

2. Statistics

The number of accidents and serious incidents involving helicopters was 77 (63 accidents and 14 serious incidents), and among these cases, we have made investigation reports public for 70 cases (60 accidents and 10 serious incidents).

The below is the statistics on the situations of these accidents and serious incidents involving helicopters for which the Board conducted investigation.

* Figures 1 to 3, 6 and 7 show data for a total of 77 cases including accidents and serious incidents under investigation, and Figures 4, 5 and 8 through 13 show data for 70 cases whose investigation reports of accidents and serious incidents have been made public.

Statistics on the accidents and serious incidents

By the number of helicopter accidents and serious incidents, there were 16 (15 accidents and 1 serious incident) in 2002, which was the highest number while the number drops to 3 (1 accident and 2 serious incidents) in the following year. The number of accidents and serious incidents varies from year to year. (See Figure 1)

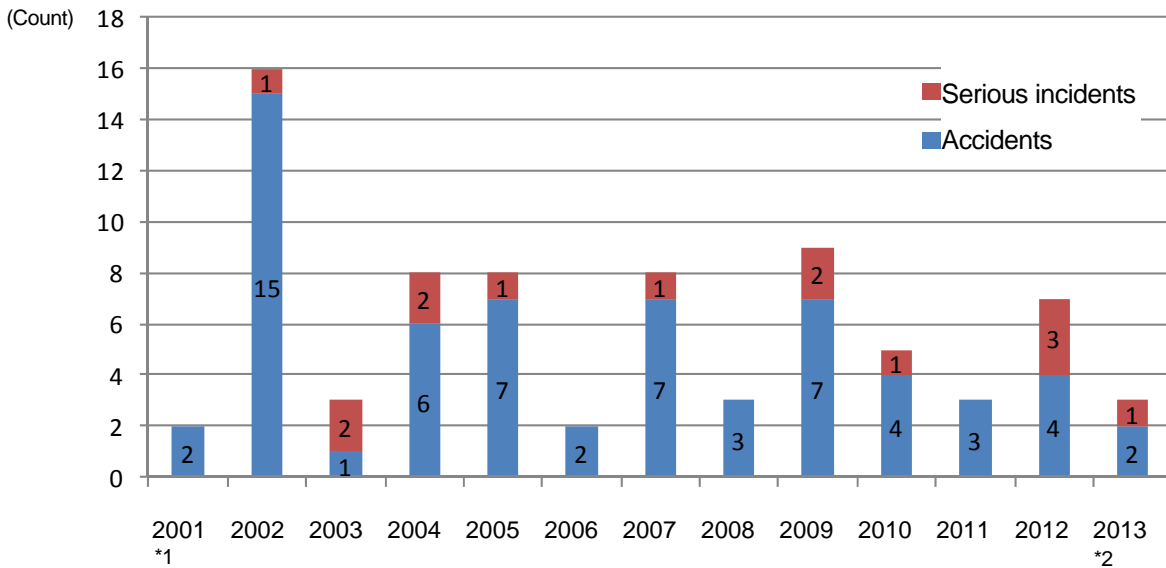


Figure 1: Changes in the number of helicopter accidents and serious incidents

*1: The 2001 figure includes the accidents and serious incidents added to the investigation since October 2001 by the Aircraft and Railway Accidents Investigation Commission.

*2: The 2013 figure includes the accidents and serious incidents added to the investigation by October, 2013.

Breakdown by type of accidents

By the accident type, the number of crashes was 27 (42.9%) which accounts for nearly half of the total accidents, followed by 6 (9.5%) each in other fatalities and injuries (ground crew etc), damage to aircraft at forced landing, damage to aircraft at landing, and other reasons. (See Figure 2)

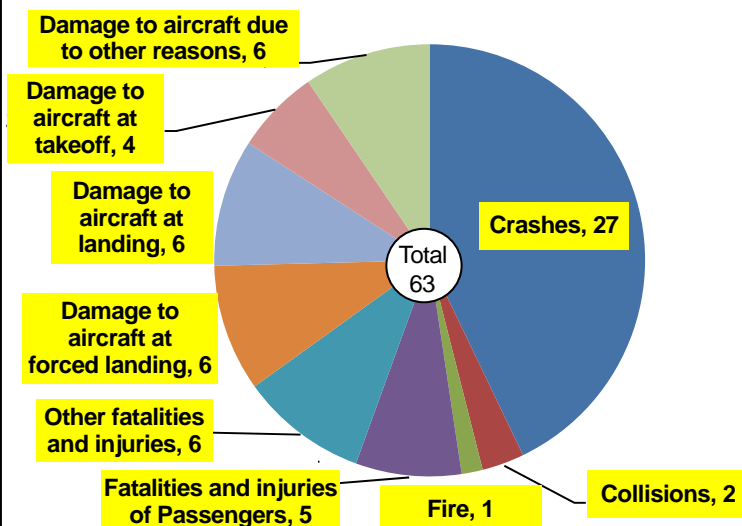


Figure 2: The number of cases by the type of accidents

Breakdown by type of serious incidents

By the type of serious incidents, the number of near misses with another aircraft was 6 (42.9%), engine stopped 3 (21.4%), and damage to engine and runway inclusions 2 (14.3%) each. (See Figure 3)

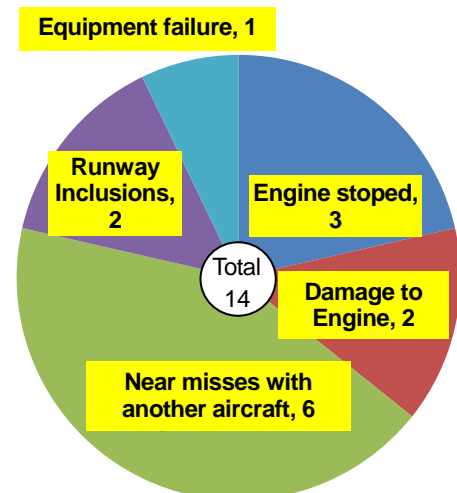


Figure 3: The number of cases by the type of serious incidents

Breakdown of the fatalities and injuries

By the number of fatalities and injuries, there were 15 accidents occurred in 2002, among which there were total 20 fatalities and injuries including 5 fatalities, 8 seriously injured and 7 slightly injured, and it was the highest number of fatalities and injuries. The second highest number was in 2007 with 7 accidents and total 18 fatalities and injured including 6 fatalities, 10 seriously injured and 2 slightly injured.

By the type of fatalities and injuries, 14 members on board died from the 4 accidents in 2010 as they were all crash accidents. (See Figure 4)

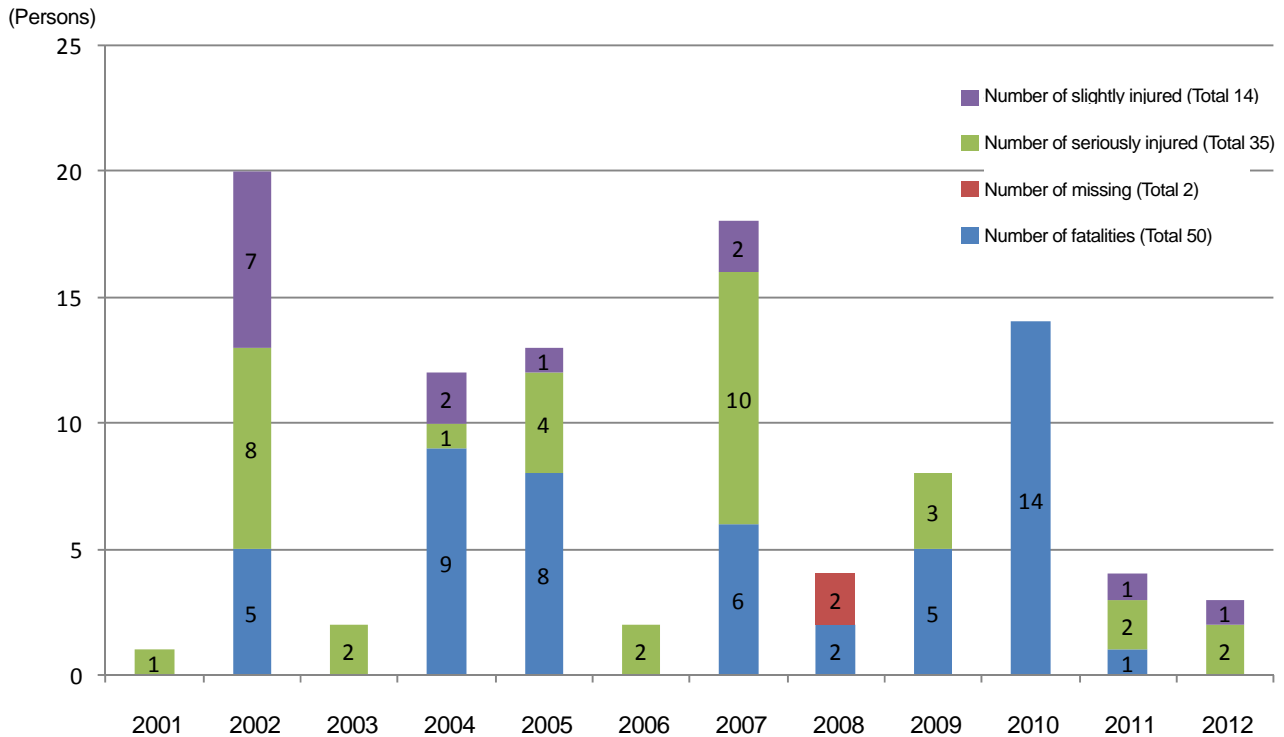


Figure 4: Changes in the number of fatalities and injuries (By the type of fatalities and injuries)

By the occupational category, there were 6 fatalities and injuries of members on board in an accident in Suishodake, Toyama City, Toyama Prefecture in 2007 involving a helicopter crashed into a slope immediately after taking off from Suishodake temporary helipad for passenger transport.

Other fatalities and injuries include non-persons on board such as ground crew and escorts. (See Figure 5)

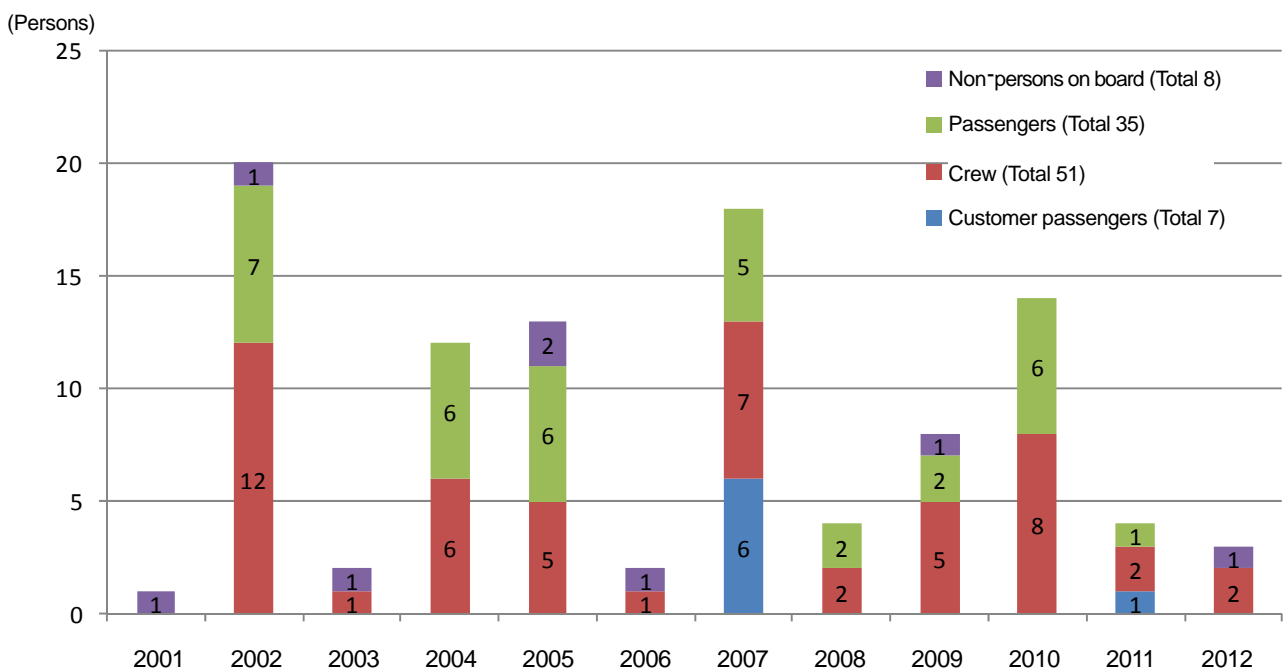


Figure 5: Changes in the number of fatalities and injured (By occupational category)

Breakdown of accidents and serious incidents by month

As for the number of accidents and serious incidents by month, there were 12 (15.6%) in July and in October, which were the highest in the year, followed by 10 (13.0%) in September. Accidents and serious incidents increase during the summer and towards the autumn except in August. (See Figure 6)

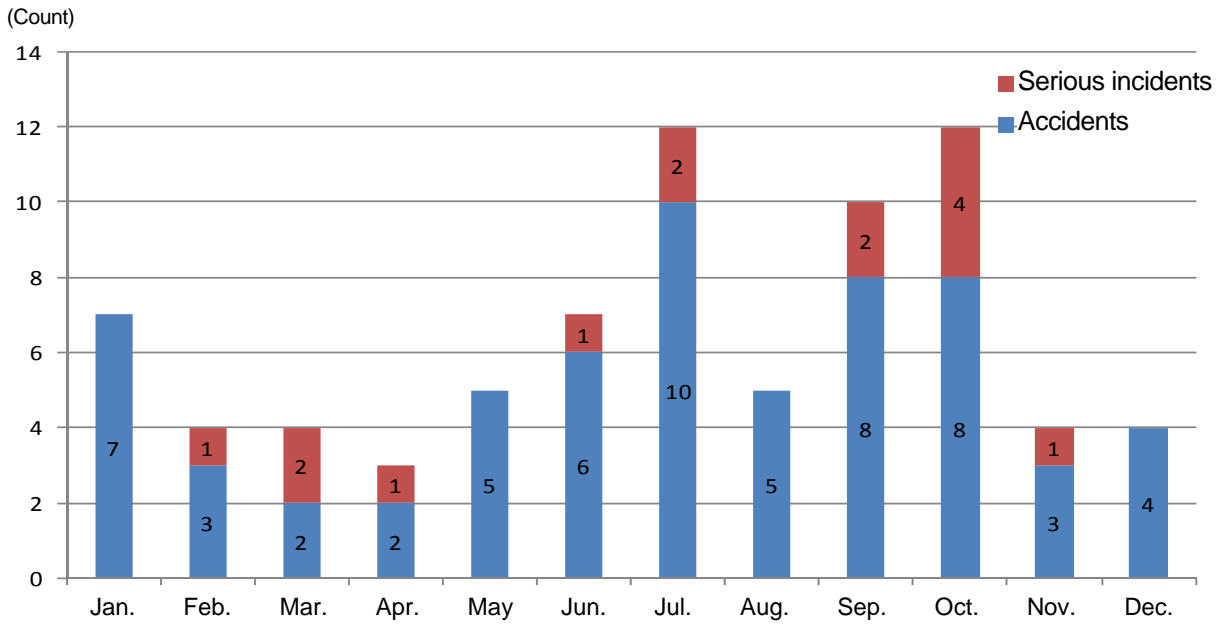


Figure 6: Number of accidents and serious incidents by month

Breakdown of accidents and serious incidents by the time of day

As for the number of accidents and serious incidents by the time of day, the highest number of accidents and serious incidents was 12 (15.6%) between 11:00 and 12:00, followed by 9 (11.7%) between 9:00 and 10:00, 13:00 and 14:00, and 15:00 and 16:00 respectively. In overall, accidents and serious incidents were concentrated between 9:00 and 17:00. (See Figure 7)

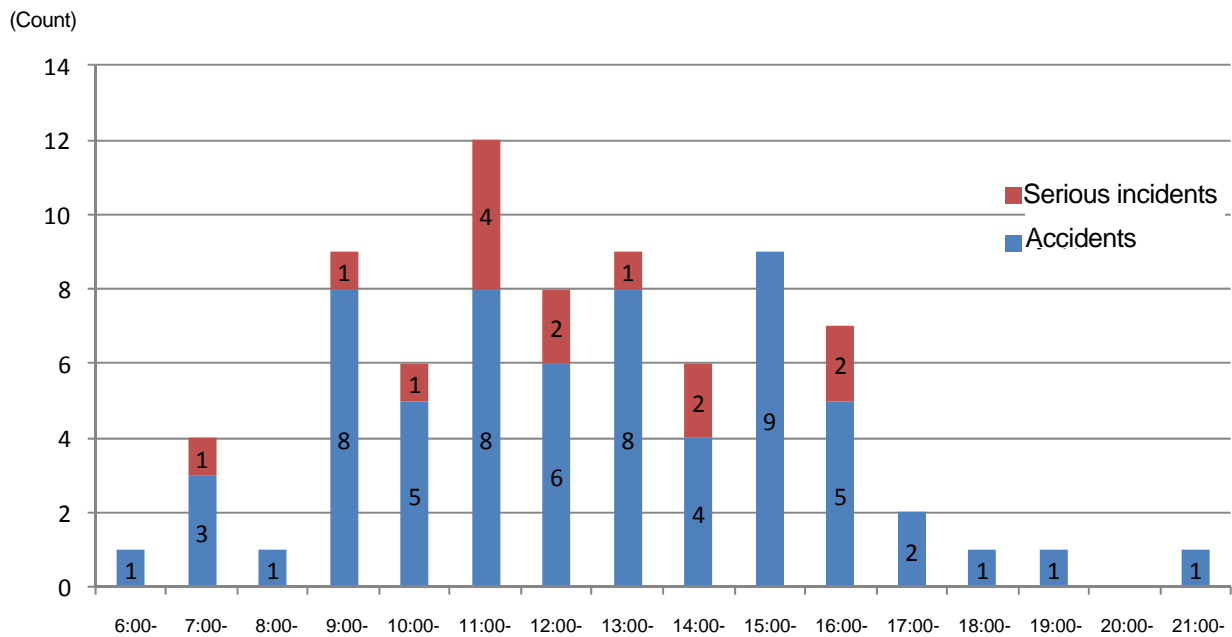


Figure 7: Number of accidents and serious incidents by the time of day

Breakdown of aircraft damage categories

By the aircraft damage category, the number of destroyed aircrafts was 39 (55.7%), while substantially damaged aircrafts was 10 (14.3%), slightly damaged aircraft was 1 (1.4%), and aircrafts with no damage was 19 (27.1%). (See Figure 8)

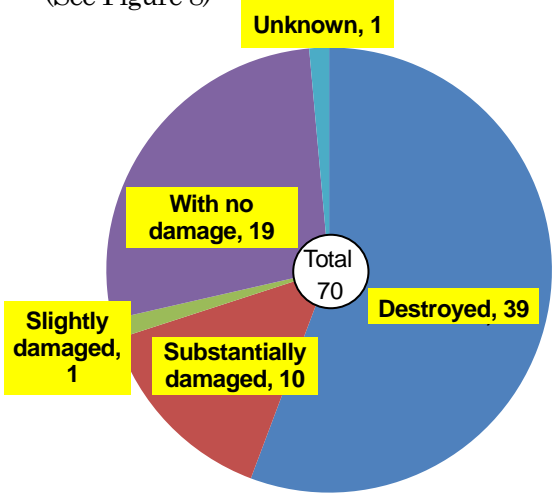


Figure 8: Breakdown of aircraft damage categories

Breakdown of accidents and serious incidents sites

By the accidents and serious incidents sites, the number of accidents and serious incidents that occurred at aerodromes/temporary aerodromes was 22 (29.7%), while 17 (31.4%) in mountains, 10 (14.3%) each in agricultural fields/mountain forests and on the sea. (See Figure 9)

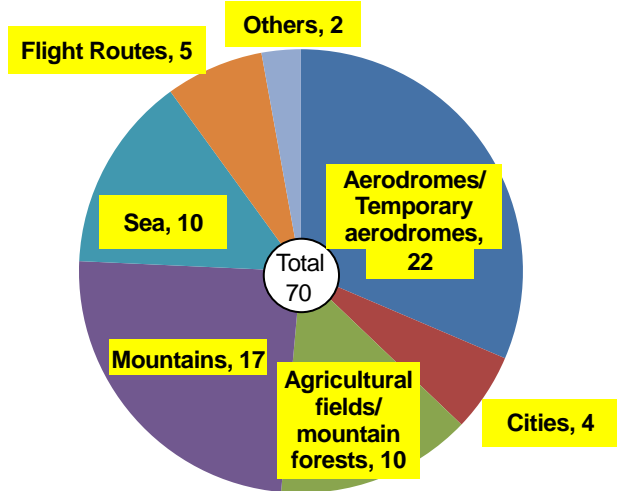


Figure 9: Breakdown of accidents and serious incidents sites

*** Definition of "Aircraft Damage Categories"**

Destroyed: It is extremely difficult to recover the aircraft's airworthiness due to the damage.
 Substantially damaged: The aircraft needs a major repair to recover its airworthiness due to the damage.
 Slightly damaged: The aircraft needs a minor repair or simple component replacement to recover its airworthiness due to the damage or failure.

Breakdown of operation phase

By the operation phase at the time of the accidents and serious incidents, the number of accidents and serious incidents during cruising phase was 47 (67.1%), at landing phase was 14 (20.0%) and at take-off phase was 7 (10.0%). Accidents and serious incidents in cruising phase account for nearly 70%. (See Figure 10)

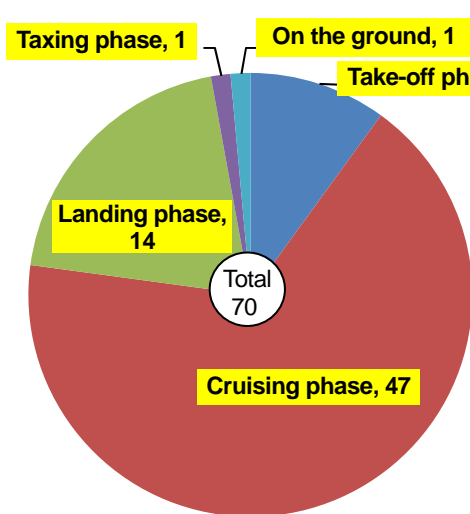


Figure 10: Breakdown of operation phase

Breakdown of flight purposes

By the flight purpose, the number of cargo transportation flights was 13 (18.6%) which accounts for the highest number among the total flight purposes, followed by 6 (8.6%) each in patrols, familiarity and ferry flights. (See Figure 11)

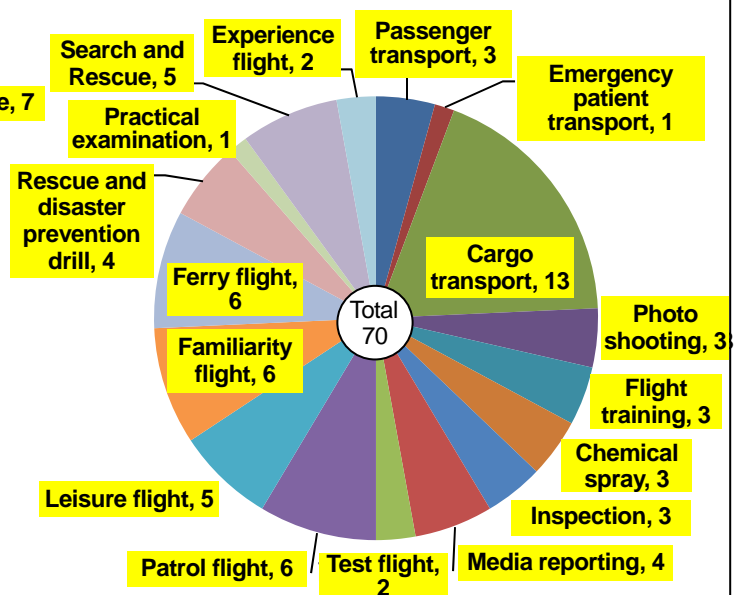


Figure 11: Breakdown of flight purposes

Categories of Causes

Approx. 80% of accidents and incidents are caused by human factors

When the causes of accidents and serious incidents in the investigation reports are categorized into four categories; human, mechanical, environmental and organization factors, the number of accidents and serious incidents caused by human factors and by human/environmental factors is 16 (22.9%) each, and human/organizational factors is 8 (11.4%). Approximately 80% accounts for “human factors or combination of multiple factors involving human factors”. (See Figure 12)

Among various classifications of human factors, following is the further breakdown of human factors based on “unsafe action”, (*3), “Inappropriate action”, “failure in detection” and others. In this classification, there are 19 (33.3%) of “Inappropriate actions” cases, which include carelessness, omission of confirmation and sloppy operational practices and this type of human factors accounts for the highest number in all human factors. The second highest is 15 (26.3%) “compound human factors” which involve multiple human factors”. Other human factors include 7 (12.3%) “Judgment errors” instances including assumption and presumptions, 5 (8.8%) “unsafe actions” such as neglecting a caution light and precautionary requirements, 4 (7.0%) “failed in detection” instances such as unable to identify what should be identified (e.g. power lines), and 3 (5.3%) “forgot” instances due to distractions. (See Figure 13)

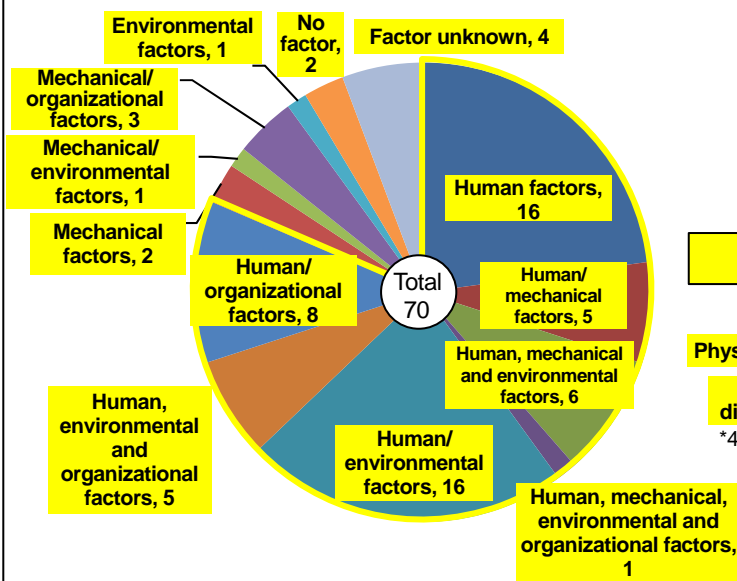


Figure 12: Breakdown of cause categories

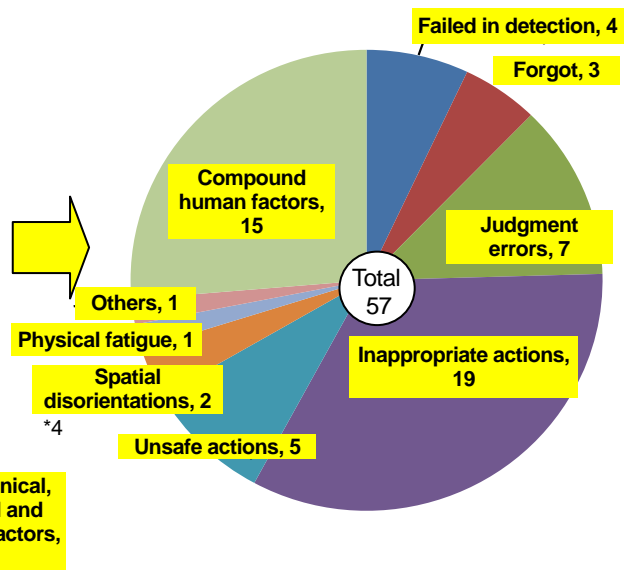


Figure 13: Breakdown of human factors

*3: Any deliberate action which might impede the safety of oneself or others without its intention. (This is the original definition of this digest.)

*4: Loss of proper perception of one's position and direction (spatial orientation) in space caused by gravity (G), one's vision and psychological effects. The spatial disorientation in flight often occurs in night flight or instrument flight. Special disorientation includes the cognitive defects in one's tilt perception, meaning one's tilt perception differs from actual tilting of the aircraft, or the directional disorientation, meaning one's direction perception differs from actual direction of the aircraft. Special disorientation is a critical symptom which could lead to a fatal accident.

Examples of human factors

Failed in detection

- Indistinct contrast of a steel tower and power lines against ground background made their detection difficult.

Judgment error

- Safety was not the first priority in in-flight decision making such as returning to the original point or destination change.

Inappropriate actions

- Insufficient rudder pedal input.
- A lack of awareness in near-by aircraft due to concentration on to flying direction.
- No advance checking performed on the ground or from sky for any obstacles in the accident site.

Examples of mechanical factors

- Not considered repetitive compression and shear strain generated lead to fatigue of the composite material.
- Red rust created with the corrosion of the contact surface of the inner ring and the outer ring caused volume expansion in the space between the two rings and this restricted the movement of the two rings.

Examples of environmental factors

- Visibility degradation from rain at night.
- Sudden strong tailwind.
- Fog restricted visibility.

Examples of organizational factors

- No established communication system in place for cargo transport.
- Regarding the burden sharing for mountain rescue activities no clear recognition.