APPENDIX 5 ADVANCED STATISTICS FOR SAILPLANES

Appendix 5
Advanced statistics for sailplanes

This appendix covers the advanced statistics for sailplane operations where the state of registry of the aircraft is an EASA Member State.

The first section outlines the safety risks, that have been derived from occurrence data from the European Central Repository (ECR). They provide per domain, and per type of operation as necessary, the relative safety risk level and frequency of each key risk area (KRA). The KRA is the most likely type of accident that would have resulted if an occurrence had escalated into an accident. It is one element of the European Risk Classification Scheme (ERCS). In terms of safety performance, they are the Tier 2 safety performance indicators for the domain. The KRAs are prioritised based on their aggregated risk contribution using the ERCS, as applied by the competent authorities from 2023 onwards in accordance with the Commission Implementing Regulation (EU) 2021/2082 published in November 2021. The timespan of the 2024 edition is, therefore, limited to one year (i.e., 2023, the first year of ERCS implementation), and will be expanded on a yearly basis until a five-year timespan is achieved. The frequency of occurrences and the related aggregated ERCS numerical equivalent scores are determined per KRA, considering accidents, serious incidents and incidents, where the KRA and the ERCS safety risk score have been completed by the competent authority. An ERCS completion rate per domain and operation type as necessary, complements therefore the presented data for the contextualisation.

The two other sections provide an overview of the Human Factors (HF) and Human Performance (HP) issues, as well as an overview of the airworthiness issues.

The term HF describes human characteristics, abilities, and limitations. The knowledge of HF is used throughout the aviation industry to design systems, equipment and work in ways that support humans in performing at their best. HP refers to how people perform their tasks. Following safety occurrences, HF and HP knowledge can also be used diagnostically to better understand what went wrong, what went right and, more importantly, to understand how to prevent such occurrences from happening again. The same European Co-ordination Centre for Accident and Incident Reporting Systems (ECCAIRS) taxonomy that helps us to identify our safety issues and (KRAs) also provides us with HF and HP codes. This taxonomy groups event types at different levels, so that all the issues relating to personnel are grouped at the highest level into 'personnel'. The personnel issues are then further subdivided into four categories: experience and knowledge events, physiological events, situational awareness and sensory events and personnel task performance events. A further two levels of subdivision exist, providing increasing granularity on the type of HF or HP issues identified. The presented data consider all occurrences of a domain, i.e., accidents, serious incidents, and incidents.

The term 'airworthiness' includes aircraft design, aircraft production, and aircraft maintenance. The attribute 'event type' in the ECCAIRS taxonomy allows regulators and industry to code the causes and contributing factors to occurrences. The first level of airworthiness analysis shows the contribution of the aircraft system loss and malfunction to accidents and serious incidents, including the distribution of the main Air Transport Association (ATA) chapters and aircraft general/generic events. The second level of analysis goes a step further, showing the contribution of design, production and maintenance to aircraft system loss and malfunction, i.e., highlighting the systemic root cause of a

system or equipment failure. The presented data consider all occurrences of a domain, i.e., accidents, serious incidents, and incidents.

1   Safety risks

The safety risks for sailplanes identified by EASA are derived from occurrences data recorded in the ECR, covering the one-year period 2023. From the 606 occurrences in 2023, only 261 occurrences were completed with the KRA and ERCS safety risk score, representing an ERCS completion rate of 44% for the domain. The hereafter information is solely based on this restricted dataset.

The KRAs for sailplanes are shown in **Appendix 5 Figure 1**. KRAs and occurrence categories (refer to core document Figure 5.7) have different purposes. While occurrence categories describe actual factors and outcomes of an occurrence, KRAs describe the potential outcome of an occurrence. The KRA is defined by the most likely type of accident that an occurrence could have escalated to. Unlike occurrence categories, where multiple categories may be assigned to a single occurrence, there can only be one KRA per occurrence. The KRA is one element of the ERCS. This scheme is applied when determining the safety risk score of an occurrence and is further detailed in the ASR introduction.

It can be stated that airborne collision was the most likely type of accident to which occurrences escalated/could have escalated for the one-year period 2023 (114 occurrences out of 261). The safety risk score, however, was low compared to the number of occurrences. This implies that many occurrences were reported as airproxes or incidents where the risk was not scored high. Aircraft upset, however, presented the highest safety risk in the domain with 53 occurrences behind that score. This implies that aircraft upset occurrences in the sailplane domain are the most likely to cause a serious outcome. This is also true for obstacle collision in flight (seven occurrences), but the risk score is the second highest in the figure. With only 14 occurrences out of 269, terrain collision presented the third-highest safety risk for the domain. While 15 occurrences escalated to/ could have escalated to excursion, the safety risk was significantly lower than the safety risks associated with terrain collision, airborne collision, and obstacle collision in flight.
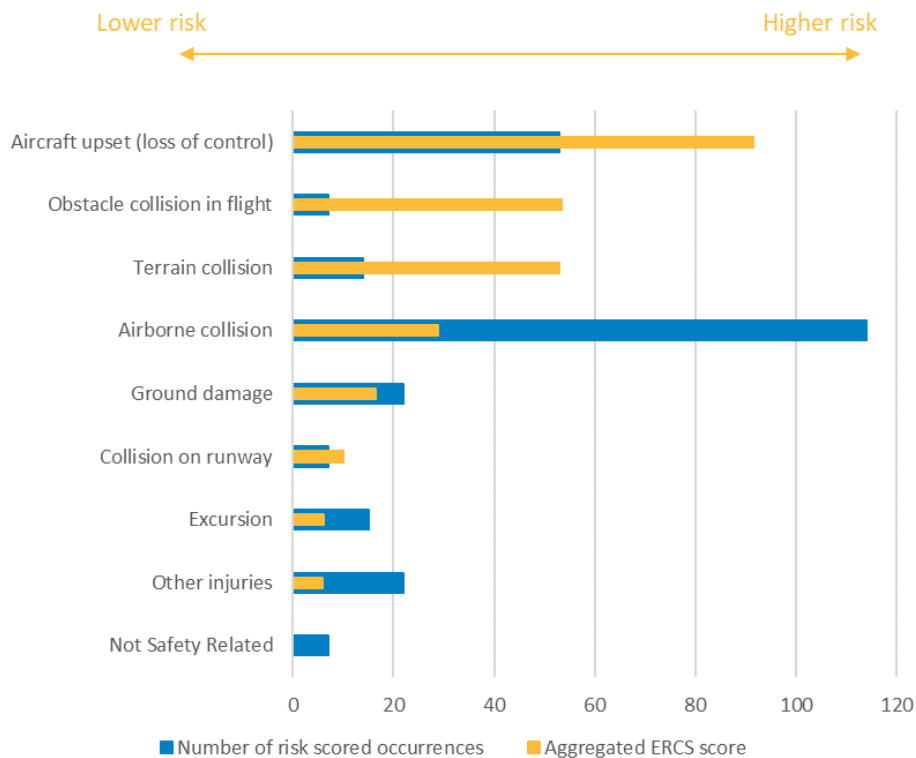
Appendix 5 Figure 1 KRAs by aggregated ERCS score and number of risk-scored occurrences involving sailplanes

2   Human factors and human performance (HF/HP)

There were close to 3 700 occurrence records involving sailplanes over the period 2019-2023. From this dataset extracted from the ECR on April 15, 2023, 377 occurrence records identified HF/HP as a contributing factor, including 73 accidents and 34 serious incidents. These occurrences are labelled as personnel occurrences in the ECCAIRS taxonomy. It is important to highlight that HF/HP issues are often not recorded within the initial occurrence report and may surface at a later date. In addition, there is often less data available to analysts/investigators owing to the lack of recording devices on board aircraft in this category. The dataset used in this chapter contains both non-powered and powered sailplanes but excludes ultralight sailplanes. **Appendix 5 Figure 2** presents the percentage of HF/HP-related occurrence records relative to the total number of occurrence records from 2019 to 2023.
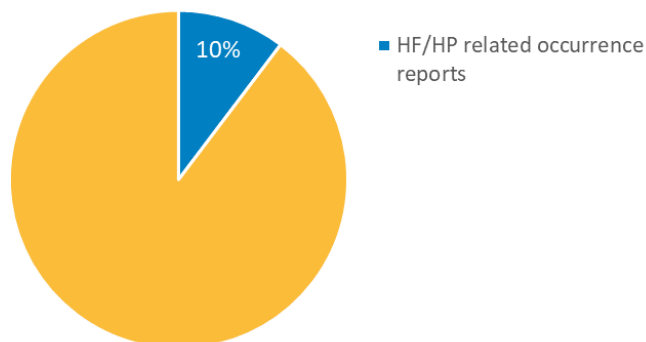
Appendix 5 Figure 2 HF/HP occurrences involving sailplanes

The application of the first level of HF/HP codes can be seen in **Appendix 5 Figure 3**. Out of the 377 HF/HP related occurrence records, 188 were coded under task performance events, 149 under situational awareness events, 69 under experience and knowledge events and 8 under psychological events. Note that one occurrence may indicate more than one HF/HP event. As for the other chapters, events relating to task performance and situational awareness are easier to diagnose following an occurrence than the underlying factors relating to the performance success.
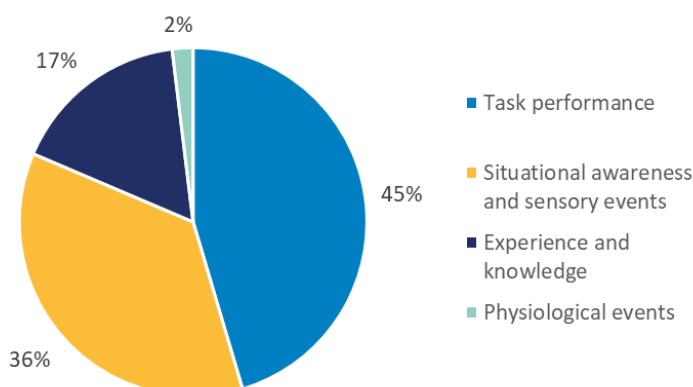
Appendix 5 Figure 3 High-level HF/HP event codes applied to occurrences involving sailplanes

Appendix 5 Figure 4 compares the number of occurrences per detailed HF/HP event code. Data shows that issues related to attention and vigilance that have been reported in 107 records are the most prevalent, indicating it as an area with most HF/HP related safety concerns. This observation is based solely on the quantitative analysis of

occurrence data and does not imply causation which may be due to various factors including but not limited to environment, operations, pressure to fly, etc.


Appendix 5 Figure 4 Detailed HF/HP event codes by number of occurrences involving sailplanes

3   Airworthiness

There were close to 3 700 occurrence records involving sailplanes over the period 2019-2023. The data were extracted from the ECR on April 23, 2024.

Appendix 5 Figure 5 provides the percentage of occurrence records that were aircraft systems related. Around one record out of five identified that the loss or malfunction of an aircraft system contributed to the occurrence, corresponding to 699 occurrence records, including 153 accidents and 52 serious incidents. These numbers mainly include records where the loss or malfunction of an aircraft system is the cause of the occurrence (e.g., loss of horizontal stabiliser). They may also include records where the aircraft system is adversely affected by another event (e.g., damage to the main landing gear system after a hard landing).
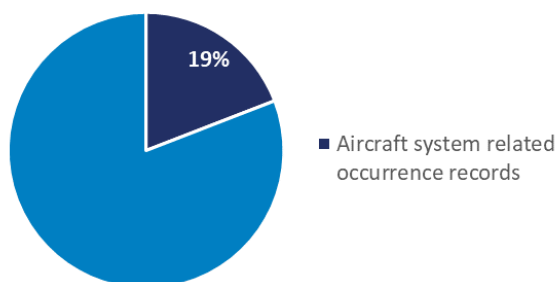
Appendix 5 Figure 5 Aircraft system-related occurrence records involving sailplanes

Appendix 5 Figure 6 provides the list of the values for the event type 'equipment', excluding 'aircraft general explosions/fire/fumes/smoke events' and 'aircraft generic' and shows their relative distribution in terms of the number of occurrence records. Affected aircraft systems with less than 15 occurrence records were grouped together in the value 'other aircraft systems'.

The main affected aircraft systems were reciprocating engine (100 records), flight compartment window (71 records), main landing gear system (63 records), wheels and brakes (34 records), voice communication system (19 records), drag control system (17 records), nose/ tail landing gear system (17 records) and elevator and tab control system (15 records).
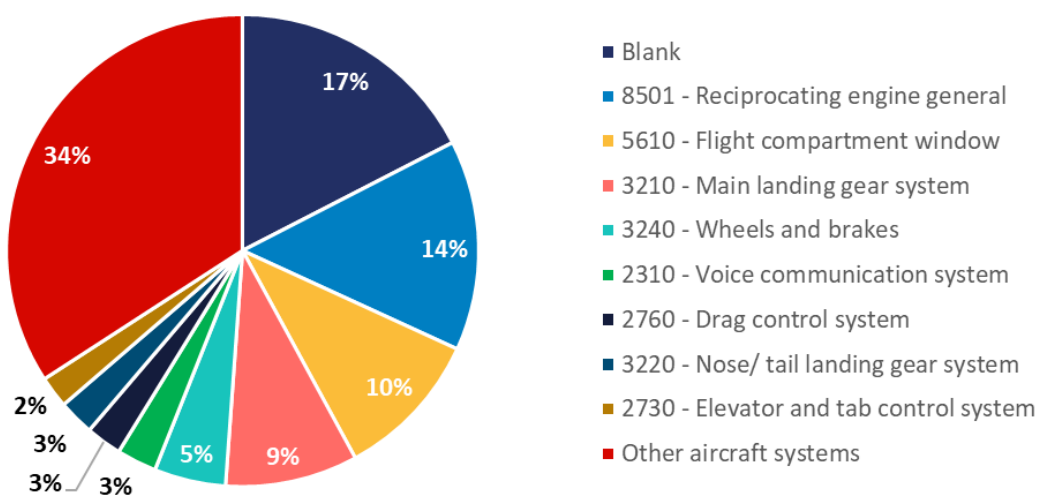

**Appendix 5 Figure 6** Aircraft system-related occurrence records per ATA chapter involving sailplanes

Considering the event types 'aircraft general explosions/fire/fumes/smoke events' and 'aircraft generic', the value 'smoke' was coded in nine occurrence records, while the values 'vibration/rattle/noise' and 'fire' were respectively coded in eight and six instances.

From the 699 occurrence records where the loss or malfunction of an aircraft system was identified in the occurrence, 55 occurrence records were attributed to an airworthiness issue, distributed in 41 records to aircraft maintenance, 10 records to aircraft design, and five records to aircraft production[1].

Appendix 5 Figure 7 provides the percentage of aircraft system-related occurrence records where the occurrence was attributed to an airworthiness issue, while **Appendix 5 Figure 8** shows the occurrence record distribution between aircraft design, aircraft production and aircraft maintenance.
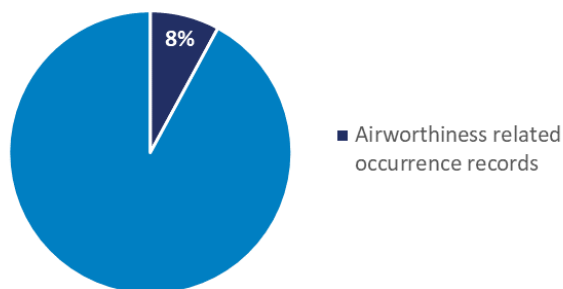
Appendix 5 Figure 7 Airworthiness-related occurrence records involving sailplanes
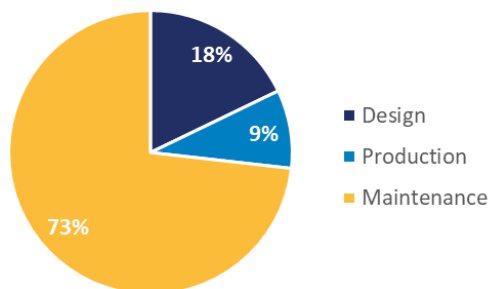
Appendix 5 Figure 8 Airworthiness-related occurrence records per airworthiness domain involving sailplanes

---

[1] One occurrence record may be attributed to one or more airworthiness domains.