



Memphis International



Air National Guard Shields Airport Neighbors from C-5 Run-Up Noise

By Jim Faber

► Facts and Figures

Project: Ground Run-up Enclosure

Location: Memphis International Airport

Owner: Tennessee Air National Guard
164th Airlift Wing

Consultant: Pond & Co.

Manufacturer and Construction: Blast Deflectors Inc.

Enclosure Size: 365 ft. deep (111.25m), 314 ft. (95.70m) wide and 48 ft. (14.63m) high

Cost:

Construction Time: 165 days

The Need: Contain noise for one of the biggest aircraft in the world, the Lockheed C-5 Galaxy

The Challenge: Tight military timetable

Blast Deflectors, Inc.

Mr. Don Bergin, Director of Technical Sales

Telephone: +1 775-856-1928

E-Mail: dbergin@blastdeflectors.com

Website: www.blastdeflectors.com

The Lockheed C-5 Galaxy is not a quiet aircraft.

The strategic airlifter hauls oversized cargo across intercontinental distances at a cruising speed of .77 Mach. It's big, strong and loud.

That could have presented noise problems at the new Tennessee Air National Guard's 164th Airlift Wing base at Memphis International Airport because the C-5s are required to execute ground engine run-ups, running engines up to takeoff power, as part of standard maintenance. That's why the airport and Guard took action to make sure the massive and important aircraft could get the maintenance it needed without disturbing the surrounding areas.

"High-power engine ground runs are a very common procedure in aircraft maintenance," says Don Bergin, director of technical sales for Blast Deflectors Inc. "Many routine maintenance procedures require running engines at power settings greater than idle thrust for

extended periods of time. The greater the power setting and longer the duration of the engine run, the greater chance that an airport may illicit reactions from the airport's surrounding communities."

To head that off before it became an issue, the Memphis-Shelby County Airport Authority required the 164th Airlift Wing to perform the engine run-ups inside a ground run-up enclosure.

The roughly \$4-million project was quickly deemed "mission critical" to the new Air National Guard base and was completed in early fall, just 165 days after the contract was awarded.

Design Principles

Like the C-5 Galaxy itself, the run-up enclosure is huge. At 365 feet (111.25m) deep, 314 feet (95.70m) wide and 48 feet (14.63m) high, it's just the right size to accommodate the 250-foot (76.20m) long, 65-foot (19.81m) tall aircraft with a wingspan of 222 feet (67.66m).



Producing a massive ground run-up enclosure for military use presented unique challenges for project consultant Pond & Co.

“Specifications could not be brand specific,” notes Christopher Farnie, Pond’s aviation project manager. “Thus specifications had to be written tight enough to ensure the facility would meet specifications requirements and would only allow qualified bidders to take part, yet loose enough so that competition would exist.”

There are three major considerations during the design of a ground run-up enclosure, Farnie explains:

- The blast deflector directs the engine exhaust upward and away from the aircraft and structure, so the design must factor in aerodynamic flow and acoustic variables.
- The primary purpose of an enclosure is to absorb the low frequency sounds created by aircraft performing high-power engine runs. The acoustic panels must be designed to keep sound from moving through the walls while minimizing sound reflection and withstanding jet blasts and weather.
- The aerodynamic design must allow the enclosure to function in changing weather and wind conditions.

Where & Why

Although the Memphis International Airport already had a designated engine run-up area, it’s located across the airport from the new Tennessee Air National Guard base. So using the existing area was just not practical, explains Bergin.

“The ability to perform engine runs directly on the new base gave the Tennessee Air National Guard the flexibility to perform extended maintenance procedures with multiple engine runs without keeping the aircraft parked in common-use areas for extended periods,” he says, noting savings in manpower and time.

A study done on behalf of the Memphis-Shelby County Airport Authority showed there would have been unacceptable noise impacts to a nearby community if the run-up tests occurred at the base without a ground run-up enclosure.



The project allowed just 165 days from award to completion, which required accelerated fabrication and construction schedules.

The Air National Guard strategically situated the new enclosure on the northeast corner of its new aircraft apron. The opening faces south (away from the most airport neighbors) and the aircraft tails point north, into the enclosure.

Less-than-ideal scheduling between construction projects caused some extra work.

“Construction of the apron was already underway, and, indeed, new conflicting utilities had been installed in the ground, requiring all of them to be addressed, and rerouted, if need be, to not interfere with the ground run-up enclosure foundation,” Farnie explains.

Speed Was Essential

Although Blast Deflectors has built other ground run-up enclosures used by Air National Guard units, the Memphis enclosure was the first the company has built specifically and exclusively for an Air National Guard unit, Bergin notes.

Because the enclosure would be used by one of the biggest aircraft in the world, designing the necessary noise abatement and aerodynamic features was challenging. Meeting the project’s tight schedule was the biggest challenge, says Bergin.

“From award to facility hand-over, we had just 165 days — a daunting task,” he relates. “We were able to meet this schedule by carefully monitoring all material fabrication schedules, coordinating material delivery and accelerating site assembly schedules by using multiple crews when required.”

Elsewhere on Base

Although vital to aircraft maintenance, the ground run-up enclosure is just part of a massive, recently completed base construction project.

The Tennessee Air National Guard 164th Airlift Wing’s new base is the largest project in Guard history. The \$245 million, 118-acre project includes a 28-acre aircraft parking apron with 14-inch thick pavement; two hangar buildings housing three hangars at 320,000 total square feet; two main parking lots for 900 vehicles; and four administrative buildings with nearly 186,000 square feet of space.

The project required four general contractors and some 800 workers at peak construction. Site construction began in early 2005 and the first vertical construction started in June 2006.

Elsewhere at the Airport

Another enclosure, “effectively identical” to the Air National Guard’s, will be built for the new FedEx facility currently under construction at the Memphis International Airport, reports Bergin. The enclosure, scheduled to be complete next spring, will accommodate any aircraft in the FedEx fleet, but will primarily be used by the Boeing 777. A new B777 maintenance hangar is currently under construction at a site adjacent to the enclosure.

“Just as the Air National Guard facility will be used exclusively by the Guard, the FedEx ground run-up enclosure will be used only by FedEx,” Bergin specifies. ✈️

▶ To post or view comments about this article, visit www.AirportImprovement.com.

