ACRP Problem Statement: 16-02-03

Recommended Allocation: --

Active Noise Reduction of Aircraft Takeoff and Maintenance Runup Operations

ACRP Staff Comments

ACRP has not conducted research specific to ground runups.

TRB Aviation Committee Comments

ENVIRONMENTAL IMPACTS OF AVIATION (AV030): Topic is of interest. While an interesting idea, many noise office complaint records would not reliably capture what caused the complaint; citizens often cannot distinguish specific activity mode. However, a more dedicated research effort might enable this ability.

Review Panel Comments

Not recommended. The concept seems a little far-fetched at this point. The proposed research may lead to a product in the future. This does not seem to be a significant issue.
Problem Statement Title
Active Noise Reduction of Aircraft Takeoff and Maintenance Runup Operations

Background
After most engine maintenance, airlines typically perform high-power runup testing. Residential areas near airports are affected by the noise from runup operations because the testing is often conducted during nighttime hours. Current practice is to locate runup operations in ground runup enclosures (GREs) or far from residential areas if possible. Aircraft accelerating from brake release on their takeoff roll at the beginning of a runway generate noise exposure similar to that of high-power maintenance runups, albeit much more frequent than maintenance operations.

Complaints from residents near airports can result in restrictions as to the timing and type of runup operations allowed in addition to flight hour limitations. Operational restrictions, whether mandatory or voluntary, cost the airlines time and money. Complaints from residents damage airport relations with the surrounding communities.

Applying active noise reduction to GREs or in free space around runup operations and runway ends may decrease noise levels and impact in communities surrounding airports. Research is needed to determine the feasibility of using active noise reduction of such operations and to perform a cost/benefit analysis.

References


Objective
The objectives of this research is to determine the pervasiveness of noise complaints from aircraft initiating takeoff (start of takeoff roll engine noise) and conducting runup operations at US airports and whether active noise reduction is a viable solution to alleviate the noise problem with or without GREs.

Proposed Tasks
The proposed tasks are to (1) conduct a survey of US airports to find the percentage of noise complaints that are caused by aircraft initiating takeoff and conducting runup operations, (2) determine the efficacy of active noise reduction for decreasing noise levels of runup operations in terms of area and population, and (3) if warranted, outline the design of a system with and without an accompanying GRE including costs, configuration, and operation.

Estimated Funding Research Duration
The project is expected to cost $300k and take 18 months to complete.

Urgency and Payoff Potential
Any reduction in noise complaints from airport neighbors would be a benefit to airport relations with surrounding communities.

Related Research
The noise levels generated by aircraft takeoff and runup operations have been measured and reduced with active noise reduction in free space by the author. Utilizing the noise emissions characteristic of jet aircraft runups with a model predicting the performance of an active noise reduction system with and without a GRE, the reduced noise levels will be estimated. Seeing the percentage of runup
operations that occur at night by airlines with hubs at an airport in conjunction with research on sleep disturbance may indicate the efficacy of an active noise reduction system.

**Persons Submitting Problem Statement**

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