

# Lithium batteries central to Boeing's 787 woes (Update)

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This undated image provided by the National Transportation Safety Board shows the burned auxiliary power unit battery from a JAL Boeing 787 that caught fire on Jan. 7, 2013, at Boston's Logan International Airport. Federal officials said on Wednesday, Jan. 16, 2013, that they are temporarily grounding Boeing's 787 Dreamliners until the risk of possible battery fires is addressed. (AP Photo/National Transportation Safety Board)

Lithium batteries that can leak corrosive fluid and start fires have emerged as the chief safety concern involving Boeing's 787 Dreamliner,

a problem that apparently is far more serious than government or company officials acknowledged less than a week ago.

The Federal Aviation Administration late Wednesday grounded Boeing's newest and most technologically advanced jetliner until the risk of battery fires is resolved. The order applies only to the six Dreamliners operated by United Airlines, the lone U.S. carrier with 787s. Other airlines and civil aviation authorities in other countries quickly followed suit.

Japan's two largest air carriers voluntarily grounded their 787s on Wednesday ahead of the FAA's order following an emergency landing by one of the planes in Japan. On Thursday, the European Aviation Safety Agency ordered all European carriers to ground the jetliner. The Indian government ordered Air India to ground its fleet of six Boeing 787s, and Ethiopian Airlines grounded its four 787s "for precautionary inspection."

Only hours before the FAA issued its order, Transportation Secretary Ray LaHood reiterated to reporters that he considers the plane safe and wouldn't hesitate to fly one. LaHood and FAA Administrator Michael Huerta unequivocally declared the plane safe at a news conference last week even while they ordered a safety review of the aircraft.

However, as details emerged of two battery failures only 10 days apart, it became apparent that the FAA wouldn't be able to wait for completion of its safety review before taking action. An inspection of the All Nippon Airways 787 that made an emergency landing in western Japan found that electrolytes, a flammable battery fluid, had leaked from the plane's main lithium-ion battery. Investigators found burn marks around the damage. Japan's Kyodo News agency quoted transport ministry investigator Hideyo Kosugi as saying the liquid leaked through the electrical room floor to the outside of the aircraft.

In the first battery incident on Jan. 7, it took firefighters 40 minutes to put out a blaze centered in an auxiliary power unit of a Japan Airlines 787. The plane was empty of passengers shortly after landing at Boston's Logan International Airport.

The two incidents resulted in the release of flammable electrolytes, heat damage and smoke, the FAA confirmed. The release of battery fluid is especially concerning, safety experts said. The fluid is extremely corrosive, which means it can quickly damage electrical wiring and components. The 787 relies far more than any other airliner in operation on electronics to function rather than hydraulic or mechanical systems.

The electrolyte fluid also conducts electricity, so as it spreads it can short circuits, interfere with electrical signals and make control of the plane impossible for pilots and ignite fires. And its corrosiveness raises concern about whether a leak might weaken a key support structure of the plane, even though the 787 is the first airliner to be made primarily from lightweight composite materials that are less susceptible to corrosion than aluminum, safety experts said.

"Anytime you have leakage of battery fluid it's a very serious situation," said Kevin Hiatt, president and CEO of the Flight Safety Foundation in Alexandria, Virginia, which promotes global airline safety.



In this photo taken by a passenger and distributed by Japan's Kyodo News, passengers leave an All Nippon Airways Boeing 787 after it made an emergency landing at Takamatsu airport in Takamatsu, Kagawa Prefecture, western Japan, Wednesday, Jan. 16, 2013. ANA said a cockpit message showed battery problems and a burning smell was detected in the cockpit and the cabin, forcing the 787 on a domestic flight to land at the airport. (AP Photo/Kyodo News)  
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The fluid leak identified in the Japanese airline plane was a "very significant finding," said John Goglia, an expert on aircraft maintenance and a former National Transportation Safety Board member.

"There are all kinds of possibilities," Goglia said. "They need to go in and take a look at it. I guarantee you everybody's doing that."

The 787 is the first airliner to make extensive use of lithium-ion batteries to help power its energy-hungry electrical systems. The batteries charge faster and can be better molded to space-saving shapes compared with other airplane batteries.

"Unfortunately, what Boeing did to save weight is use the same batteries that are in the electric cars, and they are running into the same problems with the 787 as the problems that have shown up in electric cars," said Paul Czysz, professor emeritus of aeronautical engineering at St. Louis University.

The lithium-ion batteries in several Chevrolet Volts used for crash-testing caught fire in 2011. General Motors engineers eventually figured out that the fires were the result of a battery coolant leak that caused electrical shorts after side-impact crash tests. GM retrofitted the car with more steel to protect the battery. No fires were ever reported on real-world roads.



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Jim McNerney, Boeing's chairman, president and CEO, said the company is working with the FAA to resolve the situation as quickly as possible.

"We are confident the 787 is safe and we stand behind its overall integrity," he said in a statement. "We will be taking every necessary step in the coming days to assure our customers and the traveling public of the 787's safety and to return the airplanes to service."

Mike Sinnott, chief engineer on the 787, said last week that the plane's batteries have operated through a combined 1.3 million hours and never had an internal fault. He said they were built with multiple protections to ensure that failures "don't put the airplane at risk."

The lithium-ion design was chosen because it's the only type of battery that can take a large charge in a short amount of time. Rechargeable lithium batteries are most widely used to power consumer electronics such as laptops and cell phones. But they are also known to short-circuit and start fires that burn extremely hot and are difficult to put out.

Shipments of lithium batteries are suspected of causing or contributing to the severity of fires that caused two cargo jets to crash since 2010.

Sinnett said Boeing has long been aware of possible problems with lithium batteries. However, he said Boeing had designed the plane with special safety precautions to prevent a possible battery fire and to contain a fire to a small area should one occur.

Neither GS Yuasa Corp., the Japanese company that supplies the batteries for the 787, nor Thales, which makes the battery charging system, would comment on the recent troubles.



All Nippon Airways planes including a Boeing 787, right, are parked at Haneda Airport in Tokyo Wednesday afternoon, Jan. 16, 2013. ANA said a cockpit message showed battery problems and a burning smell were detected in the cockpit and the cabin, forcing another Boeing 787 on a domestic flight to land at Takamatsu airport in western Japan Wednesday morning. (AP Photo/Shizuo Kambayashi)

Boeing and its customers will need to move quickly to resolve the

problem. The aircraft maker has booked orders for more than 800 of the planes from airlines around the world attracted by its increased fuel efficiency.

The FAA order had airlines, flight crews and passengers scrambling to figure out what to do next. Stanislaw Radzio, the captain of a LOT Polish Airlines 787 that landed at O'Hare International Airport in Chicago late Wednesday, told The Associated Press he wasn't sure when the plane would be heading back to Poland.

"We're grounded like everyone else," he said. "We are very unhappy with the situation."

He said he was told of the FAA decision during the flight from Warsaw. A captain and flight instructor at the Polish airline since 1999, Radzio said the 787 is the nicest plane he's ever flown.

A passenger on the flight, Taras Dukyn, a student at the University of Illinois at Chicago, said he was surprised when told of the grounding by reporters, but would be willing to fly the aircraft again if the problems were fixed.

"It's a really nice plane. Computers in every chair. It was comfortable, although I was a little hot," he said.

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