



Proof that fatigue kills

FRMS Forum

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Flight Group

Fatal fatigue



- 1993 Kalitta International DC-8-61F at Guantanamo Bay
- 1994 Air Algerie 737-200F at Coventry, UK
- 1997 Korean Air 747-300 at Guam
- 1999 American Airlines MD-82 at Little Rock, USA
- 2001 Crossair BAe 146 at Zurich, Switzerland
- 2002 Agco Corp Challenger 604 at Birmingham, UK
- 2004 MK Airlines 747-200F at Halifax
- 2004 Corporate Airlines BAe Jetstream 31 at Kirksville, USA
- 2004 Med Air Learjet 35A at San Bernadino, California
- 2005 Loganair B-N Islander at Machrihanish, UK

The accidents we'll examine

There's not time to study them all, so we're choosing a few examples of what fatigue can do. Its effects are always similar.

- Kalitta DC-8-61F at Guantanamo Bay
- American MD-82 at Little Rock
- Challenger at Birmingham
- Corporate Airlines J-31 at Kirksville
- Med-Air Learjet 35 at San Bernadino

Did fatigue start in 1993?

- Guantanamo Bay in 1993 was **the first accident in history for which pilot fatigue was cited as the primary cause**. The pilot stalled a perfectly serviceable aircraft into the ground on approach. His inability to monitor the aircraft's safe flight was accepted as being the direct result of fatigue.
- Why did it take so long for investigators to cite fatigue as a cause? (before 1993 it was rarely cited even as a contributory factor).
- My theory is that the cult of the “macho” pilot is to blame. **This originated with the military, where a “can do” attitude in the face of high risk is sometimes necessary**. This ethos transferred - inappropriately - to airlines, from aviators who flew in World War 2, Korea and Vietnam.
- The macho pilot is not dead yet. Neither is the macho regulator or accident investigator who used to be a macho pilot.

Guantanamo DC-8-60F

- **Situation:** The aircraft was making a visual approach over the sea from the south to land on an easterly runway (10). The right turn had to be made late on approach because of the proximity of the Cuban border to the US Navy air base, and the captain banked the aircraft to 50deg to intercept the extended centreline.
- **Probable causes:** "The **impaired judgement, decision-making, and flying abilities of the captain and flight crew due to the effects of fatigue**; the captain's failure to properly assess the conditions for landing and maintaining vigilant situational awareness of the airplane while manoeuvring onto final approach; his failure to prevent the loss of airspeed and avoid a stall while in the steep bank turn; and his failure to execute immediate action to recover from the stall."
- **Real cause in simple words:** the flight crew had been on duty 18 hours, flying for 9 hours, and were suffering from circadian rhythm disturbance and lack of sleep. **But it was still legal!**

Little Rock



It was near midnight at the end of a long day, with a storm front passing through the area and continual surface-wind updates being passed by the controller as the wind velocity swung all over the place. 20sec before landing the captain said: “This is a can of worms”, but landed anyway

Flight International’s summary of the report said: “The aircraft landed on runway 04R near midnight in a thunderstorm and overran the runway, breaking up and killing the captain and ten passengers.

The crew's misjudgements started with their hope that, after nearly 13.5h on duty, they would not have to divert because of bad weather. The NTSB report says: "Because the first officer was able to maintain visual contact with the runway as the airplane was vectored for the final approach course, both flight crew members might still have believed flight 1420 could arrive at the airport before the storm. **When the second windshear alert was received, the flight crew should have recognised that the approach to runway 04R should not continue because the maximum crosswind component for conducting the landing had been exceeded.**" During the approach, the crew missed arming the spoilers for landing, and failed to deploy them manually.

Challenger



The trip began in the USA the day before the accident. The crew started duty at 04:00 local time at Dekalb-Peachtree airport, Atlanta. They flew to Fort Myers, then West Palm Beach, from where they flew the transatlantic leg to Birmingham UK and left for their hotel at 21:30 local time after a 12.5h duty day. The report notes that the co-pilot, the handling pilot in the accident, had little sleep both nights before the fatal flight. **Note: the circadian time for the pilots, if they attempted to sleep at midnight UK time, would have been 18:00.** "Detectable amounts" of the sleep-aid drug diphenhydramine were found in the bodies of both pilots, but "no alcohol or drugs of abuse" were detected.

There was a frost overnight and the aircraft was parked on the pan. After arrival at the aircraft at about 10:40 the next day (4 January), **both pilots conducted independent external checks of the airframe, noticed frost but did not order de-icing.** Later the commander helped the handling pilot to programme the FMS because "he had some difficulties which resulted in the process being re-started". Shortly after this the pilots exchanged words:

Commander: "Got a frost on the leading edge, on there, did you see it?"

Handling pilot: "Huh?"

Commander: "D'you [see] that frost on the leading edge - wings?"

Handling pilot: "Did I feel 'em?"

Commander: "Yeah, did you-all check that out?"

Handling pilot: "Yuh".

The UK AAIB says the **crew** calculated the take-off weight and speeds correctly, and called them correctly during the take-off run, but the left wing stalled immediately after unstick. The wingtip hit the ground and the aircraft cartwheeled. All five people on board were killed.

Dead tired: Kirksville J31 and San Bernadino Learjet 35

On 17 April 2008 Flight International commented:

“On 24 October 2004 a Med Flight Air Ambulance Bombardier Learjet 35A crashed into high ground while following an air traffic control clearance after take-off from San Bernardino airport, California. All five people on board were killed. **The air traffic control officer was warned twice by his minimum safe altitude warning system that the aircraft was in danger, but ignored it.**

Flightcrew fatigue was cited as a factor in that accident but, after the report came out, National Transportation Safety Board members criticised the absence of recommendations concerning controller fatigue, despite the fact **the duty ATCO had "worked an 8h shift the day before the accident, and returned 7.5h later, without any sleep, to work through the midnight shift"**. The fact that the ATCO had ignored two minimum safe altitude warning system alerts that could have enabled him to warn the crew in time to save their lives was detailed in the report, but the reason for this stupefying passivity was not probed nor deemed worthy of future study. It took the death of 46 people at Lexington Blue Grass airport last August to wake up the NTSB. Now, having completed the factual review of the Lexington accident, the NTSB has made multiple recommendations for Federal Aviation Administration action to deal with the causes of ATCO fatigue. The NTSB didn't mention San Bernardino, but cited other results of controller fatigue including a near-collision between two United Airlines aircraft at Chicago O'Hare.

Dead tired (continued)

“The NTSB and the FAA both have blind spots on fatigue. **In this column on 31 January 2006 we wrote: "At Kirksville, Missouri in October 2004, 13 people died because FAA regulations allowed a crew [of a British Aerospace Jetstream 41] to fly six sectors from an early start on a 15h crew duty day operating a commercial passenger schedule that terminated in a non-precision approach in marginal weather at night.**

"Everybody knows that six sectors and 15h is too long a shift for a safety-critical job, but the FAA still stands by its 16h maximum for an unaugmented crew. **The experts who study fatigue, however, liken the effect on a pilot's decision-making capabilities to the results of having a blood alcohol level that would see a car driver criminally convicted. The driving offence is socially unacceptable but, if a pilot is drunk on fatigue, that, apparently, is socially acceptable.** [But] the NTSB...is so lacking in faith in the FAA's willingness to do anything to correct the situation...that, in the Kirksville report, it [only] recommends pilots should be given lessons in 'fatigue countermeasures'. That is, recognise that you must be seriously tired at this point in a duty day, and make due allowances for it. The situation is preposterous: it is like the NTSB's road transport department advising those car drivers who insist on getting drunk that they should recognise their inebriation and manage its effects.

“There is no need to change a word of what we said. It's still true, and the FAA has still done nothing to change the rules for pilots or ATCOs.”

Some recent events where fatigue is cited (it continues to happen)

- 12 Feb 2009 Colgan Dash 8-Q400 at Buffalo, NY
- 25 Jun 2007 Cathay Pacific 747F ground collision at Stockholm Arlanda. Swedish investigator said crews had been awake 18-20h and the time was 0330 local, and fatigue was a factor. Hong Kong CAA dissented, saying crew had been given sufficient rest opportunity so it was not fatigue (macho regulator syndrome?)
- 27 Aug 2006 Comair CRJ100 at Lexington KY: both the controller and the pilots judged fatigued.

FLIGHT INTERNATIONAL



Flight's best guess as to what will happen in the science versus line experience debate:
<http://www.flightglobal.com/articles/2009/04/06/324773/comment-too-tired-for-science.html>

Thank you for your attention