



Australia has selected the Airbus 330 as the KC-30B (PHOTO: EADS)

AIR TANKERS

THE FUTURE FLYING GAS STATIONS

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Modern air forces are able to travel much greater distances to targets than their forbearers, but there remains a limit to the amount of fuel that can be carried by small fighter-bombers. Strategic reach is important to most armed forces and a small show of force at distance can often be enough to deter or dissuade an enemy. To accomplish the Vulcan bomber raids on the Falklands in 1982, the RAF put in a massive effort involving two Vulcans and 12 tanker aircraft to ensure that the bombers could reach and strike targets such as Stanley airfield. Today the role of tankers is just as critical.

To have truly strategic range and the capability to attack targets or support forces around the globe without local basing an air force needs to be able to get fuel to its aircraft in flight. Tanker aircraft are, in effect, flying gas stations that given the right equipment aircraft can use to refuel. Such aircraft give air forces far greater reach and ensure that when aircraft strike targets deep in enemy airspace they have the fuel to get there and back.

In Asia, there are few air forces that can afford the luxury and expense of operating tanker aircraft

and for many regional air forces the doctrine is based on local air defence and operation in the local area. The People's Liberation Army Air Force (PLAAF), for example, sees its key roles as air defence and, in the case of an operation against Taiwan, support to ground forces and local strategic bombing. However, some nations view their role in the world as being less localised and for these countries a key capability has been the procurement of tanker aircraft.

As expected among these nations can be counted Australia, India and Japan who all see their role in the world in a larger context. In addition,

a number of other countries such as Malaysia and Singapore have retained a certain level of capability. In the case of the latter much of this has to do with its need to constantly travel strategic distances to partner nations such as Australia and the US to find the airspace to train in.

In Asia, the procurement pattern for tanker aircraft is mirroring activities elsewhere with both the US and European countries looking to update their tanker capabilities as the current generation of aircraft come to the end of their service lives. Projects have been launched by Canberra and Tokyo, among others, to update their

fleets. The pressing questions for air forces in the region are what are the current capabilities and where will tanker technology go next.

REFUELLING TECHNOLOGY

The major contention in terms of technology is the hose-and-drogue versus boom debate. In framing the debate the key is that historically, all boom-equipped tankers have a single boom and can refuel one aircraft at a time with the mechanism while those aircraft that employ the hose-and-drogue system, can simultaneously employ at least two such mechanisms and, refuel two aircraft simultaneously. The trade-off is that the boom can dispense fuel faster than a hose-and-drogue.

Another consideration is that unlike the large bombers that the booms were designed for fighter aircraft cannot accept fuel at a boom's maximum rate, which negates the flying boom's primary advantage when refuelling fighters, especially when the boom is only capable of refuelling one aircraft at a time. However, Boeing has developed a new generation boom that can refuel multiple aircraft and the use of a boom retains the option to refuel large aircraft, such as airborne surveillance and transport aircraft.

There is also a cost implication to be considered when choosing the right system. Structural modifications to commercial aircraft to accommodate a flying boom are more significant than the modifications for hose-and-drogue

mechanisms. The boom itself also costs more than the hose-and-drogue and its operation is more complex. These factors need to be weighed up when a nation is looking at acquiring an AAR capability.

POST-SOVIET HANGOVER

Currently the Indian Air Force's (IAF's) strategic reach is based around the country's Il-78MK1 Midas tanker aircraft supplied by Russia. Earlier in the year one of the tankers was used to support the deployment of squadron of IAF Su-30 fighters that travelled to the UK to conduct exercises with the RAF. The Il-78 is the tanker version of the Il-76 transport aircraft that began life in the 1970s. Work on the tanker version is believed to have begun in the 1980s.



The KC-30Bs will be able to leverage civil airline maintenance to reduce costs. (PHOTO: EADS)

The Midas is a three-point tanker using a probe and drogue and can carry a maximum payload of 48,000 kg. The three external fuel pumps for simultaneous refuelling of up to three aircraft are situated on the wingtips and at the rear of the aircraft.

The total fuel capacity of the Il-78M is believed to be some 138 tons, of which 105.7 is transferable. The aircraft has a maximum speed of 850km/h and a range in excess of 7,000km. India has a total of six aircraft that were ordered in 2003 and are flown by 78 Mid-Air-Refuelling Squadron. Having just procured the six aircraft the IAF has little in the pot for further such capabilities and the Il-78s give the IAF the strategic reach it needs with regards to potential adversaries in the region.

Both Pakistan and China are believed to have also taken an interest in procuring the Il-78 Midas. The PLAAF is reported to have ordered eight of the aircraft in 2005 as part of a larger purchase including 30 Il-76MDs that would also modernise its transport fleet. However, delivery of the order has been delayed because of increased production costs and a financial dispute between Russia and the factory in Uzbekistan where the aircraft are being built. As a result the PLAAF remain reliant on its own solution based on its H-6 (Tu-16 Barger) medium bombers. The Pakistan Air Force is also believed to have ordered four of the aircraft, this time from Ukraine, as part of its modernisation plans. However, little is known about the potential delivery schedule.

AGING FLEETS

Australia procured its first air-to-air refuelling (AAR) capability in the mid-1980s when the Royal Australian Air Force procured four Boeing 707 variants to use for both refuelling and transport missions. Currently, the aircraft are operated by No 33 Squadron and can be configured in different ways to allow the best mix of passenger and cargo space for a mission.



The RAAF is in the process of replacing its aging 707 tankers.

In its tanker role the RAAF's 707s can carry up to 43 tonnes of fuel and are regularly used to deploy the service's F/A-18 Hornet squadrons to Singapore and Malaysia to take part in regional exercises. The wingtip refuelling pods are removable to reduce weight and drag and increase range on non-tanker missions. The aircraft have a range of 7,600km and can fly at up to 890km/h. However, the aging airframes are difficult to maintain and Canberra has launched a replacement project.

The Royal Malaysian Air Force (RMAF) operates two KC-130H tanker variants of the Lockheed Martin Hercules. The aging aircraft have become increasingly difficult for the RMAF to operate successfully the issue being compounded by the fact that the aircraft were originally configured for maritime patrol operations. The RMAF is in a period of modernisation with the service bringing on stream new aircraft such as the Su-30MKM. At some point that modernisation is likely to take in options for replacing the KC-130Hs.

Malaysia's city-state neighbour,

Singapore, has more recently updated its AAR capability. The Republic of Singapore Air Force (RSAF) operates four Boeing KC-135 Stratotanker AAR aircraft that were purchased in the late 1990s. The aircraft, which form 112 Squadron, are based out of Changi Airbase, but three of the four aircraft are more or less permanently in the US supporting Singapore's training presence in the country.

The KC-135, which is also operated by the US, France and Turkey, is derived from the Boeing 367-80 (Dash-80) and has gone through a number of upgrades since its initial introduction in to service in the 1950s. However, users have recognised that the airframe is coming to the end of its life and the US Air Force has launched a replacement programme, as support drops off it is likely that other users, such as the RSAF, will also be forced to look for a replacement.

However, in the meantime the RSAF's KC-135s remain a potent capability and have allowed the city-state to make meaningful contributions to operations. On a number of occasions Singapore has

offered its KC-135s as part of coalition force generation for Iraq. The aircraft has a maximum speed of 933km/h and can carry up to 95,000kg of fuel. At a range of 1000nm the aircraft is capable of offloading over 100,000lbs of fuel.

BOEINGS EARLY GAIN

In 2003, the Japanese Air Self Defence Force (JASDF) became the first customer in the region for Boeing's KC-767, to be called the KC-767J in the Japanese inventory. Tokyo was partially influenced by the fact that the JASDF already operated the E-767 Airborne Early Warning and Control aircraft and had an established maintenance infrastructure. Japan is to get four of the aircraft, which beat out a rival bid from Airbus based on the A310. The procurement marks a historic moment for the JASDF as the

KC-767 is the first AAR capability to be purchased by the force.

The first JASDF 767-200ER arrived at Boeing's Wichita, Kansas, facility in June 2005 to begin modification to the KC-767 baseline. The Japanese KC-767 test programme was scheduled to begin in the fourth quarter of 2006 and include a one-month, 100-hour flight test programme to test Japan-unique items. First flight was achieved in December 2006, but Boeing was unable to meet the ambitious target of a first quarter 2007 delivery.

After halts to the programme, Boeing announced in late August that it had resumed flight tests of the JASDF's first KC-767 "following the completion of scheduled ground modification work." Sources said that part of the hold-up has been caused by additional modernisation and

certification testing requested by the customer. There is no firm word on when delivery of the aircraft will take place.

For its requirement the JASDF selected the convertible freighter configuration of the KC-767 allowing the force to also use it for transport requirements. The KC-767 is configured with a fifth-generation air refuelling boom and the Remote Aerial Refuelling Operator (RARO II) system. The refuelling boom allows fuel transfer to multiple receiver aircraft.

For the JASDF's version the aircraft will have two pilots and one boom operator. The aircraft can operate at a maximum speed of 915km/h and an operating ceiling of 40,000ft. The maximum take-off weight of the aircraft is 186,880kg, including a 72,877 kg fuel load.



The hose and drogue system is more manpower intensive, as concerns routine maintenance. (PHOTO: RAAF)

AUSTRALIAN GOLD

However, Boeing was unable to sustain momentum in the region with another contract award by Australia. In the Australian project, Air 5402, the KC-767 was once again pitted against an Airbus offering, but this time the European aircraft manufacturer offered an A330 variant, dubbed the Multi Role Tanker Transport (MRTT).

The RAAF decided that the MRTT more closely fitted their requirements and an acquisition contract was signed in 2004 with Airbus parent company EADS-CASA. Under the contract Australia will acquire five MRTTs to replace the aging Boeing 707s it currently operates. In RAAF service the aircraft will be known as the KC-30B. Through-life support for the aircraft is being managed in a separate contract with Qantas Airways that was signed earlier this year and will include engineering, maintenance, spares, technical data, software and training support for the fleet.



An RAAF operator keeps an eye on tanking operations (PHOTO: RAAF)

It is reported that the project is currently on schedule and within budget to achieve the planned in-

service date (ISD) of late 2009. The ISD comprises delivery of two aircraft, completion of qualification testing and



Singapore is reliant on its KC-135 to get the RSAF's combat aircraft to areas of the world where they can train.

issue of the military airworthiness certificate. The military modifications to the A330 baseline include the installation of a refuelling boom under the aircraft fuselage and an air-refuelling pod under each wing.

A visual monitoring and control system for the air refuelling equipment will be installed on the flight deck, with a new two-person refuelling operator station. The boom, which will be a new capability for the RAAF currently reliant on the hose/drogue technology of the 707s, will allow the KC-30Bs to re-fuelled a wider variety of aircraft including the RAAF's C-17 transport fleet and other KC-30B tankers. According to the RAAF, the tankers will have a 111 tonne fuel offload performance, with a 65 tonne offload capacity at 1000nm from base with two hours on station.

In its transport role, the new aircraft will be capable of carrying up to 270 passengers. The under-floor cargo compartments will be able to accommodate 34,000kg of military and civilian cargo pallets and containers. This will give the aircraft far greater versatility for the RAAF, and the larger cargo carrying capacity was one of the reasons the aircraft was selected over

the KC-767.

THE FUTURE MARKET

Outside of the US and some other major nations AAR aircraft are unlikely to be ordered in large numbers because the cost of the assets can not be justified in terms of strategic need. However, the recent Japanese and Australian purchases show that there is steady business to be done in Asia. The two countries epitomise the two main types of customer.

Australia is among a group of countries that is, or in the near future may, look to replace an existing AAR capability with a new aircraft. Budget constraints also mean that at the same time as upgrading a capability procurement chiefs are looking to squeeze as much capability into a single platform as possible. In terms of AAR assets this largely means also making sure that the aircraft can swing-role as theatre/strategic transport assets.

One of the main reasons that Canberra opted for the A330 solution was the larger cargo payload capability that the aircraft offered. Among the other nations that may in the near future be looking to upgrade

their AAR capability is Malaysia and further out Singapore may also be looking for a more up to date solution.

The flip side of the coin is Japan, which is a new entrant to the AAR business, and with the KC-767J was looking for commonality with its existing assets. It remains to be seen how well the JASDF will be able to integrate the KC-767s, but the capability is a potent symbol of how Tokyo is taking an increasingly assertive stance in the region and further abroad.

Other nations, such as India and China, have been also been looking to advance their capabilities, but have looked to Russia rather than the West for technology. As the 21st Century progresses analysts believe that other countries in the region will also identify AAR as an important capability. South Korea is among those countries that are thought to be investigating the potential of procuring an AAR platform, especially as US forces progressively withdraw from the country and it has to take on more responsibility for its own security. As result, whether as a new capability or an upgrade of an existing fleet there will be a steady AAR market in the region for the foreseeable future.