PDX and TPA utilize a new Stabile-Flow™ Ground Run-up Enclosure design for noise abatement.

Stabilizing Run-up Noise

Aerodynamics critical parameter in evolving a satisfactory GRE

By Mark Boe, Blast Deflectors Vice President of Engineering

Noise associated with ground run-ups has long been a source of irritation for residents surrounding airports. These run-ups are typically performed during the night and can be long in duration when ambient noise levels are low. Complaints have led many airports to restrict or ban nighttime run-ups, a considerable burden to airline maintenance operations.

In the 1960s and 1970s, fixed mufflers were used to treat exhaust noise. The disadvantages of this solution lay in the fact that they were aircraft and engine specific, and did nothing to treat inlet noise.

In the early 1980s, the first Ground Run-up Enclosures (GREs) were constructed, and such facilities have become the industry standard. GREs are comprised of three or four sound treated walls surrounding the aircraft. They have the advantage of accommodating many different aircraft types and provide a noise reduction, or insertion loss, of 13-18 dBA. While the acoustic results are satisfactory, most of the earlier GREs proved to have limited usability aerodynamically, as it proved difficult or impossible to run newer high bypass engined aircraft during cross or tail wind conditions.

In order to perform a satisfactory ground engine run at high power, the engine requires a sufficient quantity of stable, turbulence-free air. By the mid 1990s, it had become apparent that the square box-type enclosures

were unusable in side and tail wind conditions. Turbulence was created which led to surging and, at times, engine stalls.

Aerodynamics became the critical parameter in evolving a satisfactory GRE. The mid-1990s saw a new Stabile-Flow™ design developed, which has led to usability of over 95 percent for aerodynamically enhanced facilities. These enhanced facilities are in use today at airports including Chicago O'Hare, Indianapolis, Portland, Oakland, Tampa and Milwaukee.

Portland International Airport placed a nighttime moratorium on run-ups as an interim measure pending a permanent solution, the construction of a GRE. In order to resume night runs, the Department of Environmental Quality (DEQ) mandated stringent noise levels be met at the nearest residences with a limited number of exceedences permitted annually. After two years of GRE operation, the airport submitted a summary report to the DEQ indicating that the nighttime usability of the facility was much higher than required and the neighborhood noise exceedances were much lower than granted in the DEQ exemption.

At Milwaukee's General Mitchell International Airport, Noise Abatement Coordinator Ken Seymour reports the GRE has been in operation for 22 months and users have successfully completed over 98 percent of the 3,735 run-ups conducted inside the GRE.

The MKE staff believes that their high success rate in use of the GRE stems from the aerodynamic design of the GRE and the continuous coordination and education of users. A full year before the GRE was opened, MKE and Blast Deflectors began meeting with the Airport's aircraft maintenance personnel. The meetings continue as required to assure maximum usability of the GRE.

The end result has been an almost complete elimination of maintenance run-ups as a source of noise complaints from area residents. This is no small feat given the close proximity of homes to the airport and Milwaukee's constantly changing winds. The proven GRE technology has solved a problem that has troubled Milwaukee airport officials for decades.

An aerodynamically enhanced three- or four-sided GRE has proven to be the most cost-effective solution to ground run-up noise. It is critical that a GRE project be well planned, as site selection, user cooperation, as well as acoustic and aerodynamic performance are critical to the overall success of the project.