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Volcanoes Belching Abrasive Ash Risk Aircraft Engine Flameouts

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By Sabine Pirone

April 15 (Bloomberg) -- Ash clouds from volcanoes pose a threat to aircraft safety because the plumes are filled with abrasive silica-based materials that risk clogging up the engines and sandblasting windscreens, researchers said.

Traversing a high-altitude volcanic ash clouds with a plane may also spark an electrical discharge known as St. Elmo's fire, block speed sensors or disrupt the airstream as pulverized rock strips away paint, according to Paul Hayes, director of air safety at aerospace information service Ascend.

Civil aircraft have encountered more than 80 incidents where ash clouds disrupted the flight, and pilots narrowly avoided crashes, said Bill McGuire, a professor at the Aon Benfield UCL Hazard Research Centre in London. The volcanic ash that swept across Europe from an eruption in Iceland today prompted airports in the U.K. and northern Europe to shut down and cancel or delay hundreds of international flights.

"If you lose power and lose accurate air-speed indication, it increases the risk of losing the aircraft," said Hayes. "That's why it is prudent not to fly through an ash cloud."

According to Toulouse-based Airbus SAS, volcanic particles have a melting point that is below an engine's internal temperature, causing them to melt when they pass through an engine in midflight. This may clog turbine vanes and disturb the flow of high-pressure combustion gases, risking an engine stall, according to an Airbus flight operations briefing note.

Flaming Out

In 1982, all four engines on a British Airways Plc Boeing Co. 747 flying to Perth, Australia, shut down as the aircraft encountered ash spewed from Mt. Galunggung in Indonesia. The plane fell for almost four miles before the pilot was able to restart three engines and make an emergency landing in Jakarta.

After a volcano erupted 100 miles south of Anchorage, Alaska on Dec. 15, 1989, a KLM Boeing Co. 747 flying from Amsterdam encountered an ash cloud at 26,000 feet, according to a U.S. National Transportation Safety Board report. Ash and smoke entered the cockpit, the pilots donned oxygen masks and all engines lost power, according to the report.

The plane landed safely at its Anchorage destination and none of the 245 people on board were hurt. An eruption on June 15, 1991, by Mount Pinatubo in the Philippines damaged at least 17 airliners in flight, most than 600 miles from the volcano, according to the FAA.

Complications from volcanic dust range from sulfur odor filling the jet cabin to an outright flameout of the craft's engine due to ash ingestion. Ventilation, hydraulic, electronic and air data systems can also be contaminated, according to Airbus, the world's largest maker of passenger planes.

Detection Centers

Iceland, among the geologically most active areas in the world with more than 200 volcanoes, sits along the northern Atlantic route for aircraft flying between Europe and North America. The Pacific region has more than 100 active volcanoes.

To help detect volcanic ash plumes, the International Civil Aviation Organization helped set up nine volcanic ash advisory centers around the world, tasked with monitoring ash plumes within their assigned airspaces.

Volcanic eruptions occur several times annually and can be "exceedingly dangerous," according to the FAA. The ash plume may not be visible, particularly at night, and even if it can be seen it is difficult to distinguish from an ordinary weather cloud, the FAA said. Pilots who encounter an ash cloud should "reverse course in order to escape."

--With assistance from Rachel Layne in Boston, John Hughes in Washington and Ed Dufner in Dallas. Editors: Benedikt Kammel, Kenneth Wong.

To contact the reporter on this story: Sabine Pirone in London at spirone@bloomberg.net

To contact the editor responsible for this story: Benedikt Kammel at bkammel@bloomberg.net