ACRP Problem Statement: 14-04-09

Risk Models for Runway Excursions of Light Aircraft

Recommended Funding Amount: --

ACRP Staff Comments


TRB Aviation Group Committee Comments

AIRCRAFT/AIRPORT COMPATIBILITY: This topic was proposed in the previous funding cycle. There is interest but there are questions about whether this is research the FAA should be doing.

Review Panel Comments

Not recommended. There is not a lot of data related to GA aircraft, which may affect the feasibility of conducting this research. The tool could assess individual airport facilities. Is this an operational issue or a design issue? It could be a combination of both. The FAA design standards do not cover this because they are not predictive. Each aircraft is fundamentally different. It is uncertain how it could be accomplished even at major airports. States have to work with their airports to set funding requirements for projects as an additional step related to prioritizing their projects.
1. Problem Statement Title

Risk Models for Runway Excursions of Light Aircraft

(This research idea may or may not be in the FY 2013 Emphasis Area)

2. Research Problem Statement

One of the primary risks to aircraft are excursions that occur in the runway environment – either overruns, undershoots or (commonly) veer-offs. Excursions that pose risks to large and heavy aircraft have been increasingly studied, and the risks have been well-documented and included in databases such that it is possible now to make assessments of the risk of runway excursions and make recommendations to users on strategies to mitigate those risks. However, the prevalence and risks associated with runway excursions have not been addressed for aircraft weighing less than 6,000 pounds, in part because no effort has been made to compile a database of those excursions. Little research effort has been spent to evaluate how design standards and non-compliance issues may impact risk of runway excursions at these airports.

As a result, it has not been possible to review the excursions to spot predictive trends, associate them with remedial actions and develop a program to mitigate the hazards associated with runway excursions that involve smaller aircraft and the airport environments that they typically operate in. Moreover, data on incidents that have occurred at smaller airports may be more difficult to obtain because these events are less likely to have been reported and/or investigated.

Most aircraft with MTOW lower than 6,000 lbs are operated under 14 CFR Part 91 rules, which represent close to 90% of civil aircraft registered in the United States. Many communities benefit of GA flights and it generates over $150 billion in economic activity (source: AOPA). Many of the airports used by lighter GA aircraft are not certificated and have no towers that could report incidents. A research study using approaches similar to those presented in ACRP Reports 3, 50 and 51 would greatly benefit GA to reduce risks of runway excursions and improve aviation safety in the United States.

3. OBJECTIVE

The objective of this project is to create a runway excursion database and develop risk models for runway excursions of aircraft with MTOW lower than 6,000 lbs. As preparation for model development, a database spanning a time period, to be defined by the researchers, would documents and categorize
the type, conditions, location, aircraft involved and severity of runway events identified as runway excursions. The models would be developed and incorporated into user interface (GUI) that could allow users with a variety of familiarity with collision risk analysis to perform simple studies to determine if unacceptable risks exist at their airport under different meteorological conditions and different operating configurations. The models and analysis tool would provide both numerical (spreadsheet) and visual (image files) results.

4. RESEARCH PROPOSED

Gather information that would allow the consultant to formulate an approach that leads to a recommended methodology for calculating aircraft horizontal and vertical deviations to a level of certainty that allows an assessment of acceptable collision risks. The following are examples of tasks envisioned in this project.

- Review the approaches and methodologies used in previous studies and develop an assessment of the model’s capabilities and deficiencies, and outline technical improvements that can be made to the model to increase its usefulness.
- Consult with the FAA to gain an understanding of their efforts to develop the ASAT (??), including methodology, data sources, expected results and applicability.
- Identify data sources and gather data on runway excursions that include aircraft type, aircraft performance, operation conditions (runway, weather, type of operation, runway used, etc.), and deviation distances during the runway excursion.
- Collect a sample of normal operations data for aircraft with MTOW lower than 6,000 lbs to develop frequency models. This effort will specifically include development of a methodology for collecting data from airports without monitoring equipment or other recordkeeping of aircraft operations.
- Formulate an analytical approach to using the gathered data to estimate risk of aircraft excursions.
- Develop a user-friendly software analysis tool incorporating the models developed and prepare a users’ manual.
- Test the models and analysis tool using an identified data set; data selected for validation of the tool shall be complete and comprehensive enough to cover a variety of scenarios.
- Prepare report outlining validation results and basic information about the models and analysis tool.
- Prepare a final report summarizing the research effort.

The final report should include a preliminary set of recommendations that can be adopted by airports to mitigate risks associated with runway excursions involving aircraft weighing 6,000 pounds or less.

5. Estimate of the Problem Funding and Research Period

Recommended Funding:
Funds: $400,000
Contract Time: 18-24 months

6. Urgency and Payoff Potential

This research is considered to be an immediate need, in that it will address calculation of safety margins in a manner more comprehensive than existing tools provide. In addition, the proposed risk-based methodology will evaluate aircraft operations that cannot be currently assessed with the existing models, allowing for more precise determinations of levels of safety, particularly for GA aircraft.

7. Related Research

ACRP 04-08, Enhanced Evaluation of Aircraft Lateral Deviations during Approach in Various Weather Conditions


8. Person(s) Developing the Problem

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9. Process Used to Develop Problem Statement

This problem statement was developed from discussions with FAA Runway Safety personnel and persons involved in previous research leading to the preparation of ACRP Reports 3, 50 and 51.

10. Date and Submitted By

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Date: March 15, 2013