

## Human Error Accidents—Some Case Studies

By SHRI V CHELLAPPA\*

### Introduction :

**A**CCIDENT investigation is carried out to establish the circumstances and the cause of the accident, and apply the lessons learnt from the investigation to prevent recurrence of similar accidents. We are in an era where air machines have complicated gadgets which need skillful and accurate handling by aircrew. Therefore, the quality of the men, the training given to them, their aptitude, experience and habits assume greater importance in the context of accident prevention. Correspondingly, accident investigation also demands on the part of the investigator necessary experience, skill, and thorough knowledge of the machine. He has to understand the men operating the machines, know the current techniques and methods in use. In my experience, it has been comparatively easy to establish accurately the cause of the accident and recommend remedial action where the machine and its systems have misbehaved but to do so was rather difficult where the human factor was involved — though in majority of the accidents the cause was attributable to 'Pilot Error.'

When the cause of the accident is deduced to be human factor, most of the Investigators find it difficult to stretch their investigation beyond this point and go deeper into the realms of human psychology etc., for obvious reasons. It is for this august body of take up this matter where it has been left by the common investigator.

### Case Studies

I have made a study of about 250 notifiable accidents which occurred during the period 1967-77 in our country. I propose to mention the bare facts of some of these accidents which, I hope, may provide food for thought.

A light aircraft was engaged in giving joy-rides during the Dussehra Celebrations at Mysore some years ago. It had a capacity to carry four persons including the pilot. The Pilot was known for his sober habits and strict adherence to regulations. There used to be 20 to 30 joyrides everyday of about 5 minutes duration. On the last day of the festivities, after completing 15 joy-rides the aircraft took off again, for, perhaps the last sortie for the day after lunch break. While executing a circuit over the city, the aircraft suddenly went into a nose-dive and crashed, resulting in total fatality.

Investigation did not reveal any inflight failure of structure or controls or malfunctioning of the engine. Fortunately, we took the assistance of the Air Force School of Aviation Medicine at Bangalore and it was established that the Pilot's blood-alcohol content exceeded the safe percentage. Further probe into the Pilot's activities before the ill-fated flight brought out the fact that he had consumed liquor during lunch time.

A similar case on record of accident attributable to influence of alcohol pertains to a transport aircraft used for a training flight. However, in this case group alcoholism was involved, since the Instructor as well as the trainee-pilots, all consumed liquor before the flight. None of them survived. A flagrant and deliberate violation of all safety rules and norms, a human factor, but why?

The location of Juhu and Santa Cruz airports at Bombay are clearly marked in all Pilot's charts and the Pilots are briefed about their navigational and approach aids. Notices to airmen issued by the Civil Aviation Department, which all pilots under-

\* Director of Air Safety, Office of DGCA, New Delhi-110 022.

taking flights to Bombay, must study, clearly indicate the runway orientation, approach slope, circuit pattern etc., to the international airport at Santa Cruz. Yet in clear weather visual conditions, two international flights landed at Juhu airport with disastrous consequences, mistaking Juhu for Santa Cruz. Will it suffice to attribute these accidents to "Pilot's Error" and stop there?

Pilots are taught from the early stages of their training that they should not attempt a landing if the runway is not visible at decision height and a "missed approach" action should be initiated if they touch down at a greater distance from the threshold of the runway. Yet, precisely, for not following the above cardinal rules, two internal flights met with major accidents at Bombay airport during the past decade. The crew had several thousand hours of flying experience. Why did they ignore the rules?

Another instance is of a modern transport aircraft, piloted by an ace pilot under marginal visibility conditions. The aircraft descended below the prescribed safe height to become visual and crashed by collision with obstacles over the terrain. The cause of the accident was attributed to pilot error, but is that all to it? Why did this highly qualified crew err?

Cloud flying is a tricky business and rules are very strict, prohibiting such flights by pilots without instrument rating and aircraft not equipped with suitable instruments. At least two instances are on record of pilots of light aircraft without instrument rating attempting such flights in marginal weather conditions and ending up in total write off of aircraft and persons on board.

Any number of cases are on record of collision with obstacles, mainly wires, by agricultural aircraft. It is amazing that well-trained pilots with considerable experience in agricultural operations and who are well-acquainted with the area over which operations are carried on, collide with wires, which they had successfully flown over in the previous sorties — Could this be classified as "error of judgement" or "over-confidence"?

Another accident to a light aircraft happened recently. The Pilot who had several thousand flying hours to his credit and holding instrument rating, completely missed his way on a short cross-country

flight soon after commencing the flight. He could not spot the destination airport, set course to another airport without a 'fix' and finally ended up by crash landing the aircraft, in a place 120 KM off his track. The compass installed on the aircraft was found to be functioning satisfactorily. We may call it "Poor navigation" or 'Pilot Error,' but somehow this does not sound convincing.

#### Classification of Pilot Error Accidents

Pilot error accidents are classified by ICAO as follows:

- Improper aircraft handling.
- Improper operation of equipment.
- Non-compliance of procedures and regulations.
- Incorrect operational decisions.
- Wrong perception.
- Medical.
- Miscellaneous errors.

#### Accident Rates

A study of accidents in the past decade, for Indian registered aircraft reveals that human error accidents account for about 84%, 62% and 81% relating to public transport, aerial work and training aircraft respectively. I have made an attempt to further analyse the accidents for the categories of aircraft mentioned above.

#### Public Transport Aircraft

For the period 1967-1976, 84% of the accidents to public transport aircraft were attributed to human factors, 5% to technical factors and 11% to factors like weather etc. Of the accidents attributable to human factors, 3% were accountable to Medical, 21% to non-compliance with procedures and regulations, 42% to improper aircraft handling and the rest to miscellaneous reasons. If we split this period into two parts, i.e. 1967-1971 and 1972-1976 and study the human error accidents separately, we find that during the first half (1967-1971) the accidents caused due to non-compliance of stipulated procedures and regulations work out to 32% and in the second half (1972-1976) it had come down to 8%. However, during the first half the accidents due to improper handling of aircraft were 37% which had gone upto 47% in the second half. From the pattern observed above, the inferences that may perhaps be drawn are:

- Medical and operational standard of flight crew is high but errors due to mental stresses or cockpit confusion in critical phases of landing and take off could have caused the accidents in this category.
- Better adherence on the part of the flight crew to the procedures and regulations, brought down the accident rate in the second half of the decade.

### Aerial Operation Aircraft

It is a very well-known fact that agricultural flying by its nature is hazardous. As the aircraft operates very close to ground, even a slight mistake would result in an accident. Study of past 10 years accidents in aerial spraying work indicates that about 61% of accidents were caused due to human error. Unlike the public transport aircraft accidents, a high percentage (about 38%) of accidents are caused due to technical factors. This is considered serious and perhaps indicates that the maintenance standard of aircraft and helicopters used in aerial spraying work is not upto the desired level. Table I shows the break-up of human error accidents in respect of Fixed-Wing and Rotary-Wing aircraft used in agricultural operations.

TABLE I

Cause of the accident	Fixed Wing	Rotary Wing	Total
Perception	51.05%	48.28%	37.5%
Aircraft handling	52.63%	20.69%	33.33%
Operational decisions	15.79%	13.79%	14.58%
Procedures & Regulations	-	10.34%	6.25%
Operation of equipment	5.26%	3.45%	4.17%
Medical	-	3.45%	2.08%
Miscellaneous	5.26%	-	2.08%

From the above table it is seen that in Fixed Wing aircraft operations, a large percentage of accidents (53%) is caused due to improper aircraft handling. This is perhaps due to the fact that executing manoeuvres in Fixed Wing aircraft close to the ground, to avoid obstacles, results in accidents.

In Rotary Wing aircraft, 48% of accidents as against 21% in Fixed Wing aircraft were caused due to wrong perception. Most of these accidents were due to wire hits. The only explanation seems to be that the Pilot's judgement to avoid rotor

hitting obstacles is more difficult than avoiding undercarriage of the Fixed Wing aircraft. These are the components which normally strike the wires during aerial spraying operations.

### Training Flight Aircraft

Accidents to Training Flight aircraft normally of Flying Clubs show a trend similar to that of public transport aircraft. About 81% of the accidents are caused due to human error, 5% due to technical factors and about 14% due to other reasons. Table II gives the break-up of human error accidents in Training aircraft.

TABLE II

Perception	...	3.5%
Aircraft handling	...	24.7%
Operational decision	...	29.4%
Procedures and Regulations	...	18.8%
Operation of equipment	...	8.2%
Misc (Navigational error)	...	15.3%

From the above table it is evident that wrong operational decisions, inappropriate handling of aircraft and non-compliance of procedures and regulations are the important causes of human error accidents of training aircraft. The accidents attributed to non-compliance of procedures and regulations are basically due to low flying. Accidents due to navigational error were also quite high (about 23%) during the years 1972-73 but these have reduced to 'NIL' during the period 1974 to 1976.

### Conclusion

As I have mentioned earlier, an in-depth study of accidents caused by human factors appears to be warranted. No doubt, considerable material on research and studies made by developed countries are available in this regard. I am not sure whether these studies have taken into account the needs peculiar to developing and under-developed countries. Therefore, I would suggest for the consideration of this august body that it would be beneficial to set up a representative body of experts drawn from the Air Force, Civil Aviation and Airlines to study in depth the human factors involved in accidents to Air Force and Civil aircraft in the context of environment, training facilities, working and climatic conditions and habits peculiar to our country and make recommendations.