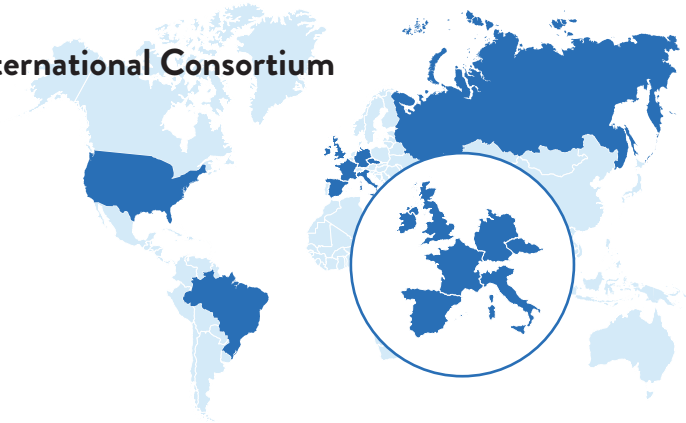
International Consortium



DLR · ATR · AeroTex UK LLP · CIRA · cnrs · EMBRAER · Honeywell | THE FUTURE IS WHAT WE MAKE IT · INTA · LEONARDO · ONERA · ЦАГИ · Technische Universität Braunschweig · United Technologies Research Center · SAFRAN · Collins Aerospace

In a nutshell

- **11.9 m€** Total estimated eligible costs
- **6.6 m€** EU contribution
- **1100** person months
- **48** months Project duration
- **19** Partners
- **10** Countries
- **6** International partners
- **13** European partners
- **8** Research centers
- **1** University
- **9** Industrial partners
- **1** Consultancy partner
- **10** Sensors technologies

Project name: SENSors and certifiable hybrid architectures FOR safer aviation in ICing Environment
Project acronym: SENS4ICE
Funding scheme: Research and Innovation Action (RIA)
Coordinating organisation: German Aerospace Center (DLR)
Contact: contact@sens4ice-project.eu
Project start date: 01/01/2019
Project end date: 31/12/2022

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 824253.

www.sens4ice-project.eu

SENS4ICE

SENSORS AND CERTIFIABLE HYBRID ARCHITECTURES FOR SAFER AVIATION IN ICING ENVIRONMENT

SENS4ICE introduces a novel approach of hybridisation of different detection techniques to intelligently cope with the complex problem of ice detection.

In the proposed hybrid system, the direct sensing of atmospheric conditions and/or ice accretion on the airframe is combined with an indirect detection of ice accretion on the airframe by monitoring the change of aircraft characteristics.

SENS4ICE will contribute to the smart, green and integrated transport while addressing the challenges of the transport competitiveness, performance and sustainability.

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT NO 824253.

Objectives

A. Increase the flight safety in icing conditions and especially for the SLD (Supercooled Large Droplets) conditions.

B. Contribute to increasing the knowledge base on the formation and occurrence of Appendix O (FAR Part 25/CS-25) icing conditions.

Hybrid Ice Detection

SENS4ICE introduces a novel approach of hybridisation of different detection techniques:

DIRECT + **INDIRECT**

Different techniques for direct sensing of atmospheric conditions and/or ice accretion on airframe.

Indirect techniques to detect ice accretion on airframe and change of aircraft characteristics.

Layered Safety Concept

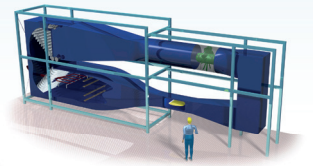
- **Strategic and tactical interaction with SLD icing:** new forecasting methods and a "now-casting" with high spatial and temporal resolution based on satellite data, weather radar data and data from other aircraft that have flown in the same area.
- **In-situ ice detection:** robust and hybrid ice detection system based on a range of sensors with different physical principles.
- **Contingency:** measures to safely exit icing conditions (preventing loss of control).

SENS4ICE addresses the development, test, validation, and maturation of the different detection principles with specific regard to hybridisation, in close cooperation with regulators, to develop acceptable means of compliance. These activities are supported by the icing wind tunnel tests and airborne demonstration of technology capabilities in relevant natural icing conditions.

Icing Wind Tunnels

26 weeks total testing time | **Nov. 2020 - Mar. 2021** Planned time frame

Technical University of Braunschweig
Icing Wind Tunnel
Braunschweig, Germany



© Technical University of Braunschweig

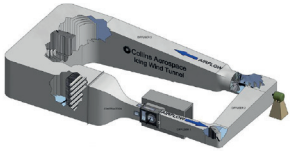
TsAGI - Aerohydrodynamic Institute named after Prof. N.E. Zhukovsky
Climatic-type Icing Wind Tunnel
Moscow, Russia

© TsAGI

Year-round Icing Wind Tunnel
Moscow, Russia

© TsAGI

Collins Aerospace
Icing Wind Tunnel
Uniontown, Ohio, USA



© Collins Aerospace

Flight Test Platforms

125 flight hours | **1st quarter of 2022**

SAFIRE ATR-42

Copyright © SAFIRE/JC Canonici

EMBRAER PHENOM 300

Copyright © Embraer

CAO YAK-42D ROSHYDROMET

Copyright © TsAGI / CAO