ANNUAL SAFETY RECOMMENDATIONS REVIEW

2018

EASA
European Union Aviation Safety Agency

EASA
European Union Aviation Safety Agency

Annual Safety Recommendations Review 2018

Strategy & Safety Management Directorate
Safety Intelligence & Performance Department

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Disclaimer

The Annual Safety Recommendations Review is produced by the European Union Aviation Safety Agency (EASA). This edition provides an overview of the safety recommendations that have been addressed to EASA in 2018. It also presents the replies produced during the year.

This annual review aims at providing feedback on the follow-up given to safety recommendations in the context of openness, transparency and accountability that characterises European Public Administration.

Apart from its safety-related informative character, this review is also expected to provide relevant information related to safety concerns raised, for both EASA itself, and its stakeholders, including the European public.

Neither the European Union Aviation Safety Agency, nor any person acting on behalf of the European Union Aviation Safety Agency is responsible for the use that might be made of the information contained within.

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Abbreviation list

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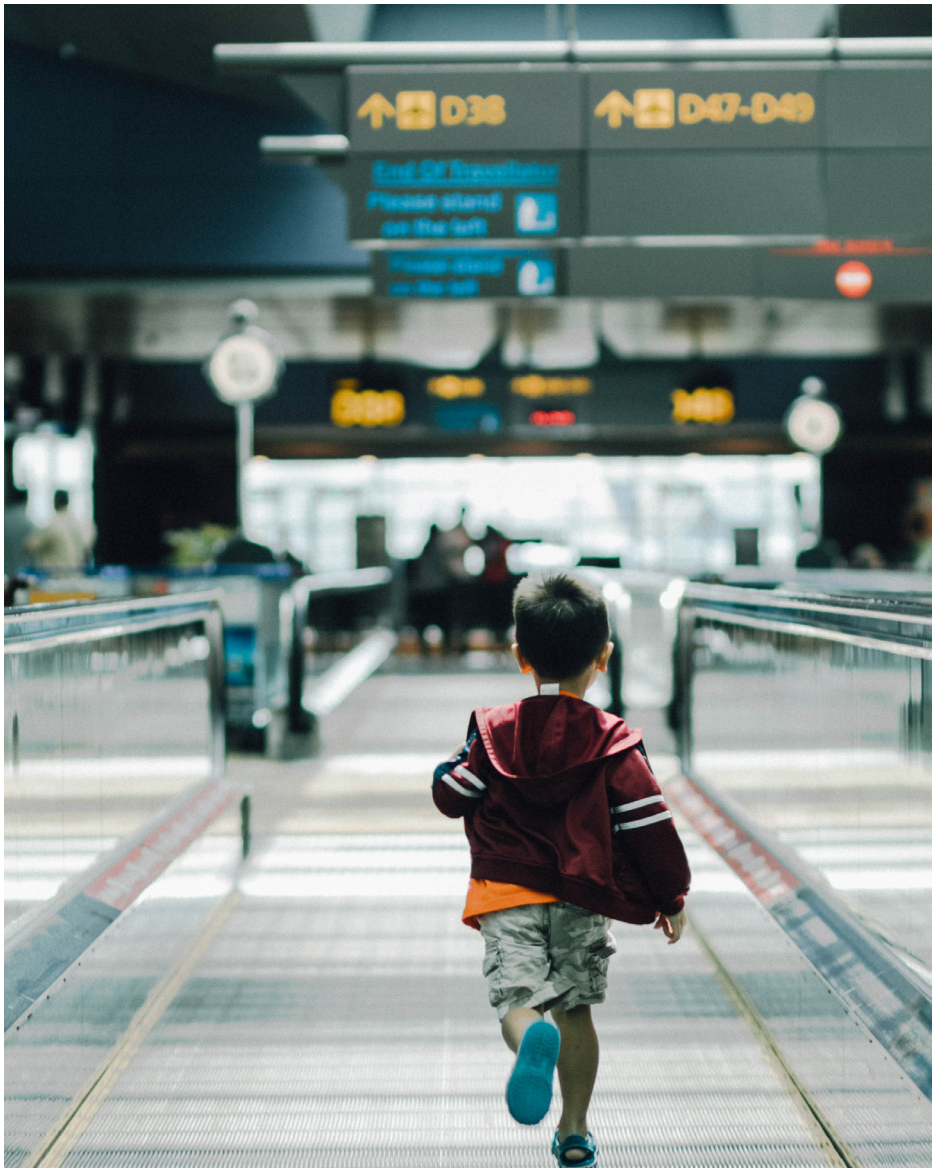
Abbreviation list

A4E	Airlines for Europe
AAIB UK	Air Accidents Investigation Branch United Kingdom
AB	Advisory Body
AD	Airworthiness Directive
ADIRU	Air Data Inertial Reference Unit
AEA	Association of European Airlines
AFM	Aircraft Flight Manual
AIBN	Accident Investigation Board Norway
AIP	Aeronautical Information Publication
AMC	Acceptable Means of Compliance
ANS	Air Navigation Services
ANSV	Agenzia Nazionale per la Sicurezza del Volo
ASAGA	Aeroplane State Awareness during Go-around
ATCO	Air Traffic Controller
ATM	Air Traffic Management
ATS	Air Traffic Services
BEA	Bureau d'Enquête et d'Analyse pour l'Aviation Civile
CAG	Collaborative Analysis Group
CAT	Commercial Air Transport
CFIT	Controlled Flight into Terrain
CIAIAC	Civil Aviation Accidents and Incidents Investigation Commission
CS	Certification Specifications
CPB	Commercial Passenger Ballooning
DSB	Dutch Safety Board
EASA	European Union Aviation Safety Agency
ED	Executive Director
ENCASIA	European Network of Civil Aviation Safety Investigation Authorities
EFB	Electronic Flight Bag
EPAS	European Plan for Aviation Safety
EU	European Union
EUROCAE	European Organisation for Civil Aviation Equipment
FAA	Federal Aviation Administration
FFS	Full Flight Simulator
FL	Flight Level
FMS	Flight Management System
FOD	Foreign Object Damage
FSTD	Flight Simulation Training Devices
FTD	Flight Training Devices
GA	General Aviation
GM	Guidance Material
GPIAAF	Gabinete de Prevenção e Investigação de Acidentes com Aeronaves e de Acidentes Ferroviários
HEMS	Helicopter Emergency Medical Service
HOFO	Helicopter Offshore Operations
ICAO	International Civil Aviation Organisation
IFR	Instrument Flight Rules
LR	Long Range
MGB	Main Gear Box
MS	Member States
NAIADS	New Air and Inertia Automatic Data Switching
NOTAM	Notice To Airmen
NPA	Notice of Proposed Amendment
NTSB	National Transportation Safety Board
PANS	Procedures for air navigation services
PC	Proficiency Check
PCU	Power Control Unit
PIA	Preliminary Impact Assessment
PFD	Primary Flight Display
QMS	Quality Management System
RMT	Rulemaking Task
SA	Single Aisle
SAE	Society of Automotive Engineers
SHK	Statens haverikommission
SIA	Safety Investigation Authority
SIB	Safety Information Bulletin
SMS	Safety Management System
SRGC	Safety Recommendation of Global Concern
SRIS	Safety Recommendation Information System
SRUR	Safety Recommendation of Union-wide Relevance
SSP	State Safety Plan

TCCA	Transport Canada Civil Aviation
TOPMS	Take-off Performance Monitoring Systems
TOS	Take-Off Securing function
TOW	Take-off Weight
UPRT	Upset Prevention and Recovery Training
USOAP	Universal Safety Oversight Audit Programme
VFR	Visual Flight Rules
ZFW	Zero Fuel Weight



Executive summary

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Executive summary

The Annual Safety Recommendations Review provides information on the activity carried out by the Agency in the field of safety investigation and follow-up. In addition, the review highlights a range of safety issues and Agency safety improvement efforts that are of interest to the European Aviation Community and the public.

This 12th edition reviews the activity performed in 2018 and presents:

- General statistical data on the safety recommendations addressed by safety investigation authorities to EASA in 2018;
- Replies that EASA has given to safety recommendations in 2018;
- Main safety topics related to the above mentioned recommendations and/or replies that have been addressed through actions taken.

Over the course of the past few years, the Agency has become the main actor in safety investigation follow-up within Europe. This has also been reflected in the establishment of a robust and rigorous process for the safety recommendations received. Owing to EASA's central position in the aviation safety system, the Agency is able to take action with respect to systemic problems and the management of risk.

The implementation of safety recommendations provides tangible improvements in safety as a result of the information that has been obtained during safety investigations. This methodical approach to investigatory work and the implementation of recommendations serves to ensure lessons are learned and help prevent future occurrences.

During 2018, Safety Investigation Authorities from 13 different States ad-

dressed 54 safety recommendations to EASA in the context of the Agency's remit. This number is higher than the number of the safety recommendations received by the Agency in 2017, which is when the number of Safety Recommendations reached their lowest level.

The majority of these safety recommendations were related to procedures or regulations. The second most frequent category were related to aircraft or aviation-related equipment/facilities. In 2018, all the safety recommendations issued originated from EASA Member States. Among these, 35 were classified as being Safety Recommendations of Union-wide Relevance (SRUR) and 29 were classified as being Safety Recommendations of Global Concern (SRGC).

The handling of safety recommendations in both a swift and responsible manner constitutes one of EASA's key responsibilities. In 2018, the Agency produced 133 replies to 127 safety recommendations:

- 76 of these were final replies (closing safety recommendations) with 43 percent carrying an agreed assessment, and 46 percent with partial agreement;
- The remaining 57 updating replies provided information on the progress of the actions decided upon by the Agency and for which the relevant activities were not yet completed;
- 80 percent of the final responses provided by EASA and assessed by the originator of the recommendation were reported as "adequate" or "partially adequate".

Introduction

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Introduction

At the European Union (EU) level, the principles governing the investigation of accidents and serious incidents are defined in Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation.

Regulation (EU) No 996/2010 transposes international standards and recommended practices as described in Annex 13 to the Chicago Convention on International Civil Aviation. It sets down an obligation for each Member State of the European Union to establish an independent permanent national civil aviation safety investigation authority, which shall investigate accidents and serious incidents in order to improve aviation safety and prevent future occurrences without apportioning blame or liability. Investigation reports and the related safety recommendations shall be communicated to the concerned aviation authorities for consideration and appropriate action, as needed.

Regulation (EC) No 2018/1139, the EASA Basic Regulation, states that: "The Agency and the national competent authorities shall undertake the necessary and effective actions to increase and promote awareness of civil aviation safety and disseminate safety related information relevant for the prevention of accidents and incidents".

EASA assigns a high priority to the follow-up of safety recommendations and has established effective procedures to that effect:

- EASA delivers the first response to incoming recommendations within 90 days;
- The safety recommendations process is subject to continuous internal monitoring until all corrective actions are closed;
- The Agency receives assessments of its responses from Safety Investigation Authorities (SIA) and can identify when opinions diverge. In this context, EASA considers the assessment given by the safety investigation authority on the appropriateness of the mitigation measures when closing the recommendation.

During EASA's last ICAO USOAP audit (November 2017), the applicable Protocol Questions (PQs) in the area of Accident Investigation (AIG) were assessed at 100% of Effective Implementation (EI) of ICAO Standards and Recommended Practices.

All safety recommendations must be taken into full consideration by the organisations to which they are addressed. In this context, the Agency maintains transparency with respect to its decisions and actions, in line with its mission for safety. The Agency will maintain its current level of cooperation in working with the European Network of Civil Aviation Safety Investigation Authorities (ENCASIA) – Working Group 6 on Safety Recommendations.

Furthermore, EASA also monitors safety recommendations that are issued to other aviation and non-aviation addressees. The types of safety recommendations that are listed below have noticeably increased over the past years:

- Safety Recommendations of Union-wide Relevance (SRUR) and with Global Concern (SRGC), addressing mainly systemic safety concerns;
- Safety recommendations addressing new developments at the national level, such as safety recommendations related to an increasing number of unmanned aircraft systems (drones/RPAS/UA), and 'dual-use' products which can be used for both military and civil aircraft;
- Safety recommendations addressing the implementation of the Quality Management System (QMS), Safety Management Systems (SMS) and State Safety Plan (SSP).
- Security-related safety recommendations, such as criminal acts (interference) affecting aircraft, crew members, critical aviation infrastructure or the safety of airspace over conflict zones.

The Annual Safety Recommendations Review provides an overview of the follow-up performed by EASA in response to recommendations addressed to the Agency by Safety Investigation Authorities originating from the investigation of Accidents and Serious Incidents or from safety studies.

The first edition of this review was issued in 2007. This 12th edition reviews the 2018 activity and presents:

- General statistical data on the safety recommendations addressed by safety investigation authorities to EASA in 2018;
- Replies that EASA has given to safety recommendations in 2018 ;
- Main safety issues that have been addressed through the actions taken.

A process to identify, assess and mitigate safety risks at the European level has been established by EASA since 2016. At the heart of this system is the concept of safety risk management, comprising the identification of safety issues, risk assessment and decision-making, resulting in the agreed best course of action to mitigate these risks. EASA, the Member States (MS) and industry work collaboratively in this process through the Collaborative Analysis Groups (CAG) and Advisory Bodies (ABs). This risk management process is coordinated by the Agency and provide inputs to the European Plan for Aviation Safety (EPAS). The Annual Safety Review (ASR) contains the main and most visible elements from safety risk management process, such as the accident and key risk area statistics, and the domain safety risk portfolios.

Safety recommendations are one of the key inputs to the safety risk management process. They provide information on the deficiencies in the system as well as proposed solutions to mitigate the associated safety risks to the aviation system.

Safety Recommendations received in 2018

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Safety Recommendations received in 2018

3.1 Overview of Safety Recommendations received in 2018

EASA is the most frequent single addressee of a Safety Recommendation. However most of the safety recommendations issued during 2018 were addressed collectively to the National Civil Aviation Authorities of the Member States.

During 2018, EASA received a total of 54 safety recommendations.

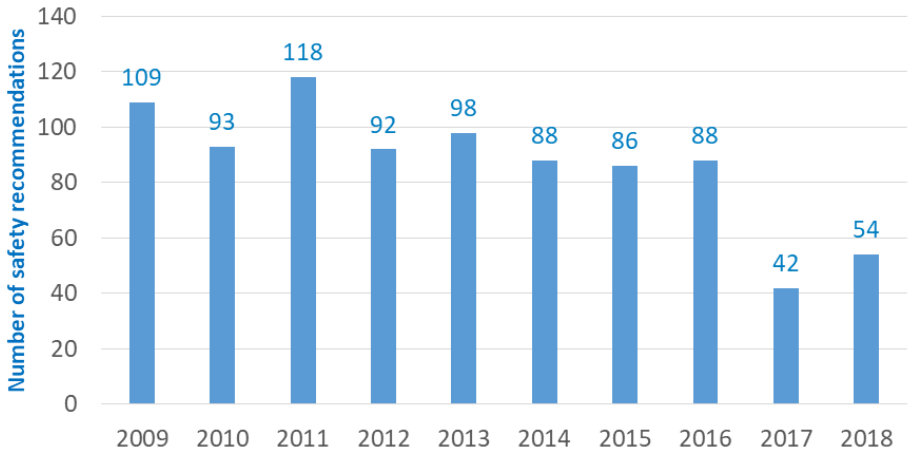
Figure 1 shows the total annual number of safety recommendations that the Agency has received over the past 10 years. The follow-up of safety recommendations and the role of EASA in that regard is mandated by Regulation (EU) No 996/2010. The issuance of safety recommendations addressed to EASA started to develop shortly before this regulation came into force in 2010. In the years from 2012 to 2016, the annual number of safety recommendations addressed to EASA remained almost constant. In 2017, this amount reduced by half. Although in 2018 a marginal increase was recorded, the downward trend remains.

This decrease is in line with the overall reduction of the number of safety recommendations issued in 2017 and 2018 by the Safety Investigation Authorities in EASA Member States.

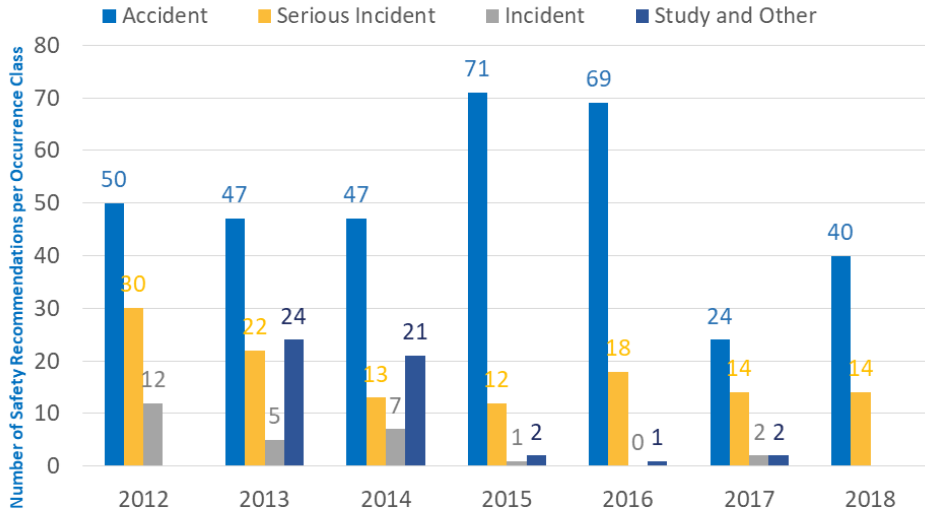
In the case of safety recommendations issued to EASA, this decrease can mostly be attributed to the following factors:

- the European aviation system is becoming increasingly more oriented towards proactively identifying the safety issues and implementing the safety actions that may otherwise be raised during investigations;
- the Agency is frequently involved in the initial phase of the draft reports, leading to draft safety recommendations being discussed in advance and in some cases these safety recommendations are either withdrawn or revisited as a result of this initial dialogue.

In 2018, the safety recommendations received were related to 32 occurrences, comprising 22 accidents and 10 serious incidents. None arose from studies.



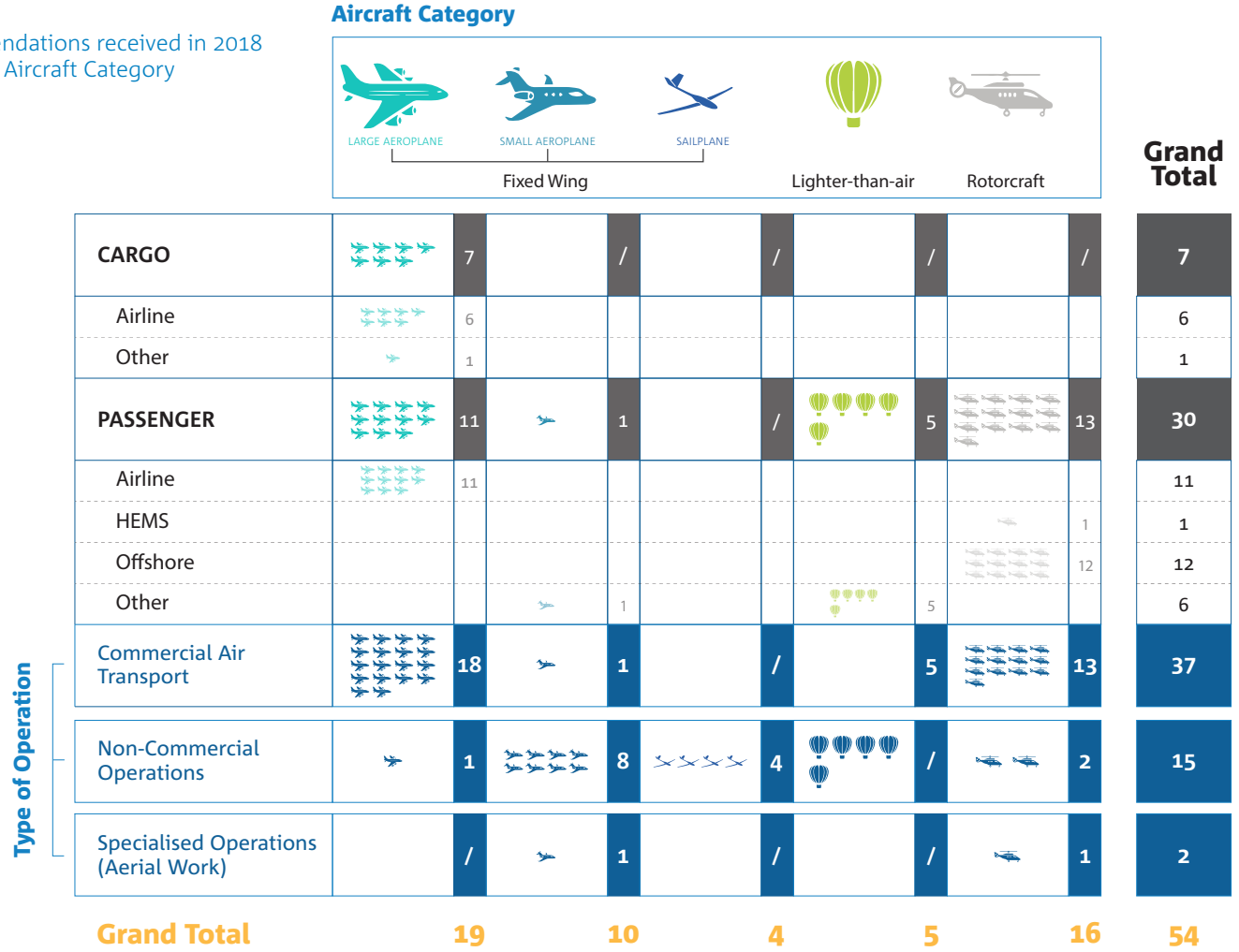
▶ Figure 1: Safety Recommendations addressed to EASA per year



▶ Figure 2: Annual Safety Recommendations by occurrence class 2012-2018

Overall, each investigation of the applicable occurrences resulted in a number from one to nine of safety recommendations being addressed to the Agency. Figure 2 shows the total number of safety recommendations by occurrence class since 2012. The aircraft categories and operation types involved in the occurrences that resulted in safety recommendations in 2018 are listed in the table below.

▶ Figure 3: Safety Recommendations received in 2018 by Type of Operation and Aircraft Category

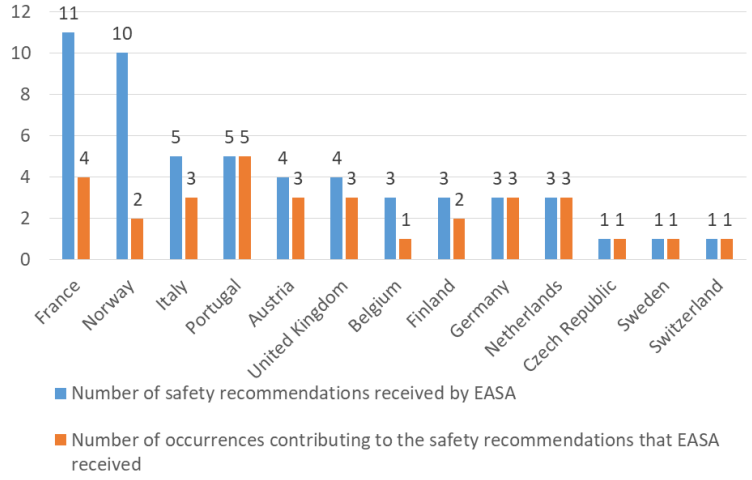


3.2 Origin of the Safety Recommendations received in 2018

In 2018, Safety Investigation Authorities (SIAs) of 13 different States addressed 54 safety recommendations to EASA. This year all Safety Recommendations received were from EASA Member States. There were no Safety Recommendations addressed to EASA from non-EASA Member States.

One-third (33%) of the Safety Recommendations received in 2018 were related to three major occurrences as follows:

1. An accident involving an Airbus Helicopters EC 225 LP Super Puma, with registration LN-OJF, which occurred on 29 April 2016 in Norway, while the helicopter was en route from the Gullfaks B platform in the North Sea to Bergen Airport Flesland.
2. An accident involving a Schroeder Fire Balloons G50/24, registered F-HCCG, on 5 October 2014 in France, where the balloon struck the ground hard, the basket turned over completely and a fire broke out during evacuation of the occupants.
3. A serious incident involving a Boeing 777, registered F-GUOC, in an event related to erroneous take-off parameters that occurred on 22 May 2015 at Charles De Gaulle airport in France.



▶ Figure 4: States contribution to Safety Recommendations received in 2018

Figure 4 shows the contribution of the different SIAs to the total number of safety recommendations addressed to EASA in 2018, as well as the number of occurrences that contributed to these safety recommendations. The number of occurrences is not always proportional to the number of safety recommendations. In particular a number of safety recommendations stemmed from the three major occurrences mentioned above, therefore this shows the SIAs of France and Norway issuing the highest number of safety recommendations, 11 and 10 respectively.

The French Office of Investigation and Analysis for Civil Aviation Safety (Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile – BEA) issued 11 safety recommendations that are related to 4 different occurrences, all of which occurred in France. Five of them arise from the accident involving a Schroeder Fire Balloons G50/24 and 4 of them stem from the serious incident involving a Boeing 777 and erroneous take-off parameters. Both occurrences are described above. The other two safety recommendations that France issued arise from:

- An accident involving a Fokker F27 with registration I-MLVT at Paris-Charles de Gaulle Airport on 25 October 2013. The aircraft was climbing through 1000 feet when the left hand propeller separated from the engine and impacted the fuselage;
- A serious incident involving an Airbus A321 with registration TC-OBZ at Deauville on 26 September 2013, during which the aircraft descended below the final approach path of the visual approach procedure.

The Accident Investigation Board Norway (AIBN) issued 10 safety recommendations, 9 of which are related to the accident involving an Airbus Helicopters EC 225 LP Super Puma as mentioned above. The remaining safety recommendation is related to:

- An accident involving an AEROSPATIALE - AS350 - B3 helicopter with registration LN-OSG which impacted the ground on 30 April 2016 at Hå in Rogaland (Norway) during an annual proficiency check (PC) for the privilege to pilot helicopters of that type.

The Italian National Flight Safety Agency (Agenzia Nazionale per la Sicurezza

del Volo - ANSV) issued 5 safety recommendations that were related to 2 accidents as follows:

- An accident involving an AGUSTA BELL - AB139 helicopter with registration EC-KJT occurred on 24 January 2017 during a medical emergency flight in the mountainous area of Campo Felice;
- An accident involving a Boeing 737-400, with registration HA-FAX, that had a runway excursion on 5 August 2016 during the landing phase of a cargo flight, at Orio al Serio airport.

The Portuguese Office for the Prevention and Investigation of Accidents with Aircraft and Railway Accidents (Gabinete de Prevenção e Investigação de Acidentes com Aeronaves e de Acidentes Ferroviários - GPIAAF) issued 5 safety recommendations which are related to 5 different occurrences, as follows:

- An accident involving a SCHWEIZER - 269C with registration G-STEP on 20 November 2015 near the Ponte de Sor Aerodrome during a solo training flight;
- An accident involving a PILATUS PC-6 with registration D-FSCB on 19 June 2016 at Canhestros that occurred during a skydiver training flight;
- An accident involving a Socata TB-200 aircraft with registration CS-DEH on 05 September 2012 close to the Évora aerodrome (LPEV) that occurred during a local solo training flight;
- An accident involving a PIPER PA31T with registration HB-LTI on 17 April 2017 near Cascais aerodrome (LPCS) in a private flight under IFR;
- An accident involving a PAULISTINHA 56 with registration CS-ALB on 18 August 2012 at S. Pedro de Merelim in a local leisure flight.

In general, the safety recommendations issued by the European SIAs in 2018 addressed a wide scope of subjects under the Agency's remit: Product certification, air operations, flight crew, aerodromes and air traffic management. The aspects covered were, inter alia, the continued airworthiness of light aircraft and large helicopters, aircraft maintenance, various aspects of air operations (such as balloon operations, HEMS, passengers' restraints), ground operations (de-icing, rescue and fire-fighting), design and production (error detection/warning systems) along with flight crew training and flight time limitations.

3.3 Involvement in accident and serious incident investigations

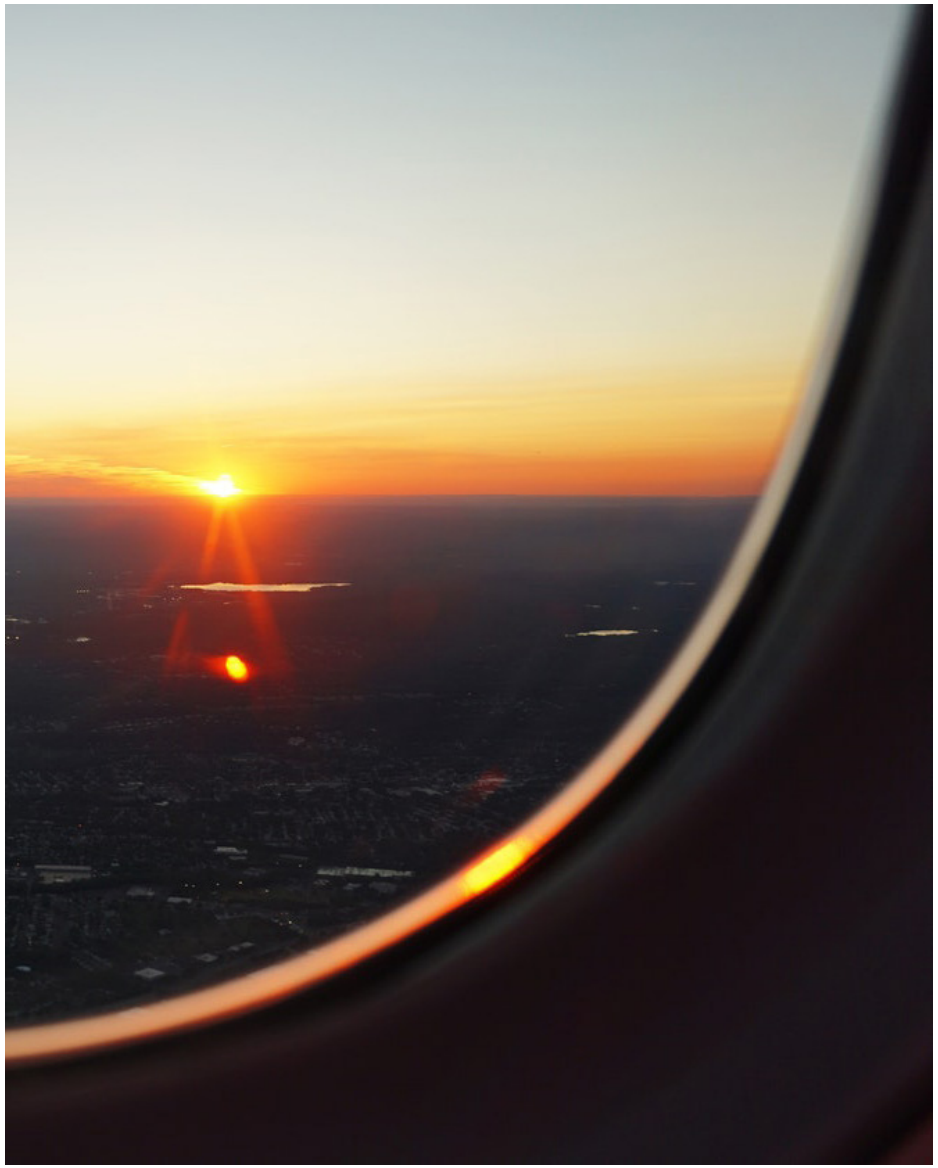
During 2018 the accidents with the highest death toll were those of a Boeing 737 in Java and of an ATR72 in Iran. A short description follows:

- A Lionair Boeing 737-800 MAX, registration PK-LQP, performing a flight on 28 October 2018 from Jakarta to Pangkal Pinang (Indonesia) with 181 passengers and 8 crew, was climbing out of Jakarta when it reached a maximum altitude of about 5400 feet, then lost height and crashed north of the Karawang area in the waters of the Java Sea.
- An Iran Aseman Airlines ATR-72-212, registration EP-ATS performing flight EP-3704 on 18 February 2018 from Tehran Mehrabad to Yasuj (Iran) with 60 passengers and 6 crew, disappeared from radar near the Zagroz Mountains at about 08:45L (05:15Z). The wreckage was later found near the village of Semirom (Iran) at the Dena Mountain at an elevation between 12,500 and 13,500 feet. No survivors were found.

Several other investigations of accidents and serious incidents were opened and/or conducted in which the Agency's role is mostly focused on monitoring the progress of the investigations and ensuring Agency representation during the investigations and providing technical expertise as required.

A list of 2018 accident and incident investigations in which EASA was closely involved, mainly through the appointment of an EASA Technical Adviser, is as follows:

- A Southwest Airlines Boeing 737-700, flight 1380, with registration N772SW, experienced a failure on April 17 2018 of the left CFM-56-7B engine and the loss of engine inlet and cowling during climb through flight level 320. Fragments from the engine inlet and cowling struck the wing and fuselage, resulting in a rapid depressurization after the loss of one passenger window. The flight crew conducted an emergency descent and diverted into Philadelphia International Airport (USA). Of the 144 passengers and five crewmembers on-board, one passenger received fatal injuries and eight passengers received minor injuries. The airplane sustained substantial damage.
- A Sichuan Airlines Airbus A319-100, registration B-6419, performing flight from Chongqing to Lhasa (China) on May 13, 2018, was enroute at FL320 about 60nm west of Chengdu over mountainous terrain, when the right hand cockpit windshield burst completely, the glass hitting and injuring the first officer. The passenger oxygen masks were



automatically released and the flight control unit (autopilot panel) was damaged. The captain initiated an emergency descent to FL235 - minimum safe altitude due to mountains, turned the aircraft around and diverted to Chengdu descending the aircraft as soon as clear of the mountains. The aircraft landed at Chengdu Shuang Liu International Airport. The first officer and a cabin crew member received injuries.

- An electric-powered Magnus eFusion aircraft with registration HA-XEF crashed on May 31 2018 and caught fire after take-off from Pécs-Pogány Airport in Hungary. The occupants were fatally injured.
  The Agency offered support as a technical adviser to the investigator in charge since the aircraft contained novel technologies for which the Agency has technical expertise.
- A Transavia airlines Boeing 737-800, with registration PH-HXM, performing a flight from Zakynthos (Greece) to Amsterdam on 8 August 2018, had slow rotation in take-off. In the preparation of flight the captain mistakenly entered the Electronic Flight Bag zero fuel weight (ZFW) in the take-off weight (TOW) field for performance calculation. The aircraft had slow acceleration during take-off and at V_R, which was 12 knots less than required, the First Officer felt sluggish controls and the aircraft had slow rotation.
- A Pipistrel Alpha Electro, an electric plane, registration I-D057, crashed under unknown circumstances on 13 October 2018, in a field along the road N975, about 2 km from Stadskanaal Airfield in the Netherlands. There was a post-impact fire. The pilot was fatally injured.
  Flight tracking data showed that the aircraft had joined the traffic circuit for an approach to Stadskanaal Airfield. The last recorded datapoint was at the end of the downwind leg.
  Although the airplane was Annex II, and hence not directly under the Agency's remit, the Agency decided to follow the investigation since there are 6 airplanes of the same design flying under EASA permit-to-fly.
- A Leonardo AW169 helicopter with registration G-VSKP was totally destroyed by impact and post impact fire on 27 October 2018 when it crashed into a car park at the southeast corner of the King Power Stadium, Leicester, UK. The helicopter lifted from the centre circle of the stadium, yawed 15° left and moved forward a few metres. It began a climb on a rearward flight path while maintaining a northerly heading. The helicopter reached a radio height of approximately 430 feet before descending with a high rotation rate. It struck the ground in an approximately upright position on a stepped concrete surface, with the landing gear retracted, rolled onto its left side and was rapidly engulfed in an intense post-impact fire.
- An Augusta A109S helicopter, Italian registration I-EITD, operated by the company 'Babcock', in the service of INEM, the National Institute of Medical Emergencies, crashed in the county of Valongo, on 15 December 2018, in the north of Portugal. The National Civil Protection Authority (ANPC) confirmed that the wreckage had been found, as well as the bodies of the four occupants: two pilots and a nurse of Portuguese nationality, and a doctor of Spanish nationality.
- A helicopter Augusta A109S, with registration XA-BON, impacted a cornfield in the Santa Maria Coronango municipality of Puebla on 24 December 2018. The helicopter was partially consumed by the post-impact fire and the five occupants (including the Puebla governor) received fatal injuries.

Please note that safety actions that were taken immediately during or following an investigation do not appear in this publication if the Safety Investigation Authority did not issue an associated, formal safety recommendation to EASA in 2018.


SpiceJet

Safety Recommendations replies in 2018

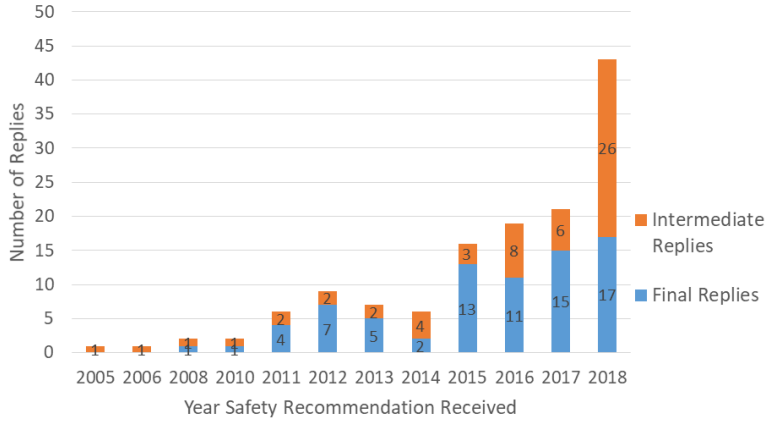
4

Safety Recommendations replies in 2018

4.1 Overview of Safety Recommendations replies in 2018

In 2018, EASA issued 133 replies to 127 safety recommendations. As updates are provided, several response letters can be issued for the same recommendation within a given year. The majority of replies produced in 2018 were EASA responses to safety recommendations received in the years 2015 to 2018.

However, replies to recommendations from earlier years were also issued, as per the table below, for those cases where follow-up actions and conclusions were reached, or which required updates and/or closure of the safety recommendation.



► Figure 5: EASA responses to safety recommendations in 2018 by year received

4.2 Status of the Safety Recommendations replies in 2018

Each final response closing a safety recommendation and the response assessment by the originator is classified according to the categories[1] given in Annex C.

Among the 133 replies that were sent by EASA in 2018 and summarised in figure 5, 76 were final replies that closed safety recommendations, resulting in the following responses by EASA:

- EASA agreed to take corrective action in 68 cases, either by directly applying the recommended actions as was the case for 33 of them, or by recognizing the safety issue for 35 of them by partially agreeing, but taking corrective actions other than those recommended;
- In another 7 cases, the safety recommendations were evaluated and the safety benefit was not agreed with.
- In 1 case, EASA requested further information to be supplied.

Figure 6 opposite shows this distribution;

In monitoring safety recommendations, their status remains open until the action related to each recommendation is fully developed and completed.

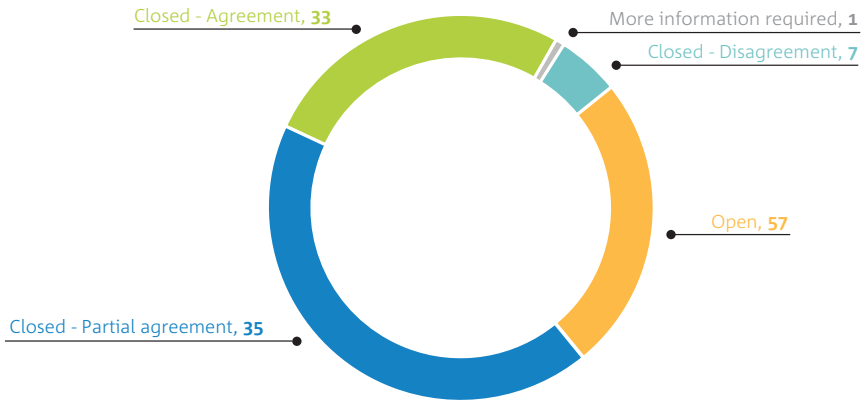
In addition to the 76 final replies closing a safety recommendation, 57 updating replies (intermediate responses) were also issued. These updating replies provided information on the progress of the actions decided upon by the Agency for which the relevant activities had not yet been completed.

To follow-up on regarding whether or not the competent Safety Investigation Authority (SIA) considers the response to be adequate, or disagrees with the action that EASA has proposed, the Agency has implemented procedures in compliance with Regulation (EU) No 996/2010.

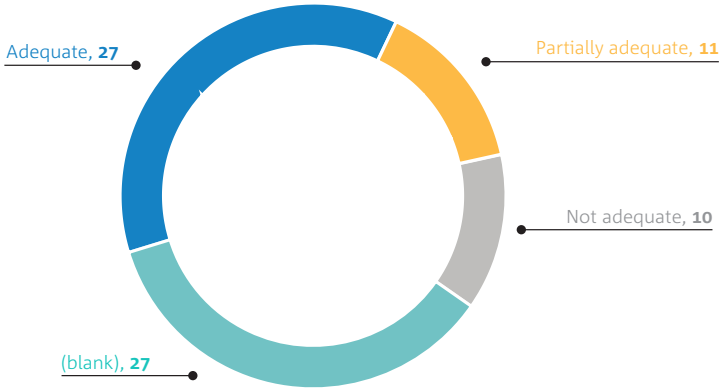
Figure 7 shows the total number of response assessments that EASA received from the SIAs, based on the 76 closing replies that were sent in 2018[2]. As assessed, 39 of the responses provided by the Agency were deemed to be “adequate” or “partially adequate” (28 and 11 respectively), and 10 responses were deemed as “not adequate”. With respect to the 27 remaining closing responses sent

[1] These definitions of classification categories are developed in collaboration with European Safety Investigation Authorities and are part of a taxonomy aimed at facilitating the management of safety recommendations.

[2] The statistical reference date is 22 March 2019.



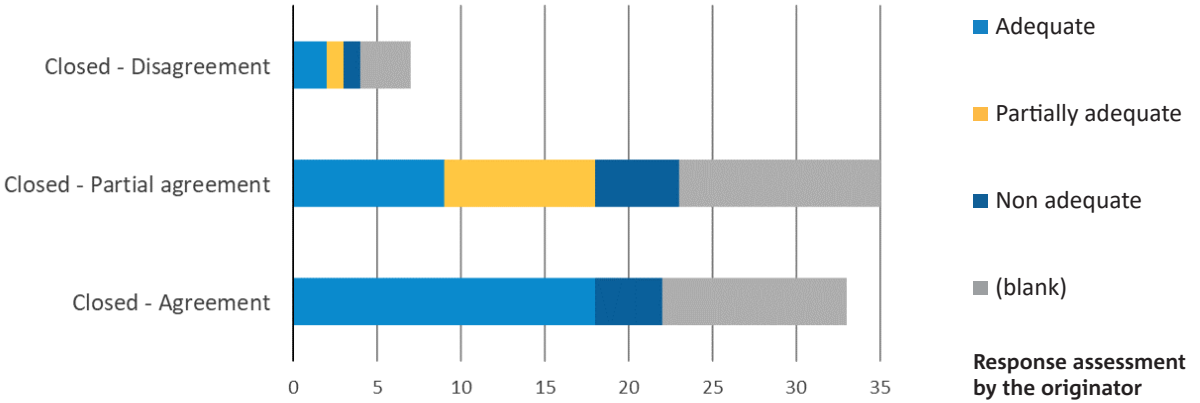
▶ Figure 6: Safety Recommendation Responses sent in 2018 [status, total number]



▶ Figure 7: Response assessment received from the originator on EASA Final Replies sent in 2018 [reference date: 22.03.2019]

in 2018, EASA is awaiting the SIAs' assessment.

Figure 8 provides a more detailed view of the recommendation assessment and/or classification as determined by the addressee.



▶ Figure 8: Assessment received by EASA on the Final Responses sent in 2018 [total, reference date: 22.03.2019]

Overview of key safety topics processed and actions carried out in 2018

5

Overview of key safety topics processed and actions

In 2018, Safety Investigation Authorities from 13 different States issued 54 safety recommendations to EASA that addressed proposals within EASA's remit. Figure 9 provides a breakdown of the safety recommendation topics. Among the safety recommendations, the European SIAs classified 35 as being of Union-wide Relevance (SRUR) and 29 as being of Global Concern (SRGC). Thus, the handling of the safety recommendations in both an expeditious and responsible manner constitutes one of EASA's key responsibilities.

The recommendations of global concern are also analysed under the European Safety Risk Management process, in order to identify relevant global safety issues in the different aviation domains.

Figure 9 provides information on the main topics by safety recommendation, according to the taxonomy used in the European Safety Recommendation Information System (SRIS). The absolute majority, 54 percent of safety recommendations received by EASA in 2018, make proposals for "procedures or regulations" [37 safety recommendations], while 27 percent address safety topics in the field of "aircraft or aviation-related equipment/ facilities " [19 safety recommendations]. A further breakdown of the topics related to procedures and regulations is also provided, with the majority of these related to design/production/manufacturing.

13 percent of the safety recommendations that EASA received in 2018 refer to safety topics in the field of "Personnel" [9 safety recommendations] and 6 percent in the field of "Quality Management System/Safety Management System/State Safety Plan [QMS/SMS/SSP]" [4 safety recommendations]. The above distribution is consistent with the data that ENCASIA presented in its Annual Report.

Among the actions taken in 2018, several key safety topics are outlined below with accompanying information on the action that the Agency has taken. The description highlights the safety issues that were underlined by the safety recommendations, together with the actions taken by the Agency in response.

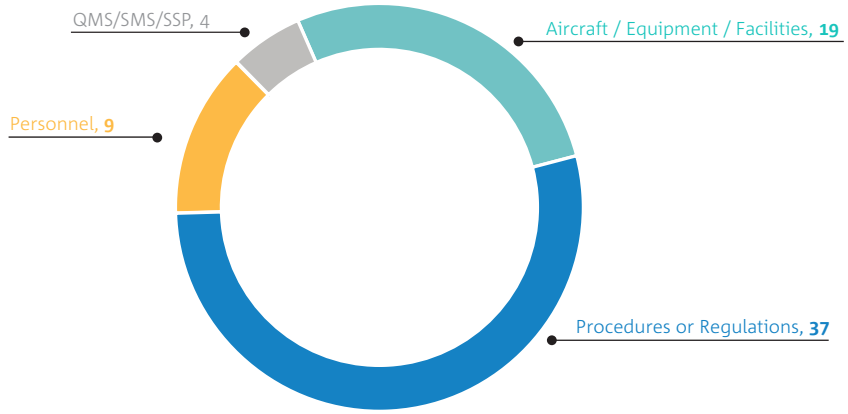
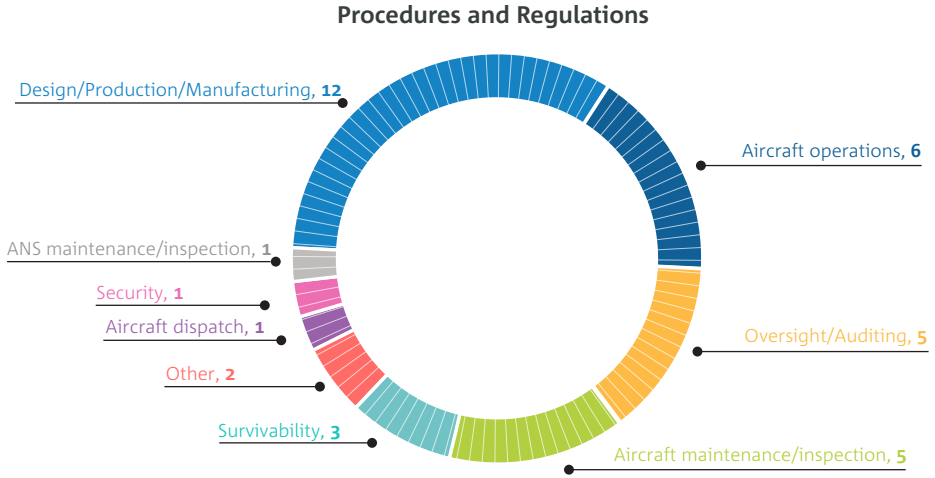


Figure 9: Safety Recommendations addressed to EASA per topic by EU SIAs[3]



[3] Note: data in Figure 9 also contains safety topics estimated by EASA for 6 safety recommendations not recorded in EU SRIS by the SIAs of the MS.

5.1 Erroneous take-off performance parameters

Over the last years a number of serious incidents have occurred involving large aeroplanes and the use of erroneous performance parameters at take-off. As a consequence discussion has been raised on the development and implementation of a technical solution to prevent such incidents, such as Take-off Performance Monitoring Systems and computer integrated functions to detect erroneous data input. The EASA Safety Risk Portfolio for Commercial Air Transport Aeroplanes identifies and addresses this topic with a wider safety issue "Entry of aircraft performance data". It encompasses the issues addressed by the 5 safety recommendations listed below.

During 2018 the Agency received 5 Safety Recommendations on this subject from 3 Safety Investigation Authorities, the Dutch DSB, the UK AAIB and the French BEA, which relate to 3 serious incidents. These recommend that EASA:

- in the scope of an update of its impact assessment, assess the safety benefit of TOPMS-type systems, taking into account, in particular, the existing systems (Airbus TOM).
- in the scope of an update of its impact assessment, assess the safety benefit of gross error detection/warning systems, taking into account, in particular, existing systems (Airbus TOS, Boeing FMS/EFB messages and protections, Lufthansa Systems LINTOP, etc.).
- in coordination with the FAA, incite manufacturers to develop, for commercial aeroplanes which are the most prevalent and the most exposed to this risk, systems adapted to the characteristics of each aeroplane family, providing increased protection against the use of erroneous parameters at take-off.
- in cooperation with other regulatory authorities, standardisation bodies, the aviation industry and airline operators, to start the development of specifications and the establishment of requirements for Take-off Performance Monitoring Systems without further delay.
- in conjunction with the Federal Aviation Administration, sponsor the development of technical specifications and, subsequently, develop certification standards for a Take-off Acceleration Monitoring System which will alert the crew of an aircraft to abnormally low acceleration during take-off.

EASA Action:

EUROCAE Working Group (WG-94) was convened in 2012, at the request of, and with the participation of EASA, with the aim to undertake preparative work to establish the feasibility of the development of EUROCAE standard(s) defining the requirements for a Take-Off Performance Monitoring System (TOPMS). This system should provide a timely alert to flight crew when the achieved take off performance is inadequate for the given aircraft configuration and aerodrome conditions. WG-94 issued their report in February 2015, concluding that the development of standards to define performance requirements and operational conditions for TOPMS was not currently feasible. This was due to a multitude of factors, including the maturity of the technology, a lack of real-time data (e.g. environmental parameters, runway conditions, airport databases, etc) and/or suitable aeroplane performance models and a lack of consensus in design criteria and testing methods.

However the Agency recognised that the industry continues to investigate technical solutions and, since 2015, some progress has been made in the domain of airport data availability and associated applications.

In the meantime, EASA has issued a Safety Information Bulletin (SIB 2016-02) "Use of Erroneous Parameters at Take-off" to alert operators and flight crew to the safety issue and to recommend the implementation of operational mitigation measures.

The effectiveness of the SIB is being evaluated with the support of the EASA Advisory Bodies composed of competent authorities and industry.

The outcome will be used by EASA to decide whether additional means of mitigating the safety risk should be assessed.

5.2 Helicopter offshore operations survivability

There are a number of risks associated with offshore helicopter operations, since they are often conducted in adverse weather. Additionally, many system malfunctions have the potential to result in ditching. Research has shown that the main reasons for fatalities in offshore operations are drowning and exposure. Most fatalities are caused by drowning as occupants are often unable to leave the helicopter in time. Therefore, when discussing safety improvement, the main focus is on the increase of post-impact survival rates.

Following an accident involving an AS332 L2 Super Puma helicopter with sixteen passengers and two crew on board that crashed into the sea during the approach to land at Sumburgh Airport, the UK AAIB issued two safety recommendations, recommending that EASA amend the Certification Specifications for Large Rotorcraft (CS-29), involved in offshore operations:

- to ensure that any approved cabin seating layouts are designed such that, in an emergency (assuming all the exits are available), each exit need only be used by a maximum of two passengers seated directly adjacent to it
- to include minimum size limitations for all removable exits, to allow for the successful egress of a 95th percentile-sized offshore worker wearing the maximum recommended level of survival clothing and equipment.

EASA Actions:

On 25 June 2018 CS-29 was amended by Executive Director Decision 2018/007/R.

This amendment includes new specifications related to the above mentioned recommendations:

- CS 29.807(d): 'Underwater emergency exits for passengers. If certification with ditching provisions is requested by the applicant, underwater emergency exits must be provided in accordance with the following requirements and must be proven by test, demonstration, or analysis to provide for rapid escape with the rotorcraft in the upright floating position or capsized.
  (1) One underwater emergency exit in each side of the rotorcraft, meeting at least the dimensions of a Type IV exit for each unit (or part of a unit) of four passenger seats. However, the passenger seat to-exit ratio may be increased for exits large enough to permit the simultaneous egress of two passengers side by side.'
  (2) Flotation devices, whether stowed or deployed, may not interfere with or obstruct the underwater emergency exits.
- CS 29.813(d): 'If certification with ditching provisions is requested:
  (1) passenger seats must be located in relation to the underwater emergency exits provided in accordance with CS 29.807(d)(1) in a way to best facilitate escape with the rotorcraft capsized and the cabin flooded; and
  (2) means must be provided to assist cross-cabin escape when capsized.'

Studies have shown that the dimensions of a Type IV exit would be sufficient to allow safe evacuation by all offshore workers whilst wearing survival clothing and equipment.

5.3 Restraint systems for parachutists

Two accidents involving aeroplanes engaged in parachuting/skydiving activities which occurred in Belgium and in Ireland resulted in a number of safety recommendations being issued to EASA:

- To conduct research to determine the most effective restraint systems for parachutists reflecting the various aircraft and seating configurations used in parachute operations (BELG-2015-002, IRLD-2015-002), to clarify the technical requirements applicable to such restraint systems (BELG-2015-003), to assess the need of mandatory pilot's back protection for airplanes used in parachute dropping (BELG-2015-004).

EASA Actions:

EASA has performed a study on the effectiveness of restraint systems provided for parachutists, starting with the operating requirements (as defined in Commission Regulation (EU) No 965/2012) and the technical requirements (as defined in the Certification Specifications CS-23 and Special Condition 'Use of aeroplanes for parachuting activities', doc. No. SC-023-div-01) for their selection and installation.

The study included:

- a review of the regulatory framework;
- an analysis of occurrence data in the last 11.5 years covering parachute operations with aircraft registered in EASA member states;
- a survey with a sample of European parachute associations;
- an assessment of different type of restraint systems including the advantages and the disadvantages; and
- a review of the available research material for parachutists' restraint systems;

Based on the results of the study the Safety Information Bulletins 2018-18 and 18R1 were issued by EASA to provide guidance for the operators and installers on the installation of restraint systems and pilots' back protection. To clarify the certification requirements applicable to parachute restraint systems and their installation, EASA revised Special Condition SC-O23-div-01 ''Use of aeroplanes for parachuting activities".

5.4 Balloon operations

A hot air balloon accident which occurred in France in 2014 triggered the issuance of the following 5 safety recommendations related to balloons operations that are included in the final accident investigation report which was published in 2018:

- EASA ensures that the flight manuals are updated to underline the need for pilot lights to be shut down before contact, whatever the landing conditions may be.
- EASA, working with balloon manufacturers and pilot representatives, studies the possibilities of an emergency fire-prevention shut-off and protection of burner control system that could be required in public transport, and possibly in general aviation.
- EASA, working with the competent authorities and commercial passenger ballooning professionals, clarifies the position of CPB (Commercial Passenger Ballooning) in the hierarchy of acceptable risks defined by the European General Aviation Safety Strategy document.
- EASA carries out a targeted assessment of the effects of the European regulation for commercial passenger ballooning on the safety level, once it has become applicable, with specific attention paid to the oversight procedures expected of the competent authorities.
- EASA uses the results of the assessment specified by the previous recommendation and ensures that the CPB oversight methods are commensurate with the targeted risk level and the ability of operators to reach this risk level.

EASA Actions:

EASA has conducted a survey with the main balloon manufacturers on emergency gas supply shut-off design solutions to ensure the system enables easy closure of the gas supply valve in an emergency, but prevents unintended movement of the control of the gas supply valve.

Taking into account feedback received from the survey, EASA published Safety Information Bulletin No. 2018-14 on 6 September 2018 recommending the use of quarter-turn valves (which are already available on the market) on liquid

gas cylinders for commercial and non-commercial balloon operations. These valves do not add complexity and provide for a quick and unambiguous operation to shut off the gas in case of leaks or fire. They also have an acceptable level of protection from involuntary control inputs.

In the SIB, EASA also recommends operators to include the emergency use of these valves in the pre-flight briefing for passengers.

Furthermore, EASA has reviewed the Aircraft Flight Manuals (AFMs) of the main EU balloon manufacturers and can confirm that they already contain instructions to turn off pilot lights before contact. The AFM of the balloon involved in the accident subject to this safety recommendation contained this instruction in the normal and in the emergency procedures sections. However, EASA supports the current practice to include, in new or revised AFMs, the requirement to extinguish the pilot lights when the pilot is satisfied that no further burner operation will be required.

Chapter 2 of the 'European General Aviation Safety Strategy' document, published on the EASA web site on 30 August 2012, concerning 'Risk based approach – a proposed acceptable risk hierarchy' contains a description of the proposed methodology for the General Aviation regulatory structural design, which takes into account the fact that different stakeholders may demand and deserve a different approach to risk management. A sort of hierarchy is proposed in descending order of "risk averseness", whereby Commercial Air Transport (CAT) is positioned second after "uninvolved third parties", and private pilots on non-commercial flights are positioned last. CAT in this context covers all aircraft types, including Commercial Passenger Ballooning (CPB), which is defined in Commission Regulation (EU) 2018/395 (balloon regulation), as a form of commercial air transport operation with a balloon whereby passengers are carried on sightseeing or experience flights for remuneration or other valuable consideration. It should be noted that the balloon regulation is applicable from 09 April 2019, and, in the meantime, balloon operations are governed by national legislation. Competent authorities and general aviation associations were represented on the working group which was tasked with making these proposals for a European General Aviation Safety Strategy.

In addition, competent authorities and commercial balloon transport professionals were consulted within the framework of EASA rulemaking task RMT.0674 'Revision of the European operational rules for balloons'. The aim of the resulting dedicated balloon regulation is to maintain the target safety levels set for balloon operations by Commission Regulation (EU) No 965/2012 on air operations, while reducing the regulatory burden for balloon operators.

The European Plan for Aviation Safety (EPAS) includes evaluation tasks which are planned over a five-year period.

Once enough time has passed to obtain sufficient data after the 9 April 2019 applicability date of the balloon regulation, consideration will be given to conducting an ex-post evaluation of the regulations, in accordance with the criteria provided in chapter 2 of the EPAS 2019-2023. The evaluations routinely include the provisions on competent authority oversight of balloon operators.

This is a systematic approach which is embedded in the established Agency's Safety Risk Management Process. Through this process, EASA monitors the safety performance of all aviation domains, including Balloon operations and takes the appropriate action depending on the risks identified.

If an ex-post evaluation of the EU regulations on balloon operations identifies any weaknesses, actions to close safety gaps will be considered for inclusion in a subsequent European Plan for Aviation Safety. This will include an assessment of whether the Commercial Passenger Balloon operators' monitoring methods, the level of risk and their ability to meet this level of risk, are matched.

5.5 Airframe ice contamination

The aerodynamic effectiveness of an airframe requires that an aircraft becomes airborne with critical airframe surfaces free from contamination by frozen or semi-frozen deposits ('contaminant'). Failure to remove contamination from an airframe and/or to protect it from acquiring further contamination before it becomes airborne may result in loss of control. This topic is identified and addressed in the EASA safety risk portfolio for commercial air transport aeroplanes through two specific safety issues: "ice on ground" and "ice in flight".

Two serious incidents that occurred because of the presence of ice resulted in two safety recommendations being issued to EASA.

In the first serious incident, a Boeing 737 was close to stalling during its approach to the planned destination airport. The analysis of data from the flight data recorder shows that three or four of the input cranks on the aircraft's elevator Power Control Units were blocked, most likely due to ice.

The Accident Investigation Board Norway (AIBN), which conducted the investigation, recommended:

- EASA to ensure that the aircraft manufacturer Boeing conduct a new safety assessment of the Boeing 737 aircraft type as regards blockage of the aircraft type's elevator system, and that the analysis result and established measures satisfy the requirements in EASA CS-25 §25.671.

In the second serious incident a BAE 146 was involved, in which heavy vibrations occurred shortly after take-off at an indicated airspeed of around 195 knots. The commander disconnected the autopilot and the indicated airspeed was reduced, whereby the vibrations ceased. Thereafter, the speed was increased again and the vibrations returned until the speed was reduced a second time. The crew then decided to abort the flight and return to the airport. The company engineers inspected the airplane after landing and discovered extensive ice coverage on multiple flight control surfaces.

The Swedish Accident Investigation Authority (Statens haverikommission - SHK) recommended that EASA should:

- Investigate and evaluate the risks of recommended methods for

de-icing and post-de-icing check, especially the incorporated method referred to in the referenced documents in GM3 CAT.OP.MPA.250 of Commission Regulation (EU) No 965/2012, and consider and decide whether the reference should be changed.

EASA Actions:

EASA has received the results of the safety assessment performed by Boeing and the FAA regarding the blockage of the B737's elevator system due to de-icing fluid surface contamination. A number of enhancements were carefully evaluated, including additional shielding for the PCU's input mechanisms, providing a fluid guard over the opening, redesigning the PCU inputs, and repositioning the stabilizer to minimize the opening size during de-ice operations. Due to the very limited space available, and the fact that any design changes would require modifications in this limited area, Boeing determined that any design modifications would create an additional risk for Foreign Object Damage (FOD) in the elevator control system which was determined to create an unacceptable risk. Therefore, Boeing determined that providing new procedures for positioning the stabilizer trim in the recommended take-off position during de-icing (as opposed to Full Airplane Nose Down) was the most appropriate solution to mitigate the safety issue.

EASA concurs with the FAA and Boeing assessment and has adopted the FAA Special Airworthiness Information Bulletin NM-16-21 on 05 March 2018 which advised B737 owners and operators of Boeing's procedural changes for horizontal stabilizer position settings during de-icing.

Moreover, EASA has, in collaboration with the ground de-icing industry community, reviewed the recommended methods for de-icing and post de-icing checks referred to in the referenced AEA (Association of European Airlines) documents in GM3 CAT.OP.MPA.250 of Commission Regulation (EU) No 965/2012, which have been superseded by SAE International 'Global Aircraft De-icing Standards' documents (see EASA Safety Information Bulletin SIB 2017-11).

With regard to the integrity of SAE International Aerospace Standard AS6285 'Aircraft Ground De-icing/Anti-Icing Processes', in particular the prescribed procedures on the incorporated method for the post de-icing checks, EASA has collaborated with the de-icing experts during forums which took place in April 2018 (Airlines for Europe (A4E) de-icing group meeting) and May 2018 (SAE International G12 'Aircraft Ground De-icing Committee' meeting). The feedback indicated that, if the post de-icing checks are conducted by suitably qualified and trained personnel, as described in the referenced SAE documents, an acceptable level of safety will be achieved.

In addition, EASA has published SIB 2018-12, dated 27 July 2018 to remind de-icing service providers about the importance of applying the procedures correctly, in particular the incorporated method for the post de-icing checks. The SIB serves to highlight, to de-icing service providers, the risks associated with improper execution of de-icing and post-de-icing checks, and the importance of correctly applying the procedures, in particular the incorporated method for the post de-icing checks, which are based on established industry standards

Before publication, the SIB underwent consultation with various stakeholders, including National Aviation Authorities, A4E, SAE, FAA and TCCA. During this consultation process, the stakeholders did not indicate a need to change the procedures which were referred to in the SIB.

5.6 Flight crew training and simulators

Pilot training remains an important issue in aviation safety and as such it is identified and addressed within the EASA Safety Risk Portfolio for Commercial Air Transport Aeroplanes through several safety issues. Flight crew training is one of the main elements of the safety issue "Experience, Training and Competence of Individuals". In addition, it is also visible in most of the operational safety issues in that Safety Risk Portfolio. It is important to clarify that flight crew training is not considered to be a safety issue but one of the main safety barriers in the systems that mitigate the risk of other identified safety issues.

During 2018, the Agency received the following 5 Safety Recommendations related to training and to 'training-to-proficiency', as it is defined in ICAO documents:

- In order to prevent "Controlled Flight into Terrain (CFIT) accidents", pilots must be able to conduct their flight preparations and route decisions correctly.
  A proper assessment of the site is indispensable, regardless of whether the pilot is or is not familiar with the area.
  In addition to official aeronautical charts/maps, computer flight planning-programs can support the preparation of the flight.
  The topographic analysis should take into account the areas for: departure, the climb, the cruising, the descent and the arrival airport and its surroundings.
  This should be emphasized during the training and the periodical check of pilots, and, if necessary, be supplemented in the training or examination documentation.

- to ensure that all operators using aircraft equipped with a "stick pusher" include in their pilot training syllabus a practical module concerning inadvertent activation of the stick pusher and the associated response. For this module, the use of a simulator shall be preferred.

- to provide indications in order to adopt specific trainings for flight crews, to cope with the "surprise" and "startle" effect, particularly in critical phases of flight such approach and landing.

- to evaluate the possibility of developing a specific training program for complex high performance single-pilot aeroplanes for which there

is not an adequate flight simulator. EASA should reinforce the content of training programmes integrating manoeuvre exercises of asymmetrical thrust management during take-off.

- to review and revise Regulation (EU) No 1178/2011 to include and specify the contents considered appropriate for the minimum one hour training flight with the flight instructor (FI), aiming the single-engine single-pilot class license revalidation.

Much of the training previously undertaken in the aircraft is now conducted in flight simulators which continue to make a major contribution to improving aviation safety. As a follow up to safety recommendations received before 2018, the Agency has taken the following actions.

EASA Actions:

On 3 May 2018 ED Decision 2018/006/R was published which amends CS-FSTD(A). The objective of this Decision is to increase the fidelity of the provisions to support the approach-to-stall and the upset prevention and recovery training (UPRT) requirements as proposed by EASA Opinion No 06/2017 'Loss of control prevention and recovery training' (RMT.0581). Furthermore, it proposes to increase the fidelity of the simulation of the engine and airframe icing effects, and develop and deploy an instructor operating station (IOS) feedback tool.

This Decision amends the Certification Specifications for Aeroplane Flight Simulation Training Devices (CS-FSTD(A)) (Initial issue), and one of its primary objectives is to achieve the maximum alignment possible with FAA CFR 14 Part 60 Change 2, which would support FSTD operators that have dually qualified devices (both FAA- and EASA-qualified), and with the applicable elements of ICAO Doc 9625 'Manual of Criteria for the Qualification of Flight Simulation Training Devices', 4th Edition.

The amendments are expected to increase safety by addressing low FSTD fidelity or lack of ability of an FSTD to conduct certain training tasks that may have contributed to previous incidents and accidents.

The date of applicability of this Decision and provisions will be 20 December 2019, after a transition period to ensure alignment with EASA Opinion No 06/2017 that proposed amendments to Annex I (Part-FCL) to Regulation (EU) No 1178/2011 (the 'Aircrew Regulation').

Besides the update of CS-FSTD(A), Notice of Proposed Amendment (NPA) 2017-13 proposed the following:

— AMC/GM to Annex VI (Part-ARA) to the Aircrew Regulation with the inspector competency framework. This amendment will be issued with a separate decision currently being drafted. The related CRD will be published with the decision;

— AMC/GM to Annex I (Part-FCL) to the Aircrew Regulation with the training matrix. This amendment was subject to focused consultation in March 2018. To be published at a later stage with the relevant decision.

In 2018 the Agency also provided support to the European Commission for the adoption of Opinion 06/2017. The final resulting text was published with Commission Regulation (EU) 2018/1974 on 14 December 2018 entered into force on 20 December 2018, and will become applicable on 20 December 2019. The amendment is a first step towards increasing the range of different levels of FSTDs. In parallel RMT.0196 is developing a method, on the basis of ICAO Doc 9625, in determining the most suitable devices in achieving the training objectives. The aim is to publish an ED Decision with CS-FSTD issue 3, and AMC/GM to Part-FCL, and Part-ORO that would enable training programs for single pilot complex high performance aeroplanes to benefit from an increased range of FSTDs, including FTDs.

Commission Regulation (EU) No 1178/2011 on Flight Crew Licensing (FCL) and Medical (MED) Requirements stipulates that it is the responsibility of the Aviation Training Organisation to develop a training programme for each type of course offered (ORA.ATO.125 Training programme).

EASA Opinion 05/2017 proposes new definitions under FCL.010 for 'available FSTD' and 'accessible' in the context of flight simulation training devices (FSTDs). The objective is to clarify when an FSTD, and, in particular, when a full-flight simulator (FFS) must be used, especially in the context of single-pilot high performance complex aeroplanes. Both definitions are to be used in conjunction with the changes made to the assessment of competence in FCL.935, and type rating training, testing and checking in Appendix 9. The objective is to provide more flexibility in the selection of adequate training devices.

The use of a specific FSTD (FNPT II, MCC, FTD2) were replaced with the generic FSTD term in the training, testing and checking programme for class and type ratings contained in Appendix 9. In addition, Appendix 9, section 6 on 'Multi-pilot aeroplanes and single-pilot high-performance complex aeroplanes, paragraph (e) is complemented to enable to use other FSTDs for aeroplanes for which no simulator exists.

5.7 Fuel management

A serious incident that occurred in Spain involving a Boeing 737, resulted in the following safety recommendation being addressed to the Agency:

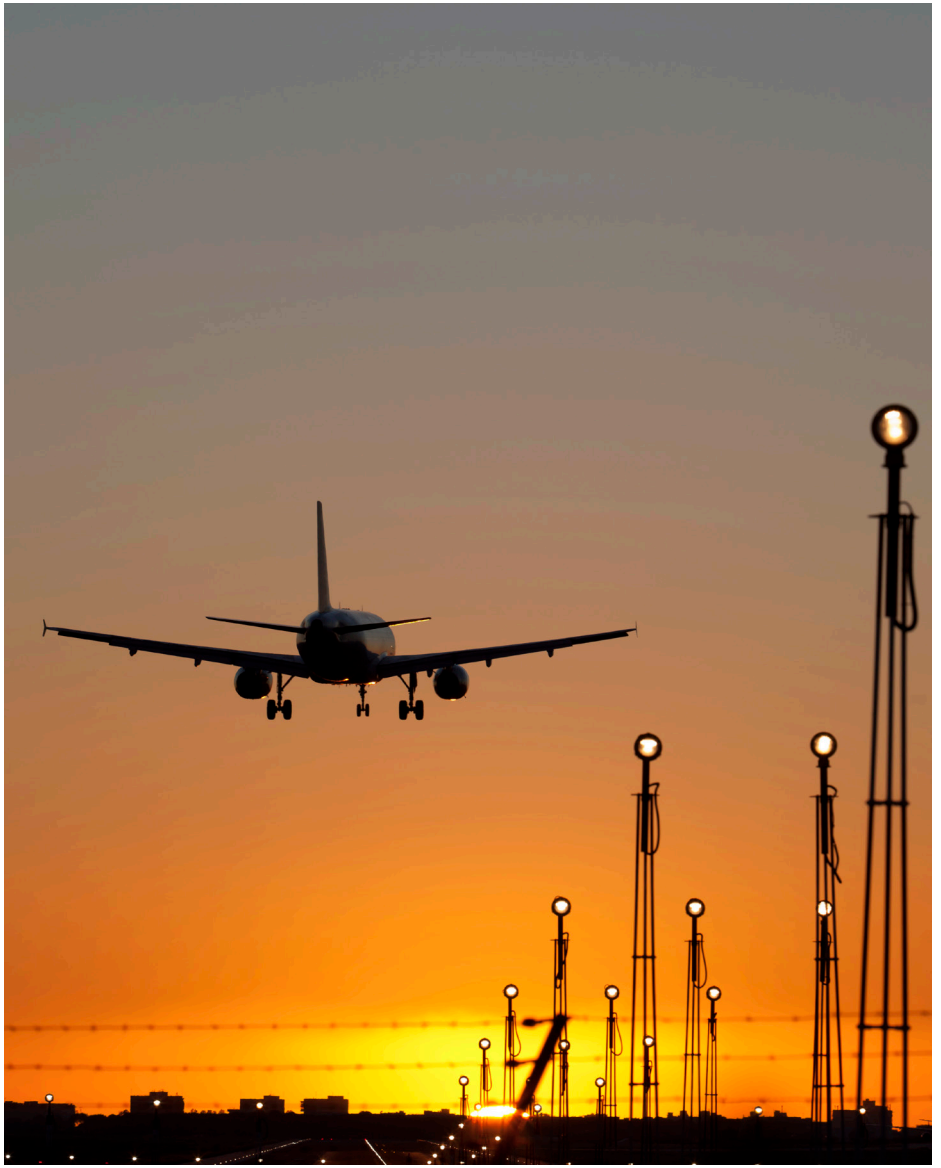
- Within the framework of the ongoing EASA rulemaking task RMT. 0573 on fuel management, EASA should consider providing guidance on “appropriate use of the” minimum fuel declaration by operating flight crew, as described in ICAO Doc.9976 “Flight Planning and Fuel Management (FPFM) Manual” through use of examples of various scenarios to illustrate how and when to use the term.

EASA Actions:

On 08 May 2018, the Agency published SIB 2018-08 ‘In-Flight Fuel Management - Phraseology for Fuel-Related Messages between Pilots and Air Traffic Control’, which provides updated regulatory references and clarification on appropriate use of the minimum fuel declaration. It is highlighted in the SIB that ICAO Doc.9976 chapter 6.10 contains examples of various scenarios illustrating how and when operating flight crew should use the minimum fuel declaration. Instead of copying these examples into the SIB, clarification has been provided on the meaning of the declaration of minimum fuel.

Through SIB 2018-08, operators and Air Traffic Service providers are recommended by the Agency to amend, as applicable, their procedures for in-flight fuel management and the fuel-related phraseology to comply with the related ICAO Standards and Recommended Practices (applicable since November 2012) and Commission Implementing Regulation (EU) 923/2012 on the common rules of the air (relevant amendments by Commission Implementing Regulation (EU) 2016/1185 applicable since 12 October 2017). Any changes should be reflected in their Operations Manuals accordingly, and these procedures should be disseminated to and applied by the relevant personnel.

Currently, Fuel Management is one of the safety issues under monitoring in the EASA Safety Risk Portfolio for Commercial Air Transport Aeroplanes, as the actions under implementation are considered to sufficiently mitigate the risk.



5.8 Runway surface condition

Runway surface friction is directly relevant to the braking action which is available to an aircraft decelerating after touch down, or after a decision to reject a take-off.

Aircraft Operators and their flight crew need to be especially aware of the potential operational safety significance of a NOTAM issued in accordance with the requirement in ICAO Annex 14 which advises that a particular runway "may be slippery when wet". Issue is automatic once it has been found that surface friction on any significant part of a runway has fallen below the Minimum Friction Level. If an aircraft is to use a runway so notified when it is actually wet, then aircraft performance for landing or take-off and Aircraft Flight Manual (AFM) limitations in respect of wind velocity need to be taken into account to determine whether use of the runway is still possible.

The following recommendation that the Agency received from UK AAIB, clearly raises the issue:

- The European Aviation Safety Agency should require operators to ensure that flight crews are provided with guidance material on aircraft performance when operating on a runway that is notified as "may be slippery when wet", or has sections thereof notified as "may be slippery when wet".

EASA Actions:

The Agency has published a Safety Information Bulletin (SIB) to enhance the awareness of air operators and pilots of the risks associated with unreliable runway surface condition reporting, to inform them of the on-going related rulemaking actions, and to provide recommendations for the purpose of mitigating those risks in the meantime (see SIB No. 2018-02 on 'runway surface condition reporting' published 18 January 2018).

Notably, in the SIB, operators and flight crew are reminded about the existing applicable provisions, and operators are recommended to be aware of the reporting methodology at the aerodromes at which they operate when developing their risk assessment and mitigation under their Safety Management Systems. Operators are recommended to give special consideration to those aerodromes that are critical in terms of runway length, challenging weather conditions, and aerodrome capability and reliability, for runway surface conditions assessment and reporting. Operators should base their assessment at least on information contained in the Aeronautical Information Publication (AIP), in-service experience and occurrence reporting. Member States are also recommended to include, in the AIP, information on the methodology in use for runway surface condition assessment and reporting, terminology and reporting format.

In case of uncertainty on runway surface condition reporting, the SIB recommends that conservative assumptions are made either in terms of aircraft performance calculations or, when different conditions are reported for different segments of the runway, in terms of assuming the worst condition for the entire runway.

Furthermore, the SIB states that operators should include in their flight crew training programme at least the following elements:

- Description of runway surface condition reporting methods; and
- Types of runway contamination and its effects; and
- Aircraft take-off and landing performance on wet and contaminated runways.

The SIB also refers to guidance on the changes adopted by ICAO for runway surface condition reporting format for aeroplane performance purposes, which is available in ICAO Doc 9981 'Procedures for air navigation services (PANS) – Aerodromes, and ICAO Doc 4444 'PANS – Air Traffic Management'.

With the publication of the SIB as summarised above, the operators are expected to provide suitable guidance to their flight crews on aircraft performance on contaminated runways.

Runway surface condition is also one of the safety issues under monitoring in the EASA Safety Risk Portfolio for Commercial Air Transport Aeroplanes, as the actions under implementation are considered to sufficiently mitigate the risk.

5.9 Rotorcraft gearboxes

An accident that occurred in Norway in 2016 involving a Eurocopter EC225 and a serious incident that occurred in the UK the same year involving a Sikorsky S92, identified several safety issues related to the helicopter's main gearbox and tail rotor. The accident investigation reports for both accidents were published in 2018 and the following safety recommendations were addressed to EASA to:

- revise the Certification Specifications for Large Rotorcraft (CS-29) to introduce requirements for Main Gear Box (MGB) chip detection system performance.
- develop MGB certification specifications for large rotorcraft to introduce a design requirement that no failure of internal MGB components should lead to a catastrophic failure.
- research methods for improving the detection of component degradation in helicopter epicyclic planet gear bearings.
- research into the development of Vibration Health Monitoring data acquisition and processing, with the aim of reducing the data set capture interval prescribed in the Acceptable Means of Compliance to CS 29.1465 and thereby enhancing the usefulness of VHM data for the timely detection of an impending failure.

This topic is covered by the Rotorcraft Safety Risk Portfolios under the safety issues "system component failure" and "handling of technical failure". Aircraft type-specific issues are handled under the Continuous Airworthiness process.

EASA Actions:

EASA has recognised the need to improve certification specifications in CS-27 (small rotorcraft) and CS-29 (large rotorcraft) relating to Main Gear Box chip detectors.

The current CS 27/29.1305(a)(23) and CS 27/29.1337(e) require chip detectors to provide a warning to the flight crew when particles of a sufficient size (or accumulation) are detected and are intended to allow the flight crew to check the correct operation of the relevant elements of the drive system.

EASA has conducted a Preliminary Impact Assessment (PIA) on the possible actions to improve the likelihood of detecting chips or particles in gearbox oil. The outcome of the PIA was the inclusion of a dedicated Rulemaking Task (RMT) 0725 in the draft European Plan for Aviation Safety (EPAS) 2019-2023.

The planned RMT.0725 will consider an amendment of the current certification specifications and their associated acceptable means of compliance for demonstrating that the chip detectors perform their intended function.

Furthermore EASA considers that the number of potentially catastrophic failure modes should be minimised. Accordingly, any component, the failure of which has a potentially catastrophic failure effect, should not be acceptable if the failure hazard severity can be mitigated to a reduced level and where such measures are considered to be technically feasible and economically justifiable.

It is clear that design choices regarding rotor drive system architecture and individual gearbox design will influence the number of potentially critical parts.

In order to better understand the significance of these design choices, research is planned within the scope of project RES.008 (Rotorcraft main gear box (MGB) design to guarantee integrity of critical parts and system architecture to prevent separation of the main rotor following any MGB failure) in the European Plan for Aviation Safety (EPAS) 2019-2023.

The Agency intends also to commission a research project into rotorcraft gearbox health monitoring. The purpose of this research will be to investigate the use of new technologies, including both hardware and methods of analysis, to improve prognostic health monitoring capability for tilt rotor, helicopter and hybrid aircraft gearbox failures.

The scope of this research will include health monitoring of epicyclic gearbox components. This project is listed as RES.011 (Helicopter, tilt rotor and hybrid aircraft Gearbox health monitoring - In-situ failure detection) in EPAS 2019-2023.

5.10 Flight plan deviations and missed approach procedures

The ASAGA (Aeroplane State Awareness during Go-around) study by the BEA raised, some years ago, the issue of non-adherence to published missed approach procedures, and the report from a fatal accident which occurred in Romania identified the problem of deviation from the flight plan. The safety investigation boards of the two States recommended that EASA:

- without waiting, in coordination with Eurocontrol and national civil aviation authorities, implement regulatory measures limiting modifications to published missed-approach procedures.
- should consider to establish some requirements for the air traffic service providers on the management of unintentional situations, such as possible infringements of the routes provided in the flight plan, of the minimum flight levels, of the minimum navigation requirements, and so on, determined by problems such as weather conditions, technical ones, determined by the aircraft performances and/or by other factors through which the air traffic controllers would require these crews confirmation on the flight rules they followed.

EASA Actions:

On 22 May 2018 EASA published Opinion No 03/2018 as a product of RMT.0464 'Requirements for Air Traffic Services (ATS)'. The Opinion proposes a broad set of organisation and technical requirements addressing the provision of ATS – Air Traffic Control Service, Flight Information Service, Alerting Service – to be included in Annex IV to Regulation (EU) No 2017/373 'the ATM/ANS Common Requirements', with the objective to harmonise the safe provision of such services throughout the EASA Member States. The proposed rules are transposed mainly from the relevant ICAO ATS provisions, in particular those in Annex 11 and Doc 4444 'PANS ATM', and are adapted to the EU regulatory framework and service provision context.

The documents published with the Opinion contain draft AMC21 ATS.TR.210(a)(3) 'Operation of ATC service - MISSED APPROACHES INSTRUCTIONS', which is intended to address this Safety Recommendation and reads as follows:

'When issuing instructions for a missed approach to flight conducting an instrument approach procedure, the ATCO should adhere to the published missed approach procedure. The ATCO should issue modifications to the published missed approach procedure only in presence of safety reasons'.

The documents also contain draft AMC1 ATS.TR.155(a) 'ATS surveillance services - FUNCTIONS OF THE ATS SURVEILLANCE SYSTEMS IN ATS', stipulating the use of ATS surveillance by ATS. This includes, inter alia, flight path monitoring.

5.11 System status messages

Following the Air France Flight 447 accident of 1 June 2009 involving an A330 over the Atlantic Ocean, the BEA issued five Safety Recommendations regarding the status messages available to the crew, according to which EASA should:

- require a review of the re-display and reconnection logic of the flight directors after their disappearance, in particular to review the conditions in which an action by the crew would be necessary to re-engage them.
- require a review of the functional or display logic of the flight director so that it disappears or presents appropriate orders when the stall warning is triggered.
- study the relevance of having a dedicated warning provided to the crew when specific monitoring is triggered, in order to facilitate comprehension of the situation.
- determine the conditions in which, on approach to stall, the presence of a dedicated visual indications, combined with an aural warning should be made mandatory.
- require a review of the conditions for the functioning of the stall warning in flight when speed measurements are very low.

A similar safety issue was identified after the accident of a GULFSTREAM IV on 13 July 2012 at Castellet Airport and BEA recommended:

- EASA and FAA ensure that the Certification Specifications (article 25-699 of the CS 25 / FAR 25 regulations) require that information on the position of the ground spoilers be available on landing.

The Swedish SIA, after the accident of a Bombardier CL600 2B19 in Sweden on 8 January 2016, raised the issue of the design of Primary Flight Displays and issued the following Safety Recommendation to EASA:

- ensure that the design criteria of PFD units are improved in such a way that pertinent cautions are not removed during unusual attitude or declutter modes.

Since the mitigating actions to address the problems associated with this topic remain aircraft type-specific, the safety issue is not included in the EASA Safety Risk Portfolio for Commercial Air Transport Aeroplanes, but handled under the continuous airworthiness process.

EASA Actions:

With regard to the flight directors, EASA and Airbus have reviewed the re-display and reconnection logic on all Airbus models.

- For the A318/A319/A320/A321, A330/A340 and A380 models, the Auto Flight System will be modified so that in flight control degraded law, the Flight Director disconnection will happen right after the stall warning is triggered. The A318/A319/A320/A321 Flight Augmentation Computer and the Flight Management Guidance Computer, the A330/A340 Flight Management Guidance Envelope Computer and the A380 Primary Flight Control and Guidance Computer will be modified. All design changes are certified. The full fleets will be retrofitted. The target dates for retrofit are before the end of 2019 for A330/A340 and A380, before the end of 2020 for A318/A319/A320/A321.
- For the A350 model, the Flight Director disconnection after stall warning is triggered, is already part of the design.
- The A300/A310 have a different architecture and the above mentioned improvement is not applicable.

Studies have been carried out to evaluate the relevance of flagging the speed in the cockpit when specific monitoring is triggered on Airbus Flight-by-Wire aircraft where, in case of detection of erroneous airspeed, the switching to the adequate displayed airspeed is automatically realised.

In the case of two pitot probes blockage leading to incorrect airspeed indications (or three pitot probes blockage provided they do not provide the same

erroneous value), in all of the Airbus models, there are already Electronic Centralised Aircraft Monitor (ECAM) messages showing reversion to alternate law and the Air Data Reference (ADR) discrepancy.

For the A318/A319/A320/A321 and A330/A340, a function which is already certified, provides the capability to display the back-up speed scale in a reversible manner. Nevertheless, a new function is expected to be certified as an improvement by the end of 2019. This function, in addition to providing the back-up speed, will include the identification of faulty speed with the speed scale being flagged on the Primary Flight Display (PFD). Another possible improvement consisting of the back-up speed computation using engine data, is also currently under consideration.

For the A350, after the aeroplane detection of erroneous airspeed data, the switching to a valid source of airspeed data is automatically performed by the NAIADS (New Air and Inertia Automatic Data Switching).

For the A380, a solution similar to the one for the A350 is under development (automatic switching by the NAIADS to a valid source of airspeed data when erroneous airspeed data is detected by the aeroplane). The target for certification of this design improvement is 2023.

Regarding the Stall Warning in order to reinforce the crew awareness in case of a stall situation, a visual warning alert “STALL STALL” will be displayed on Primary Flight Display (PFD) when the Stall Warning is triggered.

This design feature is already present in the A350 (since the initial certification), and has been retrofitted on all the A380 fleet.

For the A330/A340, the relevant modifications have been certified, and a retrofit of most of the fleet (except A330 Multi Role Tanker Transport - MRTT)

is planned to be completed by mid-2019.

For the A318/A319/A320/A321, the relevant modifications are certified and the aeroplanes with Electronic Instrument System (EIS) standard 2 (approximately 2000 airplanes) will be retrofitted. This retrofit is expected to be finished by mid-2021.

On the A300/A310/A300-600 family program, the stick shaker feature is considered to be an adequate additional means to warn the flight crew and therefore adding a visual warning alert is not deemed necessary.

EASA has performed further work with Airbus on the modification of the stall warning.

For the A350 model, the stall warning is already triggered even when the measured airspeed is very low.

For the A318/A319/A320/A321 models, the A330/A340 and in the A380 models, design changes have been certified to allow the stall warning to be triggered when the measured airspeed is very low. These design changes are applicable to aeroplanes with certain standards of Air Data Inertial Reference Unit (ADIRU).

Design changes as described above, are not feasible for the A300/A310 due to the related ADIRU standards.

The retrofit of the in-service fleets will cover all of the A380, most of the A330/A340 (approximately 150 airplanes not covered) and most of the A318/A319/A320/A321 (approximately 1500 airplanes not covered).

The target dates for the retrofits are before the end of 2019 for the A380 and the A318/A319/A320/A321, and by mid-2020 for the A330/A340.

With regard to the ground spoilers, EASA assessed the requirements applicable to ground spoilers and confirmed that Certification Specification CS 25.699(a) requires information on the position of the ground spoilers to be available on landing.

EASA's interpretation of JAR/CS 25.699(a), which differs from the FAA's one, is recorded in the document titled "EASA Large Aeroplanes Safety Emphasis Items list" revision 1, that is referred to by the EASA/FAA Technical Implementation Procedures (TIP) for Airworthiness and Environmental Certification to the EU-USA Bilateral Aviation Safety Agreement, and is published on the EASA website

(https://www.easa.europa.eu/sites/default/files/dfu/EASA%20Large%20Aeroplanes%20Safety%20Emphasis%20Items%20List.pdf) as follows:

"The FAA requirement is the same as CS 25.699(a), following an accident investigation, turned out that the FAA accepts the Lift/Drag Lever position in the flight deck as means of compliance. This interpretation differ to the EASA interpretation, where receiving the actual device position feedback is required to meet the requirement. Only observing the control/selector position providing the position command is judged not to be acceptable."

With reference to the Pitch miscompare flags, they are implemented in Primary Flight Displays (PFD) to mitigate the effect of misleading attitude indication. The intent of the certification requirements for PFD is that miscompare flags are not removed in unusual attitudes or declutter modes.

EASA has carried out an analysis of the design criteria for PFD units in coordination with the primary certification authority for BOMBARDIER CL600 2B19 (Transport Canada Civil Aviation) and the Federal Aviation Administration. The data indicates that there is no systemic issue caused by the current system safety guidance, and in particular, the guidance concerning the display of misleading attitude information and other such primary flight information.

Nevertheless, EASA intends to provide additional guidance to indicate that the failure message, flag, or comparative monitoring alert for any fault that can contribute to, or cause, misleading presentations of primary flight information, should remain on the PFD or in the primary field of view during modes of declutter, where they may be otherwise masked or removed.

The Agency has also reviewed the other EASA certified designs, and has found that, in a few models, the current design is such that certain miscompare flags are removed in declutter modes. EASA intends to assess if, for those few models, any design or procedural improvement is feasible.

5.12 Pitot design

A serious incident took place on 3 February 2013 involving an Airbus A340-600, which experienced significant airspeed oscillations on both the captain's and the standby airspeed indicators. The investigation determined that the cause was the intermittent obstruction of the Aircraft left side pitot probes and generated the following safety recommendation:

- The European Aviation Safety Agency (EASA) should consider mandating the qualification aspects of the pitot probes in icing conditions to meet the new requirements of CS-25, Amendment 16, for forward fitting to aircraft in production and for retrofitting to aircraft already in service.

This topic is part of the safety issue "ice in flight" identified and addressed in the EASA Safety Risk Portfolio. The aircraft type specific vulnerabilities are solved through the Continuous Airworthiness process.

EASA Actions:

EASA has decided to mandate the qualification aspects of the pitot probes in icing conditions to meet the new requirements of CS-25, Amendment 16 for all new Type Certificate application received after January 1st, 2010 by a mean of a Special Condition.

About the in-service fleet, EASA will not mandate the probes compliant with CS-25 amendment 16, because as of today no unsafe condition has been identified for any of the Airbus models with their probes, after the actions taken in the Single Aisle (SA) and Long Range (LR) families:

- Single Aisle family (A318/A319/A320/A321) and Long Range family (A330/A340): two kind of probes were installed on the fleet. EASA has mandated the Goodrich ones through AD 2015-0205 (SA) and AD 2009-0195 (SA) which restored the safety of the fleets. Therefore, no further mandatory actions will be taken.

- Wide Body family (A300, A310), A350, A380: there is no unsafe condition with the current probes. No mandatory action will be taken.

Conclusions

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Conclusions

In 2018, EASA received a total of 54 safety recommendations that:

- originated from 32 occurrences (22 accidents and 10 serious incidents);
- were addressed by Safety Investigation Authorities of 13 different States;
- were issued entirely by EASA Member States;
- 35 were classified as being of Union-wide Relevance (SRUR);
- 29 were classified as safety recommendations of Global Concern (SRGC); and
- the majority (54 %) were related to procedures or regulations, while 27% were related to aircraft or aviation-related equipment/ facilities.

This number of safety recommendations EASA received in 2018 is higher than the previous year, but still in line with the significant reduction recorded in 2017 when compared to the number of safety recommendations received between 2012 and 2016. One of the elements that contributed to the slight increase compared to 2017 is that in 2018 three investigation reports were published that contained significant batches of safety recommendations (9, 5 and 4 respectively) addressed to the Agency.

In response, the Agency in 2018 produced 133 replies to 127 safety recommendations:

- ✓ 76 of them, 57 percent of the replies, were final (closing safety recommendations) with 43 percent of them carrying an agreed assessment, and 46 percent with partial agreement;
- ✓ The remaining 57 updating replies provided information on the progress of the actions decided upon by the Agency and for which the relevant activities were not yet completed;
- ✓ 80 percent of the final responses provided by EASA and assessed by the originator of the recommendation were “adequate” or “partially adequate”.

The number of replies provided in 2018 was consistent with the number of replies provided in 2017. In particular, the 76 closing replies sent in 2018 allowed a significant reduction in the number of safety recommendations currently open for the Agency. Furthermore, the actions taken by the Agency in response to the safety recommendations involved several of the key safety topics that are currently part of the EPAS and are included in the safety risk management process.

Annex List

Please view the annexes by following the link below:

https://www.easa.europa.eu/document-library/general-publications/annual-safety-recommendations-review-2018#group-easa-downloads

- **Annex A:** List of 2018 Safety Recommendations Replies (pp. 2)
- **Annex B:** Definitions (pp. 192)
- **Annex C:** Safety Recommendations classification (pp.196)

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