National Concrete Pavement Technology Center
Under
Cooperative Agreement with the Federal Aviation Administration

Airport Concrete Pavement Technology Program

Request for Proposal (RFP) ACPTP 2022-5

Best Practices for Runway Rubber Removal

RESEARCH PROBLEM STATEMENT

In 2008, the Airport Cooperative Research Program (ACRP), sponsored by the Federal Aviation Administration, produced ACRP Synthesis 11 *Impact of Airport Removal Techniques on Runways, A Synthesis of Airport Practice;* a synthesis of information on the impacts of four methods of removing rubber from airport runways. Rubber buildup from aircraft tires on airport runway landing zones negatively impacts skid resistance of the runway surface making rubber removal an essential maintenance activity for the safe operation of an airport.

Since that 2008 synthesis, the industry approach has evolved to where hydro-blasting has become the primary, although not the only, method maintenance operations employs for removing rubber from runways. Although viewed as a cost effective as well as an efficient rubber removal technology, use of hydro-blasting has resulted in some cases of damage to runway surfaces. This may consist of surface texture damage, resulting in friction issues and possible concrete or asphalt durability issues, leading to costly repairs or even pavement replacement. This can also lead to questions regarding legal responsibility between the airport, the rubber removal contractor, and the runway paving contractor for the damage and any corrective action that may be needed as a result. There are a number of factors that may contribute to the potential of pavement damage, such as water pressure and nozzle offset distance from hydro-blasting equipment, forward speed of the removal equipment, time allowed for the removal process to occur, integrity of the concrete or asphalt surface, and hardness of the pavement surface aggregate. Although the 2008 synthesis concludes that “when water blasting is done correctly, runway groove and surface damage is not likely”, it does not detail what it means to have it “done correctly”. In addition to hydro-blasting, other rubber removal techniques would also benefit from determining “best practice” methods when used for either asphalt or concrete runway applications.

OBJECTIVES

The object is to produce a best practices guidance document for the removal of rubber from airport runways. Both asphalt and concrete runway surfaces are to be considered. Although the primary emphasis is on hydro-blast processes that are sometimes associated with runway damage, the guidance should also identify and address best practices for other rubber removal processes. Note that rubber removal is a post-construction airport operational maintenance activity and not related to pavement construction and therefore, it is not subject to FAA construction specifications.

Topics to address include, but are not limited to:

- Explore in broad terms the relationship between active airport operations and required maintenance regarding rubber removal, including frequency of treatments and the work required.
- Review existing published relationships between rubber build-up vs friction loss.
- Develop guidance on determining when rubber removal is needed, and what defines an acceptable level of removal per maintenance cycle.
- For hydro-blasting removal, identify best practices and methodology. For example, water pressure, forward speed of equipment, number of passes, time allowed for maintenance, end pavement acceptable friction condition, pavement surface integrity, and other issues.
- Identify best practices that ensure rubber removal occurs within the grooves of concrete and asphalt runways.
- Identify alternative removal methodologies and whether new procedures need to be developed.
- Assess what is an acceptable level of pavement damage per rubber removal event. Identify damage assessment criteria/methodologies as well as rubber removal effectiveness.
- Weigh rubber removal need vs potential accumulated damage due to multiple removal treatments over time. Explore if there is an optimal time for removal.
- Discuss the need for test strips to evaluate potential damage vs rubber removal efficiency. Recommend what a test strip process should involve.

There are successful examples of airports managing runway rubber removal. The project should include identifying no less than four of those airports and identify the approaches they employ leading to this success. Likewise, the project should review four or more examples of rubber removal events that resulted in damage or otherwise unsuccessful removal. It is anticipated that, to the extent practicable, airports selected to be reviewed for this project will have both asphalt and concrete runways, resulting in a more efficient approach and work plan to be utilized by the selected research project team. Both asphalt and concrete runway examples should be represented when identifying successful and unsuccessful removal projects.

The primary deliverable will be a report in the form of a guidance document that augments and updates ACRP Synthesis 11 by identifying and documenting best practices for runway rubber removal. It is expected that this information could be utilized by airport operators, maintenance officials, and rubber removal contractors to more efficiently restore runway pavement friction though rubber removal processes while minimizing negative impacts to the runway surface.

TASKS

The Principal Investigator (PI) will be responsible for executing a series of sub-tasks that, when completed, will result in completion of the objectives of this study within the time and budget available. The proposal does not necessarily need to reflect the exact budget or the performance period indicated in the RFP; however, any deviation must be justified and clearly explained.

Task 1 - Literature Review

The literature review should include at a minimum:

- Publications, reports, and papers addressing runway rubber build-up, friction reduction, and friction restoration through rubber removal maintenance activities, with a focus on hydro-blasting processes.
    - Published reports or articles reporting rubber removal events where runway damage resulted.

- Information on how to evaluate the need for rubber removal and what defines satisfactory rubber removal.
- Information on how to identify, evaluate, and quantify any runway damage caused by the rubber removal process employed.

Task 2 – Work Plan

The PI will develop a work plan with detailed sub-tasks to describe the activities planned. The Project Technical Panel (PTP) will meet in-person with key members of the research team to discuss the final work plan. The PI shall not proceed with Task 3 until the PTP has reviewed and approved the work plan. The work plan should also include time for reviewing a draft final report and completed final report.

Task 3 – Information Gathering/Interviews/Questionnaires

In addition to the literature review, the PI will also gather information from airport operators, rubber removal contractors and other parties identified by the research team that will further identify and define the issues. It is expected that this effort will result in examples of both successful and problematic rubber removal cases that can be documented and examined to contribute to the identification of best practices. The PI should propose how to acquire this initial information, but it is anticipated that it may be done through questionnaires.

Task 4 - Airport Site Visits/Scans

After information gathering has occurred, the research team will identify airport sites that demonstrate successful and problematic rubber removal programs. The PI will then coordinate with the respective airports to arrange for site visits that will include review of all aspects of their rubber removal program, including how airport operations staff and airport maintenance staff communicate and coordinate their activities. It is anticipated that four different visits will be conducted for the successful and problematic airport sites, for a total of eight visits. Both asphalt and concrete runway examples should be represented.

For each visit, a report shall be produced documenting the event and identifying main outcomes and conclusions. Information from these visits will contribute to the final report in identifying best practices.

Task 5 – Draft and Final Report

A draft final report will be a runway rubber removal best practices guidance document submitted to the ACPTP project manager three months prior to the end of the contract. The PI and the PTP will meet to discuss the work conducted and the outcomes of the project. The one-day meeting will be held at a mutually agreed upon location for 1-2 key members of the research team; a virtual meeting may be substituted at the discretion of the PTP and ACPTP project director. The PI will have 1 month to submit a final 508 compliant report.

REPORTS

The following reports will be required

- Literature review and work plan for PTP review and approval
- Quarterly progress reports detailing work conducted and data collected
- Report documenting the findings of the site visits
- Draft final report for PTP review and approval
- Final 508-compliant report

FUNDS AVAILABLE: Not to exceed $400,000

CONTRACT TIME: Not to exceed 27 months
Literature review: 6 months
Work plan: 18 months
Draft/Final reports: 3 months

ACPTP 2022-5 PROJECT MANAGER: John Adam, jfadam@iastate.edu; 515-294-7323

QUESTIONS ON RFP: E-mail to ACPTP@iastate.edu prior to July 8, 2022. Answers will be posted at https://cptechcenter.org/airport-pavements/acptp/

PROPOSAL PREPARATION INSTRUCTIONS: https://cptechcenter.org/airport-pavements/acptp/

ESTIMATED NOTICE TO PROCEED DATE: September 1, 2022

PROPOSAL DUE DATE: July 15, 2022 not later than 4:00 P.M. (Central Time)

PROPOSAL SUBMIT: ACPTP@iastate.edu (PDF proposal plus Excel spreadsheet, see proposal instructions)