

Air France Crash Points to Pilot Error as Skills Get Review

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(Updates with air safety expert comment in 11th paragraph.)

July 29 (Bloomberg) -- Airline pilots need better training on how to fly planes in an emergency with only limited aid from computers, investigators concluded after probing how cockpit confusion doomed Air France Flight 447 and killed 228 people.

Aviation authorities should revise pilot training and make changes to aircraft certification, flight recorders and data transmission, the French BEA aircraft accident bureau said today in a report into the 2009 crash off the coast of Brazil.

The document chronicles the final hours of the Airbus A330 aircraft, revealing a plane that responded accurately to commands, and confusion on the part of the two co-pilots while the captain was off duty. Neither pilot appeared to realize the plane had stalled, even as an alarm sounded for 54 seconds before the jet hit the ocean in the middle of the night.

The comments in the cockpit display "total incomprehension of the situation, and they are heard saying several times that they don't know what's going on," BEA Chief Investigator Alain Bouillard told a press conference in Paris today.

Flight 447 crashed on June 1, 2009, after the Airbus lost speed and stalled before beginning a 3 1/2 minute plunge into the Atlantic. No announcements were made to the passengers during the descent, the report said. Data presented by the BEA show the youngest of the three pilots, who was 32 and at the controls for most of the last minutes, angled the jet nose higher, a position the aircraft maintained until its impact.

Air France Response

Air France said there was no reason to question the crew's technical skills.

"Misleading stopping and starting of the stall warning alarm" confused the crew and contributed to the crash, the carrier said in a statement published on its Web site in response to the report. "Air France pays tribute to the courage and determination they showed in such extreme conditions."

Stalls occur when a plane slows to a degree that its wings lose lift. Recovering from a stall involves dropping the nose to regain airspeed, a procedure that novice pilots begin practicing early in their



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training. The captain, who returned to the cockpit after the plane had stalled, had almost 11,000 hours of flying experience. That compares with 3,000 hours for the youngest of the three-man crew, who remained in control.

Recommendations

Among the agency's recommendations, it called for one crew member to be designated as a "relief captain" whenever co-pilots are left alone in the cockpit. The pilot left for his break "without clear operational instructions," the BEA said.

The recommendations are likely to rekindle debate about adequate pilot training in an era of aviation dominated by computers. Modern jets are highly automated, and computers ensure the aircraft remains in its so-called flight envelope.

"The plane departed from normal cruise conditions, and the crew seem to have reacted inappropriately because they misidentified the situation," said Paul Hayes, director of safety at London-based aviation consulting firm Ascend Worldwide Ltd. "It appears they thought the stall warning was false and reacted to what they thought was an over-speed situation."

A buffeting effect resulting from the stall, audible in the cockpit recording, may have been misinterpreted by the co-pilots as a sign the aircraft was going too fast, according to Bouillard. One of the co-pilots can be heard saying, "we're doing a hell of a speed," when in fact the plane was dropping because it had already lost too much velocity, he said.

'Lively Exchange'

"There are lively exchanges and a lot of stress," Bouillard said.

Regulators should require specific pilot training on high-speed stalls, which isn't currently mandatory and which neither of the Air France co-pilots had received, the report said. Among other recommendations is the addition of cockpit cameras to enable a better reconstruction of the occurrences, a move that pilot unions have so far opposed as invasive.

Manufacturers should also consider making available a reading of the so-called angle of attack, which defines the angle between air flow and the longitudinal axis of the aircraft. In the case of the crashed Airbus, the angle, which wasn't visible to the pilots, always remained above 35 degrees during the descent.

Icy Sensors

The French investigation pieced together the last moments of the doomed flight after retrieving the flight- and data recorders from the bottom of the ocean earlier this year following multiple missions. Investigators recovered complete readings of the flight recorders, the BEA said.

Even before the recorders were found, the investigation honed in on airspeed sensors that malfunctioned

after they were blocked by ice at cruising altitude, causing the auto-pilot to shut down while the captain was on a routine break.

The junior co-pilot responded by forcing the plane into a sharp climb, the report said. He continued to pull back on the stick even after the aircraft slowed, lost lift and dropped almost vertically with the stall alarm blaring. Speed indications returned after a 54-second lapse, though they had no impact on pilot behavior, the report concluded.

The audio recording of the cockpit exchanges reveals poor communication between the co-pilots and a lack of clear command in the flight captain's absence, according to the BEA. They failed to exchange information or observations on the plane's orientation and descent through the air.

No Task Sharing

"There was no explicit task-sharing between the two copilots," the report said. "No standard callouts regarding the differences in pitch attitude and vertical speed were made."

In the final investigation phase, the BEA will consult cognitive scientists and doctors about the "human factors" leading to the crash, according to Bouillard.

At one point the junior co-pilot ceded control to his more experienced colleague, before re-engaging without warning a few seconds later. Both men briefly made simultaneous inputs on the side stick, a maneuver that prompts a vibrating warning on the steering device. While the captain had returned to the cockpit, he never took back the controls and remained in the background.

By the time the captain had rejoined his co-pilots, the situation had already deteriorated considerably, the investigators concluded in a report in May.

The chief pilot was among the victims recovered from the ocean surface in the weeks after the crash. Salvage crews managed to pull up the bodies of other victims from the sea bed after the jet was discovered earlier this year.

--Editors: Benedikt Kammel, Chad Thomas

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