ACRP Problem No. 12-02-10

Guidance Document for Helicopter Community Noise Prediction

ACRP Staff Comments: No comments offered.

TRB Aviation Group Committees Comments: ENVIRONMENTAL IMPACTS OF AVIATION CMTE - Do not support. This is a reasonable project, but just one step in a long process of improving helicopter modeling - i.e., not urgently needed. This kind of guidance should be developed by FAA's Office of Environment and Energy directly.

Review Panel Comments: Recommended — This addresses a growing issue with expanding applicability. FAA indicates that incorporating an analysis of helicopter noise is a weak link in currently available noise modeling.

AOC Disposition: No funds allocated. A question was raised as to whether this research might more appropriately be done by the FAA. It is an emerging issue, and it's important not only around airports but along helicopter corridors. This would likely be the first of many steps, and it's not clear where the research will lead. Although it's important, it's not an airport issue, per se.
I. PROBLEM TITLE

Guidance Document for Helicopter Community Noise Prediction

II. RESEARCH PROBLEM STATEMENT

In recent years, helicopter noise has become a contentious issue at many US airports. The most recent example has been an increase in complaints from helicopters flying along the north shore of Long Island which has led to elected officials introducing legislation requiring the FAA to implement helicopter flight regulations, notably the Schumer amendment to the FAA Reauthorization Bill which passed the Senate on Feb 17, 2011.

The issue of helicopter noise is likely to be important for airports in congested terminal areas in light of new vehicles and concepts being developed within the NextGen framework. For instance, with on-demand point-to-point service combining with scheduled service, rotorcraft will be providing more frequent service within the New York TRACON from satellite airports and heliports to hubs with connecting international or domestic service. Under such a scenario, helicopter and tiltrotor aircraft noise impacts will likely become an increasing issue for airport land-use and environmental planning efforts.

The Federal Aviation Administration’s (FAA) Integrated Noise Model (INM) is currently the agency’s required tool for NEPA related studies and FAR Part 150 studies. The Heliport Noise Model Version 2.2 (1994, DOT/FAA/EE/94-01, Fleming, Rickley) was recently incorporated into INM Version 7.0 (2008, FAA/AEE/08-01, Boeker et al) with a helicopter noise database collected through both FAA and manufacturer certification measurements. The fixed-wing aircraft noise prediction techniques employed in INM, rely on the widely accepted methodologies described in documents such as SAE International’s SAE-AIR-1845 and the European Civil Aviation Conference’s Doc 29 (ECAC Doc29). However, there are no peer-reviewed guidance documents describing an integrated modeling technique for the prediction of helicopter noise suitable for flight track assessment, optimal design, and land-use planning. The lack of a peer-reviewed helicopter noise prediction guidance document stands in contrast to that of fixed-wing aircraft noise guidance. The need for such guidance addresses an issue that has land use planning implications at both large and small airports. For instance, if an airport is challenged by the community on the basis of helicopter noise impacts alone, the FAA may be constrained in its ability to demonstrate the validity of current helicopter modeling techniques due to lack of supporting, widely accepted, guidance documentation.

Recognizing the lack of similarly defensible guidance for helicopter noise modeling, the FAA has asked that the Helicopter Project Working Team of SAE Committee A-21 “Aircraft Noise Measurement and Aircraft Noise/Aviation Emission Modeling” develop a guidance document for helicopter noise prediction, taking into consideration current FAA helicopter modeling techniques. The request by the FAA to consider its current helicopter modeling techniques is an important step towards identifying a way forward for the development of a defensible standard in this area. However, the relevant SAE PWT does not have sufficient resources to fully address these issues in a way that produces the desired results.

III. OBJECTIVES

The primary objective of the proposed research project is to research and document the existing integrated helicopter noise modeling technique based on INM Version 7.0b, and prepare a peer-reviewed technical guidance document.

As part of this effort, an evaluation of the helicopter noise prediction capability incorporated into INM 7.0b will be performed. This review of the current noise modeling capabilities and limitations in INM will help develop technical recommendations for future improvements of helicopter noise modeling in FAA’s Aviation Environmental Design Tool (AEDT). In evaluating the helicopter noise prediction capability of INM Version 7.0b, helicopter predictions will be compared with measurement and simulation data to provide a validation basis for the documented guidance.

IV. RESEARCH PROPOSED

A technical guidance document describing in detail an integrated method for helicopter noise predictions will be prepared and peer reviewed. This document will cover the model fidelity, source data requirements and functionality required for predicting helicopter noise in communities, suitable for airports utilizing helicopter/tilt rotor aircraft services and heliport/vertiport vicinity land use planning purposes. This research will target community noise modeling and land use planning and will methodically and comprehensively address the various elements of helicopter noise modeling, including source noise, propagation, flight operations modeling and environmental considerations.

Comparisons of the techniques in the guidance document will be made with both existing measurement data and higher fidelity simulation modeling, such as the Rotorcraft Noise Model, a validated simulation tool developed under NASA and Department of Defense funding. This study will compare RNM simulation results with INM results and with measurement data for at least two different helicopter types for which high fidelity noise source data and acoustic measurement data are available. The assessment will include those metrics commonly used in the evaluation of land use planning and community acceptance.

INM/AEDT provides a set of standard operational procedures for both aircraft and helicopters. The assessment will result in improved application of INM/AEDT and will benefit both large and small airports with current and future helicopter and tilt rotor aircraft operations.

V. ESTIMATE OF THE PROBLEM FUNDING AND RESEARCH PERIOD

Funding: $100,000
Contract Time: 12 months

VI. URGENCY AND PAYOFF PERIOD

For those airports where helicopter operations contribute to the noise contours and/or are subject to citizen complaints, a guidance document describing an integrated modeling technique is needed for the prediction of helicopter community noise so that effective land use planning solutions can be developed. This is also important considering the changes planned under NextGen, especially in terms of new vehicles and market-based concepts for providing on-demand point-to-point services to and from airports within congested terminal areas.

The payoff is to have (1) a peer-reviewed, industry-accepted, and defensible standard for assessment of helicopter noise using integrated noise modeling methodology for land use planning and (2) better guidance for future helicopter noise modeling improvements for AEDT.
VII. RELATED RESEARCH

High fidelity acoustic measurements of helicopter flight tests have been conducted by NASA and other government agencies for the purposes of advanced noise modeling. These activities include the gathering of source characteristics and investigation of the acoustic impact from rotary wing flight operations. The Rotorcraft Noise Model (2007, WR 07-04, Page et al.) was developed under NASA and Department of Defense funding and accepted by NATO. RNM is the required tool for US DoD noise assessments under NEPA. It has the capability to evaluate the noise impacts from standard or non-standard flight operations in addition to providing a means for tactical assessment of military helicopter and tilt rotor aircraft operations.

VIII. PERSONS DEVELOPING THE PROBLEM

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IX. PROCESS USED TO DEVELOP THE PROBLEM STATEMENT

This project proposal was developed as a collaborative effort by members of the SAE A-21 Aviation Acoustics and Emissions Technical Committee, Helicopter Project Working Team (see section VII) and is based on the need for a helicopter integrated noise modeling standard and a comprehensive technical assessment of the helicopter noise modeling capabilities of the Integrated Noise Model (INM) for land use planning.

X. DATE AND SUBMITTED BY

Date: 9 March 2011
Submitted by: Juliet Page (See Section VIII)

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