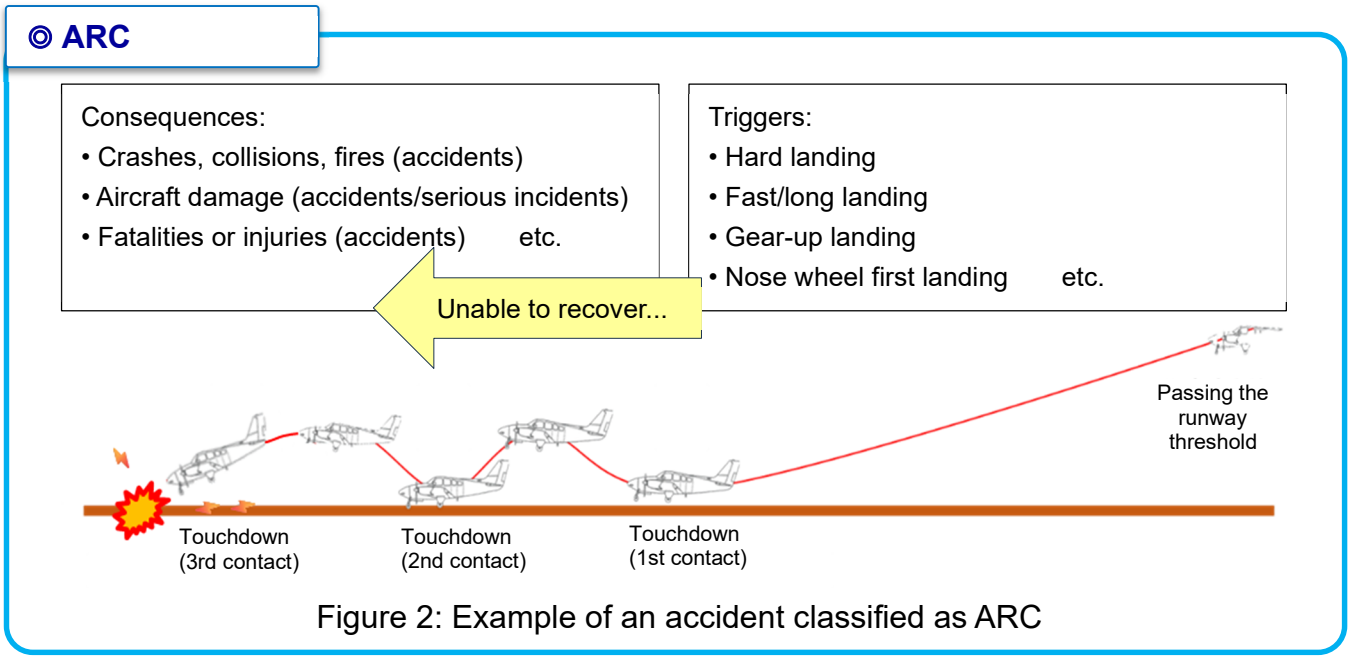


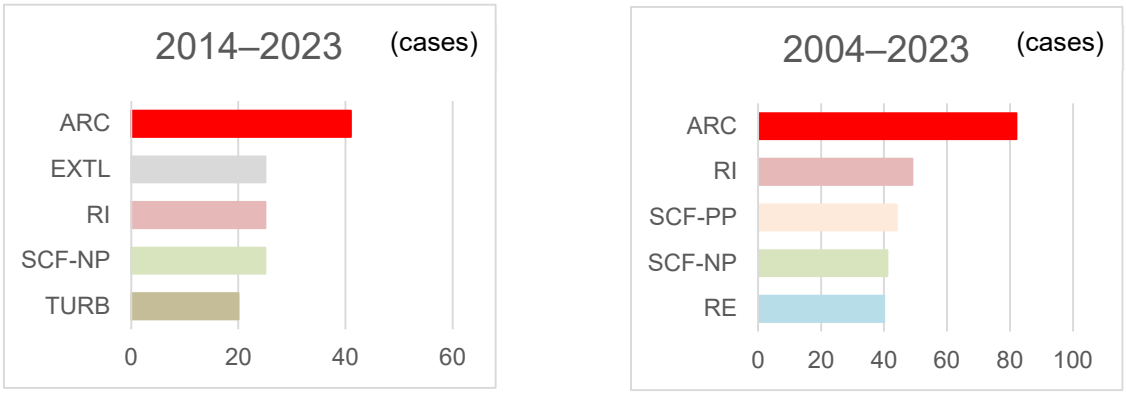
Figure 2: Example of an accident classified as ARC

In this JTSB Digest, we will focus on 41 cases of accidents and serious incidents that are classified as ARC, which occurred during the 10 years from 2014 to 2023 and whose reports were published by November 2024, (excluding those involving ultralight powered aircraft and homebuilt aircraft; hereinafter referred to as "ARC accidents") to introduce their occurrence, measures to prevent ARC accidents, and some case studies.

Chapter 2 Occurrence of ARC accidents

1. Occurrence of accidents

When looking at the occurrence categories of accidents that occurred during the 10- and 20-year periods up to 2023 (limited to accidents whose reports were published) by tabulating them, ARC accidents numbered 41 in the 10-year period and 82 in the 20-year period, making them the most frequent in both periods, and therefore, measures to prevent recurrence of accidents of this category are necessary. (See Figure 3.)



ARC: Any landing or takeoff involving abnormal runway or landing surface contact
EXTL: Occurrences during or as a result of external load or external cargo operations
SCF-PP: Failure or malfunction of an aircraft system or component related to the powerplant
SCF-NP: Failure or malfunction of an aircraft system or component other than the powerplant
RI: Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft
RE: A veer off or overrun off the runway surface
TURB: In-flight turbulence encounter

Figure 3: Number of occurrences by occurrence category (top five categories only)

Of these, looking at the breakdown of ARC accidents over the 10-year period, as for accidents, there were three crash cases, two collision cases, two cases of injuries to persons, and 24 cases of aircraft damage (which required major repair; including 7 gear-up landing cases, 3 tail strikes, and 14 other types of damage). As for serious incidents, there were seven airframe contact cases (including 3 with fuselages, 3 with propellers, and 1 with a wingtip), and three cases where the aircraft became unable to continue flight.

Next, looking at the number of occurrence by kind of aircraft, of the 41 ARC accidents, small aircraft accounted for 22 cases (about 54%), more than half, followed by gliders, with 11 cases (about 27%). By operator, private aircraft accounted for 18 cases (about 44%), nearly half, aircraft operated by organizations such as university flying clubs accounted for 12 cases (about 29%), and commercial aircraft, including those of airlines, accounted for 11 cases (27%). (See Figure 4.)

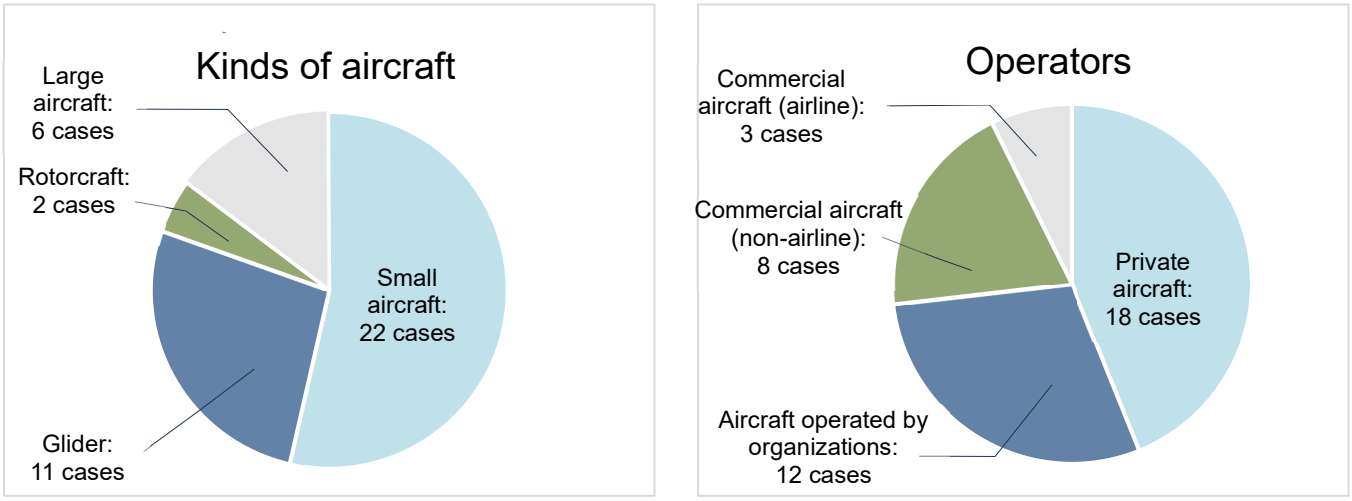


Figure 4: Number of ARC accidents by kind of aircraft and by operator

2. Occurrence of damage

As for casualties, there were two fatal accidents, four accidents with serious injuries, and three accidents with minor injuries. As there was a case where, after an aircraft bounced on the runway, inappropriate operations by the pilot led to a crash that killed all four occupants; ARC accidents do not necessarily result in only minor consequences.

Meanwhile, regarding aircraft damage, cases where aircraft were destroyed beyond practical repair and where aircraft were substantially damaged requiring major repairs totaled 30 cases (about 73%), accounting for roughly three quarters. (See Figure 5.)

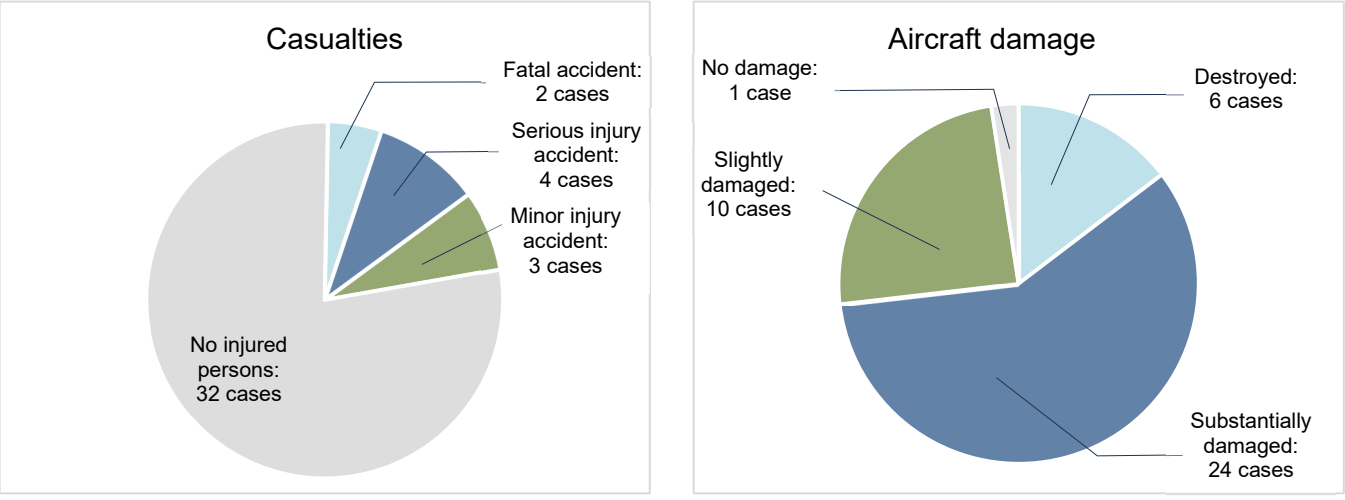


Figure 5: Number of ARC accidents by casualties and by aircraft damage

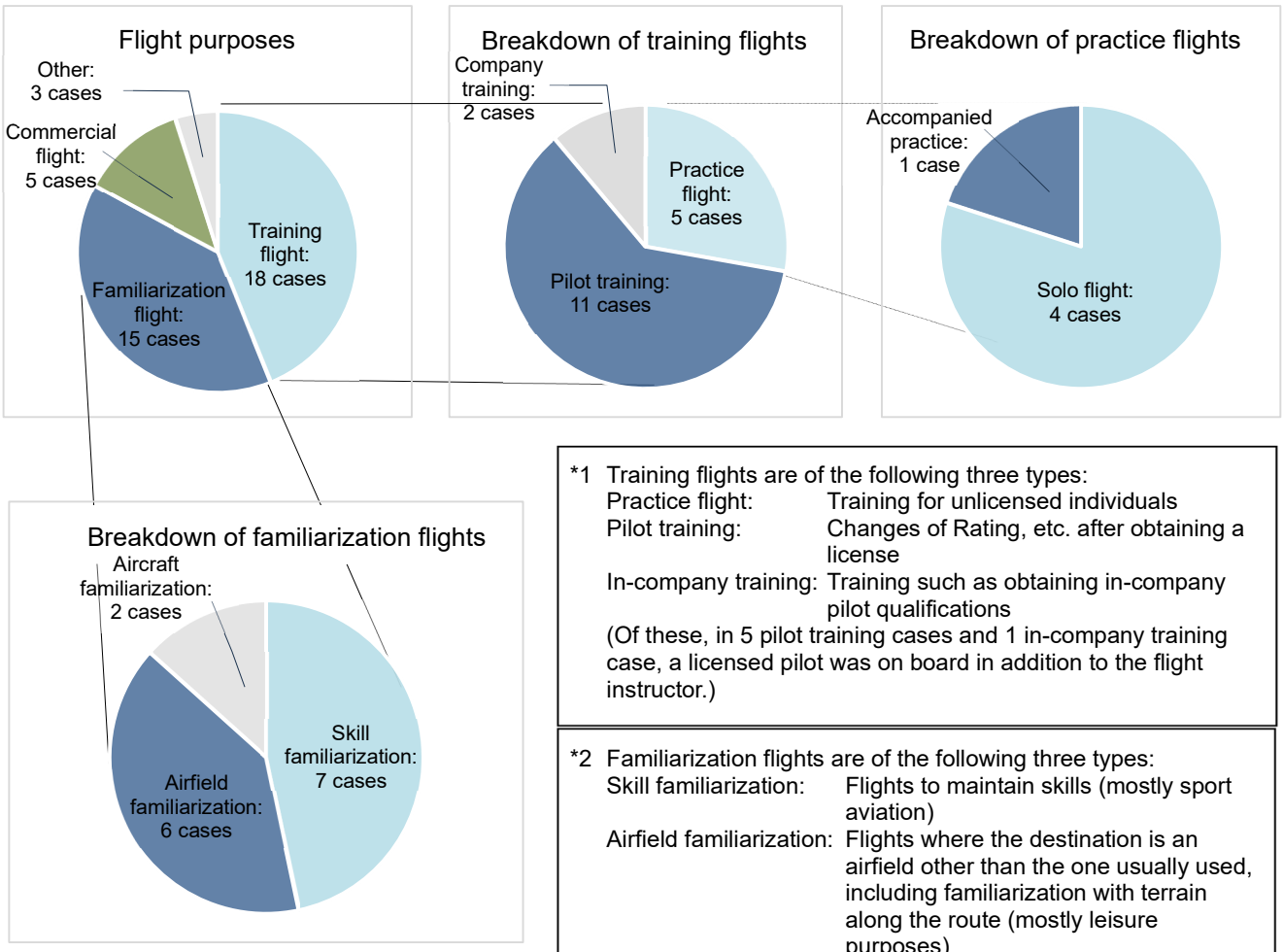
3. Occurrence by flight purpose

By flight purpose, training flights[*1] accounted for 18 cases, followed by familiarization flights[*2] with 15 cases.

In training flights, those for pilot training after obtaining a license were the most common, and among unlicensed individuals there were four cases of flight practice without a flight instructor or other supervisor on board (solo flights), notably more than for accompanied practice.

In familiarization flights, skill familiarization, which is to maintain skills after obtaining a license (including sport aviation with gliders), was the most common with seven cases, followed by airfield familiarization (including leisure flights), such as when traveling to an airfield other than the one usually used, with six cases, and aircraft familiarization for becoming accustomed to aircraft with little piloting experience with two cases.

Commercial flights other than training (including airline passenger services) were relatively few at five cases, and other activities accounted for three cases (company flights, search and rescue flights, and air transport flights). (See Figure 6.)



*1 Training flights are of the following three types:
Practice flight: Training for unlicensed individuals
Pilot training: Changes of Rating, etc. after obtaining a license
In-company training: Training such as obtaining in-company pilot qualifications
(Of these, in 5 pilot training cases and 1 in-company training case, a licensed pilot was on board in addition to the flight instructor.)

*2 Familiarization flights are of the following three types:
Skill familiarization: Flights to maintain skills (mostly sport aviation)
Airfield familiarization: Flights where the destination is an airfield other than the one usually used, including familiarization with terrain along the route (mostly leisure purposes)
Aircraft familiarization: Familiarization with aircraft for which the pilot has little experience
(Of these, in 1 skill familiarization case and 2 airfield familiarization cases, a licensed pilot was on board in addition to the captain.)

Figure 6: Number of ARC accidents by flight purpose

4. Occurrence by flight time

The pilots' flight experience showed that while there were five cases with less than 100 hours of flight time, including trainees who had just begun flight training, there were also six cases with 10,000 hours, including airline pilots, and no marked difference in accident occurrence trends was observed regarding total flight time. However, focusing on the pilots' flight time on the aircraft types in question at the time an accident occurred, 27 cases (about 65%) had 100 hours or less, accounting for more than half, and there were also three cases with 0 hours (first time operating), indicating a high proportion of accidents involving aircraft with which pilots were not familiar. (See Figure 7.) As shown in Figure 6, there were also cases where a licensed person was on board as a passenger.

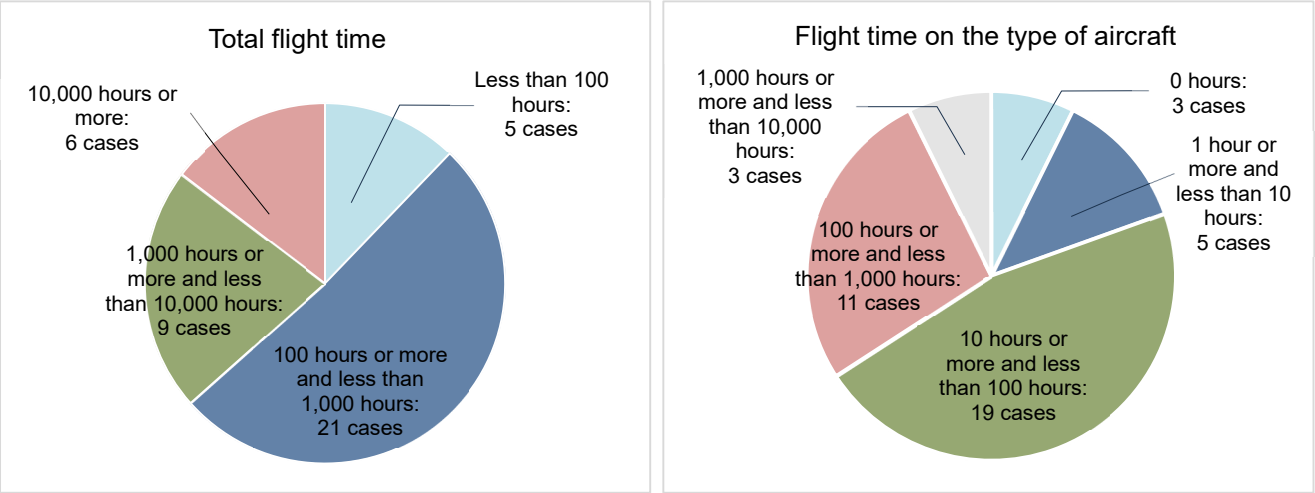


Figure 7: Pilots' total flight time and flight time on the type of aircraft in question

5. Summary of occurrence

- ARC occurs most often among the categories of accidents.
- By the kind of aircraft, small aircraft account for about half of all cases, followed by gliders.
- By operator, private aircraft account for nearly half, followed by aircraft operated by organizations.
- While "no injured persons" is the most common outcome for human casualties, fatal accidents have also occurred.
- By flight purpose, training flights and familiarization flights each account for about 40%.
- A large number of accidents occur with aircraft types with which pilots have limited experience.

In the next and subsequent chapters, we will further deepen considerations on prevention of accidents; we hope that individuals and organizations, particularly, involved in training and familiarization flights of small aircraft and gliders will find this helpful as a reference for safe operations.