

Low False Alarm Cargo Compartment Fire Detector Prototype



Cargo compartments on commercial aircraft are required to have fire detectors that will alarm within one minute of the start of a fire. The aviation industry currently uses particle sensing smoke detectors to comply with this regulation. These sensors readily detect fires but also alarm to other airborne particles not associated with fires. The ratio of false alarms from existing smoke detectors to the detection of actual cargo fires is on the order of 100 to 1. These false alarms lead to unnecessary flight diversions that are both costly and potentially hazardous.

A test project was completed that developed a series of fire detection alarm algorithms that sensed not only smoke particles but also other combustion products including heat, ionized particles, carbon monoxide (CO) and carbon dioxide (CO₂). The algorithms used various combinations of absolute values of

these combustion products as well as rate of change of the values. The algorithms were exposed to a variety of types of fires as well as false alarm sources. One of the alarm algorithms was successful in alarming to all of the test fires in less than one minute and displayed complete immunity to alarming to any of the false alarm sources.

This project demonstrated the potential for multi sensor fire detectors, with an appropriate alarm algorithm, to dramatically reduce the current rate of false alarms without a loss in detection sensitivity. This could lead to a safety improvement by significantly reducing the incidents of aircraft diverting from their intended flight paths due to false alarms from cargo compartment fire detectors. A description of this project is contained in FAA Final Report DOT/FAA/AR-07/58, "Aircraft Cargo Compartment Multisensor Smoke Detection Algorithm Development".

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