TECHNICALLY PROVEN DESIGNS | HIGH USABILITY | AERODYNAMIC PERFORMANCE | NOISE REDUCTION | PATENTED TECHNOLOGY

BDI

FEATURING LYNNCO PRODUCTS

GRE | Ground Run-Up Enclosures

In 1957, company founder Stanley Lynn developed a line of jet blast deflectors that set the standard for military and commercial airport facilities. When commercial aviation facilities were faced with the challenge of controlling noise from engine run-ups, second-generation owner Christopher Lynn, in conjunction with acoustical engineer Mark Boe, developed a GRE that offered unprecedented performance in both aerodynamics and noise mitigation.

Blast Deflectors, Inc. (BDI) is a world leader in Ground Run-Up Enclosure (GRE) technology and Jet Blast Deflector (JBD) products. Over the last 50 years, BDI has focused exclusively on solutions for the aviation industry and in the process has earned a worldwide reputation for its expertise, integrity and long-term customer commitment.

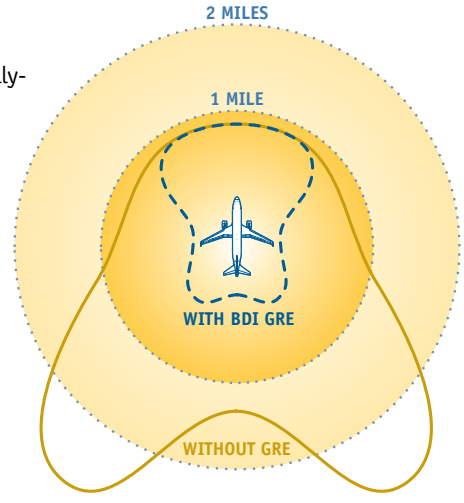
GRE installation at Tampa International Airport.

Stabile Flow™ technology with vents, roll top and sloped entry.

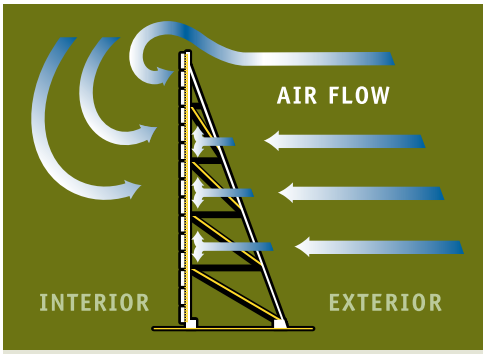
MITIGATING MAINTENANCE RUN-UP NOISE

The aviation industry has changed significantly in the past 10 years. The dramatic increase in air traffic worldwide has increased the number of take-off power ground run-ups and the noise they generate. Maintenance run-ups typically create a greater noise nuisance than actual takeoffs and are often scheduled at night. This can result in noise complaints from the community and create a serious public relations problem for airport officials.

BDI pioneered a cost-effective, technologically-advanced solution for ground run-up noise attenuation. We offer turnkey design-build GRE facilities that use patented components, proven designs and a spotless track record of successful installations.

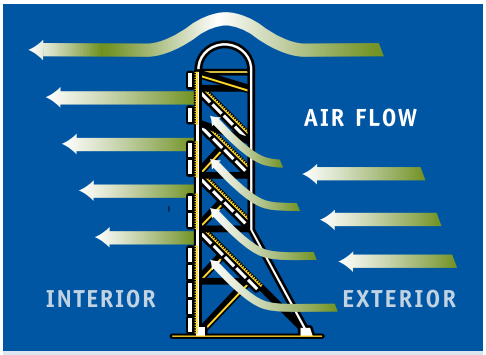


A320 | TAKE-OFF POWER | 60 L_{AMAX} CONTOUR



TRADITIONAL GRE WITH OLD TECHNOLOGY

- Screen-type diffusers or straight wall deflectors significantly raise the pressure behind the aircraft, increasing the recirculation of exhaust gas.
- Flat tops and high squared off corners impede performance by creating turbulence that leads to dangerous engine surging and stalls.
- Solid sidewalls create turbulence in side-wind conditions.
- Standard panels with a NRC less than 0.85.
- Stacked construction of lightweight aluminum panels makes replacement of damaged panels difficult.



BDI GRE WITH STABILE-FLOW™ TECHNOLOGY

- A solid, curved blast deflector maintains the energy of the blast envelope and turns it upward, decreasing the danger of recirculation.
- Rolled top and sloped entry lip on side walls reduces the risk of turbulence in quartering or side-wind conditions, allowing a stable flow of air to the engine inlet.
- Vented sidewalls significantly reduce turbulence and allow greater volumes of air to pass through the wall to the engine inlet.
- Noiseblotter™ panels provide an NRC of 1.25, reducing reflected noise.
- Individually bolted, heavy-duty galvanized steel panels ensure panel integrity and allow individual panel replacement.

The Traditional GRE

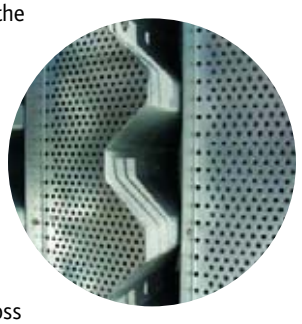
Historically, GRE designs placed square walls around the aircraft with little regard for aerodynamic performance. Jet blast was deflected using porous screens or integrated sloped rear walls. This resulted in a GRE that could be used successfully in only extremely limited wind conditions due to turbulence at the engine inlet, which can lead to dangerous stalls and surges. The acoustical benefits of a GRE are lost if an aircraft cannot use a facility in diverse wind conditions.

BDI's revolutionary ground run-up enclosures are suitable for all aircraft including the A380, B-777, and B-787. The combination of the aerodynamically advanced Stabile Flow™ design with the effectiveness of Noiseblotter™ acoustic panels provides a stable, effective GRE with very high usability and noise reduction.

Stabile Flow™ Design

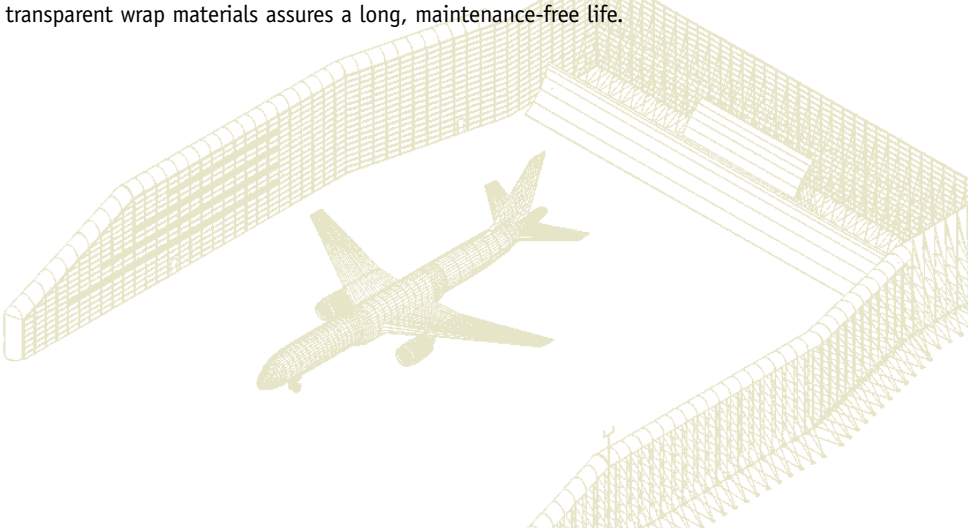
Recognizing the aerodynamic issues affecting successful high power run-ups within acoustic enclosures, BDI began an extensive development program using scale and computer modeling to develop a new approach in GRE technology. The resulting Stabile Flow™ design drastically improves GRE usability in adverse wind conditions.

By reducing vortex formation at the walls, pressure buildup at the rear of the aircraft, and inlet pressure drops, the Stabile Flow™ system assures appropriate flow conditions are maintained at the engine inlet and that exhaust recirculation is minimized.



Noiseblotter™ Panels

BDI's patented Noiseblotter™ panels were designed specifically for control of aircraft noise. They feature a high transmission loss (STC) of 36 and effective absorption of low frequency noise. These panels have a demonstrated noise reduction coefficient (NRC) of 1.25 and maintain an absorption coefficient of 1.0 at 100 Hz. The use of non-hydroscopic materials and acoustically transparent wrap materials assures a long, maintenance-free life.



SOUND SOLUTIONS |

Ending a Five-Year Ban on Nighttime Run-Up Noise at Portland International

ENGINEERING DESIGN CHALLENGES

- Seasonal winds vary 180°
- State-mandated usability requirement
- Stringent state noise regulations and reporting

After a worldwide search, Port of Portland engineers and operations staff selected BDI to design a ground run-up enclosure for Portland International Airport (PDX). To find the most advanced and low-risk GRE design, PDX staff traveled to engine run-up facilities throughout the world, including airports in Germany and England.

"The GRE from Blast Deflectors ended a five-year ban on nighttime run-up tests," says Glenn Woodman, Port of Portland Airside Operation Planner. Prior to the installation of the GRE, noise complaints had triggered a state-mandated ban on nighttime ground run-ups at PDX. Because the GRE offered such a significant noise level reduction, the ban was lifted and all aircraft were required to use the GRE for ground run-ups. The facility's advanced aerodynamic design allows for a usability of more than 99 percent.

The PDX project team had considered several other GRE designs, including three sides with a door, two sides with a roof and an unroofed three-sided design. The project team chose the last design due to its significant value and performance advantages.

Project design specifications were aggressive—a noise reduction of 18 decibels (dBA) at specified measurement points. Final results showed that the goal for noise level reduction was met or exceeded. Sound levels were reduced by as much as 20 dBA, which amounts to a noise level reduction of 75 percent during engine run-ups.

The specification applied to the PDX facility is considered by aerodynamic experts to be the most rigorous standard to date for a GRE in the United States, and possibly worldwide.

Since installation of the GRE, PDX has had more than 9,000 run-up tests and has not received a single complaint related to nighttime testing. The project was completed under budget and ahead of schedule. "We could not have hoped for a better outcome—the facility not only meets our stringent state noise regulations, but it has also brought some peace and quiet to our neighborhoods," says Woodman.

SOUND SOLUTIONS |

Chicago's O'Hare Launches New GRE Technology

ENGINEERING DESIGN CHALLENGES

- Limited construction timeframe (four months)
- Challenging wind conditions
- Strict noise reduction requirements

A radical new approach in ground run-up noise mitigation technology was pioneered when BDI designed a GRE for Chicago's O'Hare International Airport. O'Hare had been receiving an increasing number of complaints from surrounding neighborhoods because of frequent ground run-up noise. For more than two decades, O'Hare had been wrestling with this public relations issue. As one of the three busiest airports in the world, noise pollution had become a serious problem.

After analyzing O'Hare's stringent usability and aerodynamic requirements, BDI realized that a traditional GRE was not a feasible solution. Exploring other possibilities propelled BDI's technology to a whole new level. By using extensive computer and scale modeling, BDI introduced the patented Stabile Flow™ and NoiseBlotter™ technology that now sets the standard for GRE design.

The resulting GRE exceeded the usability and acoustic specifications imposed by O'Hare. This called for a reduction of up to 20 decibels (dBA) at a distance of one mile (1600 meters). "This was a level that many experts believed was impossible for an unroofed structure," says BDI President Chris Lynn. BDI not only met this acoustic specification, but exceeded it during acceptance testing. Even with Chicago's notorious wind conditions, the GRE also allowed for higher usability. In one acceptance test, winds were 18 knots, 45 degrees off the nose of a B-757. Despite these challenging wind conditions, the aircraft was run-up successfully with no engine surges or stalls and achieved the specified noise level reduction.

The construction of the GRE was completed in under four months during the winter. It has since provided for thousands of run-ups and continues to set the standard for GRE technology. "The depth and dedication BDI brought to the table made the project a tremendous success for all parties involved," says Ted Woosley, the primary consultant for the O'Hare project and a partner with Landrum & Brown in Chicago. "We needed a reliable, qualified and experienced contractor to handle the GRE. It is clear to us that BDI is an industry leader in run-up noise solutions."

SOUND SOLUTIONS |

Looks Matter: Oakland County International Airport Chooses BDI

"We required a GRE that was both highly functional and aesthetically pleasing. During the design phase, BDI produced a computer rendering that clearly showed their solution. The completed GRE with the exterior cladding looks great and exceeds the performance standards."

J. David VanderVeen, Director
Oakland County Department of Central Services
Oakland County, Michigan

BDI rendering for Oakland County International Airport, Pontiac, Michigan.

Above: Actual installation from above rendering.
Below: GRE with cladding.

FOCUSING ON RESULTS

Every GRE project requires a customized approach due to the unique conditions and circumstances that exist at each airport. The process begins with a study by BDI acoustical and aerodynamic engineers that addresses site characteristics, meteorological factors, terrain details and aircraft specifications. This information becomes the core of the design and is carefully considered throughout the project.

BDI understands the complicated dynamics of a GRE project, which often include many diverse parties, each with a different background and agenda. In addition to being the turnkey supplier, BDI's role involves facilitating teamwork among the parties. This typically includes owners, users, consultants, regulatory agencies and the local community. BDI has learned through experience what is necessary to elicit cooperation from all involved.

For a complimentary analysis of how BDI technology can mitigate ground run-up noise problems, please contact us.

BDI's philosophy is based on providing our customers with the highest quality products and services that match BDI's international reputation of performance and value earned over the last 50 years. This reputation includes technically sound designs, timely deliveries, professional installation and outstanding after-sale customer service.

Blast Deflectors, Inc. | Airport Jet Blast & Noise Protection | www.blastdeflectors.com
5595 Equity Avenue Suite 650 Reno, Nevada 89502 USA *phone* 775 856-1928 *fax* 775 856-1686 *toll-free* 877 474-1923

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