Scott Landolt
Research Applications Laboratory

The NCAR FAA Snow Machine

Friends and Partners in Aviation Weather – Fall Meeting

October 9, 2025

This material is based upon work supported by the National Center for Atmospheric Research, which is a major facility sponsored by the National Science Foundation under Cooperative Agreement No. 1852977.

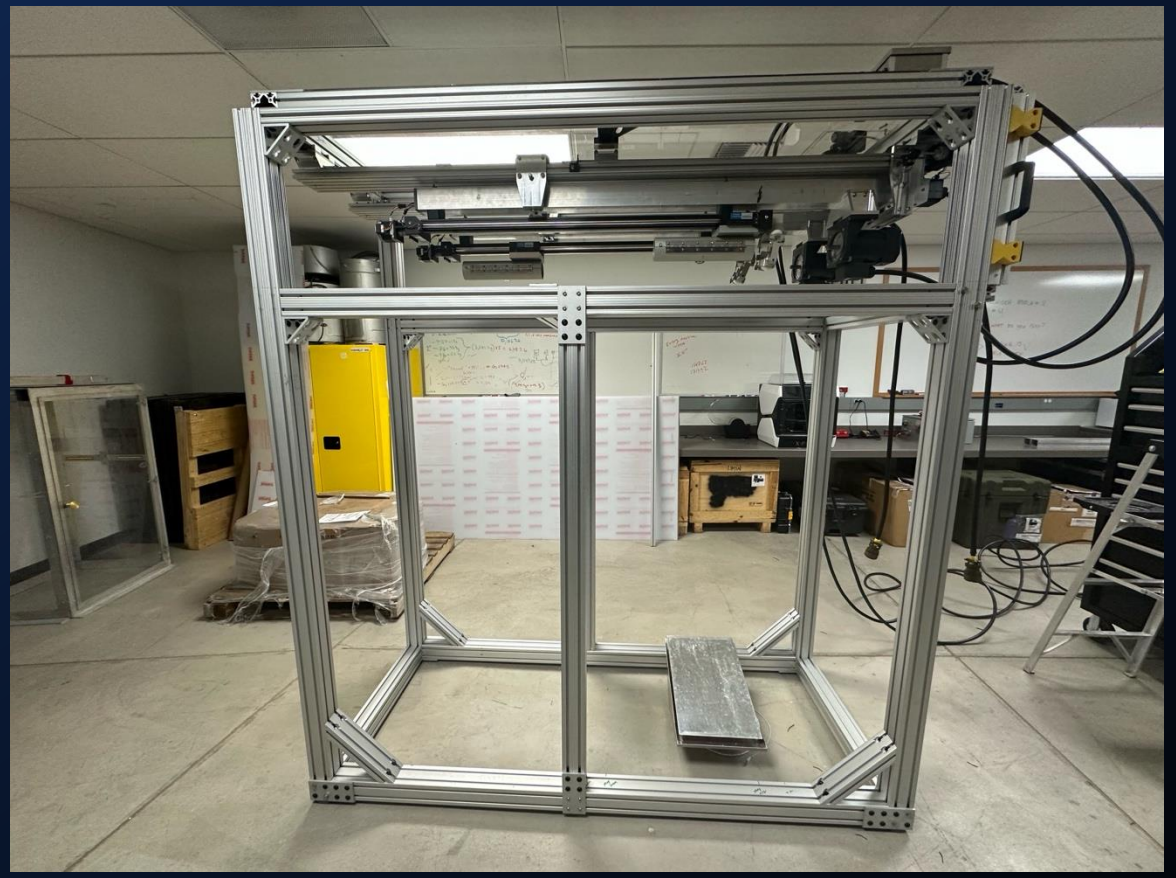
Deicing/Anti-Icing Fluid Testing Challenges

Testing of aircraft anti-icing fluids has traditionally been conducted in an outdoor environment but creates problems

- Conditions outdoors (temperature, snowfall rate, wind, etc.) can change over the course of a test
- Outdoor testing typically takes longer to accomplish
  - Can only be done during winter months
- Logistical Considerations
  - Travel time in hazardous conditions
  - Personnel availability

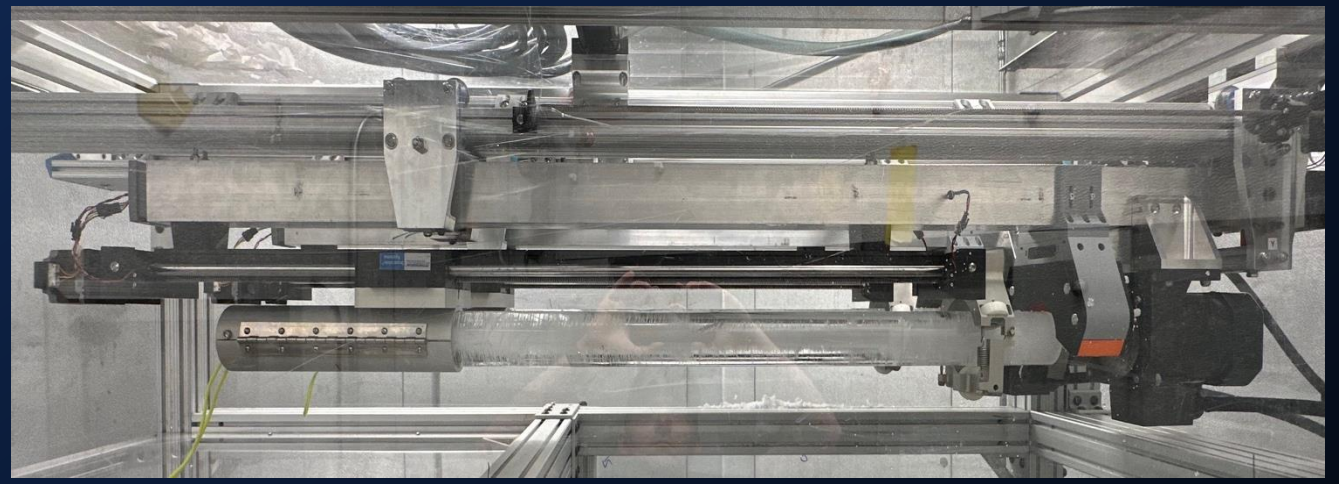
NCAR FAA Artificial Snow Generation System “Snow Machine”

The NCAR FAA Artificial Snow Generation System or Snow Machine, is a system developed under funding from the Federal Aviation Administration (FAA) to test holdover times (HOTS) for aircraft anti-icing\deicing fluids in a laboratory environment

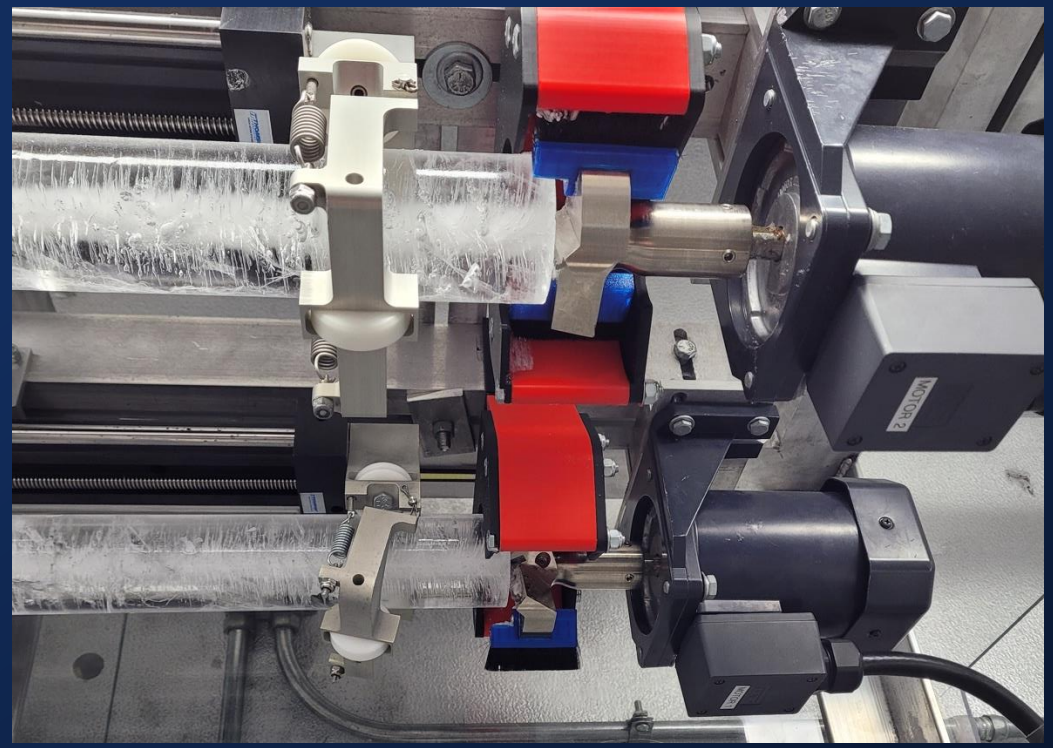


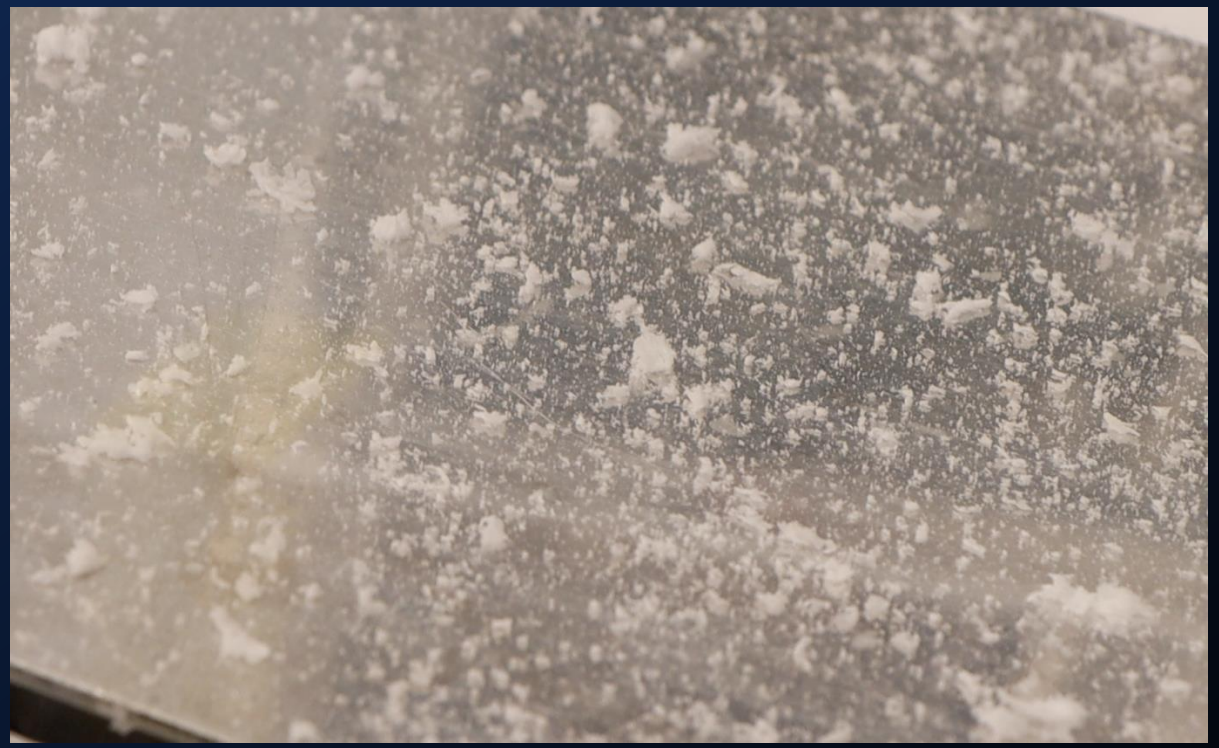
NSF NCAR Snow Machine Operational Concept

Frozen cylinders of ice are loaded onto a linear translation system, which feeds them into a specially designed rotating carbide bit that shaves the ice, creating snow-like particles



Snow Creation

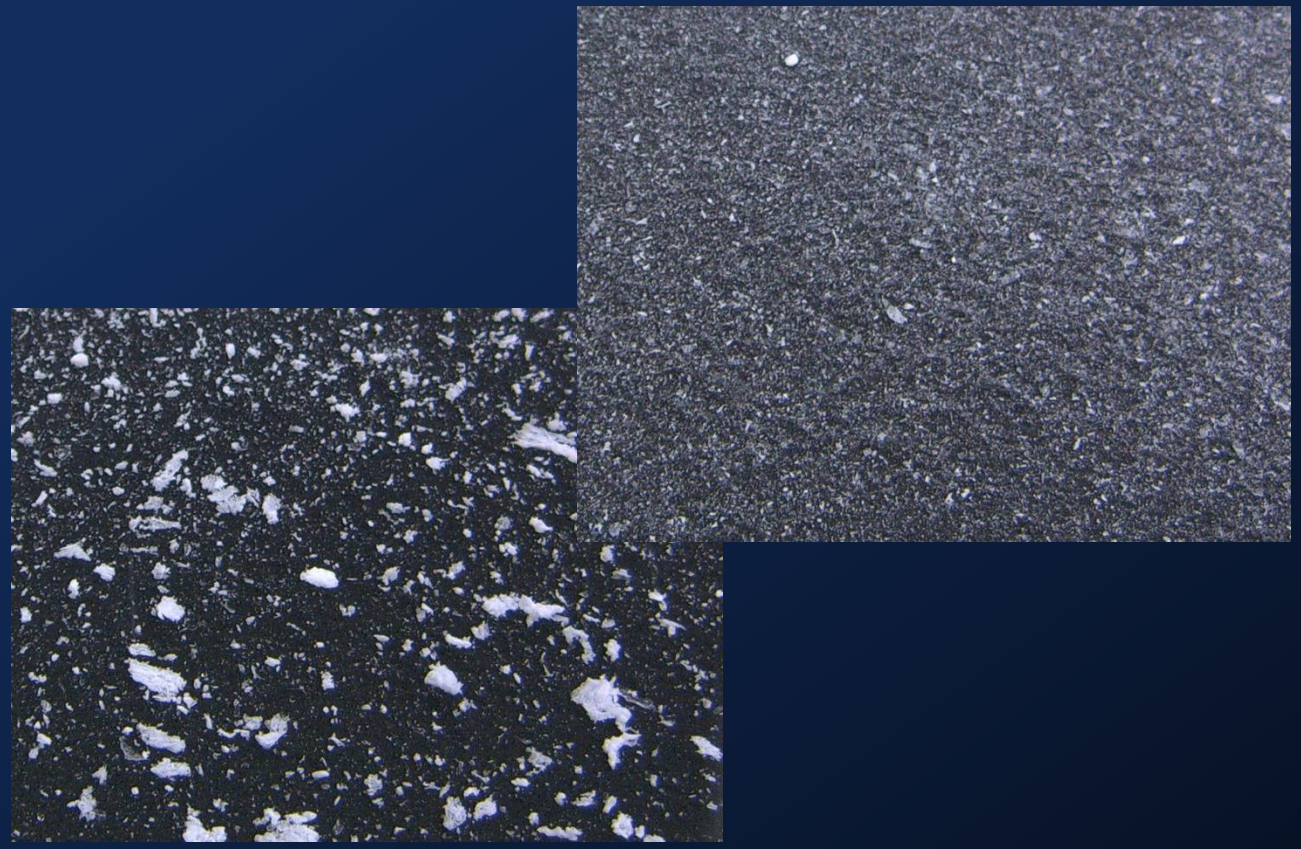




Outdoor size distributions can be recreated in the machine and the indoor size distributions naturally tend to vary based on cold chamber temperature

Snow Creation

Variable Speed Motors and Specialized Blades

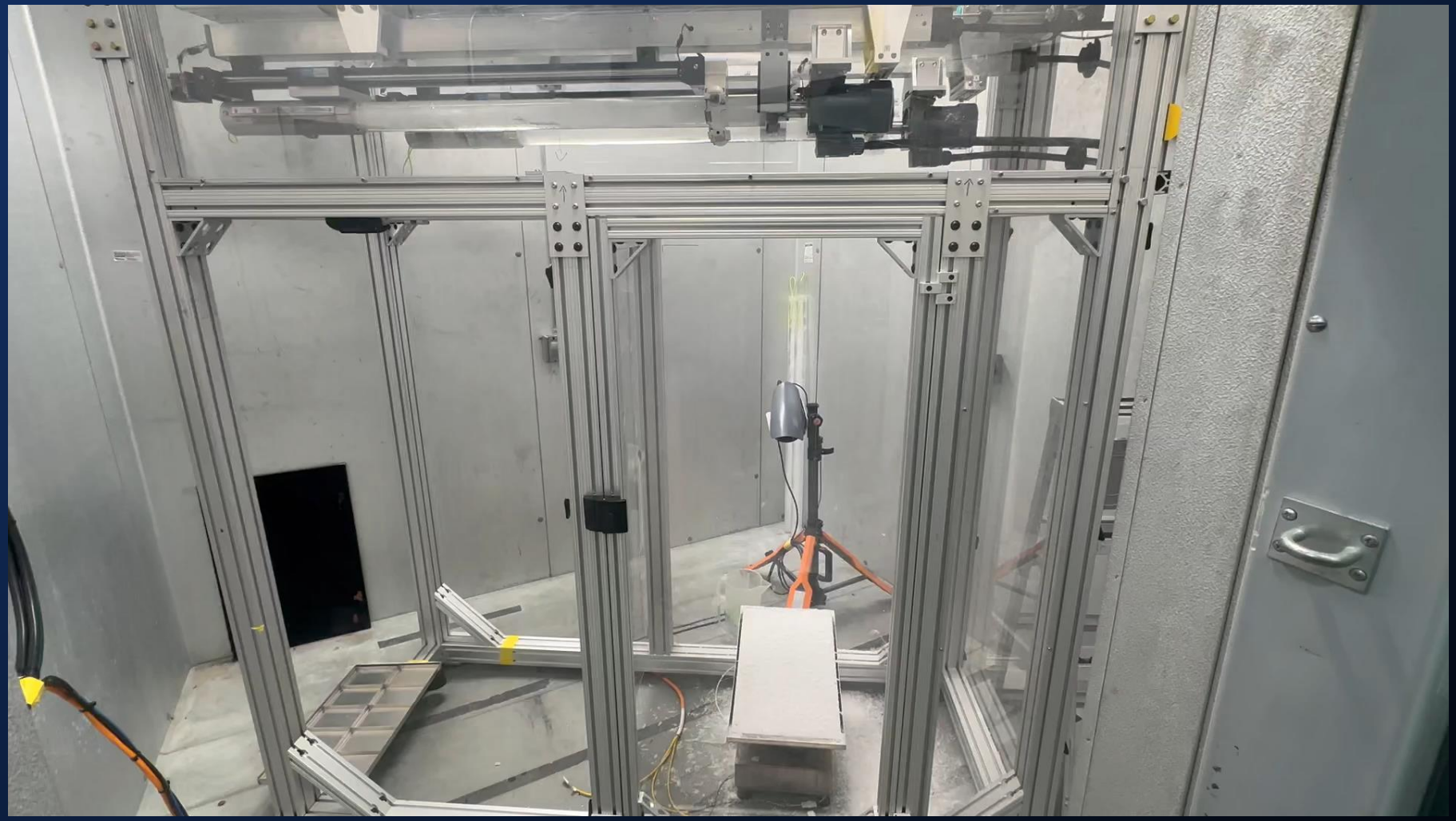


Allow for more precise control of snowflake sizes

- Slower spin rates = larger particles
- Faster spin rates = smaller particles

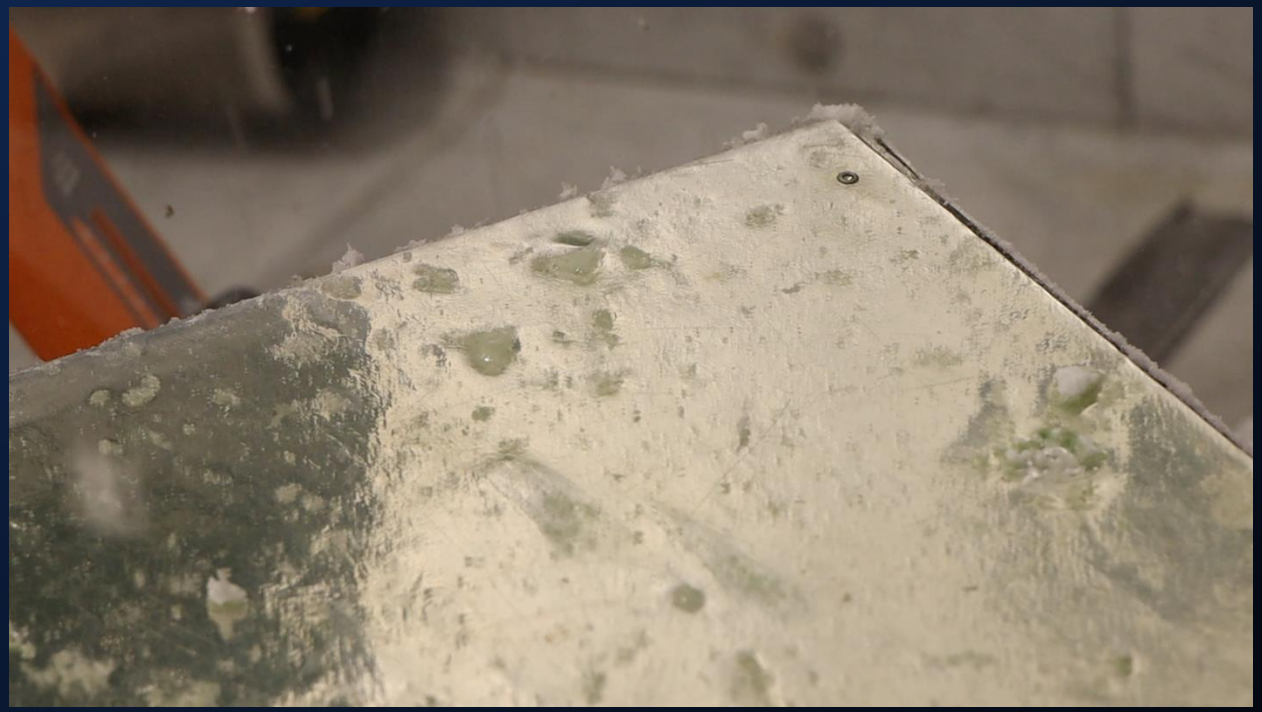
May allow for improved simulation of outdoor conditions

NSF NCAR Snow Machine



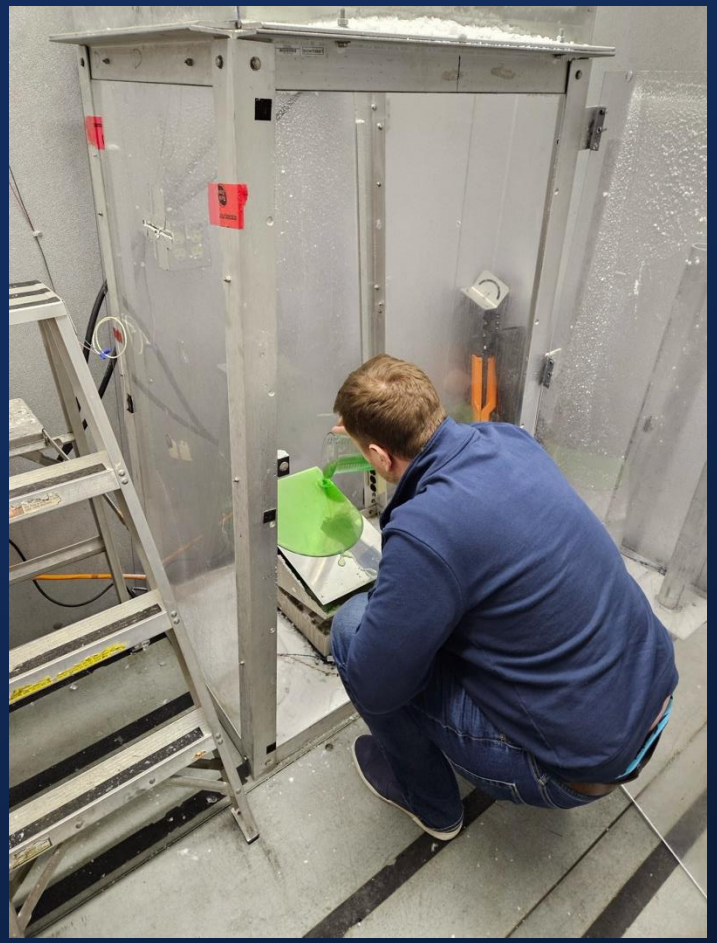
Snow Machine Fluid Testing

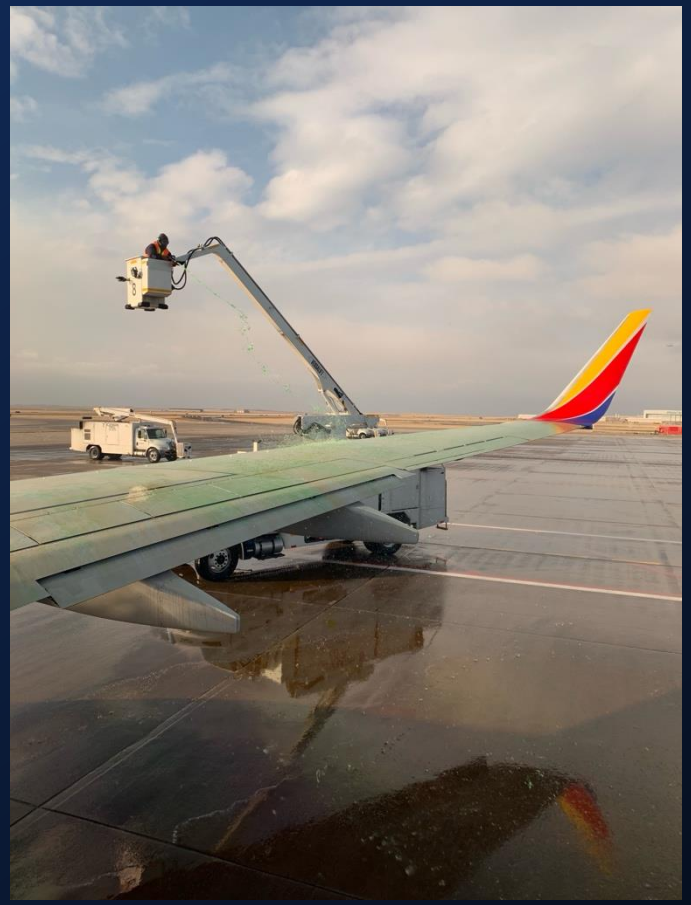
Video Documentation of Testing



NCAR FAA Snow Machine

Thank you!





This research is in response to requirements and funding by the FAA. The views expressed are those of the authors and do not necessarily represent the official policy or position of the FAA.