

## Aviators IG Interesting News #6 – 4 Years of Investigations

**#AviatorsIGFunFact: Airbus A350 airframe consist of 53% composite material.**

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One of the most expensive and extensive air crash investigation process in the United States of America still could not crease all the conspiracy theories lead by the public. 4 years of investigations lead by United States government agencies: National Transportation Safety Board (NTSB) and Federal Bureau of Investigation (FBI) concluded the most probable cause of the accident of Trans World Airlines Flight 800 (TWA 800).

Trans World Airlines Flight 800 was a scheduled international passenger flight from John F. Kennedy International Airport (JFK), New York, United States of America to Leonardo da Vinci Airport (FCO), Rome, Italy with a stopover at Charles De Gaulle International Airport (CDG), Paris, France. A total of 230 passengers, crew members and flight attendants were onboard on the leg from New York to Paris.



*Figure 1:* The aircraft involved in the incident; Trans World Airlines Flight 800; Boeing 747-131 (Reg. No.: N93119)

As per standard operational procedures, TWA flight 800 was being pushed back from the gate, completed the after-start and taxiing checklist before taking off. The air traffic controller then gave clearance for TWA 800 to takeoff on runway 22R. After conducting the before takeoff checklist, the airplane became airborne around 2019 (Eastern Daylight Time, EDT).

New York Terminal Radar Approach Control and Boston ARTCC controllers advised TWA 800 to climb and maintain at 13,000 feet. The Cockpit Voice Recorder recorded the sound of the altitude alert tone, and the Flight data Recorder indicated that the airplane reached its assigned altitude at 2027 (EDT). Around 2029 (EDT), the captain of TWA 800 noticed there was an irregular fuel flow on engine number 4.

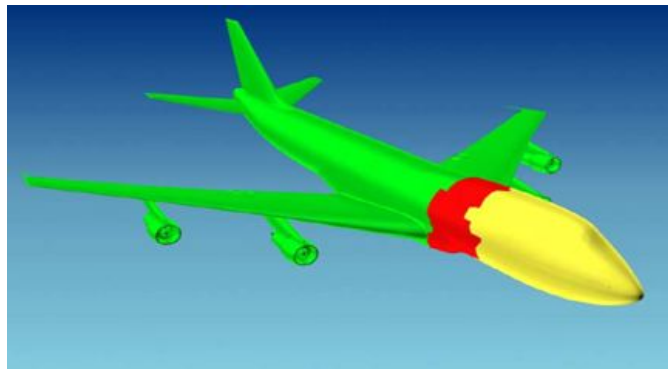
Boston ARTCC continued to give advice on TWA 800 to climb and maintain at 15,000 feet. The captain then set its engine power to climb thrust and acknowledged the instruction given by Boston ARTCC. 2 minutes after the flight crew discovered an inaccuracy of irregular fuel flow, TWA 800 suddenly disintegrated in mid-air. An airplane around the vicinity; Eastwind

Airlines Boeing 737 (Stinger Bee Flight 507), saw and heard a loud explosion, accompanied by a large fireball around 16,000 feet.

Search and rescue processes immediately being deployed, airplane wreckage were discovered floating on and beneath the surface of the Atlantic Ocean around 12.8 km south of East Moriches, New York. All 230 people on board were killed instantly, and the airplane was destroyed due to the explosion, breakup, impact forces, and the fire.

National Transportation Safety Board Air Crash Investigators were also deployed to uncover the cause of the crash of TWA 800. Speculations of aircraft bombing were being surface throughout the initial investigation and eyewitness testimony. Federal Bureau of Investigation (FBI) also joined the investigations process for possible criminal act.

Throughout the search and recovery process of the weckages, remote-operated vehicles (ROV), side-scan sonar (SSS), and laser line-scanning equipment were used for debris tagging and numbering according to their wreckage recovery location. Wreckage recovered from the ocean was transported to a former Grumman Aircraft facility in Calverton, New York. It was thoroughly examined for evidence of damage characteristic of a bomb or missile by the FBI.



*Figure 2: Trans World Airlines Flight 800 wreckage and debris trajectory analysis.*

After a painstaking 10 months of recovering effort, 95% of the TWA 800 wreckage and debris were eventually recovered. According to wreckage recovery location, investigations had outlined 3 zone areas. The initial breakup (red zone), the secondary breakup (yellow zone) and main wreckage area (green zone). The structure from the aft end of the forward cargo compartment, three of the four nose landing gear doors were recovered from the red zone.

None of the pieces of wreckage recovered from the red zone exhibited crushing damage and none of the pieces contained soot or exposure to fire. Airplane forward fuselage were recovered from the yellow zone and was revealed to severe crushing damage but none of the pieces contained soot or exposure to fire. Pieces of both wings, all four engines, and the fuselage aft were recovered from the green zone, exhibited heavy soot and severe heat damage.

National Transportation Safety Board (NTSB) Investigators considered three several possible causes for the structural breakup.

1. Structural failure and decompression
2. Live missile or bomb detonation
3. Fuel-air explosion in the center wing fuel tank

Further detailed laboratory debris examination was conducted by NTSB and FBI. NTSB suggested that Trans World Airlines Flight 800 airframe structure did not revealed any metal fatigue, corrosion or mechanical damage before the disintegration. FBI and NTSB did found traces amounts of explosive residue on the recovered airplane wreckage, but eventually was deemed inconclusive as it was unable to determine the exact source of the explosive residue.



*Figure 3: 4 years of the wreckage reconstruction on Trans World Airlines Flight 800.*

Using debris trajectory analysis and wreckage reconstruction, NTSB had sufficient evidence to determine the full breakup process of the Trans World Airlines Flight 800. However, there was insufficient evidence to prove the cause of the disintegration. The National Transportation Safety Board final report states that:

“The National Transportation Safety Board determines that the probable cause of the TWA flight 800 accident was an explosion of the centre wing fuel tank (CWT), resulting from ignition of the flammable fuel/air mixture in the tank. The source of ignition energy for the explosion could not be determined with certainty, but, of the sources evaluated by the investigation, the most likely was a short circuit outside of the CWT that allowed excessive voltage to enter it through electrical wiring associated with the fuel quantity indication system.”

“Contributing factors to the accident were the design and certification concept that fuel tank explosions could be prevented solely by precluding all ignition sources and the design and certification of the Boeing 747 with heat sources located beneath the CWT with no means to reduce the heat transferred into the CWT or to render the fuel vapor in the tank non-flammable.”

As a result of inconclusive evidence, various TWA Flight 800 conspiracy theories still exist. But none of the theories found to be true unless it could overturned the most probable cause of the disintegration that was found by the National Transportation Safety Board.

Photo sources:

Figure 1 [AlainDurand] (1995, May 01). *N93119 seen at Charles de Gaulle Airport in May 1995*. Retrieved April 04, 2018 from [https://en.wikipedia.org/wiki/TWA\\_Flight\\_800#/media/File:Boeing\\_747-131,\\_Trans\\_World\\_Airlines\\_-\\_TWA\\_AN1074840.jpg](https://en.wikipedia.org/wiki/TWA_Flight_800#/media/File:Boeing_747-131,_Trans_World_Airlines_-_TWA_AN1074840.jpg)

Figure 2 Wreckage found in each zone corresponded to specific areas of the aircraft. (2008, May 01). Retrieved April 04, 2018 from [https://en.wikipedia.org/wiki/TWA\\_Flight\\_800#/media/File:Twa\\_800\\_fig\\_22b.PNG](https://en.wikipedia.org/wiki/TWA_Flight_800#/media/File:Twa_800_fig_22b.PNG)

Figure 3 A photograph of the large three-dimensional reconstruction, with the support scaffolding visible. (1997, May 20). Retrieved April 08, 2018 from [https://en.wikipedia.org/wiki/TWA\\_Flight\\_800#/media/File:TWA800reconstruction.jpg](https://en.wikipedia.org/wiki/TWA_Flight_800#/media/File:TWA800reconstruction.jpg)

References:

In-flight Breakup Over the Atlantic Ocean Trans World Airlines Flight 800 Boeing 747-131, N93119 Near East Moriches, New York July 17, 1996. Washington, D.C: National Technical Information Service, pp.1-341. (1996, July 17). Retrieved April 04, 2018, from National Transportation Safety Board website <https://www.nts.gov/investigations/AccidentReports/Reports/AAR0003.pdf> (NTIS No. PB2000-910403, Report No, NTSB/AAR-00/03)

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Article written by Lim Jia Hao (Vice-President of Republic Polytechnic Aviators IG)  
[17047609@myrp.edu.sg](mailto:17047609@myrp.edu.sg)

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[rpaviators@gmail.com](mailto:rpaviators@gmail.com)

<https://rpaviators.weebly.com/>

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