Civil Aircraft Accident - A Case Report

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A civil aircraft accident resulting from gross crew incoordination as a result of interpersonal factors is presented. Flight safety aspects of the personality of the pilot are discussed with special emphasis on crew interaction.

Keywords: Flight safety, pilot error, aeronautic personality, accident-proneness.

In Greek mythology, there were four archetypal aeronauts called Daedalous, Icarus, Bellerophon and Phaethon. They represented the four typical aeronautic personalities of whom only Daedalous was a safe pilot. The others inexorably ended fulfilling their fate - crashing their planes and killing themselves. The reported aircraft accident and the personnel involved are typical of a Greek tragedy.

The Accident

The aircraft, a Boeing 737, was operating on a scheduled passenger service between Kathmandu and Calcutta, with 107 passengers and 7 crew members aboard. It took off from Kathmandu at 1130 hrs. The enroute weather was clear. During the flight, all parameters were normal and no abnormality was reported by the flight crew. At 1220 hrs the aircraft, while 67 km away at a height of 4,572 m, established contact with Calcutta approach. At 1225 hrs, Calcutta approach cleared the aircraft to descend to 914 m. At that time, Calcutta approach identified the aircraft 20 km north of Calcutta and cleared it for ILS approach. At 1226 hrs, permission was requested to come direct for finals on runway 19 which was accorded and the aircraft handed over to Calcutta Tower. At 1228, the pilot reported field in sight and sought permission to land - his height 792 m, distance from runway 8 km.

The Commander later stated that he had selected speed brakes himself at FL 55 in order to reduce the speed and height of the aircraft. He himself had selected flaps to positional at 210 knots 5° at 195 knots, 15° at 185 knots and landing flaps 25° could not be taken as the speed was too high. About 42 sec prior to touch down, when the aircraft was at about 305 m AGL,the Ground Proximity Warning System (GPWS) came on with 'WHOOP-WHOOP-PULL UP' warning. It sounded 15 times for about 25 sec, but the Commander continued with the approach. The landing check list after flap 15 was aborted. At 1230 hrs the aircraft touched down on runway 19 with its starboard engine touching first and then the port engine. The initial contact occurred 1,062 m from the beginning of the runway. After the initial impact the aircraft again bounced up and skipped a distance of 143 m and bounced back on the runway, thereafter it continued to slide on its belly and engines for the next 2,438 m and came to a stop 76 m off the runway. After the intial impact, the Captain realised that the landing gear was not down and selected the lever to down position. Both the outer wheels and hubs of the main gears started rubbing on the runway surface about 945 m after the initial touch down. On call from the co-pilot, the Commander initiated go around action. But as fire warning on starboard engine had come on, he aborted the go-around. Both the engines caught fire during the landing roll due to rupture of fuel lines. The crash safety services reached without any loss of time and the fire was extinguished within 5 min.

After the aircraft came to a stop, the exit doors and emergency exits were opened and all passengers were evacuated within 4-5 min. During the process of evacuation, 17 passengers and 2 cabin crew received injuries. Three received fractures of the knee and one Pott's fracture (right) while jumping from the wings. Two had sustained superficial burns, while the rest had minor bruises. There was no fatality. The aircraft suffered substantial damage.

Aeromedical Aspects

After hearing the testimony of the two pilots and the cockpit voice recorder, one glaring aspect was revealed that during the entire descent the aircraft was in an unstable approach, with all the three landing parameters, viz., height, speed and rate of descent not having been under control. Yet, there was no discussion between the pilots on this abnormal situation. The captain did not at any stage ask the co-pilot to perform the functions for which he was there, but himself undertook the tasks of both captain and co-pilot, thereby overburdening himself.

The co-pilot on his part did not call out the abnormal parameters to the Captain and did not offer any assistance in attempting to bring the situation under control, but remained a silent and passive participant in the tragic events being unfolded. Therefore, it became imperative to establish the cause of crew inco-ordination.

The first aeromedical aspect of significance which emerged was the blood alcohol analysis showing 0.1% alcohol in the Captain and 0.05% alcohol in the co-pilot. It became imperative to establish whether the pilots were under the influence of alcohol thereby exhibiting such an abnormal behaviour. The investigations carried out on this aspect revealed the following drawbacks:

a. The accident had occurred at 1230 hrs and the blood samples were taken at 1730 hrs after clearing the cubital area with spirit.

b. The blood was stored in a glass bottle and was kept in the flight despatch office for two hours at ambient temperature and not in a thermos containing freezing mixture. The possibility of bacterial contamination of the samples could not thus be ruled out.

c. The samples were analysed next day in a private clinical laboratory by Conway diffusion method which gave the above figures. Conway diffusion method is not specific for ethanol and has inherent defects.

d. To test the veracity of the laboratory, blood samples were sent from an individual who had consumed seven large pegs of rum and another who acted as the control. The control showed 0.05% alcohol and the test individual 0.11% alcohol thereby indicating that the methodology adopted was not accurate.

e. Breath analysis done simultaneously at the time of taking blood samples was negative and similarly urine samples were negative for alcohol.

f. If the figures are accepted, they reveal a blood alcohol level of 185 mg% in the Captain and 125 mg% in the co-pilot at the time of the accident and 225 mg% in the Captain and 165 mg% in the co-pilot at the time of commencement of the flight from Delhi. Such high levels would have been readily apparent to the preflight medical officer and other staff at the flight despatch office.

Taking all the above factors into consideration, the investigating team concluded that the above results were false positive.

To determine the cause of aircrew incoordination separate interviews were held with the two pilots. The first round of interviews revealed nothing of significance. During subsequent interviews it became apparent that the two pilots were not on talking terms since two years prior to the accident. They had broken off all social contacts and were positively hostile towards each other. The cause of this hostility was initially a personal incompatibility followed by an incident in the air where the two pilots had given contradictory statements and on the basis of the statement of the co-pilot, action was taken against the Captain. Thereafter, their relationship deteriorated and they avoided being rostered together until the fateful day.

On further analysis of the flying record and the confidential reports of the Captain, it was ascertained that he had 11 disciplinary cases against him in 17 years, 5 being for flying indiscipline and 6 on ground. He had landed on a wrong airfield two years earlier and had been punished then and on another occasion with reduction in pay by two stages. His flying record further revealed that he had required more than average hours of flying to become Captain in Boeings and on two occasions had to be reverted as co-pilot, given corrective training and then upgraded as Captain. Six months prior to the accident, he had been reprimanded for substandard flying performance during route check and was sent to CTE Hyderabad for corrective training again. Interviews with his colleagues revealed that everyone was wary of being rostered with him and found him an unsafe pilot who loved to show off and fly fast and dangerous.

To ascertain if the pilot possessed personality traits undesirable for safe flying, a neuropsychiatric evaluation was conducted. The examination showed that:

a. his mother had died in childhood, he was brought up by step mother, and he still had strained relations with his parents.

b. he was not good in studies, had failed in 9th class and had got third division in Higher Secondary.

c. he was discharged from IAF while undergoing final phase of flying training on disciplinary grounds 20 years back.

d. psychometry revealed an introvert, tense and anxious individual with low ego strength, tendency to act under influence of instinctive forces; he was casual, careless and not subject to discipline.

e. under narcoanalysis he stated that he lowered the undercarriage after the impact and that was his only mistake otherwise he would have got away with it.

On the above examinations, the neurospychiatrist concluded that the Captain possessed traits incompatible with flight safety and recommended removal of his Pilot-in-Command status.

Aeromedical Recommendations

A flight safety circular was made regarding the correct procedure of collection, preservation and analysis of blood samples for alcohol estimation following any incident/accident.

Neuropsychiatric evaluation of pilots was recommended to be carried out at the time of initial issue of CPL and whenever desired by DGCA.

Removal of the Captain's Pilot-in-Command status was also recommended.

Discussion

The accident revealed two significant aspects; one, undesirable personality traits of the Captain, who with his dare devil attitude led the aircraft and the passengers into a dangerous situation, and the other glaring crew incoordination which compounded the situation and perpetuated the accident. Therefore it becomes imperative on the Management to be aware of pilots who do not get along well with each other and not to roster such pilots together in the interest of flight safety. Further, they should have programmes on cockpit management so that the pilots are aware of utilisation of the available cockpit crew optimally. Indian Airlines have started such training at CTE, Hyderabad.

The other aspect of undesirable personality traits not compatible with flight safety is rather difficult to tackle at present. There is no unanimous opinion regarding the question of 'accident prone personality'. But the weight of information goes in favour of the above concept. Aeronautic personalities have been classifed into the four types as stated at the beginning.

Daedalous

a. Operational aspects : Skillful, responsible and cautious pilot who cares not only about crew co-ordination but also about marginal aspects of flight such as fuel economy, passengers' comfort, airline's image, etc.

b. Character : Stable, no overt neurotic symptoms, obsessive, alexithymic (usually shows slight organo-neurotic symptoms in order to avoid act-out his conflicts and hurt others). No spurious motivational elements.

c. Defence mechanisms : Adequate negation of danger, minimum repression of indecorous motivational elements, adequate affective-intellect dissociation, adequate selective "disafferentation" (certain proprioceptive inputs blockage in order to prevent spatial disorientation, etc), adequate trust in the "hardware", nonexistent reaction formation.

Type 'I' (Icarus)

a. Operational aspects : "Prima donna" pilot, unwise and careless. Even though he has no problems with the handling, his seductive and narcissistic worries impair his criterion or capacity to take correct operational decisions (he will land under the minimums if he had a date, for example).

b. Character : Sensation-seeker, impulsive, teenage personality with strong traits of affective immaturity. Narcissist, and with repressed unconscious motivational elements.

c. Defence mechanisms : Excessive negation of danger, excessive repression, adequate dissociation, adequate "disafferentation" excessive reliance on the machine, partial reaction formation.

Type 'B' (Bellerophon)

a. Operational aspects : Variable ability (there are very skillful pilots in this type), experts in "freezing flight decks" due to their prepotency and individualism. They disdain co-operation not only from co-pilots but also from the control tower.

b. Character: Typical "Macho-Pilot" overestimated, paranoid, extremely jealous (not only affectively but also operatively), hypersusceptible, "anti-authority". Conflictive aeronautic motivation.

c. Defence mechanism : Excessive negation, excessive repression and excessive reaction formation (In fact, Ballerophon was baptized "hiponoo" that is to say, weak and coward. Later on, on his winged steed 'Pegasus' he became aggressive and brave. The plane is the instrument which makes him overcompensate for his ego's weakness).

Type 'Ph' (Phaethon)

a. Operational aspects : Usually very skillful but unwise. Every flight is a challenge to death. Unlike Type 'I', he knows safety rules, but disdains them because of his inner conflicts.

b. Character: Risk seeker, sometimes 'out-controlled', hysterical paranoid personality, typical counter-public pilot. (Phaethon as a child was very shy and afraid; afterwards, as a teenager he became a dare devil to demonstrate to himself and others that he had no fear). Conflictive aeronautic motivation.

c. Defence mechanisms: Excessive reaction formation, negation and repression.

Conclusion

Prevention of aviation accidents due to pilot error, the main purpose of Aviation Psychiatry, starts with the selection of applicants. Every 'Bellerophon' and 'Phaethon' should be disqualified. That is to say those showing the dreadful reaction formation defence mechanisms are not fit for flying activities. The 'Icarus' pilots may become 'Daedalous' type in future if they are taught about the inherent dangers of immature attitudes.

Selection and instruction should not be carried out in isolation by physicians and pilots separately. They should be interconnected and working in a systematic way, for many of flying vices and substandard operational behaviours cannot be detected by means of psychophysiological examinations alone.