

ICING

Joint Safety Implementation Team as Modified by JIMDAT

Implementation Plan for Safety Enhancement 133R2 Icing - Turboprop Aircraft Ice Detection Systems

Statement of Work:

To prevent fatal accidents caused by in-flight icing encounters, for all turboprop aircraft with non-evaporative ice protection systems and non-powered flight controls used in Part 121 operations, manufacturers of such airplanes should : (1) adapt and implement automatic ice detection and alerting systems in **all new type designs**, and (2) conduct a study to determine the feasibility of installing automatic ice detection and alerting systems on **current existing type designs**. For current existing type designs where installation of such systems is determined to be feasible, manufacturers should develop and operators should implement appropriate design and procedure modifications to meet the intent of the safety enhancement.

For the purposes of this SE, “automatic ice detection and alerting systems” are defined as systems that do the following:

1. Automatically detect the presence of icing conditions and either:
 - a. automatically activate the ice protection system, or
 - b. alert the crew to manually activate the ice protection system.
2. Determine whether the icing conditions exceed those for which the aircraft was certified, and if so, alert the crew to exit the conditions.
3. If feasible, also provide a measurement of rate of ice accretion and provide this as advisory information to the flight crew.

Lead Organization for Overall Safety Enhancement Completion (LOOSEC):

Aerospace Industry Association (AIA)

Safety Enhancement (SE 133):

Adapt and implement automatic ice detection and alerting systems on turboprop aircraft, as outlined in the SE 133 outputs, that have non-evaporative ice protection systems and non-powered flight controls and are operated in part 121 service.

JIMDAT Score:

DIP Stand Alone Fatality Risk Reduction:
2020 - (2.73) 100% - (5.46)

Differential beyond original 46 SE CAST plan:
2020 - (0.40) 100% - (0.8)

Outputs:

Output 1

- For new **Turboprop type designs**, manufacturers agree to adapt and implement automatic ice detection and alerting systems.

Resources: AIA (LOOC), Manufacturers

Total government/industry resources: \$1, 750,000

Timeline:

1. 60 days after CAST “G” level approval for AIA to issue communication
2. 180 days after receipt of the AIA communication for manufacturers of affected turboprop airplanes to respond

Actions:

1. AIA encourages manufacturers to adapt existing ice detection probe technology to provide measurement capability of icing conditions for turboprop aircraft that exceed the conditions for which the aircraft is certified.
2. Manufacturers of affected turboprop airplanes respond to AIA letter and agree to implement ice detection and alerting systems on new type designs.

Output 2

- FAA review guidance material regarding certification for of automatic ice detection and alerting systems.

Resources: FAA AIR (LOOC)

Total government/industry resources: 0.2 FTE for FAA to review guidance and develop revision plan; no incremental costs to perform revisions as this will be part of FAA rulemaking

Timeline:

1. 12 months from CAST "G" Approval

Actions:

1. FAA review pertinent aircraft certification policy and guidance material, including AC 25.1419-1A “*Certification of Transport Category Airplanes for Flight in Icing Conditions*” and determine if revisions should be made to address certification of the ice detection and alerting systems proposed by this SE.
2. FAA develop a plan and initial schedule for making revisions to guidance material that is compatible with icing rulemaking activity recommended in SE 39, and share this information with CAST.

Output 3

- For **current** Turboprop production aircraft and **existing** type designs, conduct a study to determine the feasibility of installing automatic ice detection and alerting systems.

Resources: AIA (LOOC), Manufacturers, JIMDAT

Total government/industry resources: \$800,000 for feasibility cost study, total costs to be determined by feasibility study.

Timeline: 12 months after CAST “G” level approval

Actions:

1. AIA send a letter to manufacturers of applicable turboprop airplanes requesting that they conduct feasibility studies to determine the cost-benefits to install automatic ice detection and alerting systems for each type of turboprop aircraft they manufacture, both current and post-production.
2. Manufacturers perform the requested studies. JIMDAT will provide manufacturers with estimation of fatality risk reduction benefits from the CAST fleet-wide assessment to ensure consistency across the processes.
3. Manufacturers provide the results to AIA.
4. AIA refer the completed studies to the CAST.

Output 4

- For **current** Turboprop production aircraft and **existing** type designs, manufacturers of applicable airplanes agree to adapt and implement ice detection and alerting systems where feasible, in accordance with results of studies completed under output 3.

Resources: AIA (LOOC), Manufacturers, Operators

Total government/industry resources: Costs will be determined by results of feasibility studies in output 3.

Timeline:

1. 60 days after completion of output 3 for AIA to issue communication
2. 180 days for manufacturers of affected turboprop airplanes to respond to AIA letter

Actions:

1. AIA encourages manufacturers to implement automatic ice detection and alerting systems on airplanes where feasibility has been determined by the cost-benefit studies.
2. Manufacturers of affected turboprop airplanes agree to implement ice detection and alerting systems on current existing type designs, as feasible and in accordance with the results of output 3.

Relationship to Current Aviation Community Initiatives:

- ARAC Ice Protection Harmonization Working Group
- ARAC Flight Test Harmonization Working Group
- Airworthiness Directives
- NTSB safety recommendations
- FAA rulemaking activity for new icing regulations based on ARAC recommendations and CAST SE 39:
 - Part 25 performance and handling characteristics for certification in icing conditions
 - Part 25 requirements for activation of ice protection
 - Part 121 requirements for activation of ice protection
 - Part 25 new “Appendix X” icing conditions, e.g. supercooled large drop (SLD), mixed phased, and glaciated icing conditions
 - Part 121 requirements for exiting icing conditions
- Industry research and development of ice detection probe technology capable of detecting the presence of “Appendix X” icing conditions

Impact on Non-Part 121 or International Applications:

All operators will be affected by the procedure changes for affected airplanes.

