ANNUAL SAFETY REPORT 2017

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Confederazione Svizzera
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Swiss Confederation

Bundesamt für Zivilluftfahrt BAZL
Office fédéral de l'aviation civile OFAC
Ufficio federale dell'aviazione civile UFAC
Federal Office of Civil Aviation FOCA

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1. FOREWORD BY THE DIRECTOR

“In 2017, commercial aviation flew over 4 billion passengers on 38 million flights without a single fatality in a scheduled jet airliner. This wonderful milestone is the work of thousands of dedicated professionals in the aviation industry.” (Ask the Captain: Why aviation was so safe in 2017; John Cox, in USA Today, 7.1.2018)
For Switzerland, 2017 was also a good year in terms of accident statistics. No accidents were recorded in the field of commercial aviation. The total number of accidents in Switzerland (including foreign aircraft) and abroad (involving Swiss aircraft) decreased from 40 to 35. These resulted in nine fatalities, two of whom were killed in accidents involving gliders. Chapter 6 contains an overview of incidents that occurred during 2017.

The aim of all safety-related activities is to ensure that no accidents occur in the field of commercial aviation and the number of accidents and incidents in the field of non-commercial aviation is kept to a minimum. Here it is essential that, as the federal supervisory authority, the Federal Office of Civil Aviation (FOCA) deploys its resources in areas in which the greatest risks (probability of occurrence x scale of damage) exist.

According to the European Aviation Safety Programme and the Swiss State Safety Programme, in order to work efficiently it is important to take all the components of a Safety Management System into account. On the one hand, the accidents and incidents recorded in the report concern occurrences that have already taken place, but on the other hand, as the relevant federal authority we want to simultaneously process the data into information that will help us take appropriate decisions in the future. In this way we can identify safety measures that can be implemented in order to prevent accidents. Our aim is to reduce risks (i.e. reduce the probability of occurrence for defined scenarios) to an extent that assures a high degree of safety that is reasonable and practicable. The available accident and incident data are only one part of an overall picture, but they are nonetheless an important starting point for all targeted, risk-related and performance-based supervisory activities.

Drawing conclusions from occurrences and exchanging findings with other authorities and industry representatives help us achieve our defined safety objectives. It is one of the FOCA’s core competencies to consolidate safety-related topics in the areas of flight operations, infrastructure and technology on the basis of available data, and to analyse these in detail, and subsequently to orient its efforts and supervisory activities on the identified hotspots – to the benefit of Swiss citizens and air travellers at home and abroad

Christian Hegner, Director
Federal Office of Civil Aviation

2. INTRODUCTION, INTEGRATION INTO SAFETY RISK MANAGEMENT

This Annual Safety Report deals with incidents that occurred during 2017 in the Swiss civil aviation categories cited below, and describes how appropriate measures were implemented and which measures are planned for the future. It is primarily addressed to players in the aviation sector, but is also accessible to the general public. The structure of its chapters and incident categories is based on the European Plan for Aviation Safety (EPAS). The main purposes of this report are as follows:

1. Provision of data and information as indicators for Swiss civil aviation.
2. Measurement of the key safety data / achievement of safety objectives in accordance with the mandate from the Federal Department of the Environment, Transport, Energy and Communications (DETEC)
3. Assessment of risks in selected areas and description of negative trends
4. Description of measures based on incident data and obtained findings

The report focuses on the FOCA's direct areas of responsibility as supervisory authority (Swiss airspace, Swiss airports and airfields, HB-registered aircraft, air transport operators). Against this backdrop and based on the EPAS, it distinguishes between the following categories: Commercial Air Transport (CAT), Non-Commercial Air Transport (NON-CAT) and Special Operations (SPO). In 2017, the focus was on analysing data relating to the following accident categories: Mid-Air Collision (MAC), Runway Incursion (RI), Collision on Ground (COG) and Loss of Control (LOC). Category CFIT (Controlled Flight into Terrain) has not been included in this report, but the data will be analysed as of 2018 and presented in next year's report.

Following the first two chapters (Foreword by the Director / Introduction), chapter 3 contains a brief descrip-tion of the most important FOCA projects during the year under review. Chapter 4 deals with the current safety performance in Switzerland and throughout the world. The central component of this report is chapter 5, which presents all relevant operational incident categories and their statistics for 2017. Chapter 6 contains current data relating to flight crew fatigue, drones and cyber security, while chapter 7 deals with safety activ-ities and includes comments on the existing reporting culture. Chapters 8 and 9 focus on activities relating to the SAFA (Safety Assessment of Foreign Aircraft) programme and EASA and ICAO compliance management. And chapter 10 contains an evaluation of the results, draws conclusions from them and presents an outlook of the forthcoming activities.

3. 2017 FOCA SAFETY PROJECTS

Instrument flight rules without air traffic control (Grenchen Airport)

Since the end of summer 2017 it has been possible to carry out flights again at Grenchen Airport at the accustomed times. At Grenchen Airport, the periods during which flights can be carried out under instrument flight rules (IFR) without air traffic control (ATC) have been extended. Following an in-depth review of safety-relevant as well as legal aspects, the FOCA was able to approve the corresponding application by Grenchen Airport in summer 2017. Flights can now be carried out under IFR without ATC during off-peak periods and at midday: from 5 p.m. to 9 a.m. and from 12.15 to 13.45 p.m. FOCA personnel assisted the airport and Skyguide in their efforts to find a concept that is both safe and in line with Swiss and international requirements.

Low Flight Network (LFN)

REGA air-rescue service has been working together with the Swiss Airforce, Skyguide and the FOCA on the creation and implementation of a low flight network (LFN). The network of nationwide instrument flight routes, which is based on satellite navigation, connects airports, hospitals and the operation centres of REGA with one another. On 23 December 2017, REGA was granted an exceptional licence by the FOCA which permits it to use major hubs in the LFN round the clock. In addition to the Insel Hospital in Bern, the Cantonal Hospital of Lucerne will soon become the second hospital in Switzerland to possess an IFR approach. Together with the issued exceptional licence for the use of the approaches to Emmen and Meiringen military airfields outside of operating hours, and the IFR approaches to the hospitals in Lucerne and Interlaken that are planned for the beginning of 2018, REGA can now connect the regions of Central Switzerland and Bernese Oberland to the LFN. Furthermore, the population of the canton of Ticino can also benefit from the exceptional licence granted by the FOCA: REGA helicopters can now use the north-south flight path over the Gotthard Pass during the nighttime curfew.

Swiss Airspace: AVISTRAT

In 2016, DETEC entrusted the FOCA with the mandate of introducing AVISTRAT-CH, the objectives of which are to reduce the risks associated with the use of airspace in Switzerland and to utilise the scarce availability of airspace over Switzerland as efficiently as possible. Instead of endeavouring to improve the existing system, the idea is to create an entirely new system that will meet the presentday and future needs of users as fully as possible. A project of this nature can only be successfully implemented in close cooperation with the various stakeholders. In view of this, the FOCA initiated an online survey last year by means of which the stakeholders can inform the FOCA how they would like to be included in the preparation of AVISTRAT-CH.

At the beginning of 2018, the FOCA began to collect detailed information about the needs of the users. For this purpose it organised workshops together with the stakeholders. Once it has obtained a complete overview of the users' needs, the FOCA will take this as the basis for developing a vision for Switzerland's future airspace and aviation infrastructure. It will then draw up a strategy for the best way to realise the formulated vision. After the strategy phase has been concluded and a realisation plan has been defined, the actual implementation will be initiated in 2020. Within the scope of this project and its findings, safety recommendations of the Swiss Transport Safety Board (STSB) are to be reassessed and incorporated into the discussions.

Update on Zurich Airspace

The existing airspace infrastructure around Zurich Airport is highly complex and represents a challenge for all airspace users. Upon consultation with the FOCA, during the implementation phase in June 2017 Skyguide and Flughafen Zurich AG decided to abort the “Re-Design TMA Zurich” project. Within the scope of the feasibility study for this project (under the leadership of Skyguide), all the interests of the involved players were taken into account, though without prioritisation of the airspace users right from the start. Support at senior management level concerning the definition of clear airspace priorities is a decisive factor for the success of this project. Due to various changes, in autumn 2017 it became clear to the project team that it would no longer be possible to achieve the original objective of “a significant improvement of the safety margin at Zurich Airport” in the sense of the recommendations of the Zurich Airport Safety Review and the STSB (e.g. Bohlhof incident, 11 August 2012, report 2208 and SE 466-468, 483, 484) by spring 2018. This means that the complex airspace structure around Zurich Airport is unchanged. At the end of 2017, the Zurich Airport Coordination and Management Committee initiated a new project that is to take account of the following aspects and findings:

1. Implementation Regulation (EU) No. 716/2014: Pilot Common Project
2. Changed use of Dübendorf for civil aviation
3. Implementation Regulation (EU) on Airspace Design, including Instrument Flight Procedure Design and Airspace Process (entry into force scheduled for January 2020; implementation by January 2022)
4. Document entitled “Airspace Design Principles” (including safety buffers), which is currently being prepared by the Airspace Regulation Team headed by the FOCA and will be ready for implementation in 2018
5. Relevant safety recommendations of the STSB – to be specified by the project team
6. Airspace and (flight) procedures at Emmen airfield and (flight) procedures of Friedrichshafen / Altenrhein (ARFA) Skyguide sector because they interact with Zurich
7. Initiation of talks with the German regulator and German air traffic control – DFS (a part of TMA Zurich is above Germany).

With this new project, a risk-based approach is being applied similar to that of AVISTRAT and the Grenchen and Samedan projects. As the first step, new Instrument Flight Procedures (IFPs) are to be developed for Zurich Airport based on Implementation Regulation (EU) No. 716/2014 (first part of the take-off segment and last part of the approach segment – other parts of the procedure have to be designed more flexibly). Based on these IFPs it will be possible to move on to the next step, in which all the elements cited above (points 1 to 7) will be taken into account. With respect to coordination with all the stakeholders and the over-view of the project status, as well as the necessary decision-making powers, the FOCA will assume responsibility for the management of the project concerning the restructuring of airspace around Zurich Airport and the associated processes and procedures. In addition, all the already ongoing projects aimed at increasing the safety margin at Zurich Airport will be managed and monitored by the Zurich Airport Coordination and Management Committee.

4. ACCIDENT CATEGORIES

Global safety level

The figures published by the IATA (International Air Transport Association) for 2017 indicate a marked improvement of the global safety level during the previous year. The global accident rate decreased from 1.61 accidents per million flights in 2016 to 1.08 per million in 2017. An improvement was also recorded with regard to the hull losses rate, which decreased from 0.39 per million flights in 2016 to 0.11 per million in 2017 for aircraft with jet engines. This rate is below the five-year average (2012 to 2016) of 0.33 hull losses per million flights.

The provisional figures of the EASA for 2017 also confirm the positive trend that was identified in 2016. The number of accidents involving aircraft weighing more than 5,700 kilograms decreased again from 21 in 2016 to 15 in 2017. No fatalities were registered in this weight category. In the general aviation and helicopter categories, the provisional European figures point to a positive trend and confirm the continual downward trend since 2008. In 2017, the number of fatal accidents decreased by 25 percent in the general aviation segment and by 20 percent in the helicopter segment versus 2016.

Safety level in Switzerland

The figures for 2017 are similar to those for 2016. In both years, 40 accidents occurred. However, the number of fatally injured people rose from 7 in 2016 to 19 in 2017. This trend is also reflected in the number of fatal accidents, which increased from 6 in 2016 to 9 in 2017. The number of accidents without fatalities decreased from 34 to 31.

The accident rate for all aircraft excluding helicopters (all weight categories, only HB-registered aircraft) rose from 42 per million flights in 2016 to 55 per million in 2017. By contrast, the accident rate for helicopters (all weight categories, only HB-registered helicopters) decreased from 5 per hundred thousand flights in 2016 to 3 per hundred thousand in 2017.

As was the case in 2016, no aircraft accidents occurred in the commercial air transport (CAT) segment last year. Similarly, no helicopter accidents occurred in the CAT segment in 2017. In the area of work flights with helicopters (SPO), too, a slight improvement was noted: here the number of accidents decreased from 4 in 2016 to 3 in 2017. As before, almost 90 percent of accidents take place in the non-CAT segment. Expressed in absolute figures, there were 38 accidents and 18 fatalities in 2017 (only HB-registered aircraft).

5. OPERATIONAL ISSUES

Mid-Air Collision (MAC) or Aircraft Proximity Incidents

The sole mid-air collision involving a Swiss aircraft occurred on 16 May 2017 during the approach by a privately operated aircraft under visual flight rules to Chambéry Aix-Les Bains Airport in France. This incident is under investigation by the French authorities.

In Swiss airspace, a total of 51 AIRPROX incidents were reported in Switzerland in 2017 (2016: 42). According to Doc 4444 of the ICAO, the definition of AIRPROX (which is also applied by the FOCA's Airprox Analysis Board) is as follows: «A situation in which, in the opinion of a pilot or the air traffic service personnel, the distance between aircraft and their relative positions and speed has been such that the safety of the aircraft involved may have been compromised.»

If commercially operated aircraft were involved in the reported AIRPROX incidents, this only concerned those with fewer than 19 seats for passengers. In around 42 percent of the AIRPROX incidents that were classified as serious, at least one of the involved aircraft was a helicopter, and in 46 percent of the cases an airforce aircraft was involved. This points to a good reporting culture on the part of airforce pilots. However, it is difficult to estimate the number of unreported AIRPROX incidents in the general aviation segment. The entry into force of Regulation (EU) 376/20014 (reporting of occurrences in civil aviation), which has also been applicable in Switzerland since 2016, will undoubtedly result in an increase in AIRPROX reports from the general aviation segment.

Since the ICAO airspace categories have to be defined according to the type of air transport (composition for commercial or private transport, operation under visual flight rules or instrument flight rules, according to the manoeuvrability of the aircraft, etc.), and in order to assure a sufficient distance between aircraft, on the basis of requirements and regulations the typical dangers, risks and potential measures are also differentiated according to airspace category.

Airspace category Charlie (C), controlled airspace, terminal manoeuvring areas, air routes and upper airspace primarily used for IFR flights

ATC-relevant reports concerning violations, procedural errors and conflicts in 2017: 532 (2016: 429).

Of these reports, 160 (2016: 101) concerned airspace infringements and 118 (2016: 151) concerned separation minima infringements, though typically the vast majority of the latter only involved minor infringements of the specified criteria. Around 82 percent of the separation minima infringements involved commercial flights. Roughly two-thirds of the reports were attributable to incorrect instructions by ATC: here, due to highly frequented airports and airspace in Switzerland during peak periods, air traffic controllers were compelled to utilise the specified minimum separation criteria to the greatest possible extent in order to keep traffic flowing smoothly. As noted above, the system records and reports even the slightest deviations from the specified separation minima. These reports generally do not have any consequences on the safety of the aircraft. The conflict rate per 100,000 IFR fights decreased again in 2017.

Airspace category Delta (D), controlled airspace, control zones of intercontinental and regional airports, mixed use for VFR and IFR flights

ATC-relevant reports concerning violations, procedural errors and conflicts in 2017: 506 (2016: 451).

Here, too, the number of airspace violations by pilots operating flights under visual flight rules in the general aviation segment formed the largest category of precursors for other potential conflicts. Fortunately, these resulted in very few incidents involving inadequate separation from aircraft operated under instrument flight rules. In 2017, only 3 commercially operated aircraft were involved in an inadequate separation in category D airspace.

Airspace category Echo (E), controlled airspace for IFR flights at lower altitudes at regional airports, though primarily used for VFR flights in the general aviation segment

ATC-relevant reports concerning violations, procedural errors and conflicts in 2017: 116 (2016: 95).

Here the number of reports is low compared with those for airspace categories C and D, but most of the reported conflicts during flights in airspace E are on the serious side. Half of all reported cases on inadequate separation in Switzerland take place in airspace Echo. In 2017, 8 commercially operated aircraft were involved.

Loss of control during flight

Throughout European airspace, loss of control of an aircraft is now among the most common causes of accidents. Here a distinction is made between loss of control due to insufficient engine power, structure-related loss of control due to damage, and human performance and limitations in daily operation. In addition, the influence of weather conditions (storms, lightning strikes, hail, etc.) was identified as a possible cause of air accidents due too loss of control.

A) Loss of control during flight: Engine power

This category concerns the loss of control during flight due to loss or reduction of engine power. This may be caused by technical defects, faulty manipulation, maintenance errors, damage incurred on the ground, bird strike, weather influences, lack of fuel or contaminated fuel.

In 2017, 164 reports concerning technical defects were received – a slight reduction versus the previous year. 30 of these cases resulted from maintenance errors. 73 bird strikes were reported – again, a slight reduction versus the previous year. It should be noted that only a very small proportion of reported incidents resulted in a deviation from the normal flight parameters. The following scenarios were observed in this accident category:

Deviation from normal flight parameters due to loss or reduction of engine power

In 2017, in the field of commercial transport in this category, one take-off was aborted due to a loss of directional control caused by asymmetric thrust, and one landing was aborted with a temporary minor excess approach speed due to an engine control problem. In a few cases, engine problems gave rise to precautionary landings at alternative airports or aircraft returning to the airport of departure.
In the general aviation segment, 3 emergency landings had to be made due to loss of engine power. In the work aviation segment (glider towing), an emergency landing was required due to loss of power.

The following potential causes were identified:

- In the majority of cases, the loss of engine power was attributable to technical defects in the engines and their systems, while technical defects in the fuel system accounted for a small number of engine power losses.
- 2 engines failed due to technical defects and in 4 cases the engines were switched off as a precautionary measure due to warning signals.
- Lack of fuel was responsible for one of the emergency landings in the general aviation segment.
- Most of the reported bird strikes against engines or propellers were reported in the CAT segment. A small number of these resulted in damage but did not cause a loss of engine power.

Engine fire

The following causes were identified:
- A technical defect gave rise to a fire alarm in a commercially operated aircraft shortly after take-off.
- In the general aviation segment, an engine fire occurred.

B) Loss of control during flight: Human/aircraft performance and limitations

In this category, 396 reports were received in 2017 concerning technical defects – a slight reduction versus the average of the past few years. 43 of these cases resulted from maintenance errors. In addition, 118 incidents were reported relating to aircraft loading. It should be noted that only a very small proportion of reported incidents resulted in a deviation from the normal flight parameters. The following scenarios in particular were observed in this accident category:

Deviation from normal flight parameters due to malfunction of instruments, flight control, systems or automation

In 2017, in this incident category, 5 cases of a minor deviation from the planned flight status or speed were reported in the commercial aviation segment. In the general aviation segment, only one flight status deviation was reported. In the case of one non-commercially operated helicopter, the failure of the tail rotor drive resulted in an auto-rotation landing.

The following potential causes were identified:
- Hydraulic or electronic defects in the flight control system
- Autopilot errors
- Broken tail-rotor activation cable

Impedance of crew due to loss of cabin pressure, contaminated cabin air, smoke or fire

In this category no control losses were reported in 2017; in a few cases a precautionary landing was initiated or the crew used oxygen masks due to smoke in the cockpit. In the general aviation segment, one emergency landing occurred due to smoke in the cockpit.

The following potential causes were identified:
- Traces of oil from an engine or auxiliary power unit that penetrated the air-conditioning system
- Defective electrical/electronic components
- Odour development in the galley due to defects or soiled ovens or coffee machines
- Defects in the cabin pressure and air-conditioning system

Deviations from flight parameters

This category concerns deviations from essential flight parameters such as flight speed, horizontal and vertical flight position or incorrect power calculations.

As was the case in 2016, most of the deviations from flight parameters in 2017 occurred in the commercial aviation segment. 90 percent of these involved fixed-wing aircraft and less than 5 percent occurred in the helicopter operations segment. Only 7 percent of the reports originated from the leisure-time aviation segment. More than half these incidents occurred during approach and landing phases, while 30 percent took place during cruise flight and 10 percent during take-off. These figures include aircraft registered abroad (8 percent) and incidents that occurred both within Switzerland and abroad.

Most of the incidents involved the following deviations:
- From the specified flight speed (60 percent) – only a very slight increase versus 2016
- From the horizontal flight attitude (30 percent / +20 percent versus 2016)
- From the banking position / rolling motion (7 percent / 50 percent reduction versus 2016)

Identified causes for flight deviations

Due to a lack of information, in the majority of reported cases it was not possible to determine the exact cause. The causes in the other cases were as follows:

- Weather conditions (turbulence, very strong wind, wind shears)
- Suboptimal manual or automatic adherence to the flight path
- Sudden manoeuvres due to external influences
- Incorrect configuration of steering surfaces (buoyancy and brake flaps)
- Inadequate or incorrect power calculations
- Insufficient monitoring of flight parameters, for example flight speed, due to distraction in the cockpit caused by monitoring of other flight-relevant displays. When such distractions occur, audiovisual alarms draw the attention of the pilot to any resulting deviations from the flight parameters.

More than 90 percent of these incidents had a very low influence on safety.

In the field of helicopter operations, 13 reports were received in 2017 regarding deviations from flight parameters. This figure is slightly higher than the four-year average (2013 to 2016). In most cases, the deviations concerned too high or too low engine and rotor speeds, and were largely operational in nature or attributable to inattention.

Laser attacks

In 2017, 92 laser attacks of aircraft crews over Swiss territory were reported to the FOCA (a 16 percent increase versus 2016, but 6 percent below the four-year average). Roughly 7 percent of the reports received in 2017 indicated a higher risk potential because at least one crew member was hit directly by the beam and suffered temporary sight impairment or eye pain. An increase in laser attacks was ascertained at Zurich and Geneva airports. This is understandable in that laser attacks are mainly possible at low flight altitudes, i.e. during landing and take-off (distance from, and visibility of, aircraft).

In 2017, 15 helicopter crews were targeted with laser pointers (the same number as in 2016). Once again, no geographic frequency of laser attacks against helicopters was identified in 2017. The potential threat of laser attacks is slightly higher in helicopters because, unlike passenger aircraft, they generally only have one pilot. If the pilot's sight is seriously impaired, there is no co-pilot to take over the controls. In view of this it is especially important to protect helicopter crews against laser attacks.

Dangerous goods

In the carriage of dangerous goods segment, roughly the same number of reports were registered in 2017 as in 2014 and 2015, though 35 percent fewer than in 2016. The increase in reports in 2016 is attributable to the fact that more random inspections were carried out at Transitpost during that year, primarily by one stakeholder. In 2007, the highest number of reports received by the FOCA (152) concerned undeclared dangerous goods such as nail varnish remover, perfumes and batteries. This figure corresponds to the average for the past four years. The second-highest category concerned damaged dangerous goods (30 reports). Here the number of reports was slightly below the four-year average. By way of summary it can be stated that the trend with respect to dangerous goods is stable to slightly decreasing.

Loss of control in flight: Aircraft structure

This category concerns the loss of control during flight due to failure or influencing of the aircraft structure. This may be caused by technical defects, faulty manipulation, maintenance errors, damage incurred on the ground, bird strike or dangerous goods. In 2017, 74 reports concerning technical defects were received – a slight increase versus the previous years. 12 of these cases resulted from maintenance errors. A total of 343 bird strikes were reported (the same as in 2016). In addition, 83 incidents relating to damage during aircraft ground handling (an increase versus 2016) were reported. It should be noted that only a very small proportion of reported incidents resulted in a deviation from the normal flight parameters. The following scenarios were observed in this accident category:

Deviation from normal flight parameters due to failure of or degraded aircraft structure

In 2017, technical structural damage, damage caused during aircraft ground handling, by bird strikes or dangerous goods did not result in the loss of control of any aircraft registered in Switzerland.

The following potential causes were identified:

- In the CAT segment, considerable structural damage was caused during maintenance or handling on the ground. This type of damage primarily occurs to the fuselage or doors.
- Various types of damage to parked aircraft were reported due to faulty operation of handling equipment and vehicles. Since the damage concerned was immediately reported by ground personnel, it was possible to inspect the aircraft concerned before take-off and where necessary to declare it non-airworthy.
- Bird strikes affecting the aircraft structure were reported in the CAT segment. A small number of these resulted in damage but did not cause a deviation from the normal flight parameters. In the general aviation segment, one case of serious structural damage was reported, though the pilot was able to land the aircraft safely.
- Damage to the cockpit windscreen or its heating mechanism gave rise to several incidents in the commercial aviation segment.
- In the general aviation segment, in two cases a door opened during the flight, and structural damage was caused due to corrosion and cracks.

Failure of or degraded aircraft structure due to fire outside the pressurised cabin

In a historic aircraft, a fire broke out in the undercarriage due to overheating during taxiing tests at high speed.

Runway excursion

Overshooting the runway and lateral departure from the runway are regarded as one of the most common types of accident during take-off and landing. Such occurrences can be fundamentally attributed to weather conditions, technical defects or human error. In the past four years, a total of 67 incidents and accidents were reported, though none occurred in the CAT segment in 2017. These incidents can be classified in two main categories:

Overshooting the Runway

In 2017, 4 cases were reported in the general aviation segment in which an aircraft could not be halted and thus overshot the runway. This figure is below the average for the past three years (2014 to 2016).

In 2017 the following causes were identified for the above cases of overshooting the runway:

- Abortion of take-off following loss of engine power during acceleration on the ground
- Insufficient acceleration during take-off due incorrect positioning of brake flaps
- Delayed acceleration during tow take-off with a glider
- Landing error with resulting touch and go attempt. The pilot wanted to perform a take-off manoeuvre, but this was no longer possible due to the low flight speed. The aircraft tipped sideways due to a stall and collided with the ground.

In 3 cases an investigation was initiated by the STSB. In the CAT segment there were no incidents of this nature in 2017.

Runway Side Excursion

The increase in such incidents did not persist in 2017. Whereas 24 incidents were recorded in 2016, only 8 were reported in the general aviation segment in 2017. One person received minor injuries and 2 incidents involved aircraft registered abroad. In the CAT segment there were no serious incidents of this nature in 2017.

The following factors were deemed to be the cause of runway side excursions:

- Pilot error during the landing phase, with subsequent loss of control
- Landing after several attempts due to excessive speed, with subsequent loss of control and lateral drifting
- Shearing of the aircraft after landing due to uneven application of braking power on the left and right engines
- Loss of control following a hard landing due to high wind
- Aborted take-off due to loss of engine power, with subsequent opening of cockpit door and loss of control of steering due to pilot distraction

Runway incursion

Runway incursion is the term that is used if the runways at airports and airfields are accessed or used by people, vehicles or aircraft without authorisation.

Here a distinction is made between the runway itself and the protected area adjoining it. Any cases of unauthorised access or use of the protected area by people, vehicles or aircraft must be reported to the FOCA.

A distinction is also made as to whether an airport or airfield is controlled and supervised by an air traffic control authority (e.g. tower control, ground control, apron control) or whether it is an uncontrolled airfield.

In 2017, 62 runway incursions were reported to the FOCA (2016: 86).
29 runway incursion reports concerned aircraft, 11 concerned vehicles and 22 concerned the unauthorised presence of people on runways.

Runway incursions mostly occur at regional airports or airfields that are not as thoroughly protected by fencing, barriers and markings as intercontinental airports. Thus at regional airfields, the proportion of people and vehicles that do not belong to the airfield but nonetheless intentionally or unintentionally access a runway or its protected area is high.

In most cases, pilots who enter the protected area or runway with their aircraft without authorisation (stop bar crossing deviations) do so because they have overlooked the corresponding markings or lights (inadequate awareness of the situation), or have had a communication problem with air traffic control. These incidents resulted in a few aborted landings ordered by air traffic control or autonomously initiated by the pilot of an approaching aircraft.

Communication problems rarely result in an aircraft entering or taking off from a runway that has not been allocated by ATC.

Collision on the ground

This category concerns a collision between a taxiing aircraft and another aircraft, vehicle, person, animal or other obstacle in its path. It does not include collisions on the runway.

In 2017, 7 collisions resulting in material damage were reported in this incident category. The number of incidents remained relatively stable in the past four years. In addition, 254 incidents were reported that had the potential to result in a collision. The majority of the reported cases occurred in the CAT segment, while a few cases concerned the general aviation segment. The following main scenarios were observed in the CAT segment:

Aircraft moving on taxiway or apron without clearance from ATC

In 2017, 28 incidents occurred (more than half of which were at foreign airports) in which an aircraft began to move on a taxiway or apron without clearance from ATC and thus could have caused a collision. The number of such incidents was lower than in 2016.

In most cases, the identified causes were as follows:
- Although the crew understood the instructions of ATC correctly, there was a temporary loss of orientation (usually at foreign airports due to a lack of familiarity with the taxiway layout)
- The crew understood the instructions of ATC correctly, but subsequently overlooked relevant signals and markings (for example, due to distraction resulting from activities in the cockpit)
- The crew did not understand the instructions of ATC correctly and erroneously believed they had been given the go-ahead

Failure to maintain a safe distance from other aircraft or objects

In this category, 10 incidents at Swiss airports or airfields were reported in which an aircraft failed to main-tain a safe distance from other aircraft, vehicles or objects while taxiing or parking. The number of such incidents was higher than in 2016.

The following causes were identified:
- The aircraft was not correctly guided by the escort vehicle
- The crew lost their awareness of the situation (for example, due to distraction in the cockpit) and deviated from the specified taxiway or oversaw relevant markings
- Taxiing clearance by ATC was inappropriate

Taxiing aircraft impeded by a person, vehicle or object

Here, 128 incidents at Swiss airports or airfields were reported in which a safe distance was not maintained between a vehicle or a person and a taxiing aircraft. A further 13 incidents were recorded concerning the unsuitable placement of equipment at an aircraft stand or in the vicinity of a taxiway. On average, a slight increase in such incidents has become apparent over the past four years.

In most cases, the identified causes were as follows:
- Failure to observe right of way due to lack of awareness of the situation by the vehicle operator (due to distraction or focus on other activities)
- Due to time pressure, ground handling personnel replaced equipment outside the designated storage area

Helicopter operations

This chapter deals with helicopter operations that cannot be allocated to any other incident category. It solely concerns flights with underload (aerial work).

In 2017, a total of 17 reports were recorded. The number of incidents remained more or less constant over the past four years. In the period between 2014 and 2017, the number of reported incidents fluctuated between 23 (2014) and 17 (2017). Due to the relatively low number of reported incidents it is not possible to draw any clear conclusions. In view of this it is also difficult to identify a trend.

Full or partial loss of load

In the period under review, 10 cases involving loss of load were reported, 3 of which resulted in injuries. This corresponds to the figures for 2016. In 9 cases, part or all of the load was lost. In one case, the load had to be released due to adverse wind conditions (tailwind) during the final approach. In all 3 cases that resulted in injuries the STSB initiated an investigation.

The following causes can be cited for such incidents:
- Unexpected behaviour of the load during the flight (e.g. rotten wood)
- Breaking-off branches during timber transport
- Possibly inadequate slinging method or equipment

6. EMERGING ISSUES

Flight crew fatigue

The global industry has been subject to increasing pressure for more than a decade, especially in the commercial air transport segment. Increasing competition and competitive pressure are the main causes for the negative trend that has set in during the past few years. Efforts aimed at optimising profits are having a negative impact on air transport operators both in the air and on the ground. Flight duty periods are being scheduled up to the legally specified limits and these maximum working hours are then based on the applicable national legislation.

Fatigue affects our mental, sensory and muscular processes and gives rise to negative effects such as misinterpretations, the false assessment of hazardous situations, slower reaction times and even falling asleep in the cockpit, with potentially fatal consequences.

Standard work-time regulations and legally regulated flight service periods are not enough on their own to prevent the risk of fatigue. Instead, it is necessary to identify potential causes for signs of fatigue at an early stage and prevent it with the aid of appropriate measures. Following the introduction in 2014 by the EASA of new restrictions on flight service periods, new limits were defined that have to be observed within the EASA member states. Furthermore, air transport operators now have to incorporate fatigue risk into their safety management systems. This will enable them to take better account of significant influencing factors for the specification of the length of service periods, for example the number of flight sectors, night flights, consecutive early or late shifts, time zone changes, etc. The FOCA carries out periodical inspections of fatigue management by air transport operators.

Exceeded flight service periods and shortened rest periods

In accordance with the applicable legislation, deviations from the maximum flight service periods specified by the EASA must be reported to the FOCA. This obligation also applies in the case of shortened rest periods and notified occurrences of fatigue. The following findings can be cited based on the received reports:

A marked increase (+40 percent) in the number of flight service periods that exceeded the specified limit was ascertained towards the end of 2014 and at the beginning of 2015, though a steady decrease then set in. The number of cases stabilised at around 12 per quarter in 2017. The number of reports relating to shortening of rest periods has also steadily fallen in the past few years: only 5 cases were reported in 2017. Whereas in 2014 and 2015 an average of 5 reports were submitted concerning fatigued pilots, this figure rose sharply towards the end of 2016 – a trend that was attributable to the impending negotiations with pilot unions on a collective employment agreement. In 2017 the number of reports per quarter returned to the relatively low level of 4 to 8.

Remotely piloted aircraft systems

The increasing trend with respect to incident reports and incidents involving drones appears to be persisting. However, during the year under review no collisions or accidents involving drones occurred that resulted in injuries. The FOCA strongly urges players in Switzerland's civil aviation sector to report all incidents involving drones so that it can obtain as complete and objective a picture as possible. Some time will be required before it is possible to assess the influence of an improved reporting culture.

Sales of drones (especially in the hobby sector) have increased sharply in the past few years. It is currently estimated that around 100,000 drones have been sold in Switzerland, but the exact number of these devices in use in Switzerland is not known.

The number of reported incidents involving drones, most of which concern sightings by aircraft crews, rose sharply last year: the FOCA received 85 reports from pilots or Skyguide air traffic controllers concerning drone sightings. 36 of these reports came from passenger aircraft, and 14 concerned incidents at foreign airports. The FOCA received 14 reports last year from the general aviation and business aviation segments. As is the case in most other countries, no collision between a drone and an aircraft has occurred to date in Switzerland. However, in 2017 the STSB initiated several investigations concerning incidents in which drones came into dangerously close proximity to passenger aircraft. Almost all the reported significant incidents occurred at locations where a drone should not have been flown without a permit from the FOCA or the airfield concerned or Skyguide (within a radius of 5 kilometres around an airport). In this context a detailed risk assessment was carried out in the first quarter of 2018 which revealed the degree of probability of occurrence of a collision between a drone (with a maximum weight of 2 kilograms) and an aircraft (airliner, business jet, light aircraft, helicopter) in Switzerland.

The FOCA regards the risk situation as stable, but it is also aware that increased attentiveness and communication efforts will be required in the future in order to secure the responsible use of the constantly increasing number of drones designed for use by the general public. The Federal Council also recognised the need for action regarding the remote identification of drones in order to duly enforce the applicable legislation. For this reason, the FOCA's Innovation Management Office supported the development of an "urban space" (U-Space). This concerns a system by means of which automated traffic management can be introduced for drones. If drones are subject to automated traffic management their identification, monitoring in airspace, coordination with other airspace users and the protection of particularly sensitive areas can be secured. Since it will incorporate all the necessary elements for the enforcement of the applicable legal provisions, U-Space is to become the central instrument for assuring the safe, controlled operation of drones and serve as a basis throughout Europe.

Switzerland is a global leader in the area of remotely piloted aircraft systems and has developed a risk assessment method called Specific Operational Risk Assessment (SORA) that is internationally regarded as ground breaking. Switzerland's successful approach to the regulation of drones was made possible thanks to close cooperation between universities, the industry and the FOCA. In the past few years it has triggered a rapid development within the domestic industry, as well as the influx of numerous foreign companies. In the past few months, the FOCA was inundated with numerous enquiries and project applications. This additional burden reached a level at which it was no longer possible to respond with due responsibility and without incurring losses in terms of safety. In view of this, at the end of October 2017 the FOCA had to discontinue its processing of applications in order to prepare immediate measures and reorient itself. It is therefore foreseeable that it will not be able to sustainably perform the associated new and demanding tasks and meet its high-level targets, despite a high degree of efficiency, without additional resources. Possible solutions include outsourcing the licensing procedure, automation along the lines of a nationwide "U-Space" development, personnel transfers to the detriment of conventional duties, or the setting of quotas for drone activities. The examination of licensing procedures for commercial drone projects was reinstated at the beginning of 2018.

Cyber Security

In the area of cyber security, in 2017 the FOCA repeated its call for proportional and harmonised procedures and measures. Activities within the European Civil Aviation Conference (ECAC), the ICAO and the relevant EU and EASA bodies were closely coordinated. The FOCA also participated in the activities aimed at developing the second Swiss national strategy to protect against cyber risks (NCS 2.0).

In 2017, the revised recommendations of the ECAC regarding cyber security in the civil aviation sector will be incorporated into the National Aviation Security Programme (NASP) in 2018. The FOCA also participated in European exercises concerning cyber risks relating to civil aviation. The preparatory activities were already initiated in 2017 and were closely coordinated with national and international partners.

The supervisory activities that were initiated several years ago were continued in 2017.

7. SAFETY PROMOTION / REPORTING CULTURE

The FOCA uses various channels for external safety promotion. It organised events in 2017 at which stakeholders were given information about projects and new developments (Safety Oversight Committee, Swiss Aviation Days, AOPA/Aeroclub/SHA events, etc.). It also headed several workgroups in which safety risks were discussed and campaigns (e.g. films focusing on airspace violations) were prepared together with industry representatives. The attention of the general aviation sector was drawn to hotspots via the social media channel, “Stay-Safe!”. The FOCA is also a member of the EASA Safety Programme Network (SPN), which initiated numerous sensitisation campaigns in the course of 2017.

In 2017, 5,231 incidents (2016: 5,370; 2015: 4,896) were reported. In addition to these initial reports, follow-up and concluding reports were also received, bringing the total number of reports in 2017 to 7,747. In the commercial air transport segment, the number of reports was more or less unchanged, though the number of reports by private pilots has increased since the entry into force of Regulation (EU) 376/2014 on 1 April 2016 (2017: 239; 2016: 226; 2015: 66). As already noted in chapter 5 (AIRPROX incidents), it is difficult to estimate the number of unreported incidents. With regard to airfields (2017: 831; 2016: 799; 2015: 589) and maintenance providers (2017: 63; 2016: 55; 2015: 52) a slight increase in reported incidents was recorded. Reports by Skyguide increased by around 35 percent versus 2016; these increases point to a positive trend in reporting culture.

8. SAFA / ACAM

Swiss aircraft operators in the EU Ramp Inspection Programme (SAFA/SACA)

The key figure (ratio) that is calculated within the framework of the EU Ramp Inspection Programme is based on the number of categorised and weighted findings divided by the number of inspections.

In 2017, the number of inspections carried out by foreign authorities of aircraft registered in Switzerland decreased slightly versus 2016. The actual number depends on the planning of the individual EASA member states and can therefore vary.

Generally speaking, the FOCA regards the safety performance in the Swiss civil aviation sector as good in an international comparison, despite a slight increase in the number of findings and the Swiss ratio. The ratio of 68 percent of the air transport companies registered in Switzerland and which were audited in 2017 was below the average for the member states of the European Civil Aviation Conference (ECAC) and the global average.

One of the reasons for the slight increase in the Swiss ratio is that there were a few aviation companies with a higher number of findings which in the view of FOCA experts were to some extent too stringently evaluated. In addition, in 2017 more non-commercial air operations with complex motor-powered aircraft were inspected, most of which had findings in the areas of procedures and documentation.

The FOCA defined and implemented appropriate remedial measures.

The majority of the addressed findings did not directly give rise to a safety-relevant situation, though in some cases (CAT 3 findings) the safety margin was reduced.

9. COMPLIANCE MANAGEMENT

EASA

Number of inspectors

In 2017, 2 focused inspections were carried out in the areas of OPS (flight operations) and ANS (air navigation services) and 3 in the areas of FCL (licensing), MED (flight medicine) and FSTD (simulators).

FOCA performance 2017

66.6 percent of all findings in the areas AIR, OPS, FCL, MED, FSTD and ANS belonged to the "Critical Elements 6" (licensing, certification, authorisation and approval obligations) and "Critical Elements 7" (supervision obligations) categories. In the area of ANS, almost 60 percent of all findings were allocated to Critical Element 6 alone. In addition, in the area of OPS, Critical Element 3 (state civil aviation system and safety supervision functions) was represented to an above average extent.

Status of the findings

In the areas AIR, OPS and ANS, delayed corrections of errors in 26 percent of C findings and 33 percent of D findings gave rise to "overdue" classifications. The higher the percentage of delays, the greater the negative effect on the EASA standardisation rating. This can result in an increase in the frequency of EASA audits. Furthermore, a total of 40 percent of all findings in these areas were classified as D findings. These have a certain degree of safety relevance if they are not remedied within a short period of time.

EASA Rulemaking / EASA Opinions

In addition to its provisions governing air transport management and air traffic control providers, the 126-page Implementation Regulation (EU) 2017/373 also specifies authority requirements in the areas of ATM/ANS, and this document called for the highest amount of work in 2017. Other published legislative documents (including EASA opinions) were less lengthy in line with the cool-down period announced by the EASA.

ICAO

Universal safety oversight audit programme (USOAP)

The ICAO did not carry out any audit activities in 2017. Nonetheless, the results (effective implementation) changed slightly in the audit modules versus 2016. The reason for this is that the ICAO revised its audit questions, which resulted in a change in the proportions of satisfactory / not satisfactory. Most of the findings (19 – last audit carried out in 2010) are included in Critical Element 4 (technical personnel qualification and training). 17 of these concern the area of ANS, though most of these were already remedied. A desktop audit should be requested in order to conclude the findings.

Comparison of the status of implementation in Switzerland and the member states

For half the critical elements, the effective implementation rate is close to 100 percent. For all critical elements and the majority of audit modules (exception: ANS) Switzerland's effective implementation rate is above the EASA average. There are no findings in the ORG and PEL (personnel licensing) modules (100 percent effective implementation).

Compliance with standards and recommended practices (SARPS)

As of the end of 2017, Switzerland had reported 665 category (less protective or partially implemented or not implemented) differences to ICAO annexes. This corresponds to a deviation by 6 percent from the 11,244 SARPs.

ICAO Rulemaking

In 2017, 4 amendments to ICAO annexes entered into effect. The amendment to Annex 1 (personnel licensing) concerned the validation of licences between countries that have a formal agreement in place for this purpose. The three amendments to Annex 6 (operation of aircraft) concerned the use of halon in fire extinguishers.

10. ASSESSMENT AND OUTLOOK

In terms of aviation safety, 2017 was a pleasing year both in Switzerland and throughout the world. In the commercial segment there were no accidents or fatalities. The number of accidents and incidents in the non-commercial segment was within the average range for the previous years. In addition, it may be stated that the quality of Switzerland's civil aviation sector data with respect to incident reporting is very good today. Here the implementation of EU Regulation 376/2014, which entered into effect in 2016 and particularly imposes an obligation on pilots in the general aviation segment to report safety-relevant incidents to the applicable authority, undoubtedly contributed towards this outcome.

The FOCA is aware of the most important safety-related topics to be addressed. Some of this knowledge is derived from data and information contained in incident reports provided by the industry. In the future, this view from the perspective of the past is to coincide with risk assessment forecasts. In addition, management decisions are to be risk- and performance-based and prioritised in accordance with predefined criteria. Data obtained from incidents can be used as a decision-making basis alongside other factors, for example in the framework of the AVISTRAT project. In view of the European risk portfolio and its findings, mid-air collisions (MACs) and loss of control (LOC) are right at the top of the list of priorities. Under systemic issues, operational issues and emerging issues, this Safety Report deals with the same topics as those contained in the European Plan for Aviation Safety (EPAS). The results of STSB investigations can be used to find out which safety barriers failed to function in a given incident. These findings, too, together with the resulting recommendations, largely correspond to the figures presented in this Annual Safety Report. In comparison with the other European countries, Switzerland is among the leaders; this is underscored by the SAFA/ACAM results and the findings of the ICAO and EASA audits.

This Annual Safety Report provides the FOCA safety divisions and external industry partners with feedback on the reports and incidents in the Swiss civil aviation sector in 2017 (retrospective). Internally, alongside other variables, this data can be used in order to specify the appropriate priorities within the scope of supervisory activities (forward-looking). For the industry, the added value consists in the fact that a nationwide overview of incidents can be gained and the development of the safety performance in comparison with the previous years can be observed (trend identification). While the big picture does not substitute topic-specific analysis, it nonetheless provides a good starting point for further discussion and future activities.

With respect to new topics such as drones and low flight networks, it will be necessary to collect a lot more data in order to obtain findings from these and from any incidents that should occur. Alongside a proactive procedure (risk assessment), the reactive approach within the framework of incident analyses will be retained in the future in line with the motto, "If you can't measure it, you can't manage it". The FOCA's Safety Risk Management unit aims to derive additional and more precise information from incident reports in the future with reasonable effort and expense. Its long-term objective is to draw the right conclusions from big data and focus on the critical and relevant topics.