All Quiet in Dubai

***Airports International* looks at how Emirates Airline has taken extreme measures to minimize the acoustic impact of engine ground runs.**

After many years of carrying out engine runs at various locations at the Dubai International Airport, Emirates now can perform them in a Ground Run-up Enclosure (GRE) adjacent to the new Emirates Engineering Centre. This is not only more convenient, but also minimizes the acoustic impact engine run-ups have in the community adjacent to the airport.

Background

The Emirates Engineering Centre is one of the largest civil aviation maintenance facilities in the world and consists of eight air-conditioned hangars designed to accommodate aircraft of any size, including the A380. High power ground run-ups of aircraft engines are a very common component in aircraft maintenance procedures and they generate a significant amount of jet blast and noise. Depending on the power setting and duration, a ground run-up can create as much noise as an actual take-off run, but can last for much longer. Emirates Airlines required a GRE to minimize the acoustic impact of high-power engine runs in a large residential area adjacent to the airport.

The example they chose was designed and supplied by Blast Deflectors Inc, from Reno, Nevada, that specializes in jet blast and run-up noise protection.

"A GRE is an acoustic enclosure that reduces noise in the surrounding area during high power engine runs without creating a jet blast hazard in the immediate area" says Don Bergin, Director of Technical Sales for BDI. "This is the first such facility we have built in the Middle East and one of the largest we have designed".

According to Bergin, the Emirates facility has a height of 49ft 4in (15m) and a width of just over 347ft 4in (105m), large enough to accommodate any commercial aircraft, although it was primarily designed for Emirates fleet, which includes the A300, A330, A340, A380, B747 and B777.

"Our entire organization is proud to have contributed to this prestigious project," says Don Bergin, Director of Technical Sales for BDI.

"While we have been involved in A380 projects in the past, this is the first facility with the Stable Flow aerodynamic features we have built that was designed from the onset to accommodate the A380."

The Emirates facility at Dubai is large enough to accommodate any commercial aircraft, although it was primarily designed for the airline's fleet, which includes the A300, A330, A340, A380, B747 and B777. (All-Blast Deflectors Inc)

According to Bergin, BDI has previously built more than 17 ground run-up enclosures, including facilities for Kuala Lumpur International Airport, Chicago O'Hare, Tampa, Sofia (Bulgaria) and Portland, to name a few.

Project Team

In addition to designing and supplying the facility for the Emirates project, BDI was involved early in planning of the project and shared input on facility orientation, access and civil requirements.

"We worked with Emirates and their main consultant, ADPi, to identify the ideal facility orientation that would provide maximum usability," says Bergin. The facility planning was completed in 2006 and construction began in mid-2007. Construction of the facility was handled by Airpo-Tech LLC, a Dubai based general contractor specializing in airport infrastructure projects.

Construction of the facility lasted for nearly ten months, during which time material from across the globe as well as from the UAE was staged at the Emirates site. More than 30 ocean containers of parts and material were unloaded and assembled on site. "We had personnel in Dubai for the majority of the installation process, from the unloading of the first container to the tightening of the last bolt" says Bergin.

Throughout the construction process BDI personnel worked closely with Airpo-Tech LLC. "BDI provided the expertise and supervision to ensure that the facility was erected according to their drawings and requirements" says Krikor K. Jabourian, Managing Partner of Airpo-Tech. "We have installed a number of jet blast deflectors but the GRE project was much larger and more involved than past projects. Having BDI personnel work with our crews allowed us to keep the project on schedule and avoid unnecessary delays."

The Emirates facility is equipped with patented Noise Blotter acoustic panels that are designed to absorb the low frequency sounds generated by aircraft engines.

Air Flow & Acoustics

One of the most challenging aspects of planning and designing a ground run-up enclosure is facility orientation and aerodynamic usability. According to Bergin, "Aircraft engines aren't designed to run at high power on the ground – they're meant to be moving forward when higher power settings are used. We advise the facility planners on the ideal orientation as well as aerodynamic features that provide a stable environment in which to test the engines."

According to Bergin, BDI's patented Stable Flow design incorporates aerodynamic features that deliver smooth, turbulence-free air to the aircraft engine. "This is particularly important when performing engine runs in side and tail wind conditions as any disturbance to the air flow into the engines can result in a compressor stall or engine surge, which aircraft technicians carefully avoid. Our Stable Flow run-up enclosures, which are currently in use at airports across the globe, have proven to be reliable solutions for performing engine runs in challenging wind conditions" says Bergin.

In addition to aerodynamic features, the BDI facility is equipped with patented Noise Blotter acoustic panels that line the interior of the three-walled structure. "These panels are designed specifically to absorb the low frequency sounds generated by aircraft engines" says Bergin. "Each panel measures 6ft x 32in (183 x 81.2cm)." According to Bergin, more than 3,200 Noise Blotter panels were mounted to the walls of the Emirates GRE in order to meet the specified acoustic performance.

Facility Commissioning

The project specifications required that the facility be tested upon completion in order to verify the acoustic performance levels. During the acoustic acceptance tests on November 23, 2008, two aircraft were run at full power both outside the

facility and inside the GRE. Instruments recorded noise levels during both the open-air and in-facility engine run-ups. "The difference in noise levels between the open-air and in-facility engine run-ups is called insertion loss" explains Bergin. After run-ups were performed with two aircraft, a Boeing 777-300ER and an Airbus 340-500, the necessary data was recorded to determine the insertion loss each aircraft.

"We were most pleased that the acoustic performance of the facility met the specified insertion loss," says Jabourian. He adds that: "Upon the conclusion of the various tests that we carried out with Emirates the GRE was formally handed over on November 24, 2008."

Facility Features

The Emirates GRE is equipped with a number of features to streamline the engine run-up process. "The facility is equipped with a video monitoring system that allows Emirates personnel to monitor activities taking place in the interior of the facility from remote locations. This can be very helpful when staff are planning an engine run, or when supervisors need to know if an engine run has been completed," says Bergin.

Another helpful feature is the large wind speed/wind direction display mounted on the interior of the facility. The 'scoreboard' allows personnel sitting in the flight deck of aircraft being tested to easily check the current wind conditions. "While the aerodynamic features of our design allow engine runs to be performed in challenging wind conditions, it is nonetheless critical for personnel using the GRE to constantly monitor wind conditions. The large information display is a great tool for users."

Bergin adds that facility is fully controlled by a campus wide BMS and connected to the fire alarm system.

Construction of the facility lasted nearly 10 months during which time material from across the globe as well as the UAE was staged at the Emirates site.

Gulf Region

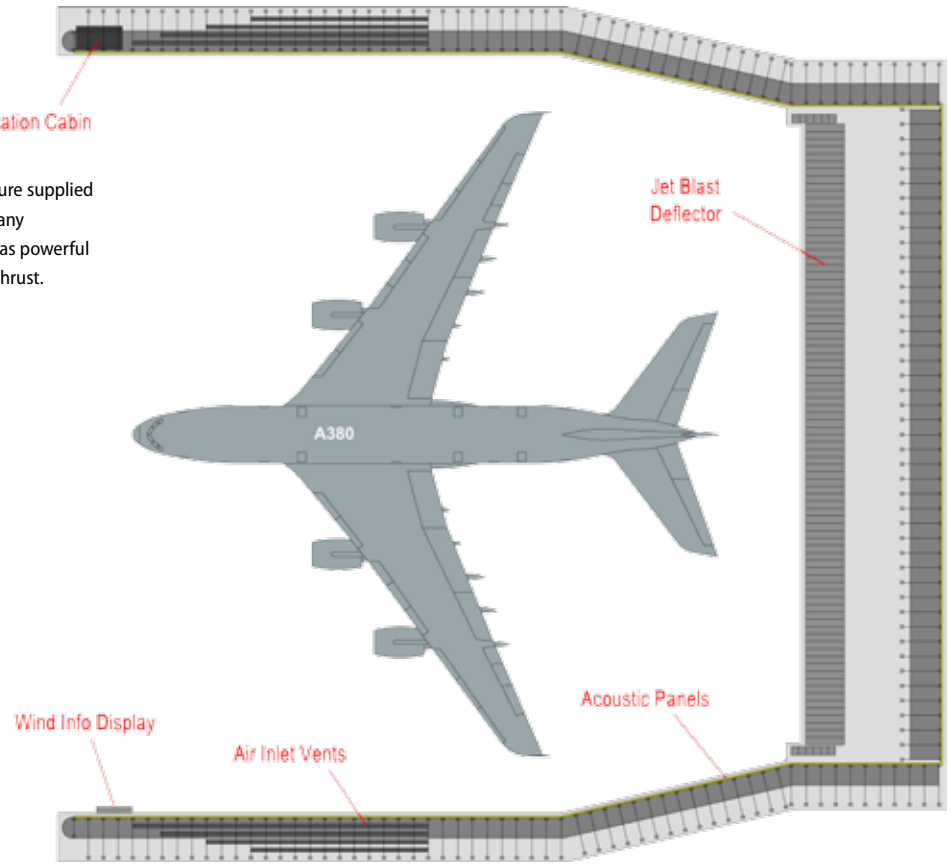
In addition to the GRE project for Emirates airlines, BDI has supplied several blast deflectors elsewhere at Dubai International Airport. "We recently supplied a jet blast deflector to protect the main road from Dubai to Sharjah (Al Itthid Road) from aircraft taxiing in the Cargo Village area" says Bergin. "In other parts of the UAE we recently installed a number of new full-power rated jet blast deflectors for Abu Dhabi Aircraft Technologies (ADAT), an Abu Dhabi based MRO." According to Bergin, the company has also done work for the UAE military at the Al Dhafra Air Base.

In other parts of the Gulf region, BDI is quite active in Qatar, having recently begun the installation of deflectors at the New Doha International Airport. "We are supplying two types of jet blast deflectors for the NDIA project – one version for a full power run-up area as well as taxi-duty versions adjacent to both terminals" says Bergin. "The run-up project did not require noise protection like the Emirates project did, but rather a sophisticated jet blast deflector configuration that allows engine runs in multiple orientations with multiple aircraft." The project at NDIA involves nearly 1,000 lineal meters (approximately 3,200 lineal feet) of jet blast deflector.

According to Bergin, BDI has recently completed several other Middle East / Africa projects in Egypt, Ethiopia and Djibouti. "Several blast deflectors were installed as part of the T3 expansion at Cairo International Airport. Our work in Djibouti as well as other projects in Egypt was military related, while in Ethiopia we installed a full power engine run-up deflector for Ethiopian Airlines maintenance operation in Addis Ababa."

One of the most challenging aspects of planning and designing a ground run-up enclosure is facility orientation and aerodynamic usability.

The BDI Stable Flow™ ground run-up enclosure supplied for the Emirates project can accommodate any commercial aircraft as large as an A380 and as powerful as a B777-ER, which produces 115,000lb of thrust.



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