

JTTSB Digests

JTTSB (Japan Transport Safety Board) DIGESTS

(Issued in December 2017)

Digest of Aircraft Accident Analyses

Injuries suffered in Use of Evacuation Slides during an Emergency Evacuation

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1. Preface

During fires such as an emergency landing, an aircraft must be equipped with devices for emergency evacuation that allows passengers to escape from the aircraft as quickly as possible. One of such devices for emergency evacuation is an evacuation slide.

Out of the 1500 cases of aircraft accident investigation reports issued by JTTSB*, in 14 cases, emergency evacuations using evacuation slides were carried out, and in 13 cases out of these 14 cases, passengers suffered injuries.

(*These investigation reports include those issued by its predecessors, the Aircraft Accidents Investigation Commission established in 1974, and the Aircraft and Railway Accidents Investigation Commission renamed in 2001).

Preventing injuries, this issue of JTTSB Digests introduces cases where the passengers suffered injuries during use of evacuation slides from these previous accident investigation reports.



Evacuation Slide (for Training)

2. Statistics on Injury Occurrence

According to the 14 cases of the accident investigation reports issued by JTSB and its predecessors (Table 1), emergency evacuation procedures were conducted not only in cases that a normal landing was not possible, such as an undershoot, overrun and runway excursion, but in cases that a fire occurred (Fig. 1). In most of such cases, passengers suffered injuries during evacuation (Fig. 2).

Why are there so many cases of injured during evacuation? Explanations of the statistic characteristics of serious injured based on these 14 cases are given below.

| | Year | Place | Operator | Injured | | Year | Place | Operator | Injured |
|---|------|----------|-------------------------|--|----|------|-------------|--------------------|---|
| 1 | 1977 | Haneda | Philippine Airlines | Slightly injured: 1 | 8 | 1996 | Narita | Japan Airlines | <u>Seriously injured: 3</u> Slightly injured: 19 |
| 2 | 1977 | Oshima | All Nippon Airways | Slightly injured: 13 | 9 | 1998 | Narita | United Airlines | <u>Seriously injured: 4</u> Slightly injured: 20 |
| 3 | 1982 | Ishigaki | Southwest Air Lines | <u>Seriously injured: 3</u> Slightly injured: 45 | 10 | 2005 | Kansai | Qantas Airways | <u>Seriously injured: 1</u> Slightly injured: 8 |
| 4 | 1990 | Narita | Cathay Pacific Airlines | <u>Seriously injured: 2</u> Slightly injured: several dozen | 11 | 2007 | Naha | China Airlines | None injured |
| 5 | 1991 | Narita | Northwest Airlines | <u>Seriously injured: 8</u> Slightly injured: 38 | 12 | 2013 | Takamatsu | All Nippon Airways | Slightly injured: 4 |
| 6 | 1993 | Hanamaki | Japan Air System | <u>Seriously injured: 3</u> Slightly injured: 55 | 13 | 2015 | Hiroshima | Asiana Airlines | Slightly injured: 28 |
| 7 | 1993 | Haneda | All Nippon Airways | <u>Seriously injured: 9</u> Slightly injured: 112 | 14 | 2016 | New Chitose | Japan Airlines | <u>Seriously injured: 1</u> Slightly injured: 2 |

Table 1

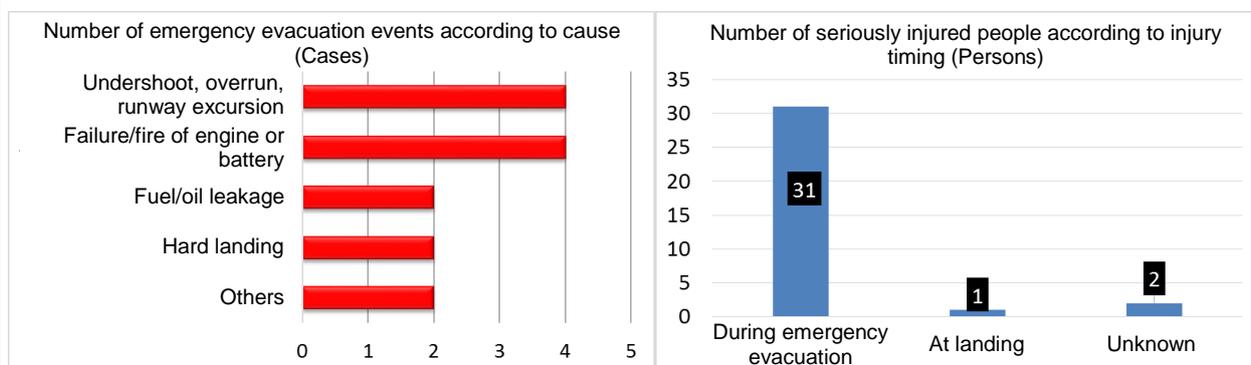


Fig. 1

In this chapter, the injury region of 34 seriously-injured persons, excluding slightly-injured persons, were analyzed and 27 injured person suffered a fracture of the thoracic spine, lumbar spine, pelvis, etc., and they account for nearly 80% of the total. (Fig. 3)

An analysis of the cases where serious injuries occurred during evacuation using evacuation slides revealed that, in each case observed the serious injured suffered in use of evacuation slides, the slides were deployed at a ground with a hard surface, such as a runway, taxiway, and aircraft

Fig. 2

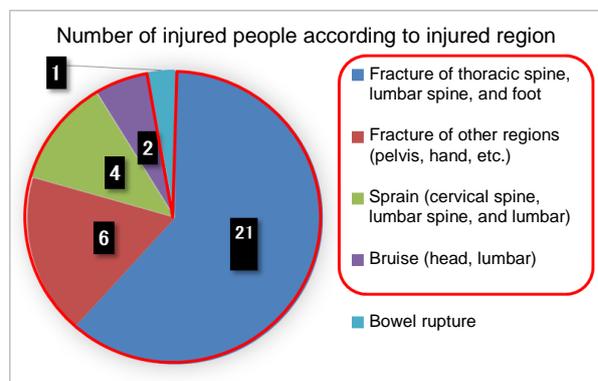


Fig. 3

Specific points of the injured are as follows:

- They flew out from the end of an evacuation slide, and injured their lower back.
- They slid out of their parent's arms to the ground, and fractured their pelvis.
- With no assistance on the ground, they fell and hit their back first, which caused a bruise.
- They were pushed forward by a succeeding passenger behind them, fell down with both hands on the ground, and fractured their left ankle.
- While sliding, they were hit by a suitcase of another passenger, and fractured their pointer finger.
- As the falling speed accelerated, they were thrown out of the slide, and fractured their hand.

The gender and age structures of the passengers vary. However, as far as the seriously injured are concerned, the tendency is more females in terms of the male-to-female ratio and people over 50 years old by the age. (Fig. 4, Fig. 5)

There are some medical study reports cited in the investigation report for the accident occurred in an All Nippon Airways aircraft in 1993 (Case (1)) (http://www.mlit.go.jp/jtsb/eng-air_report/JA8096.pdf), one report says that the spines of older people are weaker than those of younger people. And another report says that females suffer rapid reduction in bone mass after menopause, in contrast, males have less of a tendency for bone deterioration due to aging.

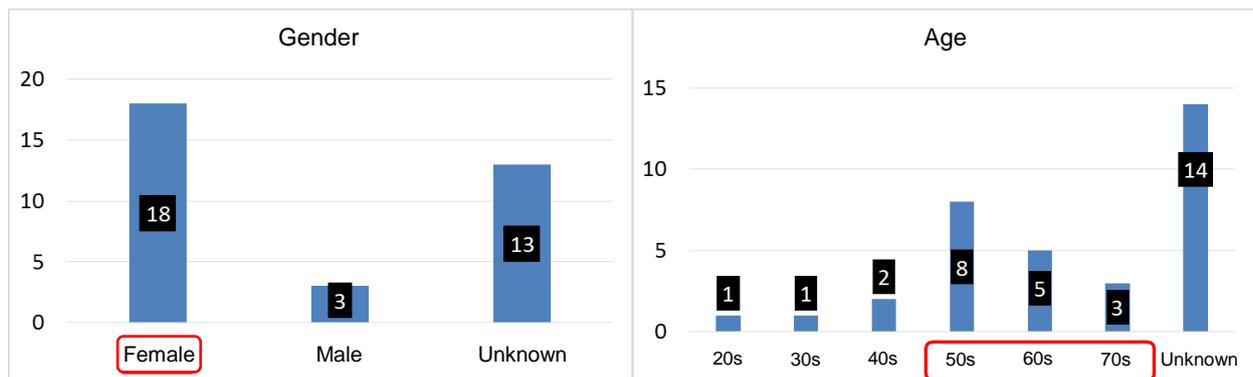


Fig. 4

Fig. 5

According to an airline company, key points to prevent injuries in evacuation using a slide are as follows:

- (1) Do not stop in front of the slide but jump onto it and sit down with your hips touching the slide
- (2) Hold your torso upright with both arms extended forward
- (3) Place your feet shoulder-width apart with your toes pointing upward
- (4) Keep looking at the landing point. This will bring your center of gravity forward, and thus prevent excessive speed.

However, in an emergency, sometimes it is difficult to take such a posture. It is important to assign some staff to assist the evacuating persons at the bottom end of the slide.

In the accident of a China Airlines aircraft in 2007 (Case (3)) (http://www.mlit.go.jp/jtsb/eng-air_report/B18616.pdf), the aircraft was badly damaged and destroyed by fire, leaving only part of the airframe intact. Despite the damage, the 165 persons on board, consisting of 157 passengers and 8 crew members, were all safe.

As for this smooth evacuation with no injured even on the hard ground, it is attributable to the fact that a ground crew member noticed at an early stage an abnormal condition of suspected fuel leakage, and voluntarily went to assist passengers at the bottom end

of the slides.

The number of deployed evacuation slides is also an important factor for smooth evacuation. During an emergency evacuation, some emergency exits are judged as dangerous to use due to a fire, and thus not all slides can be used. (Fig. 6, Fig. 7)

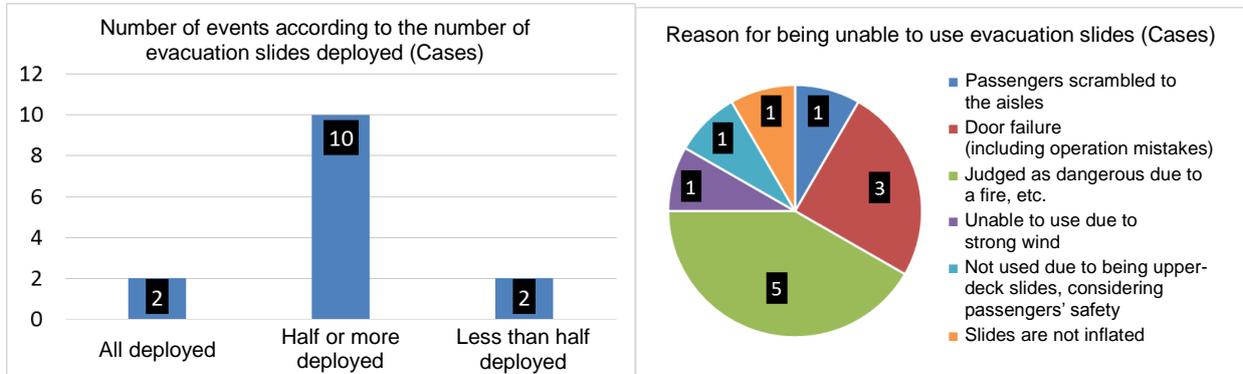


Fig. 6

Fig. 7

In the accident of a Cathay Pacific Airlines aircraft in 1990 (http://www.mlit.go.jp/jtsb/eng-air_report/VR-HOC.pdf), a hard landing was conducted due to strong wind. Then, out of eight of all evacuation slides, only four slides on the right side could be deployed because of fuel leakage. In addition, deployed evacuation slides were flapped by strong wind and most of them became unusable. Thus, the passengers remaining on board were forced to use only one slide for evacuation. Two of the passengers suffered serious bone fractures due to the congestion when using the evacuating persons,

In the accident of a Northwest Airlines aircraft in 1991 (http://www.mlit.go.jp/jtsb/eng-air_report/N663US.pdf), five doors, out of ten doors, were opened and evacuation slides were deployed. However, due to the fact that the cabin pressure still remained, it took about one minute from the captain's evacuation instruction to door opening. Thus, after evacuation slides were deployed, passengers scrambled to evacuate. Many of them fell on the paved ground surface, or collided with other passengers, thereby suffered injuries by receiving hard blows on their back, buttocks, limbs, etc.

Finally, as for the capability of evacuation slides, the design criteria for aircrafts stipulate that it must have been demonstrated that, by using the slide, all of the specified number of passengers can evacuate within 90 seconds under the specified conditions.

However, in an actual emergency evacuation, the required evacuation time depends on such factors as the weather at that time, the time zone, the number of evacuation slides deployed and the degree of emergency. (Fig. 8).

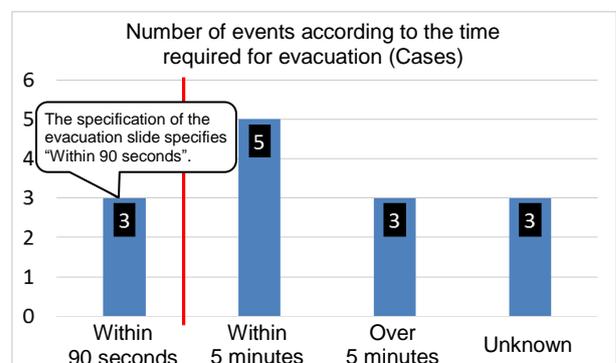


Fig. 8

Participating “Emergency Evacuation Training”

The current issue of the Digests features injuries that occur when using evacuation slides. This time, with cooperation from Japan Airlines (hereinafter referred to as “JAL”), I had the opportunity to participate in an “Emergency Evacuation Training”, as part of operation skill improvement. The JAL training facility near Haneda Airport has a full-scale mock-up that imitates a part of the fuselage of a middle-sized passenger carrier in service. In this facility, initial training for new cabin crew members, as well as annual regular training for all active cabin crew members, are carried out. One of the things required when a state of emergency occurs is that cabin crew members have knowledge and capability regarding safety-related actions during an emergency, such as appropriately guiding passengers. Actions required during an emergency situation vary depending on the situation. Evacuation procedures also vary depending on the aircraft model. Cabin crew members must be familiar with these actions from various aspects, and must thoroughly brush up on skills to attain a certain level. Otherwise, cabin crew operations cannot be performed.

The first menu of the training was evacuation through an evacuation slide. First, we learned the evacuation posture, in which the hands were held straight forward. Then, we got into the mock-up, which recreates a cabin so faithfully that we felt as if we were in a real cabin. Looking down from the emergency exit, it was about 4 meters off the ground and for a moment I hesitated to slide. From the sitting posture, I slid at a fairly high speed and landed in an instant. Landing was no problem because we practiced the evacuation posture beforehand. But, even for adults, sliding and landing require courage, and evacuation will be difficult if you are carrying baggage. For older people and children, sufficient support should be given. We heard that, in an actual emergency evacuation, you should not stop in front of the slide. Instead, you should jump from a standing posture with your hands held straight forward. The instructor gave the following tips: Never evacuate while carrying baggage because by doing so a proper sliding posture cannot be taken, which could result in injuries; it is important to not to stay near the aircraft after evacuation but to move to a safe place. I understood that this was very important in order to prevent the number of injuries from increasing.



Next, we got onto the mock-up again to perform training for an emergency landing. With the assumption of an emergency landing on the ground, an emergency command was given. The instructor, who was a cabin crew member acting as safety staff, repeatedly said “Heads Down!” both in English and Japanese in a loud voice, and instructed us to take an anti-shock posture. Overwhelmed by the forceful instructor, we took a head-protection posture by crossing both arms and leaning toward the seat in front of us. Images of an emergency state were shown on the monitor installed in the mock-up, sounds of shock were realistically reproduced, and the space was filled with smoke. Thanks to this recreated emergency state, we experienced a sense of reality and urgency. The instructor also explained that, when many passengers panic during an emergency, it was important to give instructions in a loud voice. After that, we learned how to guide passengers onto an evacuation boat floating on a pool for water-evacuation training assuming an emergency water landing.

The training on that day was finished at this point. We heard that various situations were prepared as emergency scenarios and that the training of that day was only a portion of the entire training and that new cabin crew members were given strict training for one week. I previously thought that cabin crew members were on-board service staff meant to keep the cabin comfortable for passengers. However, as safety staff with the task of safely delivering passengers to their destinations, cabin crew members bear an important role of fully ensuring safety during an emergency. This original function was now understood.

Throughout the training, the following was understood: It is the top priority of an airliner that, in an emergency, safety staff give instructions to passengers promptly and appropriately to prevent passengers from panicking and maintain a high level of safety; it is necessary to make passengers aware and understand that selfish behaviors without following the crew’s instructions will directly lead to the loss of safety.

3. Case Studies of Accidents

(1) Emergency evacuation was conducted, because inside of the aircraft was filled with white smoke

Summary: On May 2, 1993, a Boeing 747-400, operated by Airline A, during taxiing after landing at Tokyo International Airport came to a stop and made an emergency evacuation close to Parking Spot 56.

In the emergency evacuation, nine passengers, out of a total of 490 persons consisting of 15 crew members and 475 passengers (including 7 infants), were seriously injured.

No fire occurred on the aircraft.

Lead up to emergency evacuation

Around 20:50

The aircraft landed at Tokyo International Airport.

Around 20:53

After landing the aircraft taxied towards Parking Spot 56, and then the cockpit and the cabin became rapidly filled with a white smoke-like substance.

Around 20:54

The aircraft came to a stop approximately 10 meters NE of the standing position of Parking Spot 56. The captain commanded the crew and passengers to execute an emergency evacuation.

Around 20:57

The emergency evacuation was conducted from all exits except for L3 using evacuation slides, and the evacuation of all persons on board was completed. During the evacuation, nine passengers were seriously injured and transported by ambulances to hospitals.

Breakdown of the seriously injured

- Male aged 58 sustained a compression fracture of the 12th thoracic spine, Exit: UL (door on the left side of the upper-deck)
After sliding down and losing balance, he hit the ground after being thrown several meters. He could not stand up because his left foot was numb.
- Female aged 68 sustained a compression fracture of the 12th thoracic spine and a fracture of the 4th carpal bone of her right hand, Exit: UL
Sliding down while sitting, she was thrown from the end of the evacuation slide, and could not stand up due to pain in her waist afterwards.
- Female aged 53 sustained a compression fracture of the 12th thoracic spine, Exit: UL
Sliding down while sitting, she was thrown from the end of the evacuation slide and could not stand up afterwards.
- Female aged 55 sustained a compression fracture of the 9th thoracic spine, Exit: UL
Sliding down while sitting with her pumps taken off, she held that posture and landed on her back. She could not move for a while due to pain around her waist.

- Female aged 72 sustained a compression fracture of the 12th thoracic spine, Exit: R2 (2nd door on the right side of the main-deck)
Sliding down while sitting, she was thrown from the end of the evacuation slide. She had pain around her waist.
- Female aged 51 fractured her left ankle, Exit: R3 (3rd door on the right side)
Slid down in a sitting posture. She landed and stood up normally, but was hit by a succeeding passenger behind them and fell down with her hands hitting the ground, at which time she had severe pain in her left ankle.
- Female aged 52 sustained a neck cervical sprain, and head and waist contusion, Exit: R3
Upon landing she sustained bruises on her head and waist by hitting the ground, after which time she could not walk due to pain.
- Female aged 62 sustained a compression fracture of the 12th thoracic spine, Exit: R5 (5th door on the right side)
Sliding down while holding a sitting posture, her back was struck at landing. She could not stand up due to pain in her back.
- Female aged 56 sustained a compression fracture of the 1st lumbar spine, Exit: L5 (5th door on the left side)
She landed on her back. She could not stand up due to pain around her waist.

The slightly injured persons suffered mainly bruises, sprains, and scratches.

Situation at evacuation

Cabin attendants loudly told passengers not to bring baggage, and took away the baggage at the exits, but there were some passengers who evacuated with baggage such as Boston bags and handbags anyway.

It is estimated that approximately 20 percent of the passengers evacuated carrying baggage, which is considered one of the causes of the injuries.

Out of the 58 passengers who evacuated from the upper-deck, the injured consisted of 4 seriously injured and 18 slightly injured, which is an injury rate of approximately 38%.

On the other hand, out of the 417 passengers who evacuated from the main-deck, the injured consisted of 5 seriously injured and 90 slightly injured, which is an injury rate of approximately 23%.

Exits on the upper-deck are located higher than those on the main-deck, and have a longer sliding distance so the posture during sliding tends to change, which seems to account for the higher injury rate.

At the time of the accident, it was raining at the site. Someone stated that the evacuation slides were slippery because they were wet with rain.

It seems that normal landing became difficult as the sliding speed increased and the deceleration effect at the end decreased.

Among the passengers over 50 years old, the ratio in terms of gender is almost the same between male and female. However, out of the nine seriously injured, eight were female.

The elderly are generally known to be physically weaker and less athletic than younger people, and their bones, especially in females, deteriorate with age. This tendency may have been one of factors contributing to the injuries.

The investigation report of this case is published on the Board's website.

(Issued on December 9, 1994)

http://www.mlit.go.jp/jtsb/eng-air_report/JA8096.pdf

(2) Emergency evacuation was conducted, based on a report that a fire was coming out from the tire

Summary: On September 13, 1996, a Boeing 747-400, operated by Airline B, started its take-off run for the flight from New Tokyo International Airport (current: Narita International Airport) to Frankfurt International Airport. Because there was a problem with the No.4 engine, the take-off was canceled.

Then, the aircraft entered from the runway to the taxiway and stopped there. Upon receiving the report from the air traffic controller that a fire was coming out from the tire, 20 crew members and 333 passengers made an emergency evacuation using evacuation slides.

During the evacuation, 3 passengers suffered serious injuries and 19 passengers suffered minor injuries.

Lead up to emergency evacuation

Around 13:11

After obtaining a take-off permission from the controller, the aircraft entered Runway 16 and started its take-off run.

During the take-off run, there was a problem with the No.4 engine, and the take-off was canceled.

Around 13:13

Following the instruction of the controller, the aircraft went out from the runway and stopped at Taxiway A.

Around 13:16

The controller told the aircraft, "It looks like a fire is coming out from the tire".

Around 13:16:30

The captain instructed the cabin attendants and passengers to evacuate.

Breakdown of the seriously injured

- Female aged 56 sustained a comminuted fracture of the 12th thoracic spine, Exit: R2
When she slid down, there was no one to support her. She was thrown to the ground, hitting her back first and she could not move by herself afterwards.
- Female aged 62 sustained a compression fracture of the 1st lumbar spine, Exit: R4
When she slid down, no one helped her get to the ground. She felt as if she was thrown to the ground and could not move afterwards.
- Female aged 69 sustained a waist contusion, Exit: L4
With no one assisting people on the ground, she fell down hitting her back first and she could not move by herself.

19 slightly injured persons suffered mainly bruises, sprains, scratches, etc.

Situation at evacuation

- The time required for the evacuation was approximately two minutes.
- The number of evacuation slides used was 7 out of 12. The slides on the upper deck were not used considering passengers' safety, and the others were not used due to fuel leakages, etc.
- In an exit where two cabin attendants were allocated, one attendant slid down to the ground and assisted passengers coming down on the slide.
- In some exits, assistance was temporarily provided because the cabin attendants asked passengers to do so after reaching the ground. But in other exits, such assistance was not provided.
- Many passengers headed for the exit carrying hand baggage, and the cabin attendants instructed them not to carry baggage. Nevertheless, some passengers evacuated with baggage.

Referential matters

- In October 1996, The Civil Aviation Bureau of the Ministry of Transport (current: the Ministry of Land, Infrastructure, Transport and Tourism) established a "Study Group concerning the passenger guidance from an aircraft during an emergency evacuation" within the Incorporated Foundation (current: Public-interest Incorporated Foundation) Association of Air Transport Engineering and Research where the experts, air carriers, the travel and tourism industry and the Civil Aviation Bureau participated to study how to guide passengers in aircraft emergency evacuations. The study group compiled a report, the main points of which are as follows:
 - (1) From April 1, 1998 onward, cooperation is to be sought from any passenger sitting in an emergency exit seat as an assistant during an emergency evacuation.
 - (2) Revision of the safety guidance card and the safety video
 - (3) Training concerning emergency evacuation for tour conductors of travel agencies
 - (4) Informing passengers of the contents of the safety guidance card and the safety videoUpon receiving this report, the Civil Aviation Bureau of the Ministry of Transport gave scheduled air transport services operators and international non-scheduled air transport services operators the circular notes that contained the plan to make the safety information well-known to all passengers aboard an aircraft and the provision of the system to ensure helpers during an emergency evacuation.
- Based on the notification, Airline B has enhanced safety information and has established the system in which, from April 1, 1998 onward, cooperation is to be sought from any passenger sitting in an emergency exit seat as an assistant during an emergency evacuation.

The investigation report of this case is published on the Board's website.

(Issued on May 29, 1998)

<http://www.mlit.go.jp/jtsb/aircraft/rep-acci/98-3-JA8902.pdf> (Only available in Japanese)

(3) Emergency evacuation was conducted, Fuel leaking from the fuel tank caught fire and the aircraft was engulfed in flames

Summary: On August 20, 2007, a Boeing 737-800, operated by Airline C, landed at Naha Airport. Immediately after the aircraft stopped at Spot 41, fuel that was leaking from the fuel tank on the right wing caught fire. The aircraft was engulfed in flames and destroyed by the fire, leaving only part of the airframe intact.

There were 165 persons on board, consisting of the captain, seven other crew members, and 157 passengers (including two infants). There were no dead or wounded.

Lead up to emergency evacuation

10:31:57

The aircraft stopped in Spot 41.

10:32:53

A fire broke out somewhere in an area aft of the No.2 (right) engine and it spread to the right wing leading edge and the apron surface below the No.2 engine.

10:33:05

The assistant maintenance engineer reported the fire to the captain over the interphone.

10:33:52

The captain instructed the cabin crew to prepare for an evacuation.

10:34:24

Passengers began evacuation.

10:36:06

Evacuation of passengers and cabin crew was completed.

10:36:11

The first explosion occurred on the right wing.

10:36:20

The captain escaped through the right-hand cockpit window using an evacuation assist rope.



Situation at evacuation

- There were no dead or wounded.
- The time required for the evacuation was 2 minutes and 28 seconds. (from 10:33:52 to 10:36:20)
- The number of evacuation slides used was 4 out of 6.
- In a questionnaire survey conducted for the passengers, about 25% of the respondents said that they saw assistants at the bottom end of the evacuation slides.
- About 60% of the respondents brought their baggage with them when they evacuated. None of them said that they were restrained by carrying their baggage as they evacuated.

Factors contributing to there being no casualties

It is considered highly probable that the following factors contributed to there being no casualties and wounded people despite the huge scale of the fire and the delayed start of fire-fighting operations.

- An orderly evacuation was made possible due partly to the fact that the passengers had begun preparing for disembarkation immediately after the aircraft stopped in its spot and were waiting in line in the aisle.
- The ground crew members were aware of the abnormal condition that was suspected of fuel leakage with the aircraft at an early stage and reported it to the captain.
- The emergency exits of the aircraft were positioned relatively low to the ground, and the accident occurred during daytime in good weather, which helped facilitate the evacuation.
- Voluntary assistance by ground crew members at the slides helped evacuees make a smooth exit.
- The fire started after the aircraft had parked, which facilitated discovery and reporting of the fire and prompt implementation of evacuation and assistance.
- As the adjacent aircraft stands on both sides were empty, no other aircraft suffered any damage.
- The disembarkation was not of a type using a boarding bridge, which eliminated the chance of the bridge and the terminal building suffering any damage.

The investigation report of this case is published on the Board's website.
(Issued on August 28, 2009)

http://www.mlit.go.jp/jtsb/eng-air_report/B18616.pdf

(4) Emergency evacuation was conducted, based on a warning indicating the presence of smoke in the cargo compartment(s)

Summary: On August 21, 2005, an Airbus Industrie A330-303, operated by Airline D, took off at Narita International Airport heading for Perth International Airport. During the flight, a warning was displayed on the electronic centralized aircraft monitor (ECAM) indicating the presence of smoke in the cargo compartment(s). The crew made the decision to change their destination to Kansai International Airport and the aircraft landed at the airport.

Subsequently, on its way to a parking spot, a passenger emergency evacuation was conducted using escape slides on the taxiway.

There were 194 persons on board including 13 crew members and 181 passengers. During the evacuation, one passenger was seriously injured and eight passengers sustained minor injuries.

There was no damage to the aircraft.

Lead up to emergency evacuation

Around 23:05

During the flight, a warning was displayed indicating the presence of smoke in the cargo compartment(s).

Around 23:43

Because smoke warnings were repeatedly displayed thereafter, the captain made the decision to fly to Kansai International Airport.

00:51

The aircraft landed at Kansai International Airport and stopped on the taxiway.

Around 00:55

An airport fire-fighting command-post vehicle saw something that looked like white smoke coming out from below the cockpit and reported it to the control tower. Then, the evacuation slides of the aircraft were suddenly deployed.

Around 00:57

After confirming that there was smoke from around the nose gear, the captain radioed that the evacuation was going to be made using slides. Then, evacuation started.

Breakdown of the seriously injured

- Female unknown age fractured her pelvis.
On the lower portion of an evacuation slide, the passenger, who was until then held by her parent from behind, slid out of her parent's arms and struck her lower back against the ground.

Eight passengers sustained minor injuries due to bruises or abrasions.



Situation at evacuation

- Some passengers were carrying hand baggage or carry-on suitcases as they evacuated.
- The number of evacuation slides used was 7 out of 8. At one slide, the door did not open.
- Firefighters provided assistance at the bottom of three slides. At the slide where the serious injury occurred, there was no one assisting people.
- The cabin attendants did not ask passengers that slid down to the ground first to assist the subsequent passengers.

The investigation report of this case is published on the Board's website.

(Issued on March 28, 2008)

http://www.mlit.go.jp/jtsb/eng-air_report/VH-QPE.pdf

(5) Emergency evacuation was conducted, because odd smells and smoke were observed within the cabin and a fire occurred in the

Summary: On February 23, 2016, a Boeing 737-800, operated by Airline E, had stopped on a taxiway in order to depart from New Chitose Airport and head to Fukuoka Airport. Odd smells and smoke were observed within the cabin and flames were confirmed at the rear of the engine. Because of these issues, an emergency evacuation was conducted through the evacuation slide.

There were 165 persons in total aboard the aircraft, consisting of 159 passengers and six crew members. During the emergency evacuation, one person suffered a serious injury and two passengers suffered minor injuries.

The aircraft was not damaged.

Lead up to emergency evacuation

14:52

The aircraft stopped at Taxiway T2 due to poor visibility because heavy snow was falling.

14:58

Odd smells were observed within the cockpit and the cabin.

14:59

The cabin attendant reported to the flight crew that smoke was in the cabin.

15:01

The cabin attendant reported to the flight crew that as a result of checking through the cabin, it was not possible to identify the source of the smoke, the smoke that filled the cabin near its center, and that no fire was seen around the engine although heavy snow affected visibility.

Around 15:06

As the engine stopped and a fire was seen, the captain instructed the cabin attendant to conduct an emergency evacuation.

15:15

Evacuation of all people on board was completed.

Breakdown of the seriously injured

- A passenger with gender and age unknown

Although two helpers were at the bottom of the evacuation slide, their attention was on an infant following the passenger, so they did not pull the passenger up when the passenger fell down and forward, which caused them to land on their back.

Situation at evacuation

The overhead bin had many doors opened and it looked as if baggage had been carried out.



It is highly probable that since so many of the passengers opened the overhead bin to carry out baggage and attempted to slide down the slide with it, each cabin attendant took measures to confiscate their baggage.

At the time of emergency evacuation, a cabin attendant called out in a loud voice, "No baggage!!", but there were many passengers who carried their baggage, and she confiscated it as she was guiding the passengers.



A flight crew member was about to step out from the cockpit, but the door was blocked by baggage which the passengers were attempting to carry out. Being afraid of blocking the path for passengers to evacuate by opening the door, he waited for most of the passengers to complete their evacuation, and then stepped out to the cabin.



Because the flight crew moved to the cabin after almost all of the passengers evacuated, it is probable that they could not control the evacuation of everyone and could not assist in the evacuation of passengers. Furthermore, it is somewhat likely that the instruction telling the passengers to pay attention or to comply with the emergency evacuation was not communicated in appropriate or effective manners.

Safety action

Safety action taken after the accident

- Revision of the safety video
- Adding the contents to the periodic rescue training carried out by cabin attendants
- Implementation of education concerning the emergency evacuation for the group staff of the company



The investigation report of this case is published on the Board's website.

(Issued on December 21, 2017)

http://www.mlit.go.jp/jtsb/eng-air_report/JA322J.pdf

4. Conclusion

As stated so far, in cases where evacuation slides were used, a fairly large number of the passengers suffered injuries during evacuation.

The highest priority to design evacuation slides is placed on the prompt evacuation to ensure passengers' life in an emergency such as a fire. Therefore, the injured during an evacuation cannot be eliminated. However, the injured can be reduced by taking a proper evacuation posture and by having helpers to provide assistance at the bottom end of the evacuation slide.

We should be sure to check the safety guidance card and the safety video when boarding on an airplane. As mentioned in the card and the video, it is important to use an evacuation slide without your hand baggage. The hand baggage may tear the evacuation slide, or may hit other passengers to cause injuries. Otherwise, if there are passengers who attempt to evacuate with carrying hand baggage, cabin attendants have to spend the time to take the baggage away them, which hinders their primary duties of assisting evacuation. One airline company said exactly how to obtain cooperation from passengers remains a matter to be addressed, because there is a limitation to what cabin attendants can do by themselves.

It is not too much to say that the passengers' cooperation is actually the key to prevent injuries during an emergency evacuation.

Tip from the Director for Analysis, Recommendation and Opinion

Aircraft accidents are something we rarely encounter throughout our life and also something we do not want to encounter.

From what I hear, even if we take an aircraft every day, the probability of encountering an accident is at most once in several hundred years. In this sense, we could say that an aircraft is a very safe means of transportation.

However, even if it is a rare occasion, it is very important to prepare assuming that you could be in an accident.

This should be kept in mind not only by people who engage in the air transport business but also by people who use aircrafts. This JTSB Digests introduced cases where evacuation slides were deployed.

There are many orders that passengers must obey when using an evacuation slide, such as not carrying baggage and taking off high heels.

It will increase the risk of causing more damage, if even one person thinks that sliding down while carrying his/her baggage is not a big deal.

The public transportation users including aircrafts may tend to be passive with respect to securing safety, but we hope that each of you keep in mind that there are things you can and should do.

[We welcome your comments on "JTSB Digests"](#)

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