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AIRBUS



Blue-ice runway operations

Airbus ACJ to Antarctica

An Airbus Corporate Jetliner (ACJ) is now flying regularly to and from Antarctica, transporting scientists more quickly and in greater comfort than by ship. The flights are the first to Antarctica by any airliner, the first landings on ice by

any Airbus aircraft, and mean that the Airbus ACJ Family is now flying on every continent, highlighting the versatility of the family. Captain Garry Studd explains operation of the aircraft in Antarctica.



David VELUPILLAI
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Airbus Customer Affairs

Operations

It is approaching midnight in Australia, and Captain Garry Studd is preparing to fly a group of research scientists in Skytraders' Airbus Corporate Jetliner (ACJ) to Antarctica. The flight takes just over four and a half hours, so it means a landing in the middle of the night - albeit in daylight, because of the midnight sun.

Why not during more civilised hours? The reason is to have a colder temperature on the Wilkins blue-ice runway where they will land, and it highlights the contrasts and paradoxes of the Antarctic.

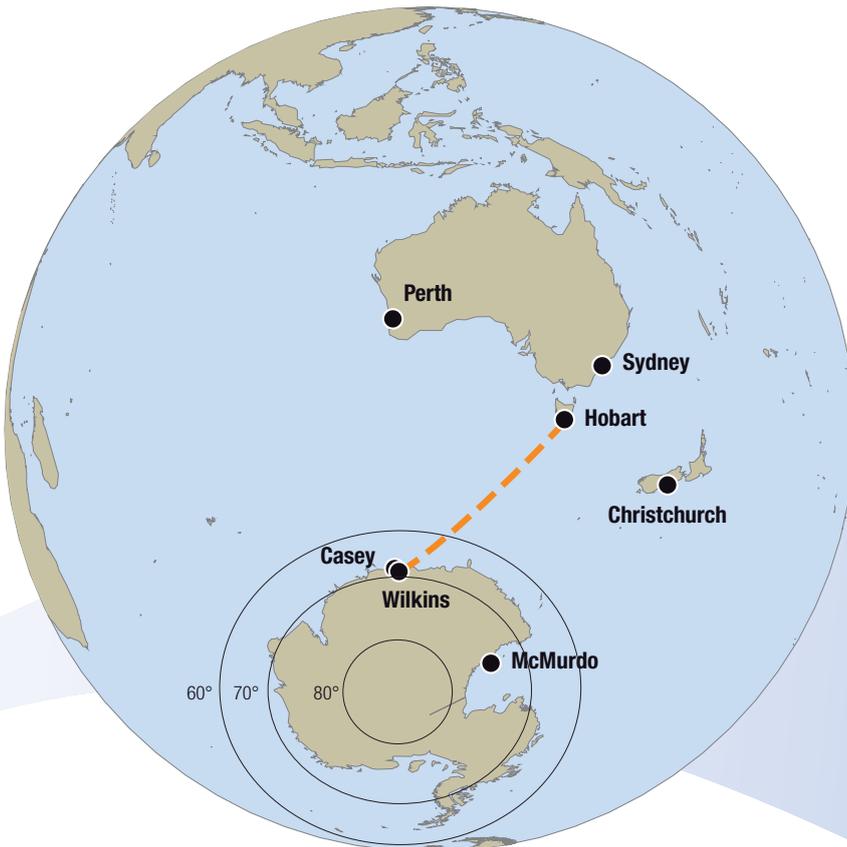
We think of the Antarctic as being one of the coldest places on Earth, and indeed it is, with winter temperatures falling below -60° Celsius. But it is summer and, in the daytime, it rarely drops below -20° Celsius.

Landing at night when the temperatures are lower means that the ice runway will have a better surface coefficient of friction. There are about 2,500 feet of ice underneath the runway, and solid ground underneath that - unlike the Arctic, where there is only ice - but it is, of course, the ice on the surface that matters. Much about the Antarctic is impressive. Some 80 per cent of the world's fresh water is locked up in its ice, and it is one of the world's coldest, loneliest, most beautiful and most unspoiled places.

Garry Studd has wanted to be a polar explorer since the age of about seven, has been involved in the Antarctic for more than 31 years, and is probably one of the world's most experienced Antarctic pilots.

So what's it like taking an Airbus aircraft to Antarctica and landing on an ice-runway?

► **Midnight sun:**
the Earth's tilt means 24 hours a day of sunlight in summer in the southern polar region.



Garry Studd says: ‘The landing and stopping are not a problem – braking action is only slightly worse than landing on a wet runway - our biggest challenge is lateral control and handling the aircraft on the ground, especially in strong winds, when there is risk of the whole aircraft trying to ‘weathercock’ (point its nose into wind)’. He continues – ‘The team on the ground measures the friction coefficient every 500 metres along the runway before we land and reports to us by radio – if it is okay we land, and if not we turn around.’ In practice, the Airbus ACJ pilots are looking for a runway friction coefficient of around 0.20 or better, before they will commit to a landing.

‘Blue-ice’ simply means a runway surface that is kept clear of snow by the wind and, at Wilkins, a 30 knots wind is typically what you get. Meteorological measurements, made before the runway was built, allowed its centreline to be aligned with this wind.

‘The challenge comes when you try to turn the aircraft around at the end of the landing roll,’ continues Studd, ‘so we deliberately restrict the Airbus ACJ’s centre-of-gravity when landing on ice to

keep a better distribution of weight on all three landing gear to optimize the bearing strength of the ice and also assist us to make a 180 degree turn on the blue-ice runway in winds of up to about 50 knots.’

Skytraders operates its Airbus ACJ with four additional centre tanks (ACTs) in its cargo-hold – there is room for a maximum of six – and appreciates the aircraft’s outward-opening cargo doors, which maximizes the remaining cargo space. The extra fuel carried in these tanks allows Skytraders to fly its Airbus ACJ to Antarctica and back without refuelling, which brings several important benefits. ‘First, it means that if the weather is not good enough for a landing, we can always turn around and fly back to Australia, which is pretty important when you recognize that there is no nearby alternate,’ comments Studd. ‘Secondly, the Antarctic is very much a pristine, unspoiled place – one of the reasons it is so valuable to scientists – so avoiding refuelling means that there is no risk of contamination from a fuel spill. And thirdly, transporting fuel to the Wilkins runway would make it very costly – perhaps as much as \$25 a gallon.’



Approach to the Wilkins runway, note PAPI lights on the left of the runway



Landing on the Wilkins runway

Skytraders looked at a range of aircraft ranging from small to large before choosing the Airbus ACJ for its Antarctic operations. ‘We wanted an aircraft without a point-of-no-return for the mission,’ says Studd, and the Airbus ACJ’s very long range and modest size and weight make it great for the job.’

It operates the flights to and from the Antarctic on behalf of the Australian Antarctic Division, and the big benefit it brings is a reduction in the time it takes to get scientists and their equipment to and from the region. ‘Under the best conditions, it takes about ten days to go by ship from Hobart to the base at Casey, but it can take three or four weeks if you get stuck in the ice,’ points out Studd. ‘The Airbus ACJ also costs less a day to run than a ship, says Studd, ‘and freeing one up is helpful for marine research.’ The rapid flight time is also of direct benefit to some scientists. He cites the example of one researcher that makes measurements of an isotope buried in 1,000 metre long ice cores that are drilled out of the ice. The isotope breaks down in about 24 hours so, until the flights began, it was not possible to get them back to the labora-



tory in time for meaningful research. Some of the ice in these cores dates from a million years ago, making it a very special and unique insight into the Earth’s past. Other Antarctic research covers many other fields – such as atmospheric measurements, geology, glaciology and work involving plants and animals.



Runway flyover

On the way



Skytraders' Airbus ACJ flights also make research more accessible to scientists – who might not be able to afford to devote the month or two that travel by ship would demand, but would be able to spare a week or two. It also makes emergency evacuation flights possible and, if equipment breaks or something needs replacing, then it can easily be flown out very quickly.

Skytraders' Airbus ACJ features an airline-style layout, with 28 seats in business class, and 54 in economy. Flights to the Antarctic typically carry around 20-25 passengers, however, which is well within the 40 or so persons that can be accommodated in the emergency shelter at the Wilkins runway (the main Australian research base is at Casey, about 60 kilometres away).

The Antarctic flights leave from Hobart in Tasmania, and are run as a full public transport operation – one of the benefits of the Airbus ACJ is that it is fully certificated

for such operations – under the company's own Air Operator Certificate (AOC). They are flown during the Antarctic summer, which typically runs from end-October to early-March. Because the routing takes the Airbus ACJ far from nearby airports, the flights are flown under 180 min Extended Time Diversion Operations, which are like ETOPS (Extended Twin-engine Operations), but with some additional requirements. Based on experience to date, Skytraders' Airbus ACJ typically does two or three trips a week at the start and end of the season, when there is the most need for getting people and equipment to and from the site, and an average of about one trip a week during the rest of it.

The blue-ice runway at Wilkins is certificated to the same high standards as other Australian airports, including Sydney. It took four years to build, and is the largest

certificated aerodrome in Australian territory. Situated 70 kilometres inland, and at a height of 2,500 feet, the Wilkins runway is 4,000 metres long and 100 metres wide. It comprises levelled blue-ice, and has to meet the same stringent standards required of other Australian airports – including no bumps above a certain height and other conditions. Creating and maintaining a surface of compacted snow, which offers better braking action, is a constant challenge, and the surface can easily be destroyed by a blizzard. Fortunately, the blue-ice runway underneath can still be used for landings, albeit with some limitations.

Skytraders made its first Airbus ACJ landing in the Antarctic on 19th November 2007, at the US base in McMurdo Sound, where the facilities are much larger and longer established. This was followed by a first landing at Wilkins on 9th December, and full operations were certificated by Australia's Civil Aviation Safety Authority (CASA) in January 2008. 'We very much appreciated the support from Airbus for these pioneering flights, especially that of Airbus pilot John Quinnell, who has been the life and soul of our operation in the Antarctic, and that of retired Vice President Flight Division Pierre Baud, who was with us on our very first landing at Wilkins Runway,' says Studd.

One of the big challenges of regular Antarctic flights is, of course, the risk of an aircraft becoming unserviceable on the ground. Skytraders works actively to minimize the risk, by keeping the aircraft well maintained and only committing to landings when everything is in good working order. Like other corporate jet operators around the world, it also flies with an engineer on board. The Auxiliary Power Unit (APU) is started at top-of-descent, for example, to ensure that there are at least two sources of air for an engine start on the ground (the APU and the ground power

unit). 'We also tend to avoid changes to the aircraft configuration until we are sure that we can land', says Studd.

But what happens if the worst happens, and the aircraft becomes unserviceable on the ground? 'It might take time, but we would find a way to fix it,' says Studd. 'The Antarctic is a very special place, and people help each other,' he adds. 'We tend to go only when the weather is good', says Studd, 'and in the Antarctic the weather is usually either very, very good, or very, very bad.'

'In practical terms, we are looking for a cloud base of 2,000 feet or more, and a visibility of at least 10 kilometres, before we will commit to a landing', he adds. 'In weather terms, one of the biggest dangers is the lack of surface definition in the landscape, making it hard to judge how far away things are, and how high you are above them', points out Studd. 'This is exacerbated by a phenomenon known as whiteout, which can occur even when there is a high cloud-base and, sometimes, unlimited visibility.'

An established Global Positioning System (GPS) approach is used when flying into Wilkins, and all of the bearings are 'true' rather than magnetic.

'We operate in 'true' or grid-based navigation below a latitude of 60° south', says Studd, 'and making the transition is very easy in the Airbus ACJ – everything goes to 'true' on the push of a button'. Precision Approach Path Indicators (PAPI) provide the final guidance in the final phases.

'We will only land if there is less than 5 knots of cross-wind, we have 'primary' GPS navigation and if the runway friction coefficient is 0.2 or better', explains Studd. 'We fly a fully managed approach and will typically use medium autobrake for the landing', adds Studd.



► **True VS magnetic:**

Magnetic compasses behave erratically close to the poles, and navigation based on a true or grid reference is used in the polar regions.

‘Once on the ground, we minimize use of the nosewheel steering to avoid skidding’, he adds.

The edges of the runway are marked by canvas markers on canes, which have to be put out for each aircraft arrival and departure, or they would blow away. Eight full time staff are responsible for weather reporting, and for clearing and preparing the runway for each landing.

‘Ice is dynamic, and one of the peculiarities of the Wilkins runway is that its threshold moves at about 12-15 metres a year, significant, but not enough to affect our day-to-day operations’, points out Studd.

After landing, we leave the slats and flaps in the ‘1 + F’ configuration, which allows easier detection of any trapped ice and snow and is also the setting that we will use for takeoff.

Once the Airbus ACJ has landed, it usually stays just long enough to unload and reload passengers and equipment. This usually takes about one and a half to two hours, during which the engines are shut down but the APU is kept running. ‘When it is -20° Celsius and blowing 50 knots, however, things take a bit longer’, points out Studd. ‘We operate with three pilots on board’, says Studd, ‘which gives us some reserve for the unexpected, such as one of us being incapacitated by slipping and falling on the ice. With the engineer and a flight attendant that makes a crew of five’, he adds. ‘We are sometimes faced with snow blowing along the surface and, in such conditions, the good clearance between the Airbus ACJ’s engines and the ground are a further plus’, he adds. ‘When it is time to leave, we do a wing anti-ice check, then we start the engines and it is back to Australia for the Skytraders Airbus ACJ - until the



next mission'. 'During the past season we flew a total of 12 flights, turned back twice for weather reasons, and achieved 100 per cent reliability', says Studd.

The Antarctic flights are only one part of Skytraders' use of the Airbus ACJ, however. Studd points out that the aircraft is the first of its kind in Australia that it is available for charter, and that it has already done many flights of this kind. 'We're expecting to fly about 300-400 hours a season, and are very pleased with what we have already achieved with our Airbus ACJ operations', says Studd. 'The Airbus ACJ has more than demonstrated its versatility and reliability in operations to one of the most hostile places on Earth, and we are glad to have it in our fleet', he concludes.

► **'Antarctica in brief'**

Antarctica comprises some 13 million square kilometres - more than the whole of Canada and the United States put together, and about twice the size of Australia. Paradoxically, for a land that has so much of the world's freshwater locked up in its ice cap, Antarctica is a very dry place. Parts of the ice cap are more than 14,000 feet high, and even the South Pole is some 9,250 feet high. Nobody owns Antarctica although several countries, including Australia, have territorial claims.

Some 45 countries are signatories to the Antarctic Treaty, which currently ensures the future of Antarctica for scientific, non-commercial and peaceful purposes. Australia has the largest claim to Antarctica - just over 40 per cent - and runs three scientific research bases, at Casey, Mawson and Davis. Turboprop CASA 212s - equipped with skis - and operated by Skytraders are also used for flights within Antarctica on behalf of the Australian Antarctic Division.

► **'Airbus ACJ Family'**

Airbus has created corporate jet versions of its aircraft from time to time since its early days, but it was not until 1997 that it entered the market in a more comprehensive way, with the launch of an A319 derivative called the Airbus Corporate Jetliner (ACJ). Featuring a VIP or other cabin chosen by the customer, extra fuel-tanks in the cargo-hold for intercontinental range, high-thrust engines for good takeoff performance, built-in airstairs and a richer specification, it has established itself as the new top-of-the-line in corporate jets,

delivering more comfort and space than traditional business jets. The Airbus ACJ Family, which now comprises the A318 Elite, ACJ and A320 Prestige, has won more than 100 sales, worth more than \$5.5 billion since its inception, and continues to win new business from private clients, companies and governments. It is complemented by VIP widebodies ranging from the A330/A340 through the A350 and all the way up to the A380, for customers that want even more comfort and space, as well as the range to fly 'non-stop to the world'.



▶ **Garry Studd**

has wanted to be a polar explorer since he was seven years old and, when he was just 16, led an expedition to Spitzbergen, within the arctic circle. He originally attempted to qualify as a doctor, but became a pilot instead when this did not work out. He began flying in Antarctica in 1977, where he was Chief Pilot for the British Antarctic Survey, flying Twin Otters, until 1984. He has continued his involvement with Antarctic flight operations for various organizations to date. His passion was development flying and, from 1984-1988, he ran the flight test department of Decca Navigator in the UK (later Racal Avionics and THALES). From 1990 he was Chief Pilot of a major UK executive jet charter company and latterly ran his own company specialising in training Falcon 900 business jet pilots and, for part of this time, he also flew Falcons for a private customer. In 2004, Garry went to Australia to become Deputy Chief Pilot for Skytraders. He has flown some 17,000 hours, of which about 6,000 are in the Antarctic. His interests include skiing and woodworking.

CAPTAIN GARRY STUDD ACCEPTS AIRBUS AWARD ON BEHALF OF SKYTRADERS - AIRBUS ACJ FORUM IN PARIS, 2ND APRIL 2008

Captain Garry Studd, Skytraders' Deputy Chief Pilot (centre), accepts the Airbus award for Skytraders' pioneering of the first flights to the Antarctic by any airliner, the

first landings on an ice-runway by any Airbus aircraft, and the first operations on the continent by an Airbus Corporate Jetliner.

The award was presented by Charles Champion, Airbus EVP Customer Services (left) with Antoine Vieillard (right), Airbus VP A320 Family and CJ/VIP Programme within Customer Services.



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Conclusion

Antarctica, once the preserve of polar explorers, is now regularly accessible to scientists through regular flights by the Airbus ACJ, helping us to understand more about our planet. Conscious of the need to preserve this pristine wilderness for generations to come, the flights are made in an environmentally responsible way,

with careful preparation and operation helping to ensure safety in challenging surroundings.

The Airbus ACJ's ability to handle a wide range of climatic conditions means that it takes these demanding operations in its stride, highlighting once again the versatility and operational flexibility of the modern Airbus family.

