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JUST

BY WAYNE ROSENKRANS

Infrastructure upgrades vary as airports anticipate the Airbus A380's entry into airline service.

The world's 29 or so airports aiming to create safe conditions for Airbus A380 operations and Boeing 747-8 service later on have plenty to consider, but nothing that is impossible through the use of existing standards, modified standards or waivers. But some are holding off infrastructure upgrades until final criteria have been set for them.

By late summer 2007, the U.S. Federal Aviation Administration (FAA) is expected to announce decisions that will affect A380 operations on U.S. airport runways and taxiways narrower than those prescribed for new large aircraft 20 years ago by the International Civil Aviation Organization (ICAO), says an April 2007 report by the U.S. Government Accountability Office (GAO).[1] In addition to safety-related airport readiness, the report assesses the A380's potential impact on the capacity of 18 U.S. airports and how 11 non-U.S. airports have prepared so far to address issues raised by the first airliner to fit the category of the largest aircraft, called Airplane Design Group VI.

"According to FAA officials, [the Airplane Design Group VI] standard helps ensure that pilots can safely operate large aircraft like the A380," the report said. "Although the design standards do not govern aircraft operations, aircraft operators must seek FAA's approval for certain aircraft to use facilities and infrastructure that do not meet standards and demonstrate to FAA that an acceptable level of safety is maintained."

The only other Airplane Design Group VI aircraft that some airports will have to accommodate in the near future is the 747-8 — the passenger model is expected to enter service in late 2010, the report said. "The A380 falls under ICAO's [airport] design standards for the largest aircraft (Code F), which require at least 60-m wide runways (about 200 ft)[2] and 25-m wide taxiways (about 82 ft)," the report said. The FAA's counterparts in several countries already have

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approved A380 operations on some 150-ft (46-m) wide runways at their airports, however, after determining that the airports will be able to provide a level of safety equivalent to ICAO standards and recommended practices (SARPs).

Airports have had three options for safely accommodating the A380 and other new large aircraft:

- Adhering to civil aviation authorities' regulations and guidance derived directly from ICAO SARPs for accommodating the largest commercial jets with Code F–level airport infrastructure;
- Requesting and obtaining approval for modifications of civil aviation authority standards — for example, by using interim guidance issued by FAA in 2003[3] for a five-year period or by following consensus-based recommendations[4] adopted specifically for the A380 since 2002 by the European Aviation Safety Agency (EASA), several European civil aviation authorities and Australia to provide an equivalent level of safety; or,
- Postponing infrastructure upgrades until the relevant civil aviation authority issues its final requirements.

Typically, the U.S. airports plan infrastructure changes to handle scheduled service and/or to accommodate diversions by new large aircraft based, in part, on whether A380 service likely will affect them in 2007/2008, 2009/2010 or after 2010. "The [FAA's interim] guidance allows the conversion of existing 150-ft wide runways to 200 ft by adding 25 ft [8 m] of [lesser] strength pavement to each side and extending the shoulders [typically for structural reasons or erosion control], and allows use of 75-ft [23-m] taxiways by widening shoulders … adding center lights [and imposing operating restrictions]," the GAO said in a 2006 report.[5] The 2007 report, however, said that among the 11 non-U.S. airports studied, "seven of the eight Asian and Canadian airports will not have to impose operating restrictions on the A380 to the extent of U.S. airports."

Infrastructure Upgrade Scope

According to Airbus, the A380 was designed to minimize airports' need to upgrade infrastructure. "The A380 is the first new large aircraft that has been designed to be compatible with existing airports, as the result of a 16-year-long dialogue with regulators, customer airlines, airport operators, pilot and trade associations and ground handlers," the company told the GAO.[6]

Nevertheless, some airports that want to accommodate Airplane Design Group VI aircraft have planned or completed upgrades to a wide range of infrastructure components, including runway and taxiway pavement and/or shoulders, fillets,[7] jet-blast pads, taxiway bridges, ground vehicle tunnels, signs, lights, pavement markings and safety areas, aircraft rescue and fire fighting (ARFF) capability, gates, fuel pits, airbridges, passenger lounges, drainage, utilities and/or aircraft maintenance hangars.

The broader context of the A380 introduction includes numerous actions by the FAA, Airbus, airports and other organizations to mitigate safety challenges, the report said. For example, minimum distances for wake-vortex avoidance to be applied by air traffic control (ATC) to crews of any aircraft trailing an A380 during flight are greater than for other aircraft types (Figure 1, page 48), although ICAO and Airbus expect that civil aviation authorities in time will reduce these distances — as occurred after the introduction of the 747-400.

Decisions about changes to accommodate new large aircraft have been relatively complicated for airports. "Of the 18 U.S. airports [that GAO] visited, 11 have applied for modifications to standards that would allow [airlines] to operate the A380," the report said. "Of the remaining seven airports, officials indicated they were unsure if such modifications will be needed and will decide whether to request modifications to standards after FAA decides whether an A380 can safely operate on a 150-ft wide runway or whether a 200-ft wide runway will be required."

Among reasons that EASA in December 2006 approved A380 operations

Wide Enough

on 150-ft wide runways and 75-ft wide taxiways as a general rule are the specific aircraft equipment and runway-to-taxiway centerline-deviation studies that showed that large aircraft do not deviate significantly from the centerline. "The A380 … is equipped with an external taxiing camera system to assist flight crews in keeping the aircraft in the center of taxiways when moving on the airfield," the 2007 GAO report said. "The cockpit was also designed to be much lower to the ground than other large aircraft to provide the flight crew better visibility."

ARFF Concerns

An unresolved safety challenge for some of the airports is providing sufficient ARFF capacity for new large aircraft. "Some fire and rescue officials at the airports [GAO] visited were confident in their ability to respond to an A380 incident," the 2007 GAO report said. "However, several of them identified additional equipment, personnel or training needs that would improve their ability to respond to emergencies involving large aircraft, such as the A380."

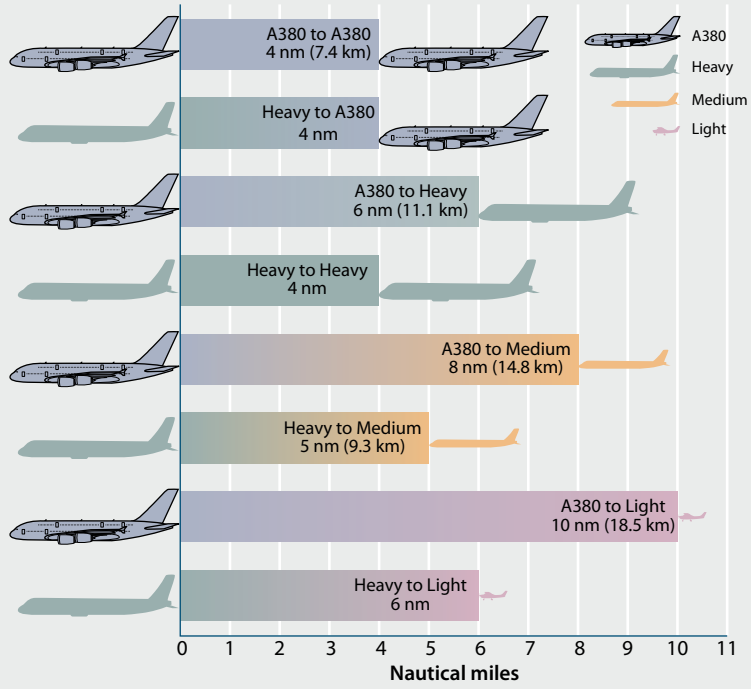
The report said that in the case of the A380, fire-related technical advances in external and internal materials could improve the time available for occupants to evacuate. "A new material called Glare that is highly resistant to fatigue, is used in the external panels for the upper fuselage and provides a longer period of time preventing fire from penetrating into the passenger cabin — about 15 minutes compared to about a minute for standard aircraft aluminum," the report said. "In addition, thermal acoustic insulation blankets, designed to extend the time before an external fire penetrates the fuselage, will be used inside the A380. Combined, these materials could provide additional time for evacuation by delaying the entry of fire into the cabin. The interior materials used in the A380 will also have decreased flammability properties and the aircraft will be equipped with enhanced fire and smoke detection systems."

Airport and ARFF officials also have recognized that the advent of A380 service has implications for quantities of water and fire-extinguishing agents. "The A380 can hold almost 82,000 gal [310,404 l] of fuel, compared to about 57,300 gal [216,904 l] carried by the Boeing 747-400," the report said. "Although the A380 will have Glare material … it will not be installed on the underside of the aircraft where a fire caused by leaking fuel is most likely to occur, according to an FAA official."

The FAA currently is evaluating the need to update its ARFF guidance for new large aircraft, including the amount of water and extinguishing agent needed to respond to fires involving specific types, but FAA officials told the GAO that, generally, airports planning for A380 service already exceed minimum requirements. Some officials also expressed their concern that "the number and position of the A380's [emergency evacuation] slides could also impede the fire and rescue vehicles' access to the aircraft."

Methods for accessing the upper deck of an A380 also have to be considered by ARFF officials. "Most fire and rescue officials at the airports [GAO] visited indicated that they do not have the equipment to access the upper deck of the A380 for fire fighting or evacuation purposes," the GAO report said. "Although the height to the upper deck door of the A380 is essentially the same as that of the 747, according to an FAA official, the

Minimum Radar Wake-Turbulence Separation for Approach/Departure



Source: U.S. Government Accountability Office

Figure 1

need to invest in such equipment now becomes more critical for the A380 because more passengers are seated on the upper deck of the A380. … Some airports … are planning to add a vehicle with a penetrating nozzle with a higher reach that can inject fire extinguishing agent into the upper deck of the A380 [such as a 65-ft (20-m) boom being researched by the FAA]."

The GAO said that airports should have plans for the post-evacuation safety of an unprecedented large number of evacuees. "A related concern of FAA officials [and] airport fire and rescue officials … [is] their ability to control the crowd and how to treat injured people on site prior to being moved to nearby hospitals," the report said. "In most cases, airport fire and rescue officials said that they plan for reasonable worst-case scenarios in which about 50 percent of the passengers can be treated for injuries on the largest aircraft operated at the airport."

Non-U.S. Airport Readiness

The GAO researchers found that some non-U.S. airports will require safety-related restrictions for A380 operations while others will be virtually unrestricted. Examples of plans/improvements include:

- A new 3,800-m (about 12,500-ft) runway that is 200 ft wide and meets ICAO A380 ARFF requirements at Beijing Capital International Airport;
- Tokyo Narita International Airport's ICAO Code F and A380 ARFF compliance, designation of one runway for A380 operations and a restriction prohibiting simultaneous operation of two A380s on parallel taxiways;
- Amsterdam Schiphol Airport's ICAO A380 ARFF compliance, one new Code F–compliant runway and two Code E 45-m (150-ft) wide runways with 23-m wide taxiways to be used for A380s under EASA waivers, and possible limitation on use of a taxiway bridge; and,
- ICAO A380 ARFF compliance, upgraded runway lighting, widening and strengthening of shoulders of two 50-m (164-ft) wide runways for A380 use under waivers plus designation/reconfiguration of A380 taxi routes and runway hold positions at London Heathrow Airport.

Responding to the latest GAO report, Airbus said that these safety challenges sooner or later will apply to the other new large aircraft, noting that the 747-8 "has dimensions and characteristics that should require the same assessment as the A380: runway and taxiway widths; airfield horizontal separations; gate availability and compatibility; increased number of passengers over the current larger aircraft; [ARFF] categorization and requirements; [and] wake vortex characterization and classification … in particular at U.S. airports that will have 747-8 flights before [A380 flights]."

Among its safety-related responses, Airbus also noted that A380 slides provide "two re-entry lines, which provide direct access for fire fighters or emergency responders into both main deck and upper deck"; that wake-vortex separation standards implemented in November 2006 by ICAO already provide "the same level — or an increased level — of safety, compared to separation standards for other aircraft flying today"; and that the aviation industry should recognize the value of wake-vortex characterization of all future commercial aircraft and possibly reclassification of existing aircraft. ●

Notes

1. U.S. Government Accountability Office (GAO). "Commercial Aviation: Potential Safety and Capacity Issues Associated With the Introduction of the New A380 Aircraft." Report no. GAO-07-483. April 2007.
2. The 200-ft width alone does not mean that the runway is suitable for new large aircraft. For example, Paris Charles de Gaulle Airport and San Francisco International Airport have some 200-ft wide runways that are unsuitable for takeoffs/landings or have insufficient length for takeoffs by the A380 under all or some conditions.
3. GAO. "Costs and Major Factors Influencing Infrastructure Changes at U.S. Airports to Accommodate the New A380 Aircraft." Report no. GAO-06-571. May 2006. This report said, "As of March 1, 2006, 11 airports had submitted 68 requests for modifications of standards to U.S. Federal Aviation Administration, of which 47 were approved, 10 disapproved and 11 were under consideration." Examples of results included requiring relocation of a taxiway 13.5 ft (4.1 m) farther from a parallel taxiway; requiring a subset of runways, taxiways and taxi routes for A380 operations; restricting/prohibiting simultaneous operation or reducing maximum taxi speeds on parallel taxiways occupied by an A380 and other aircraft; A380 taxiing speed limited to 15 kt; informing A380 pilots to apply oversteer; and adding signage showing A380 crews restricted taxiing sections of taxiways.
4. According to the "Common Agreement Document of the A380 Airport Compatibility Group," Version 2.1, December 2002, European civil aviation authorities, representatives of European airports and others in the aviation industry informally agreed on common recommendations to authorities.
5. GAO. "Costs and Major Factors Influencing Infrastructure Changes at U.S. Airports to Accommodate the New A380 Aircraft." Report no. GAO-06-571. May 2006.
6. Cohen-Nir, Dan. Letter to Gerald Dillingham, director of civil aviation issues, GAO, April 11, 2007.
7. A fillet is a paved area installed at runway or taxiway intersections for safely turning a large aircraft.