

Inflight and Preflight Detection of Pitot Tube Anomalies

Increases the safety of aircraft passengers and crew

The health and integrity of aircraft sensors play a critical role in aviation safety. Inaccurate or false readings from these sensors can lead to improper decision making, resulting in serious and sometimes fatal consequences. This project demonstrated the feasibility of using advanced data analysis techniques to identify anomalies in Pitot tubes resulting from blockage such as icing, moisture, or foreign objects.

The core technology used in this project is referred to as noise analysis because it relates sensors' response time to the dynamic component (noise) found in the signal of these same sensors. This analysis technique has used existing electrical signals of Pitot tube sensors that result from measured processes during inflight conditions and/or induced signals in preflight conditions to detect anomalies in the sensor readings.

Analysis and Measurement Services Corporation (AMS Corp.) has routinely used this technology to determine the health of pressure transmitters in nuclear power plants. The application of this technology for the detection of aircraft anomalies is innovative. Instead of determining the health of process monitoring at a steady-state condition, this technology will be used to quickly inform the pilot when an air-speed indication becomes faulty under any flight condition as well as during preflight preparation.

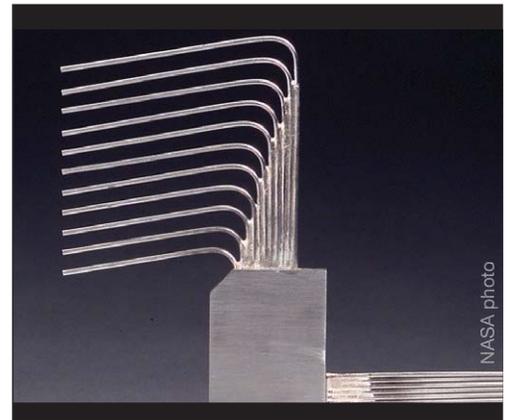
Applications

NASA

- ▶ Pitot tube/static system performance

Commercial

- ▶ Aviation and aerospace:
 - Detection of Pitot tube anomalies resulting from blockages during inflight or preflight conditions
 - Wide applications in commercial, private, and military aircraft industries
 - Applicable to new aircraft and existing aircraft with only minor modifications



Phase II Objectives

- ▶ Research and acquire existing air data systems and evaluate them for compatibility with the proposed signal analysis techniques
- ▶ Complete laboratory experiments to identify the signal analysis techniques that best distinguish Pitot tube blockage
- ▶ Develop and optimize the inflight blockage detection algorithm and software
- ▶ Develop and build inflight blockage detection prototype system
- ▶ Develop and build preflight blockage detection prototype system
- ▶ Demonstrate and validate prototype blockage detection system through inflight testing

Benefits

- ▶ Improves detection of inaccurate indications
- ▶ Increases safety of passengers and crew
- ▶ Reduces the potential for accidents

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