation industry's most important events in this or any year. The move came following the crash of an Ethiopian Airlines 737 Max 8 on 10 March, less than six months after the loss of a Lion Air Max 8. Investigations into the two accidents led to the aircraft's Maneuvering Characteristics Augmentation System being identified as a major contributing factor and three days after the Ethiopian crash, all Max aircraft were grounded.

Deliveries of 737 Max models in 2019 up to

that point had numbered 57 and no further deliveries have been made. However, in its third-quarter results, Boeing included the assumption that regulatory approval of the type's return to service would occur in the fourth quarter of 2019, although a number of operators – including Southwest Airlines and Air Canada – have already announced that the aircraft will not feature in their schedules until the first quarter of 2020.

At the time of grounding, Boeing was implementing a production increase of the family to 57 aircraft per month, to be achieved during 2019. The company has continued to assemble aircraft, which have been parked. When announcing its expectation of the Max's return to

service, Boeing highlighted its desire to reach that 57 aircraft per month rate by late 2020.

The programme did receive a boost during the Paris air show in June when IAG revealed it had signed a letter of intent to buy 200 Max aircraft, featuring an unspecified split between the Max 8 and the Max 10. IAG said the aircraft would be operated by a number of its airlines, including BA, Level and Vueling. No firming up of the order has yet been announced.

Meanwhile, previous-generation 737s – the NGs – have continued to be delivered. The backlog at the end of September stood at nine, suggesting that by the time the Max is cleared to fly again, all of the NGs are likely to have been handed over. ■

Boeing 737 orders and deliveries

| | 737-700 | 737-800 | 737-900 | 737 Max 7 | 737 Max 8* | 737 Max 9 | 737 Max 10 | Variant TBC |
|----------------------------|------------|------------|------------|------------|------------|------------|------------|-------------|
| First flight | 09/02/1997 | 31/07/1997 | 03/08/2000 | 16/03/2018 | 29/01/2016 | 13/04/2017 | | |
| Net orders (all-time/2019) | 1,134/0 | 4,991/0 | 557/0 | 57/-3 | 2,776/-50 | 147/0 | 531/0 | 1,273/-144 |
| Deliveries (total/2019) | 1,134/0 | 4,982/29 | 557/22 | | 357/49 | 28/8 | | |
| Backlog | 0 | 9 | 0 | 57 | 2,419 | 119 | 531 | 1,273 |

* 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 | 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

Operators are being cautious about when type will be reintroduced into schedules

57

Total Max deliveries in 2019 before grounding



Boeing 747

While Airbus has opted to set a date for the end of A380 production, the Boeing 747 line is still delivering aircraft, thanks to its continued presence in the market for new widebody freighters.

And while Cirium fleets data reports that the backlog at the end of September was just 19, the Air Cargo section of Boeing's latest Commercial Market Outlook presents the manufacturer's confidence in the 747-8F as a going concern, although there have been no new orders so far this year.

The Commercial Market Outlook predicts 4.2% air cargo traffic growth for the 2019-2038 period. This translates into an increase from the 2019 large widebody freighter fleet of 580 air-



Air cargo market is supporting demand for the jumbo

craft to a requirement for 840 in 2038.

While some of the aircraft creating that expanded fleet in this market segment will be conversions, there is still a place for new freighters. With no A380F available other than via a hypothetical modification, this leaves Boeing in a strong position to pick up orders. ■

19

Backlog for 747-8F, as at end September 2019

Boeing 747 orders and deliveries

| | 747-8I | 747-8F |
|-------------------------|------------|------------|
| First flight | 20/03/2011 | 08/02/2010 |
| Orders (all-time/2019) | 36/0 | 107/0 |
| Deliveries (total/2019) | 36/0 | 88/5 |
| Backlog | 0 | 19 |

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

Like the 747, the 767 production line is also dependent on sales of new freighters. However, Boeing has been trying to develop a New Mid-

market Airplane for some time and with its resources stretched, some industry observers have posited the idea of a re-engined 767. The prospect seems slim, but the aviation industry has made unexpected moves before.

The Boeing Commercial Market Outlook

forecasts a rise in the medium widebody freighter fleet from 640 to 1,200 over the period from 2019 to 2038. Unlike the large widebody freighter market, this will be a tougher sector in which to gain new orders for the 767-300F because it has the A330-200F for competition. ■



Medium widebody faces competition from A330-200F

Boeing 767 orders and deliveries

| | 767-300F |
|-------------------------|------------|
| First flight | 20/06/1995 |
| Orders (all-time/2019) | 327/10 |
| Deliveries (total/2019) | 267/13 |
| Backlog | 60 |

Boeing 767 specifications

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

1,200

Boeing projected medium freighter fleet size by 2038

Boeing 777

The Boeing 777 is another programme where the backlog for the passenger model is dwindling while the manufacturer presses on with the introduction of new models to the family. The highly successful 777-300ER picked up new orders in 2019 but by the end of September, only 33 of the type were left in the backlog.

Meanwhile, the 777X has built a substantial orderbook of 344, with all but 53 being for the 777-9. At present Emirates (35 orders), Qatar Airways (10) and Etihad Airways (eight) are the only customers announced for the 777-8. The Etihad orders are effectively on hold as in February the carrier indicated that it would only take six 777-9s rather than its 2013 order of 17 777-9s and eight 777-8s.

The first 777-9 came together in November 2018 at the company's Everett plant. As yet, though, the aircraft has not made its first flight, which was originally planned for this year. In early September, Boeing had to suspend load testing after a reported cargo door failure during the final testing of the static test aircraft.

In August, the company said it would delay the 777-8's schedule. However, the model – designed to carry 384 passengers in a two-class configuration and fly up to 8,730nm (16,000km)



All but 53 out of 344 777X orders are for the -9

– has returned to the fore as it has been chosen by Boeing to compete in Project Sunrise. This is the challenge set by Qantas to enable the

carrier to operate nonstop flights from London and New York to cities on Australia's east coast, most notably Sydney. ■

Boeing 777 orders and deliveries

| | 777-300ER | 777F | 777-8 | 777-9 | 777-8/9 |
|-------------------------|------------|------------|-------|--------|---------|
| First flight | 24/02/2002 | 14/07/2008 | | | |
| Orders (all-time/2019) | 839/2 | 234/15 | 53/0 | 281/18 | 10/0 |
| Deliveries (total/2019) | 806/12 | 174/20 | | | |
| Backlog | 33 | 60 | 53 | 281 | 10 |

Boeing 777 specifications

| | 777-300ER | 777F | 777-8 | 777-9 |
|-----------------------|-----------|-------|-------|-------|
| MTOW (t) | 351 | 349.7 | 351 | 351 |
| Seats (two-class/max) | 336/550 | | 384 | 426 |
| Payload (t) | | 102 | | |
| Range (nm) | 7,370 | 4,970 | 8,700 | 7,300 |

Boeing 787

At 1,452 net all-time orders, the 787 Dreamliner family is close on the heels of the 777 as Boeing's best-selling widebody twinjet. While the 787 has not quite taken that record, it has set a benchmark of a different kind with the first nonstop commercial flight from New York to Sydney.

The flight lasted 19h 16min and was part of

Qantas's test programme for Project Sunrise.

The 787-9 has actually been the bright star of the family this year in terms of pushing up net sales. Its orderbook has grown by 69, while the 787-8 total has remained static and that of the 787-10 has risen by 14.

There have, however, been some important deals. At the Paris air show, Korean Air announced a commitment to buy 10 additional 787-9s and 10 new 787-10s, as well as agreeing

to lease a further 10 787-10s from Air Lease.

The slower growth in sales has had its effect though. In its third-quarter of 2019 results, Boeing said that from late 2020 it would reduce production of the 787 from 14 currently, to 12 aircraft a month.

In service, some Rolls-Royce Trent 1000-powered 787s have been suffering blade problems, including deterioration issues on the newest model, the Trent 1000 TEN. ■



Japanese carrier received its first -10 in March

69

New commitments for 787-9 so far during 2019

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/2019) | 442/0 | 818/69 | 192/14 |
| Deliveries (total/2019) | 359/5 | 494/90 | 40/25 |
| Backlog | 83 | 324 | 152 |

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

While the orderbook for Comac's C919 narrow-body remains static at 305 – the last firm orders were announced on 19 September 2017 – the flight-test programme continues to make progress, with the fifth prototype having completed its maiden sortie on 24 October. One further prototype is planned and is expected to take to the air before the end of 2019.

Beyond firm order figures, the combined number of options, letters of intent and memoranda of understanding totals 703. Notable among these is “a strategic co-operation” announced in June 2018 between HNA Group and Comac, for the purchase of 200 C919s.

The most recent official scheduled date for certification, delivery and entry into service was late 2020 or early 2021. Recent reports, however, indicate that Comac is very likely to delay that date by about another year. China Eastern Airlines is the launch customer.

Production is scheduled to begin by the end of this year, following the start of component production for the first batch of C919s in September. Production of the aircraft's wingbox and other components is in progress.

Comac itself is in charge of building the main fuselage and wings, plus final assembly. Its partner, Chengdu Aircraft, is building the front fuselage and nose, while another partner, Xian Aircraft, is developing the main fuselage and wingbox segments. ■

Comac C919 orders and deliveries

| | C919 |
|-------------------------|------------|
| First flight | 05/05/2017 |
| Orders (all-time/2019) | 305/0 |
| Deliveries (total/2019) | |
| Backlog | 305 |

Comac C919 specifications

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

Flight-test campaign now involves five prototypes

200

HNA commitments, announced June 2018



Irkut MC-21

Since March 2019, Irkut has had three MC-21-300 test aircraft in the air as part of its flight-test programme. The third prototype's maiden sortie came shortly after flight-test specialists from the European Union Aviation Safety Agency (EASA) had their first flight session with another of the prototypes. The EASA crew evaluated various flight modes during flights lasting between 2h 30min and 4h.

All three aircraft in the flight-test programme are powered by Pratt & Whitney PW1400G engines, but Aviadvigatel PD-14 units are expected to be installed on an MC-21 shortly. That aircraft is due to take to the air early next

year. Two PD-14s have been transferred to Irkut and the plan is for a further pair of engines to be delivered by the end of 2019.

Irkut plans to install an all-economy cabin with 211 seats in its fourth MC-21-300 prototype, reporting that it will have seats at 28in pitch towards the front of the cabin and 29in seat pitch at the rear.

Cirium fleets data has the MC-21 with 175

175

Total firm orders, as per Cirium fleets data

firm orders, with the last of these having been announced in July 2017. Of these, 18 are for the smaller MC-21-200, while the rest are for the MC-21-300. Commitments via letters of intent or memorandums of understanding total 160.

The most recent of these came at the MAKS Moscow air show, when Yakutia signed a tentative agreement for five MC-21-300s and Bek Air 10.

The flight-test programme has not been without hitches. Aircraft number 3 is reported to have experienced a landing-gear problem during a flight on 3 October. The company acknowledged that “a landing-gear deployment indication ‘malfunctioned’ during the final stages of the flight”.

The MC-21-300's certification date and entry into service are planned for 2021. ■

CRAIC

CR929

Still seeking its first firm order, the CR929 wide-body being developed by CRAIC is currently at the design definition stage. The Comac-United Aircraft joint venture aims to follow that with configuration definition as the next milestone.

During this year's MAKS Moscow air show, CRAIC and its parent companies held a meeting of the CR929 Program Consultancy Committee with airlines and other relevant companies invited to attend. At MAKS, a full-size cabin mock-up of the CR929 was demonstrated for the first time in Russia. This was based on the CR929-600, the baseline member of the three-aircraft family, which is designed to carry 280 passengers in a three-class layout for up to 6,480nm (12,000km). The largest member of the family, the CR929-700, has capacity for 320 – again in three classes – and its planned range is 5,400nm.

Although some reports have stated that the smallest member of the family will not automatically be developed, both parent companies include it on their websites. This model, the CR929-500, will be able to carry 250 passengers over 7,560nm.

2025

Timetabled date for CR929's first flight



Concept design is expected to be completed early next year

CRAIC plans to complete the concept design early next year, before freezing that design in the first half of 2022. The type's first flight is currently scheduled for 2025.

Comac will take responsibility for producing the CR929's fuselage and completing final assembly in Shanghai. The aircraft's composite wings, empennage, and tail section will be produced in Russia. In fact, 50% of the CR929's airframe will be made from composite materials.

No engine choice has yet been made, nor major suppliers announced, and a Western engine is expected to be on the first prototype. Powerplants from both China and Russia are being developed, however. Aero Engine Corporation of China has the AEF 3500 in development, while United Engine aims to deliver the Aviadvigatel PD-35-1 demonstrator unit by 2023 before moving to production. ■

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 |

One MC-21-300 experienced a fault with landing gear on 3 October



Irkut MC-21 orders and deliveries

| | MC-21-200 | MC-21-300 |
|-------------------------|-----------|------------|
| First flight | | 28/05/2017 |
| Orders (all-time/2019) | 18/0 | 157/0 |
| Deliveries (total/2019) | | |
| 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 |