



Instant detection of the presence of ice using fiber optics. A single optical fiber can cover large areas

Videos



Applications

Detection systems with instant ice detection:

- Aeronautics
- Wind generation
- Critical infrastructures
- Cold systems



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Spanish Version



FIBER OPTIC BASED ICE SENSOR

The Composite Materials Area of the Spanish National Institute of Aerospace Technology (INTA) has developed a fiber optic sensor that instantly identifies the presence of ice on the surface of a body, being able to distinguish different types of ice.

Description

The presence of clouds of supercooled water in the trajectory of aircraft generates the sudden growth of ice on their wings, which modifies their aerodynamics and the consequent loss of lift. This has been the common reason for some of the latest aviation accidents.

On the other hand, wind turbines subjected to similar situations tend to accumulate ice on their blades, which leads to an imbalance of the wind turbine, which must be braked as a precaution until the ice is removed, with the consequent production losses.

This technology detects the presence of ice instantly, so that an alert can be issued to manage the situation (e.g. by activating an anti-ice system, consult other INTA technologies). The sensor does not modify the aerodynamics of the body since it is embedded in the material.

The system, in its simplest configuration, is based on a pair of fiber optic sensors, such as Bragg gratings (FBGS) or long period gratings (LPG), with certain characteristics and placed in certain areas of the body. The synchronized reading of both sensors shows differences that correlate with the presence of ice. It is even capable of differentiating different types of ice, which are related to different degrees of danger.

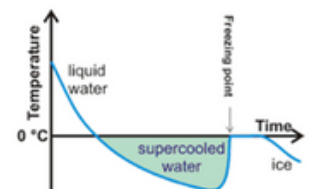
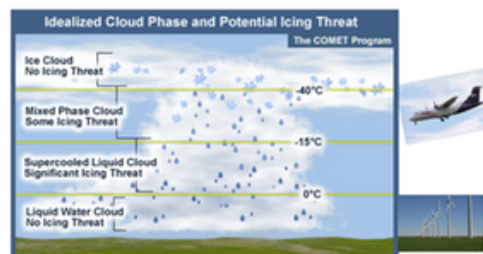
Due to fiber optics' characteristics, different sensors can be inserted in a single fiber, leading to the coverage of large surfaces of a body with a single fiber, with the ability to differentiate the response of each sensor and, therefore, to locate the presence of ice accurately.

Competitive advantages

- Ability to immediately identify the presence of ice in any area of the surface of a body.
- A single fiber is capable of incorporating a large number of sensors and, therefore, covering large surfaces.
- Allows to identify different types of ice, linked to different levels of security.
- Economic system and free of electromagnetic interference.

Situation

Patented technology, validated and proven in ice tunnel. Looking for collaboration for the development of a demonstrator in real conditions and subsequent transfer of the technology.



https://www.weather.gov/source/zhu/ZHU_Training_Page/icing_stuff/icing/icing.htm