EUROPEAN AVIATION SAFETY AGENCY
AGENCE EUROPÉENNE DE LA SÉCURITÉ AÉRIENNE
EUROPÄISCHE AGENTUR FÜR FLUGSICHERHEIT

ANNUAL SAFETY REVIEW 2011

easa.europa.eu

Overview and key facts 2011

Overview of total number of accidents and fatal accidents for EASA MS operators

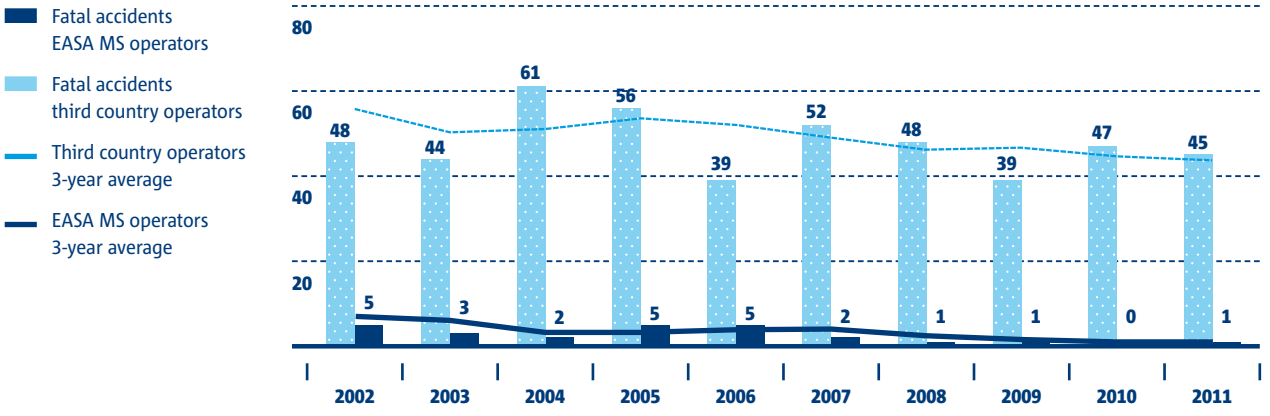
Aeroplanes

Period	Number of accidents	Fatal accidents	Fatalities on board	Ground fatalities
2000–2009 (average)	30	4	89	0
2010 (total)	28	0	0	0
2011 (total)	32	1	6	0

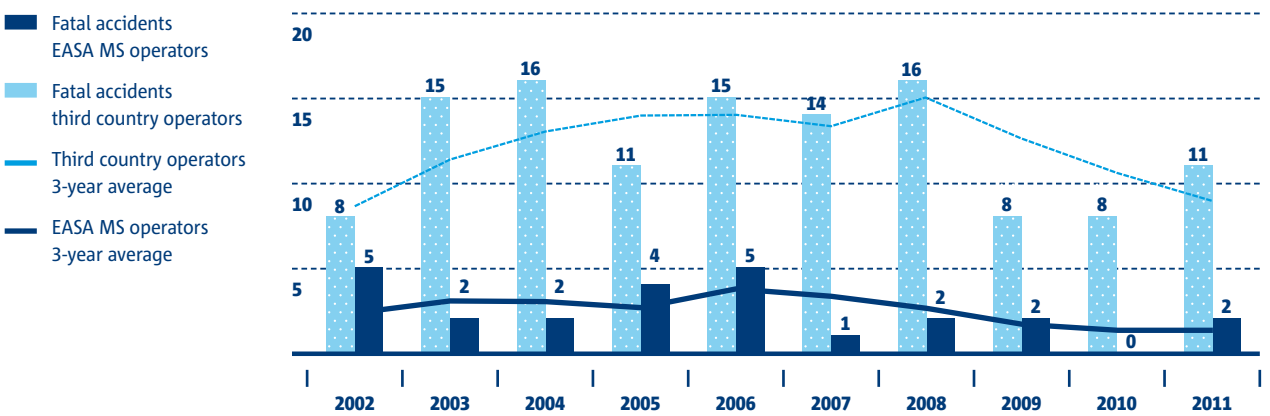
Helicopters

Period	Number of accidents	Fatal accidents	Fatalities on board	Ground fatalities
2000–2009 (average)	8	3	12	0
2010 (total)	2	0	0	0
2011 (total)	6	2	4	0

Fatal accidents in commercial air transport – EASA MS and third country operated aeroplanes



Fatal accidents in commercial air transport – EASA MS and third country operated helicopters



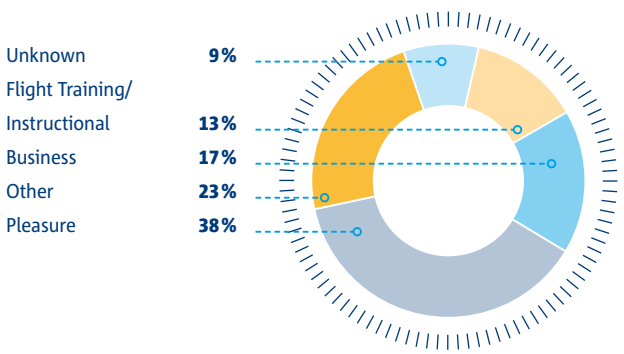
Overview of total number of accidents and fatal accidents by aircraft category – EASA MS registered aircraft with MTOM below 2 250 kg

Aircraft category	Period	Number of all accidents	Fatal accidents	Fatalities on board	Ground fatalities
Balloon	2006–2010	20	0	0	0
	2011	24	3	4	0
Dirigible	2006–2010	0	0	0	0
	2011	1	1	1	0
Aeroplane	2006–2010	518	62	116	1
	2011	499	62	103	1
Glider	2006–2010	183	18	21	0
	2011	166	18	24	0
Gyroplane	2006–2010	11	3	3	0
	2011	26	5	7	0
Helicopter	2006–2010	81	10	22	1
	2011	72	10	20	0
Microlight	2006–2010	211	34	49	0
	2011	204	43	61	0
Other	2006–2010	76	12	14	0
	2011	62	18	19	0
Motorgliders	2006–2010	58	9	13	0
	2011	55	9	14	0
Average	**2006–2010**	**1158**	**149**	**238**	**3**
Total	**2011**	**1109**	**169**	**253**	**1**
Increase (%)	**2011 over previous**	**– 4.2 %**	**13.7 %**	**6.4 %**	**– 68.8 %**

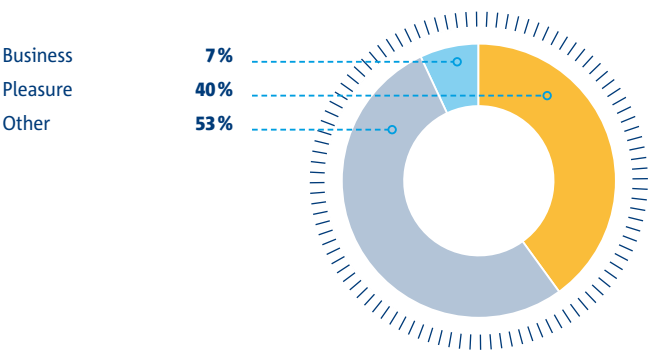
Note: Figures for period 2006–2010 are average of the five years.

Fatal accidents in General Aviation by aircraft category and type of operation (2002–2011)

Aeroplanes



Helicopters











EUROPEAN AVIATION SAFETY AGENCY
AGENCE EUROPÉENNE DE LA SÉCURITÉ AÉRIENNE
EUROPÄISCHE AGENTUR FÜR FLUGSICHERHEIT

ANNUAL SAFETY REVIEW

2011

easa.europa.eu

Table of Contents

Executive summary

The accidents of the year 2011 send a contradictory signal: on the one hand, the number of accidents involving passenger fatalities in scheduled operations worldwide remained high at 16, but the related number of fatalities to passengers dropped from 658 in 2010 to 330 in 2011.

The drop in the number of passenger fatalities can be mainly attributed to the involvement of smaller aircraft in fatal accidents as well as to a lower proportion of fatalities of persons on board when compared to the previous year.

In Europe, the number of fatalities in 2011 was one of the lowest in the past decade. There was a single fatal accident in which 6 of the 12 persons on board received fatal injuries. For the decade 2002–2011, the rate of accidents in scheduled operations in EASA Member States (EASA MS) is one of the lowest in the world with 1.6 fatal accidents per 10 million flights.

The Air Traffic Management (ATM) domain has a small contribution, either direct or indirect, to accidents and incidents in the overall aviation system. However, efforts are still required to continuously improve ATM safety.

For the sixth year, the Agency collected from EASA MS data for light aircraft with a certificated Maximum Take-Off Mass (MTOM) of 2 250 kg or less. Although reporting of accidents has been comprehensive, the quality of some reports would benefit from further improvement in order to better identify the circumstances of the accidents.

This Annual Safety Review (ASR) has been expanded by adding a new chapter to address safety in relation to aerodromes. In this chapter issues such as runway excursions and bird strikes are briefly covered. In addition, information on aviation activities in Europe, developed by EUROCONTROL, has been added. This chapter aims to provide an overview of the state of the aviation industry in terms of traffic movements as well as fleet size.

1. Introduction

1.1 Background

Air transport is one of the safest forms of travel. Nevertheless, it is essential to continuously improve that level of safety for the benefit of European citizens. The European Aviation Safety Agency (EASA) is the centrepiece of the European Union's (EU) strategy for aviation safety. The Agency develops common safety and environmental rules at European level. Also, it monitors the implementation of standards through inspections of the Member States and provides the necessary technical expertise, training and research. The Agency works hand in hand with national authorities which continue to carry out many operational tasks, such as certification of individual operators, aircraft or pilot licensing.

This document is published by EASA to inform the public of the general safety level in the field of civil aviation. The Agency provides this review on an annual basis as required by Article 15(4) of Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008. Analysis of information received from oversight and enforcement activities may be published separately.

1.2 Scope

This Annual Safety Review presents statistics on European and worldwide civil aviation safety. The statistics are grouped according to type of operation, for instance commercial air transport, and aircraft category, such as aeroplanes, helicopters and gliders.

EASA had access to accident and statistical information collected by the International Civil Aviation Organisation (ICAO). States are required, according to ICAO Annex 13 'Aircraft accident and incident investigation', to report to ICAO information on accidents and serious incidents to aircraft with a certificated maximum take-off mass (MTOM) over 2 250 kg. Therefore, most statistics in this review concern aircraft above this mass. In addition to the ICAO data, a request was made to the EASA Member States (EASA MS) to obtain light aircraft accident data for the years 2010 and 2011. Furthermore, data on the operation of aircraft for commercial air transport was obtained from both ICAO and the NLR Air Transport Safety Institute (The Netherlands).

The ASR is based on the data that were available to the Agency and to Eurocontrol on 1st April 2012. Any changes after that date are not included. ***Note:*** Much of the information, is based on initial data. That data is updated when results of investigations become available. As investigations may take several years, data from previous years may need to be updated. This occasionally leads to differences between data reported in this ASR when compared to that of previous years.

In this review the terms 'Europe' and 'EASA Member States' are considered as the 27 EU Member States plus Iceland, Liechtenstein, Norway and Switzerland. The region is assigned based on the State of the Operator of the accident aircraft for commercial air transport operations. For all other operations, the region is assigned based on the State of Registry.

Within the statistics, special attention is given to fatal accidents. In general, these accidents are internationally well documented. Figures including non-fatal accident numbers are also presented. It is recognised that additional information could be presented by using advanced statistical tests, however this would add complexity to the document.

1.3 CONTENT OF THE REVIEW

The goal of the report is to cover all aspects of aviation within the remit of the agency. Consequently, a new chapter on aerodromes has been added. The chapter on Air Traffic Management (ATM) has, as in the previous year, been provided by EUROCONTROL. An introductory chapter on aviation activities in Europe was added in order to put the accident and incident data reported into their proper context.

The Annual Safety Review no longer provides the specific safety related activities of EASA. Information on activities in Europe aimed at improving safety are published in the European Aviation Safety Plan (EASp), which is found at: **http://easa.europa.eu/sms/**

CHAPTER 2 presents an overview of the historical development of commercial aviation safety. It has been shortened and now only provides the accident rate for the last twenty years. **CHAPTER 3** describes the fleet and number of traffic movements in EASA MS. Statistics on commercial air transport operations are provided in **CHAPTER 4**. **CHAPTER 5** provides data on general aviation and aerial work. **CHAPTER 6** covers light aircraft accidents in EASA MS. **CHAPTER 7** gives a summary of the data in the European Central Repository (ECR) of occurrences. **CHAPTER 8** discusses aerodrome related safety issues and **CHAPTER 9** focuses on ATM issues.

Data and analysis in the ASR is in most parts restricted to the remit of the Agency and therefore it contains few or no information on operations such as State Flights, Search and Rescue or Fire-fighting conducted by aircraft operated by the military as well as ultralight aircraft.

A list of used definitions and acronyms as well as extra information on the accident categories used can be found in **APPENDIX 1: DEFINITIONS AND ACRONYMS**.

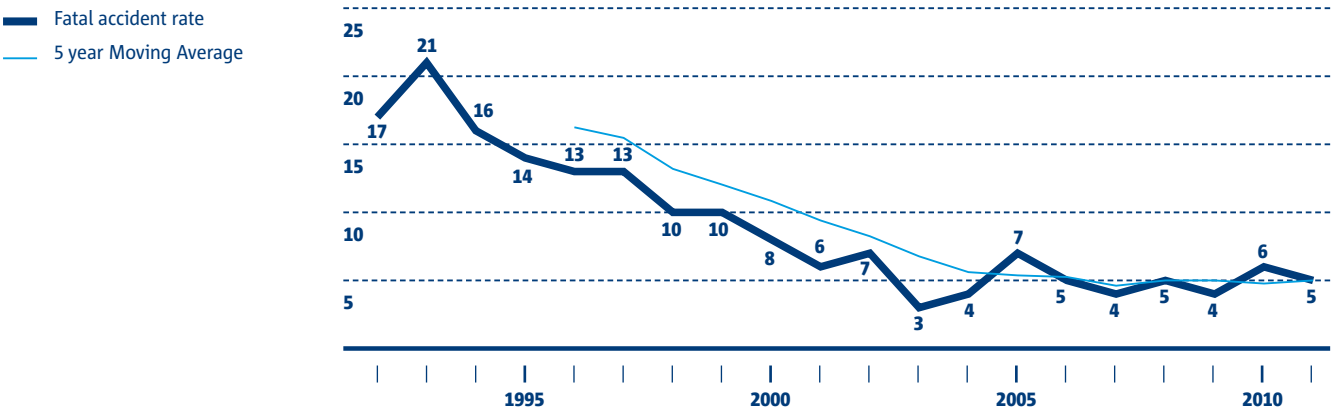

SIDE STICK PRIORITY
TERR ON ND
NORTH REF
ECAM SWITCHING
LDG GEAR
AUTOBRK
DOOR/OXY
CABIN
CARGO
BULK
LDG GEAR GRVTY EXTN
A/THR
A/THR

2. Historical development of aviation safety

Until 2009, the Annual report of the Council, ICAO produced accident rates for accidents involving passenger fatalities in scheduled operations. The progress of this rate over the past 20 years is shown in **FIGURE 2-1**.

FIGURE 2-1

GLOBAL RATE OF ACCIDENTS INVOLVING PASSENGER FATALITIES PER 10 MILLION FLIGHTS, SCHEDULED COMMERCIAL AIR TRANSPORT OPERATIONS, EXCLUDING ACTS OF UNLAWFUL INTERFERENCE

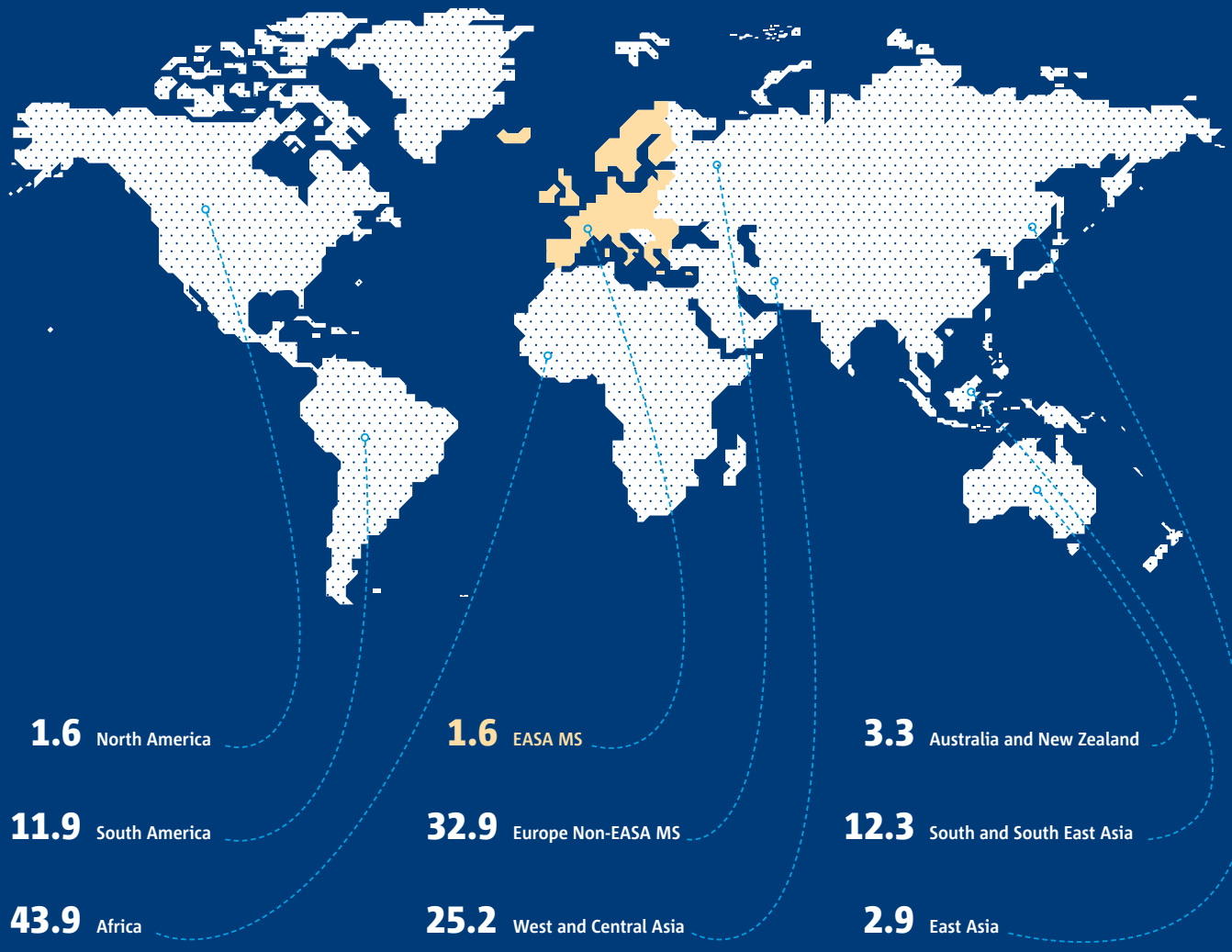


Note: The figure for the year 2010 was revised based on new traffic data. The data shown for 2011 are based on preliminary estimates.

From 1993 the rate of accidents involving passenger fatalities in scheduled operations (excluding acts of unlawful interference) per 10 million flights dropped continuously until 2003, when it reached its lowest value of 3. In recent years the rate of fatal accidents has not improved significantly, averaging between 4 and 5 fatal accidents per 10 million flights. Also, the 5 year moving average rate has remained almost constant since 2004.

FIGURE 2-2 shows that the fatal accident rate differs significantly per world region.

FIGURE 2-2 **RATE OF FATAL ACCIDENTS PER 10 MILLION FLIGHTS PER WORLD REGION (2002–2011, SCHEDULED PASSENGER AND CARGO OPERATIONS)**



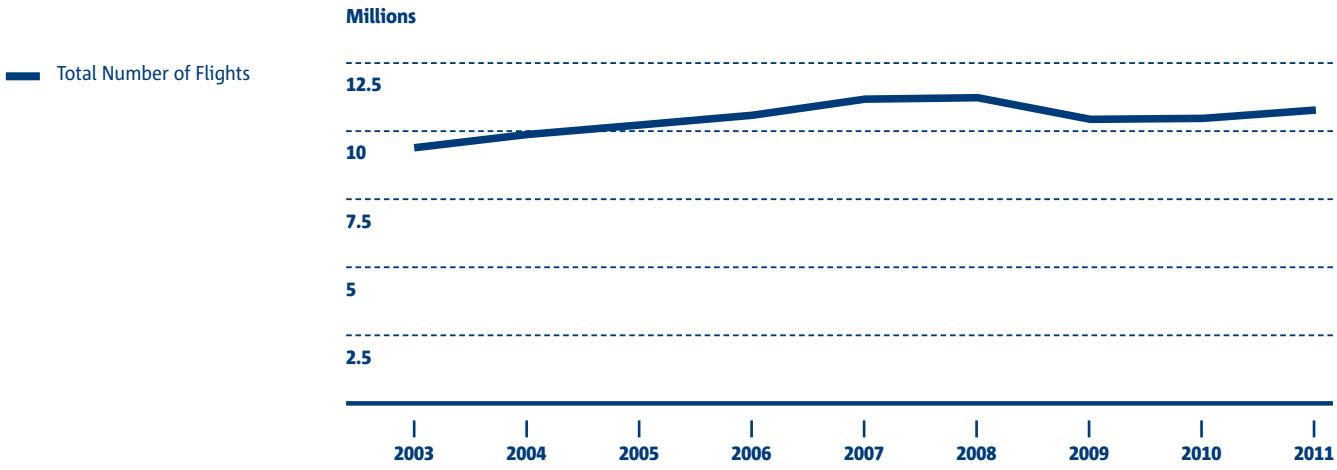
Note: Compared to the Annual Safety Review of 2010 the rate of accidents for EASA MS has dropped from 3.3 to 1.6 fatal accidents. This change is mainly because of the exceptionally high accident rate (11.7) which EASA MS operated aircraft had in the year 2001. This year is not included in the Review of 2011 (includes only the decade 2002–2011).


A04
A46

3. Evolution of Air Transport in EASA MS

Since 2003 the traffic levels in the EASA MS showed a steady yearly increase that reached a maximum of 5.6 % in 2008. This was followed by a significant dive, of over 7 % in 2009, that could be associated with the beginning of the global economic crisis. As from 2010 the traffic level started to recover slowly. The level reached in 2011 is similar to the one of 2006.

FIGURE 3-1 **EVOLUTION OF TRAFFIC IN EASA MS (2003 – 2011)**



Note: EASA MS includes the airspace of the EU27 Member States, Switzerland, Norway and Iceland. Liechtenstein does not have a national Flight Information Region hence it is not considered in the above chart.

3.1 EVOLUTION OF THE TRAFFIC LEVELS IN EASA MS BY MARKET SEGMENTS

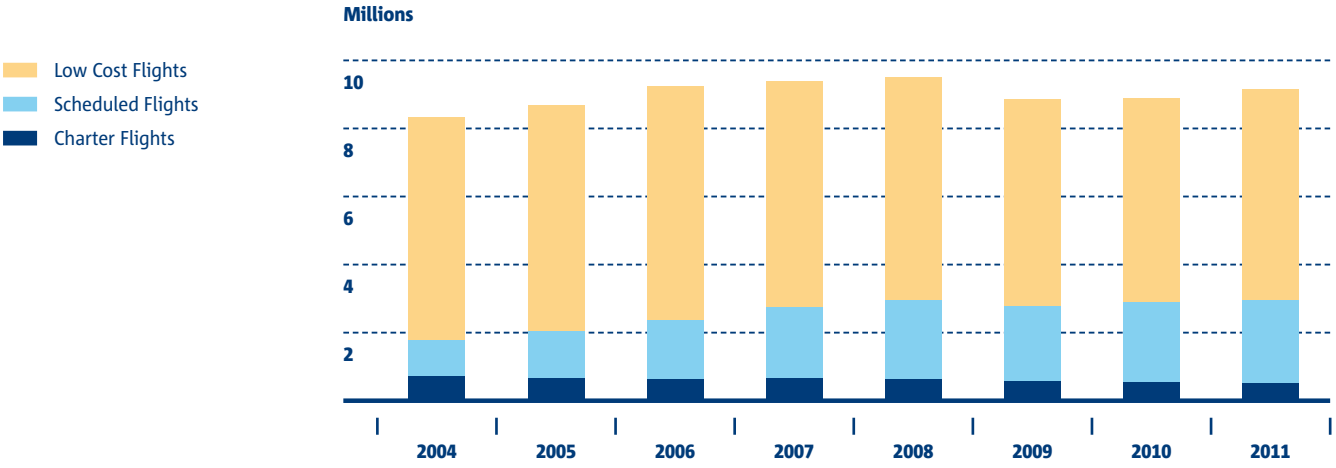
The chart below shows the evolution of the number of flights in EASA MS airspace over the last seven years broken down on the type of flight based on the most common market segments: charter, low-cost and scheduled flights.

It is to be noted that over the period analysed the low-cost flights faced the most significant increase compared with the other market segments, the number of flights in 2011 being more than double compared with the level of 2004.

The most significant yearly increase in the number of low-cost flights was of over 60 % in 2004, followed by a slower increase in the following years.

FIGURE 3-2

EVOLUTION OF TRAFFIC IN EASA MS BY MARKET SEGMENT



The beginning of the global economic crisis marked the 2009 traffic levels when the number of low-cost flights dropped with 2.9 % in comparison with the previous year. However, it is to be noted that this market segment was the least affected, as the charter flights suffered a drop of 13 %, followed by the scheduled flights with around 7 %.

Last but not least, over the analysed period in the given geographical area, the overall number of charter flights fell by 35 % whilst the number of scheduled flights decreased only by 5 %.

3.2 EVOLUTION OF THE NUMBER OF REGISTERED AIRCRAFT IN EASA MS

The information below is based on data from Eurocontrol Central Flow Management Unit and contains information only on aircraft filling a flight plan. Therefore aircraft below 2 250 kg which do not file a flight plan are not represented. **FIGURE 3-3** provides the evolution over the past four years of the number of aircraft registered in EASA MS. It is notable that the number of registered aircraft in the analysed region decreased continuously over the last years.

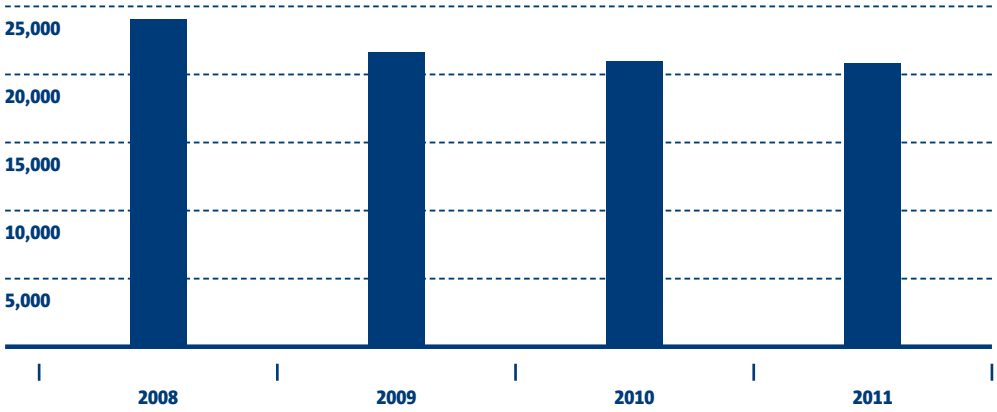
The most significant drop of 10 % took place in 2009, period associated with the beginning of the global economic crisis.

FIGURE 3-4 shows the composition in 2011 of EASA MS registered aircraft by mass category. Aircraft with mass from 5 701 kg to 272 000 kg represent more than 60 % of the fleet.

FIGURE 3-5 depicts the composition in 2011 of EASA MS registered aircraft by aircraft category. More than 90 % of aircraft are aeroplanes with helicopters representing 5 % of the total fleet.

Note: All figures in this chapter provided by EUROCONTROL © 2012

FIGURE 3-3 **EVOLUTION OF EASA MS REGISTERED AIRCRAFT**



Note: EASA MS includes the airspace of the EU27 Member States, Switzerland, Norway and Iceland. Liechtenstein doesn't have a specific ICAO 2-letter designator hence it is not considered in the analysis.

FIGURE 3-4 **AIRCRAFT REGISTERED IN EASA MS BY MASS CATEGORY**

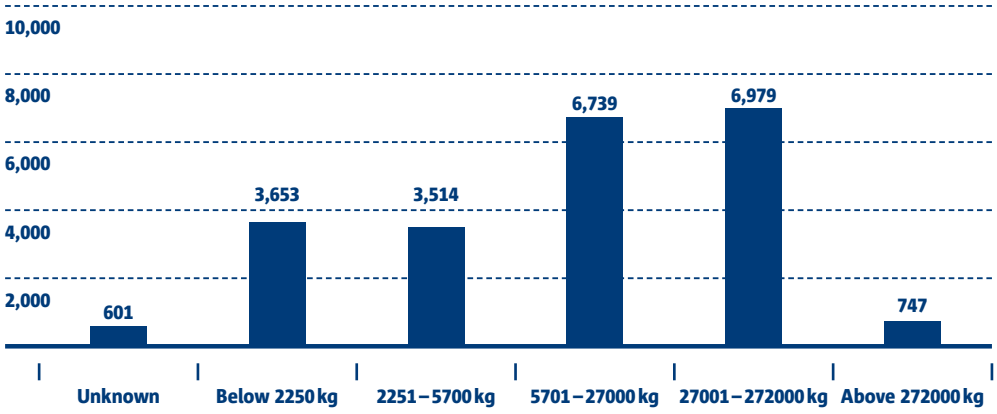
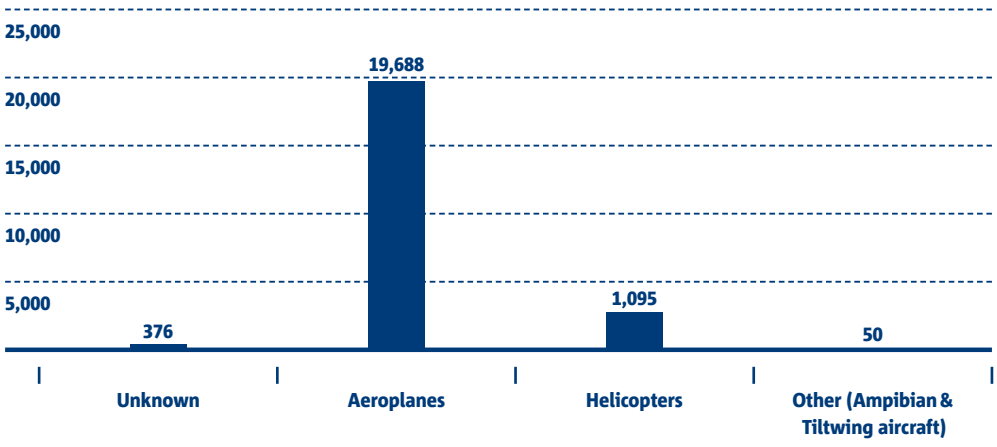


FIGURE 3-5 **AIRCRAFT REGISTERED IN EASA MS BY AIRCRAFT CATEGORY**



4. Commercial Air Transport

Commercial air transport operations involve the transportation of passengers, cargo and mail for remuneration or hire. The accidents included in this chapter involved at least one aircraft with a certificated maximum take-off mass (MTOM) over 2 250 kg. Aircraft accidents are aggregated by the State in which the aircraft operator was registered. Accidents and fatal accidents are identified as such using the definitions of ICAO Annex 13 'Aircraft accident and incident investigation'. The first section of this chapter is focused on aeroplanes and the second on helicopters.

4.1 Aeroplanes

In 2011 a single fatal accident involving an aeroplane operated in EASA MS occurred. The aircraft was a Swearingen SA227 and 6 of the 12 occupants on board received fatal injuries. **Table 4-1** shows that the number of fatal accidents in 2011 was below the average in the previous decade (4 per year) and so was the number of fatalities. The 32 accidents in 2011 represent a higher number than last year (28) and also a higher one than the average in the previous decade (30).

Table 4-1 **Overview of total number of accidents and fatal accidents for EASA MS operators (aeroplanes)**

Period	Number of accidents	Fatal Accidents	Fatalities on board	Ground fatalities
2000–2009 (average per year)	30	4	89	0
2010 (total)	28	0	0	0
2011 (total)	32	1	6	0

FIGURE 4-1

FATAL ACCIDENTS IN COMMERCIAL AIR TRANSPORT – EASA MS AND THIRD COUNTRY OPERATED AEROPLANES

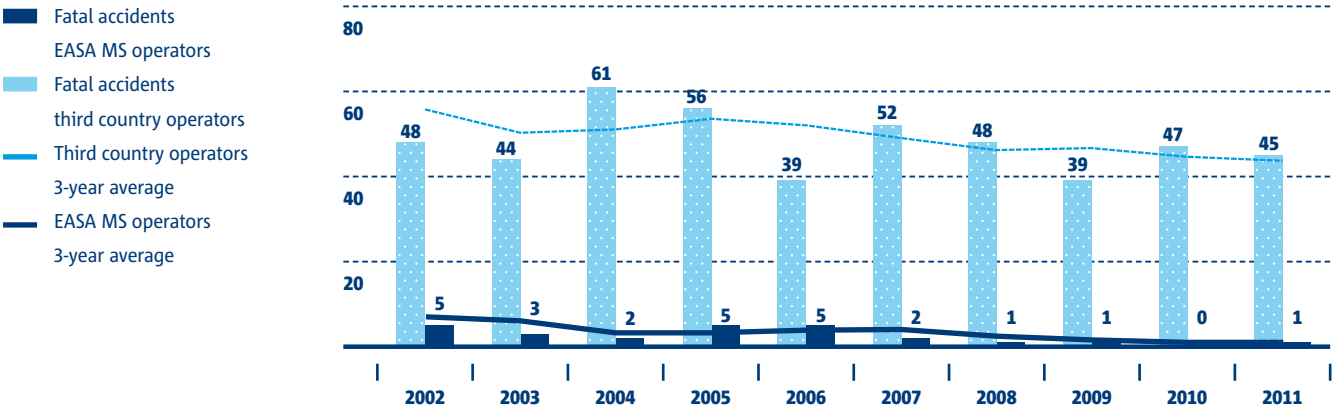


FIGURE 4-2

RATE OF FATAL ACCIDENTS IN SCHEDULED PASSENGER OPERATIONS – EASA MS AND THIRD COUNTRY OPERATED AEROPLANES (FATAL ACCIDENTS PER 10 MILLION FLIGHTS)

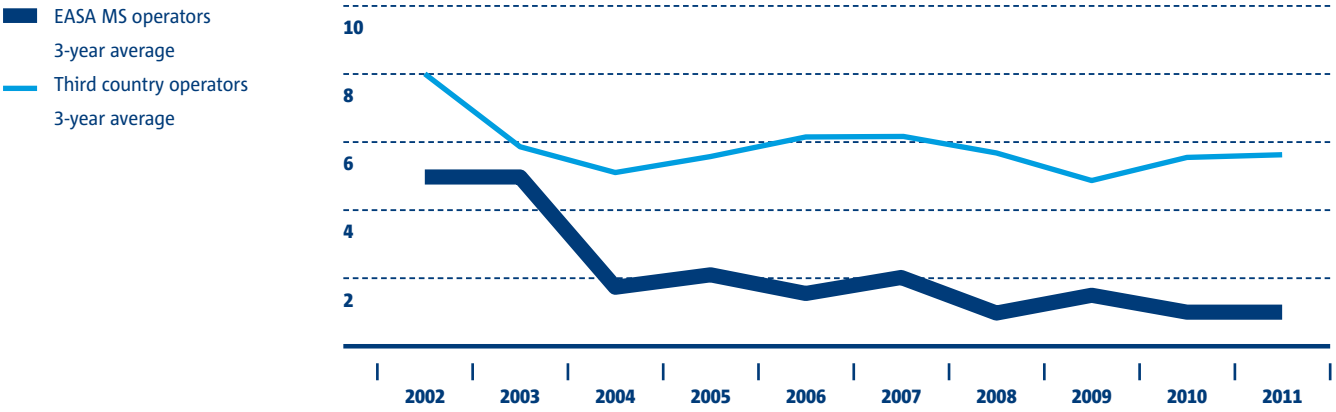


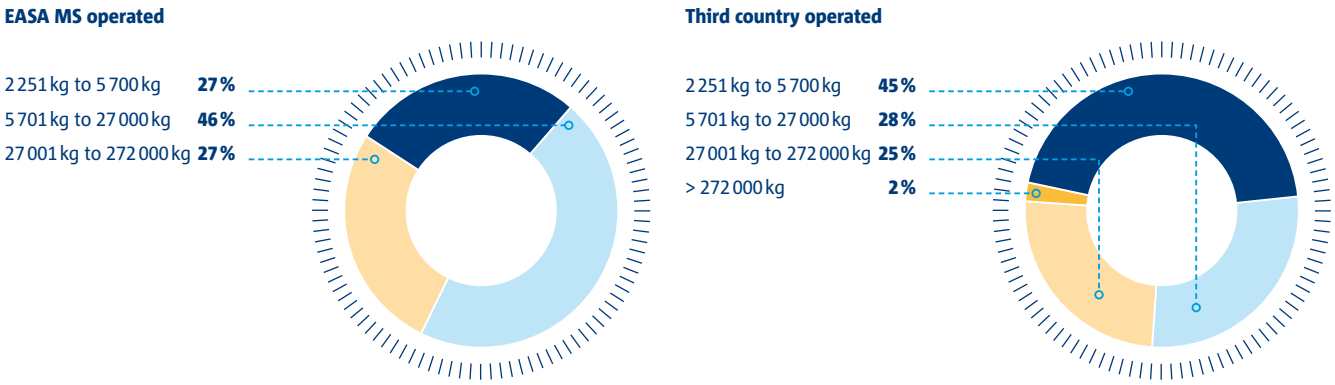
FIGURE 4-1 shows that the number of fatal accidents involving EASA MS operated aeroplanes has decreased significantly in the last decade. In recent years the number of fatal accidents indicates an improvement in safety for EASA MS operators. For operators outside EASA MS (third country operators) the number of fatal accidents has marginally decreased to 45 from 47 last year.

FIGURE 4-2 shows that the improvement in the level of safety is also reflected in the rates of fatal accidents. These are created by comparing the number of fatal accidents with the number of flights conducted by EASA MS and third country operators. In 2011 the average rate of fatal accidents for EASA MS operators was less than one (0.96) per 10 million flights.

4.1.1 FATAL ACCIDENTS BY AIRCRAFT MASS CATEGORY

FIGURE 4-3 describes, for the last decade, the proportion of fatal accidents by aircraft mass category (weight) for operators based in third countries and those based in EASA MS.
For third countries it shows that 45 % of the aircraft involved in fatal accidents were of mass between 2 251 kg and 5 700 kg. Examples of such aircraft are the Beechcraft King Air, the

FIGURE 4-3 **FATAL ACCIDENTS BY AIRCRAFT MASS CATEGORY**



Cessna 208 Caravan, the De Havilland DHC-6 and others. Aircraft with mass between 5 701 kg and 27 000 kg were involved in 28 % of the fatal accidents for operators outside EASA MS. Examples of such aircraft are the Embraer 145 or the Yakovlev Yak-40. Heavy aircraft with mass greater than 272 000 kg (for example the Boeing 747 'Jumbo') represent only 2 % of fatal accidents in the past decade.

For EASA MS operators aircraft of mass between 2 251 kg to 5 700 kg were involved in 27 % of fatal accidents. This proportion is lower for EASA MS operated aeroplanes compared to third country operated (45 %) and the difference is due to a much smaller number of these aircraft being used for commercial air transport operations in Europe. Aircraft of mass between 5 701 kg and 27 000 kg were involved in 46 % of the fatal accidents. Another 27 % of fatal accidents involved aircraft in the mass category between 27 001 kg and 272 000 kg. The majority of jet powered aircraft belong to this mass category.

4.1.2 ACCIDENT CATEGORIES

The assignment of an accident under a single or multiple occurrence categories assists the identification of particular safety issues. Accident categories were assigned to fatal and non-fatal accidents which involved EASA MS operated aeroplanes based on the CAST-ICAO Common Taxonomy Team (CICTT[1]) definitions. An accident may have more than one category, depending on the circumstances contributing to the accident.

FIGURE 4-4 shows that the accident categories with the highest number of fatal accidents in the decade of 2002 to 2011 were LOC-I ('Loss of control in flight') and CFIT ('Controlled Flight Into Terrain'). Events assigned under LOC-I involve the momentary or total loss of control of the aircraft by the crew. This loss might be the result of reduced aircraft performance or because the aircraft was flown outside its capabilities for control. CFIT accidents involve the aircraft colliding with terrain while it is still under the control of the crew. Such accidents can be the result of loss of situational awareness or of errors of the crew in managing the aircraft systems. The Figure also shows that the highest number of non-fatal accidents involved an ARC ('Abnormal runway contact'). These accidents include long, fast or hard landings as well as the scraping of the tail or the wing of the aircraft during take-off or landing.

Note: [1]The CICTT developed a common taxonomy for the classification of the occurrences for accident and incident reporting systems. Further information may be found in Appendix 1: Definitions and acronyms.

FIGURE 4-4

ACCIDENT CATEGORIES FOR FATAL AND NON-FATAL ACCIDENTS – NUMBER OF ACCIDENTS BY EASA MS OPERATED AEROPLANES (2002–2011)

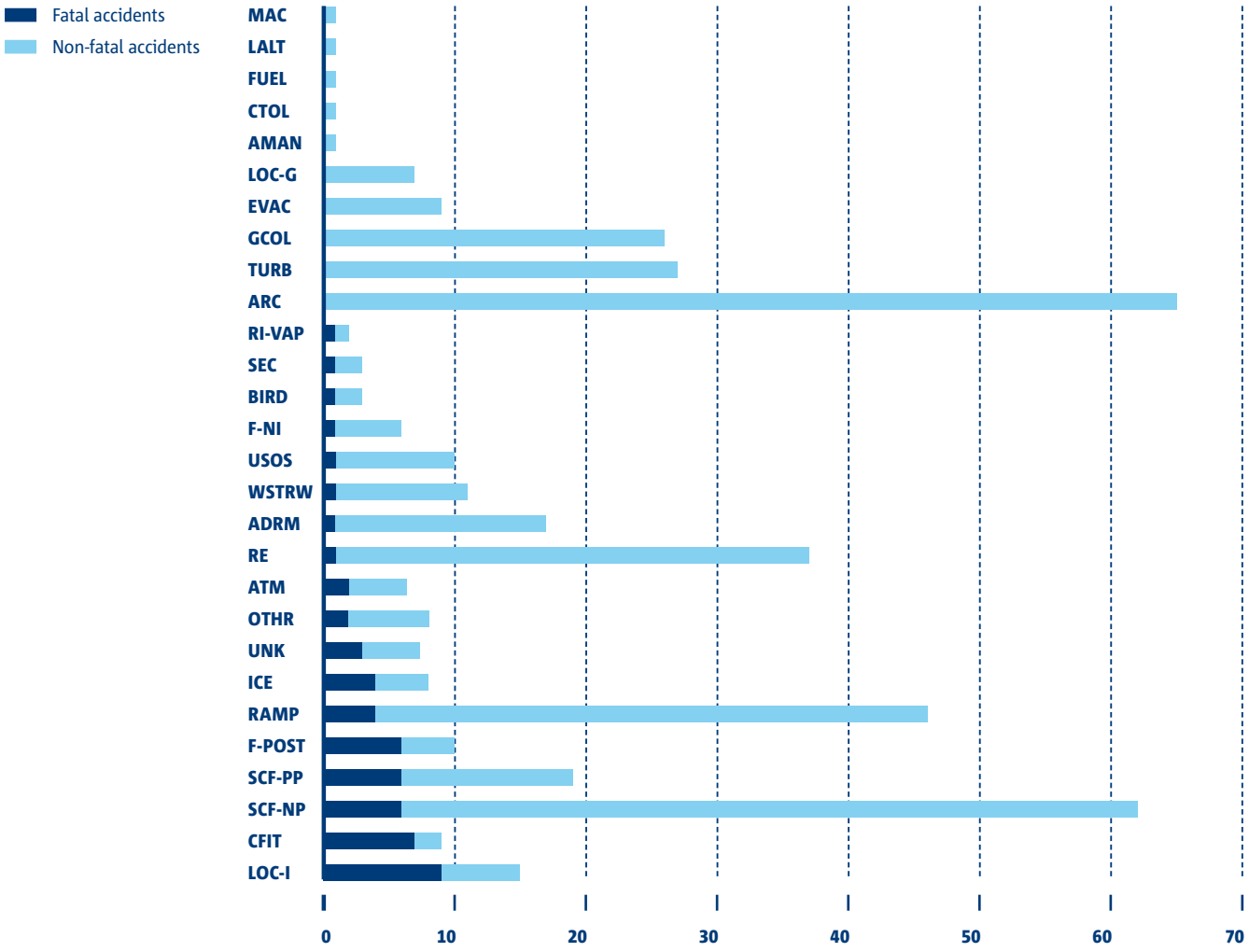


FIGURE 4-5

ANNUAL PROPORTION FROM ALL ACCIDENTS IN PERCENTAGE OF CFIT, SCF-PP AND LOC-I ACCIDENT CATEGORIES – EASA MS OPERATED AEROPLANES

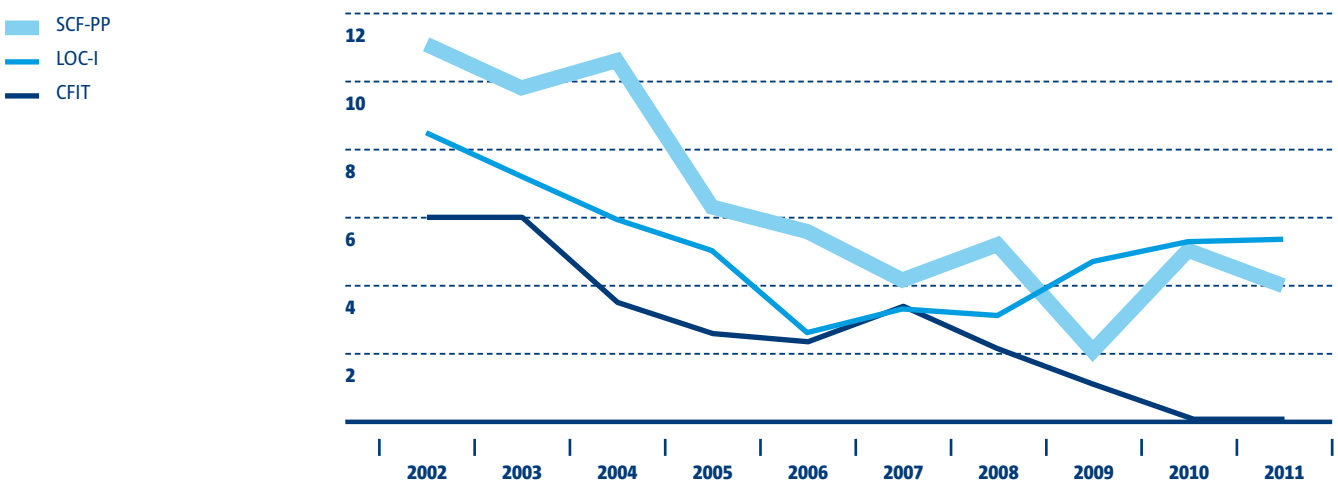


FIGURE 4-5 shows the trend of some of the occurrence categories over time. The graph is created by calculating the percentage of accidents which have been categorised under the occurrence categories. From this Figure it is evident that CFIT accidents involving EASA MS operated aircraft have an overall decreasing trend over the past decade. This can be attributed to technological improvements and to increased awareness of situations which may lead to such accidents. A similar trend is also shown for accidents which involve the failure of a system or component directly related to the operation of an engine, SCF-PP ('System or Component failure related to powerplant'). In recent years there has been an increasing trend in the number of accidents involving loss of control (LOC-I).

4.2 HELICOPTERS

The following section provides an overview of accidents in helicopter commercial air transport operations (MTOM above 2 250 kg).

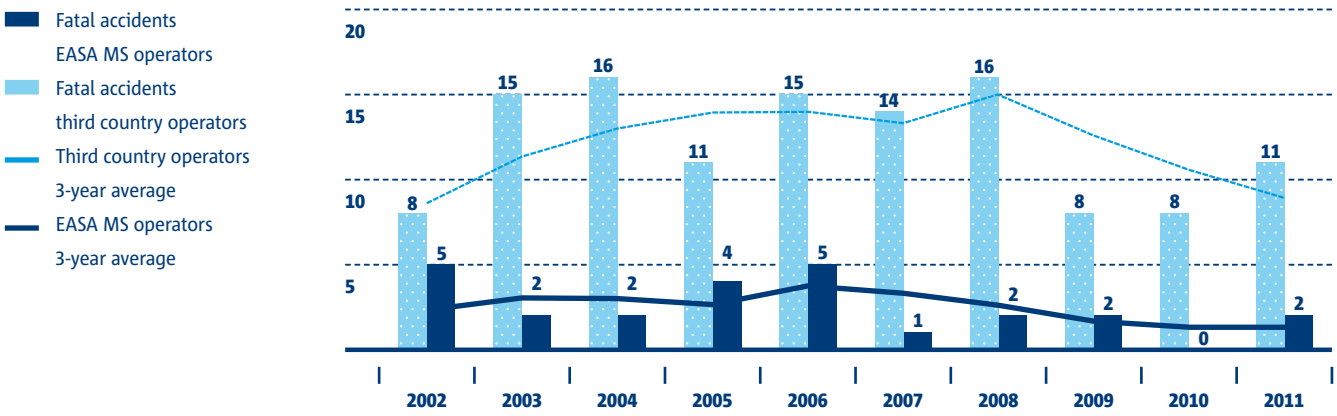
TABLE 4-2 shows that in 2011 there were 6 accidents, of which 2 were fatal, involving helicopters in commercial air transport operations, by EASA MS operators. Although both numbers are slightly below the decade average, they are higher than in the previous year.

TABLE 4-2 OVERVIEW OF TOTAL NUMBER OF ACCIDENTS AND FATAL ACCIDENTS FOR EASA MS OPERATORS (HELICOPTERS)

Period	Number of accidents	Fatal Accidents	Fatalities on board	Ground fatalities
2000–2009 (average per year)	8	3	12	0
2010 (total)	2	0	0	0
2011 (total)	6	2	4	0

FIGURE 4-6 compares the number of fatal accidents between operators in EASA MS and those in other regions (third country operators). Overall, fatal accidents involving EASA MS operators represent 20 % of the number of fatal accidents worldwide. For third country operators, from 2009 and onwards there has been a considerable decrease in the number of fatal accidents.

FIGURE 4-6 FATAL ACCIDENTS IN COMMERCIAL AIR TRANSPORT – EASA MS AND THIRD COUNTRY OPERATED HELICOPTERS



4.2.1 Fatal accidents per type of operation

Figure 4-7 shows the number of fatal accidents by type of operation during the period of 2002 to 2011. For third country operated helicopters the highest number of fatal accidents occurred in passenger operations. Most fatal accidents of EASA MS operated aircraft (13) involved helicopter emergency medical services (HEMS[2]). This represents 42 % of the total number of fatal accidents for helicopter EMS operations worldwide. The category 'Other' includes cargo and air taxi operations.

4.2.2 Accident categories

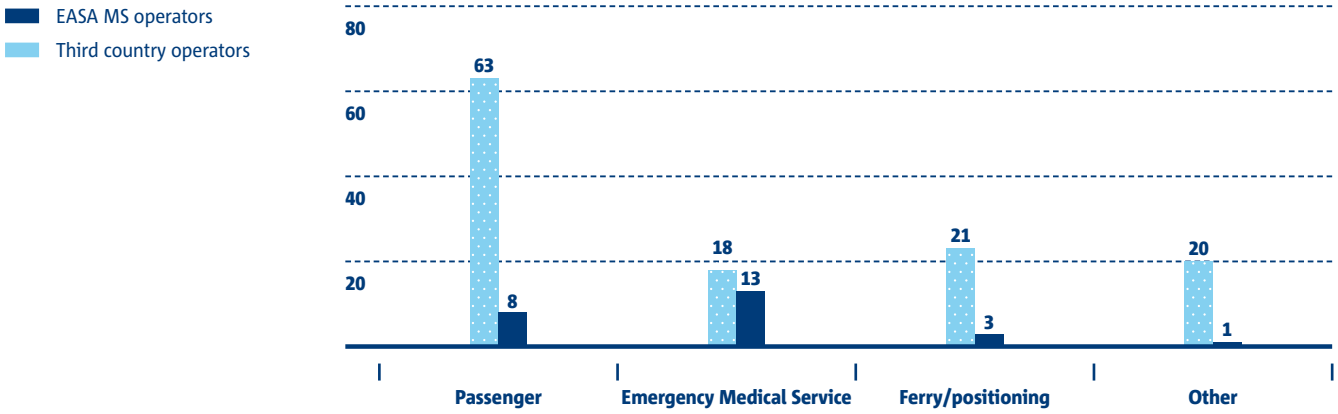
In order to assist in the identification of particular safety issues, one or multiple accident categories were assigned to helicopter accidents involving EASA MS operators. This was done using the CICTT definitions which were explained in **section 4.1.2**.

Figure 4-8 shows that the category with the highest number of fatal accidents is CFIT ('Controlled flight into terrain'), followed by LALT ('low altitude related operations'). This occurrence category includes accidents which occur while the aircraft is flown intentionally at low altitude, excluding the phases of take-off and landing. For helicopters, the category of SCF-NP ('System or component failure not related to an engine') includes accidents related to a malfunction of the gearbox.

Accidents in the category 'Collision with obstacles during take-off and landing' (CTOL) include all accidents during take-off and landing where the main or tail rotor collided with objects on the ground. This category is applicable mainly to helicopters as these aircraft often operate in confined areas close to obstacles.

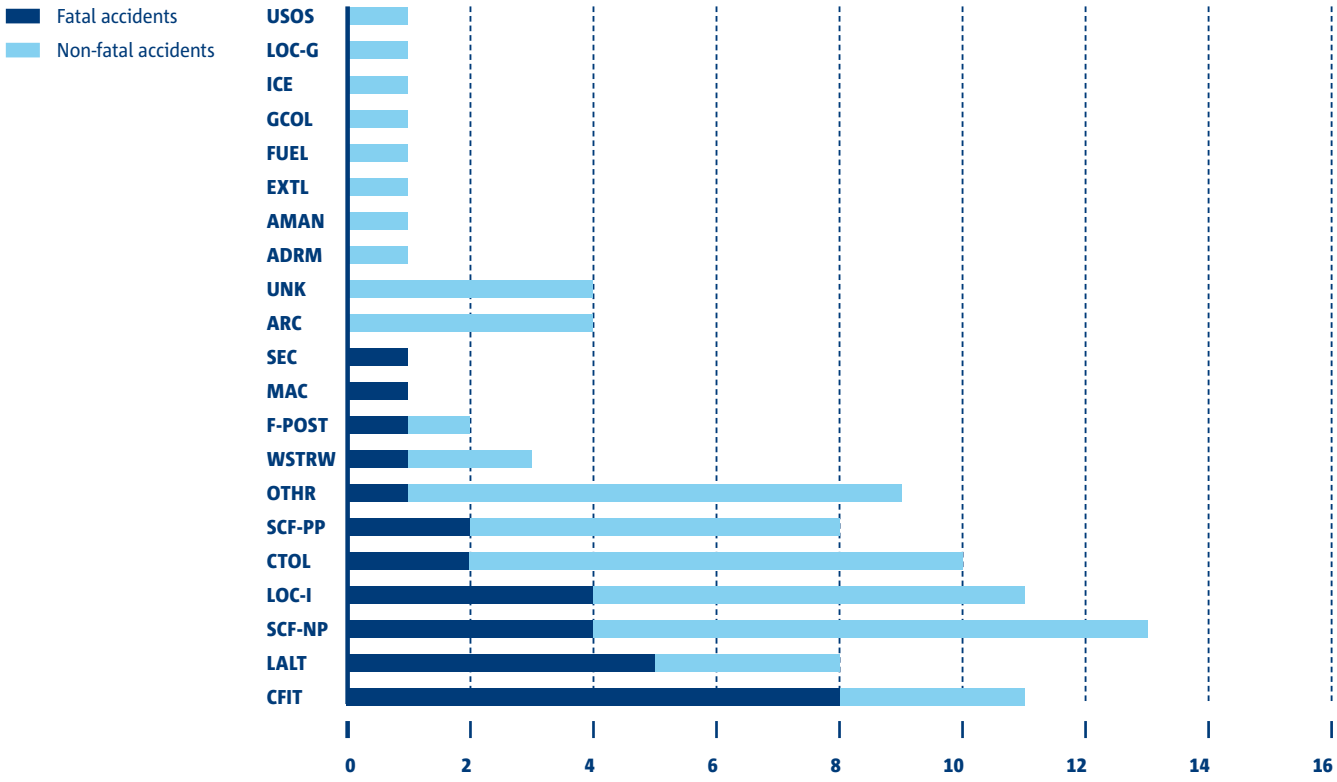
Figure 4-7

Fatal accidents by type of operation – EASA MS and third country operated helicopters (2002 – 2011)



Note: [2] HEMS flights facilitate emergency medical assistance, where immediate and rapid transportation of medical personnel, medical supplies or injured persons is essential.

FIGURE 4-8 ACCIDENT CATEGORIES FOR FATAL AND NON-FATAL ACCIDENTS – NUMBER OF ACCIDENTS BY EASA MS OPERATED HELICOPTERS (2002 – 2011)



5. General Aviation and Aerial Work

This chapter discusses accidents which involved aircraft of a mass over 2 250 kg in General Aviation or Aerial Work operations. General Aviation means all civil aviation operations other than commercial air transport or an Aerial Work operation. Aerial Work is an aircraft operation in which an aircraft is used for specialised services such as agriculture, construction, photography, surveying, observation and patrol, search and rescue, aerial advertisement. This chapter includes only aircraft registered in EASA MS.

5.1 Accidents in General Aviation and Aerial Work

In **Table 5-1** the time period presented extends from 2000–2011, showing the number of accidents in 2010 and 2011 as well as the average for the decade preceding these years.

Table 5-1 **Overview of number of all accidents and fatal accidents by aircraft category and type of operation – EASA MS registered aircraft with MTOM above 2 250 kg**

Operation type	Aircraft category	Period	Number of all accidents	Fatal accidents	Fatalities on board	Ground fatalities
General Aviation	Aeroplanes	2000–2009 (average per year)	6	6	12	1
		2010	14	3	6	0
		2011	13	4	12	0
	Helicopters	2000–2009 (average per year)	5	2	3	0
		2010	5	0	0	0
		2011	4	2	6	0
Aerial Work	Aeroplanes	2000–2009 (average per year)	7	2	4	0
		2010	4	0	0	0
		2011	10	2	2	0
	Helicopters	2000–2009 (average per year)	7	2	3	0
		2010	9	3	8	0
		2011	7	4	9	0

FIGURE 5-1 **FATAL ACCIDENTS IN GENERAL AVIATION BY AIRCRAFT CATEGORY AND TYPE OF OPERATION (2002 – 2011)**

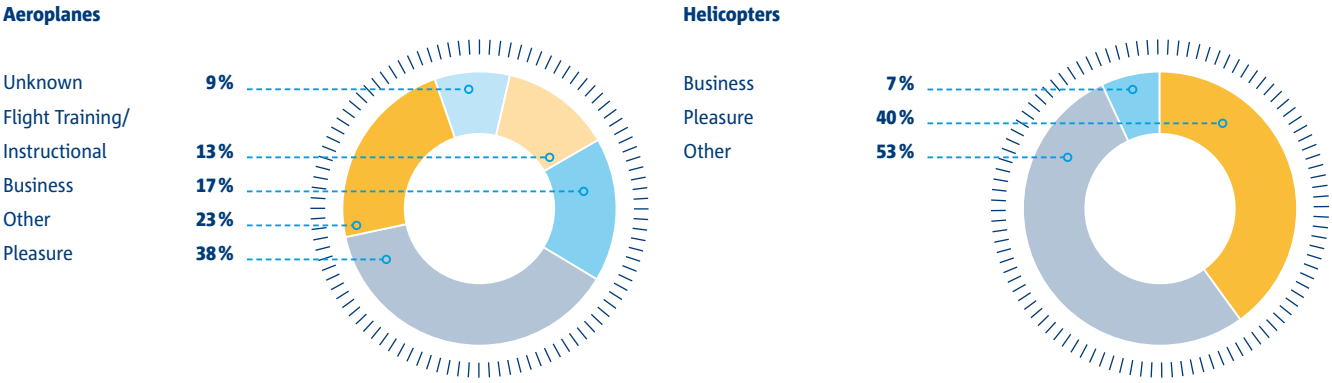
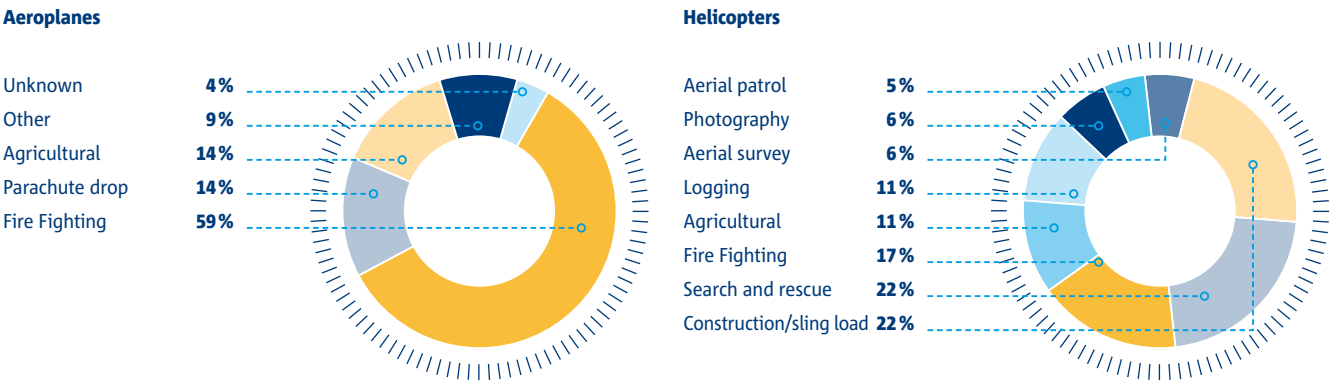


FIGURE 5-2 **FATAL ACCIDENTS IN AERIAL WORK BY AIRCRAFT CATEGORY AND TYPE OF OPERATION (2002 – 2011)**



FIGURES 5-1 and **5-2** show the distribution of fatal accidents by type of operation between aeroplanes and helicopters for the decade 2002 to 2011.

5.2 ACCIDENT CATEGORIES

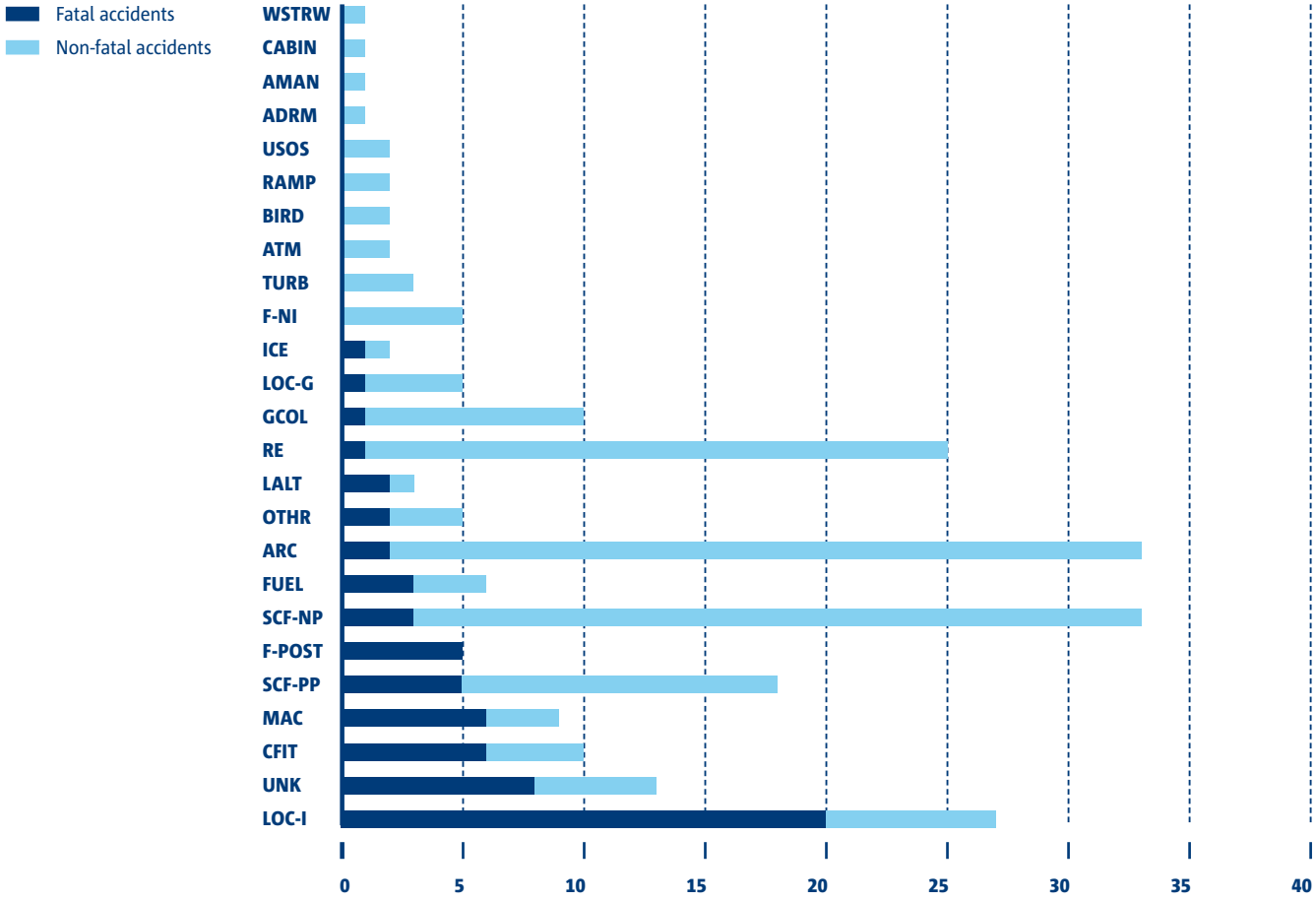
In a similar way to other parts of this review, one or multiple accident categories were assigned to the accidents involving aeroplanes and helicopters in General Aviation and Aerial Work.

5.2.1 AEROPLANES IN GENERAL AVIATION AND AERIAL WORK OPERATIONS

FIGURE 5-3 shows that 'Loss of control in flight' (LOC-I) is the category with the highest number of fatal accidents. The investigation in several of these accidents was not able to determine all the causes which led to the loss of control. There are several fatal accidents with 'Unknown' (UNK) accident category indicating that there was insufficient data to permit classification of these accidents. 'Abnormal Runway Contact' often precedes a 'Runway Excursion' (coded under RE): both accident categories have high numbers of non-fatal accidents.

FIGURE 5-3

ACCIDENT CATEGORIES FOR FATAL AND NON-FATAL ACCIDENTS IN GENERAL AVIATION – NUMBER OF ACCIDENTS BY EASA MS REGISTERED AEROPLANES WITH MTOM ABOVE 2 250 KG (2002 – 2011)



For Aerial Work there is a particular issue in obtaining all data related to accidents in this type of operation. One of the most hazardous types of Aerial Work operation in this regard is related to fire fighting. This activity may be performed by commercial operators but also by State organisations (e.g. Air Force) as 'State Flights', however 'State flights' are not included in this review, because they are outside the responsibilities of the Agency.

FIGURE 5-4

ACCIDENT CATEGORIES FOR FATAL AND NON-FATAL ACCIDENTS IN AERIAL WORK – NUMBER OF ACCIDENTS BY EASA MS REGISTERED AEROPLANES WITH MTOM ABOVE 2 250 KG (2002 – 2011)

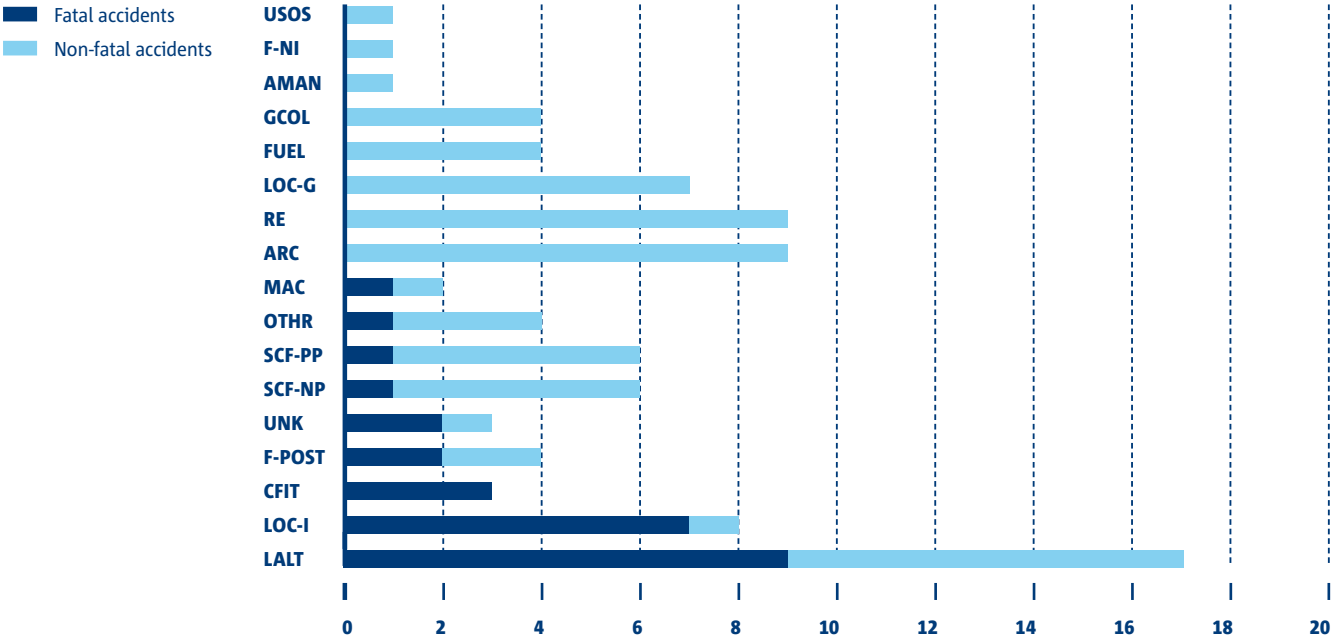


FIGURE 5-4 presents a similar picture for aeroplane accidents in Aerial Work. Accidents involving aeroplanes flying intentionally low, close to the ground (coded under LALT) represent the highest number of fatal accidents. Loss of aircraft control (LOC-I) is the category with the second highest number of fatal accidents, followed by 'Controlled flight into terrain' (CFIT). None of the aircraft involved in these CFIT accidents was equipped with terrain awareness equipment which may have helped to avoid the accidents. There is no requirement for aircraft in this category to be equipped with terrain awareness equipment.

5.2.2 HELICOPTERS IN GENERAL AVIATION AND AERIAL WORK OPERATIONS

Fewer accidents have occurred involving helicopters in both General Aviation and Aerial Work, in comparison to aeroplanes. This is also a reflection of the smaller fleet size of helicopters registered in EASA MS.

FIGURE 5-5 shows that 'Loss of control in flight' (LOC-I) represents the highest number of both fatal and non-fatal accidents in General Aviation helicopter operations. This highlights that loss of control of helicopters remains an issue of concern.

In Aerial Work operations, helicopters are used for a variety of roles which involve manoeuvring at low altitude (LALT) and the carriage of external load (EXTL). Under such conditions any safety issue such as an error in handling or a 'system or component failure related to an engine' may result in a 'Loss of control in flight' (LOC-I).

FIGURE 5-6 shows that such safety issues concern the majority of fatal accidents. It also shows that, for Aerial Work the percentage of fatal compared to non-fatal accidents in low altitude operations (LALT) is much lower for helicopters than for aeroplanes (shown in **FIGURE 5-4**). This is likely to be related with the lower speed of helicopters during such operations compared to aeroplanes.

FIGURE 5-5 ACCIDENT CATEGORIES FOR FATAL AND NON-FATAL ACCIDENTS IN GENERAL AVIATION – NUMBER OF ACCIDENTS BY EASA MS REGISTERED HELICOPTERS WITH MTOM ABOVE 2 250 KG (2002 – 2011)

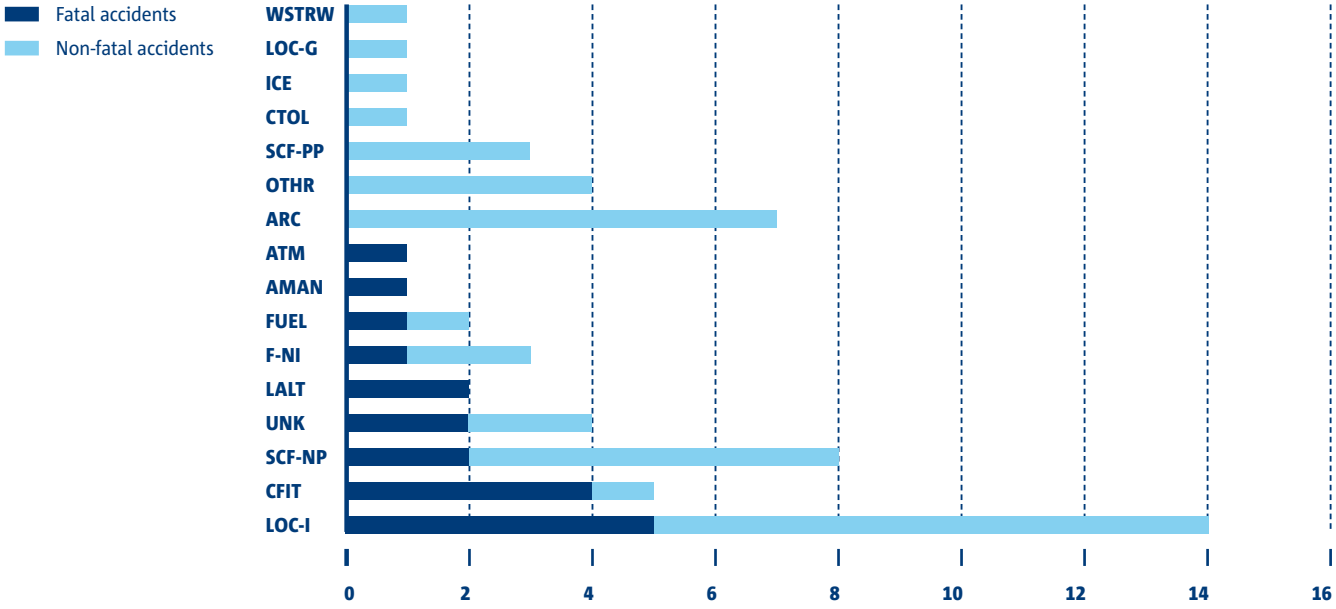
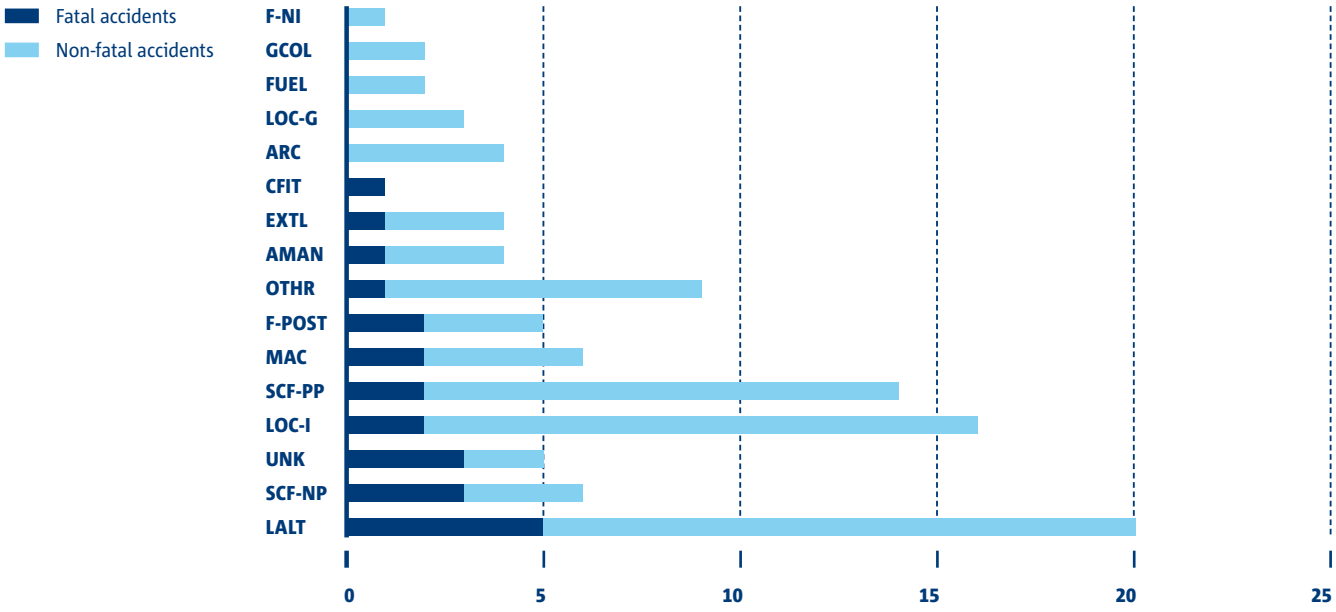


FIGURE 5-6 ACCIDENT CATEGORIES FOR FATAL AND NON-FATAL ACCIDENTS IN AERIAL WORK – NUMBER OF ACCIDENTS BY EASA MS REGISTERED HELICOPTERS WITH MTOM ABOVE 2 250 KG (2002 – 2011)



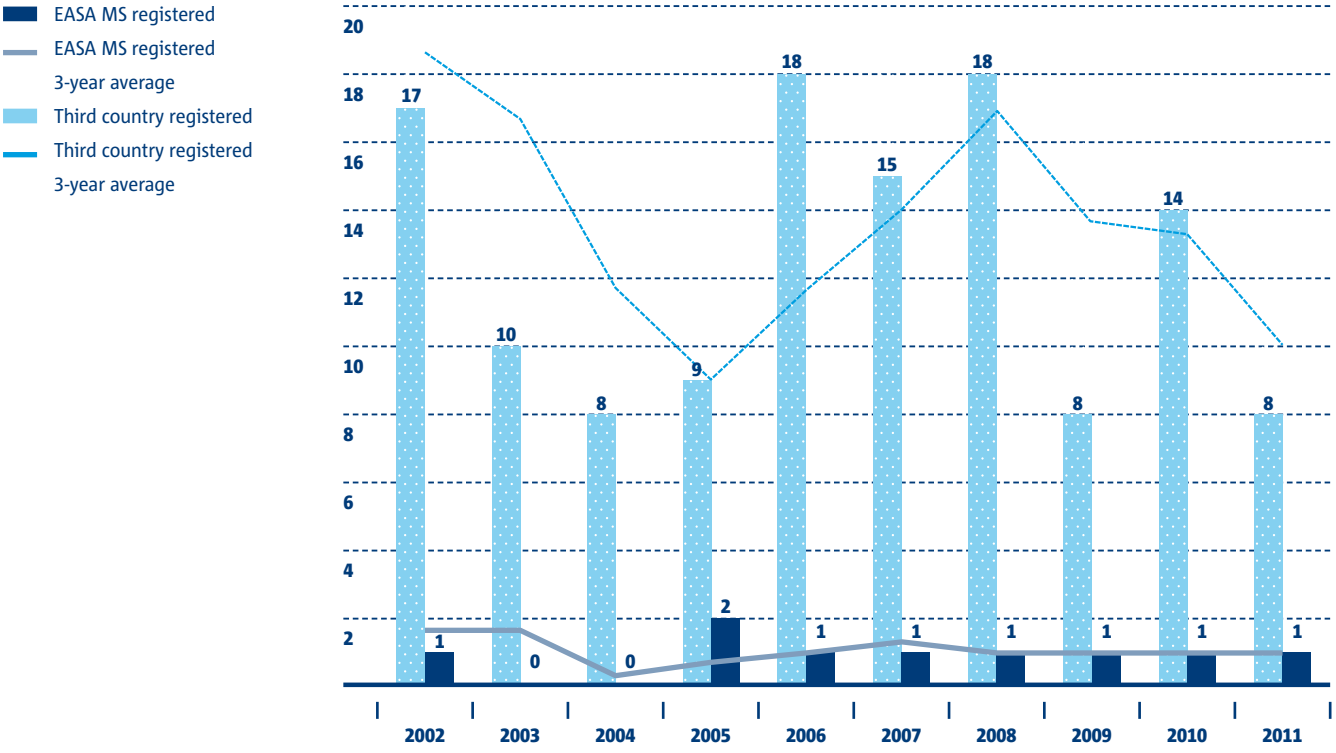
5.3 Business Aviation

According to ICAO, Business Aviation is considered a subset of General Aviation operations. The data on Business Aviation are presented in this document in light of the importance of this sector.

In recent years, there was one accident each year for EASA MS registered aeroplanes. Worldwide, the number of fatal accidents has been overall decreasing in the last decade.

Figure 5-7

Fatal accidents in business aviation – EASA MS and third country registered aeroplanes



6. Light aircraft, aircraft below 2 250 kg MTOM

Only accidents occurring in the territory of the EASA MS are used in this chapter of the ASR. The aircraft considered in this chapter have a MTOM lower than 2 250 kg. Data on accidents involving light weight aircraft was sent from all EASA MS.

As in previous years, the level of reporting and the quality of the reports differs by EASA MS. Some States which previously supplied good quality data did not perform so well, others however showed an improvement in the quality and completeness of the data. Two States provided only a written short summary with limited information which did not enable any further analysis of the accidents.

For the year 2011, three States; Cyprus, Luxembourg and Liechtenstein reported zero accidents in their territory. France, Germany and the UK reported 60 % of all the accidents in 2011. The total number of accidents in 2011 exceeded 1100. It should be noted that the actual number of accidents may differ, as some recent accidents are possibly missing from the database as their investigation continues.

TABLE 6-1 presents the number of accidents, fatal accidents and fatalities in 2011 and compares them with the average for the previous period (2006 – 2010). The total number of accidents decreased in 2011 when compared with the average of the previous years; however globally the fatal accidents and fatalities on board increased. The increase in fatal accidents and fatalities occurred mainly in accidents involving Balloons, Dirigibles and Gyroplanes (and, outside EASA's remit, in Microlights).

TABLE 6-1 **OVERVIEW OF TOTAL NUMBER OF ACCIDENTS AND FATAL ACCIDENTS BY AIRCRAFT CATEGORY – ACCIDENTS IN EASA MS WITH AIRCRAFT BELOW 2 250 KG**

Aircraft category	Period	Number of all accidents	Fatal accidents	Fatalities on board	Ground fatalities
Balloon	2006–2010	20	0	0	0
	2011	24	3	4	0
Dirigible	2006–2010	0	0	0	0
	2011	1	1	1	0
Aeroplane	2006–2010	518	62	116	1
	2011	499	62	103	1
Glider	2006–2010	183	18	21	0
	2011	166	18	24	0
Gyroplane	2006–2010	11	3	3	0
	2011	26	5	7	0
Helicopter	2006–2010	81	10	22	1
	2011	72	10	20	0
Microlight	2006–2010	211	34	49	0
	2011	204	43	61	0
Other	2006–2010	76	12	14	0
	2011	62	18	19	0
Motorgliders	2006–2010	58	9	13	0
	2011	55	9	14	0
Average	**2006–2010**	**1158**	**149**	**238**	**3**
Total	**2011**	**1109**	**169**	**253**	**1**
Increase (%)	**2011 over previous**	**– 4.2 %**	**13.7 %**	**6.4 %**	**– 68.8 %**

Note: Figures for period 2006–2010 are average of the five years.

FIGURE 6-1 **EVOLUTION OF TOTAL NUMBER OF ACCIDENTS OVER THE LAST 6 YEARS – ACCIDENTS IN EASA MS WITH AIRCRAFT BELOW 2 250 KG**

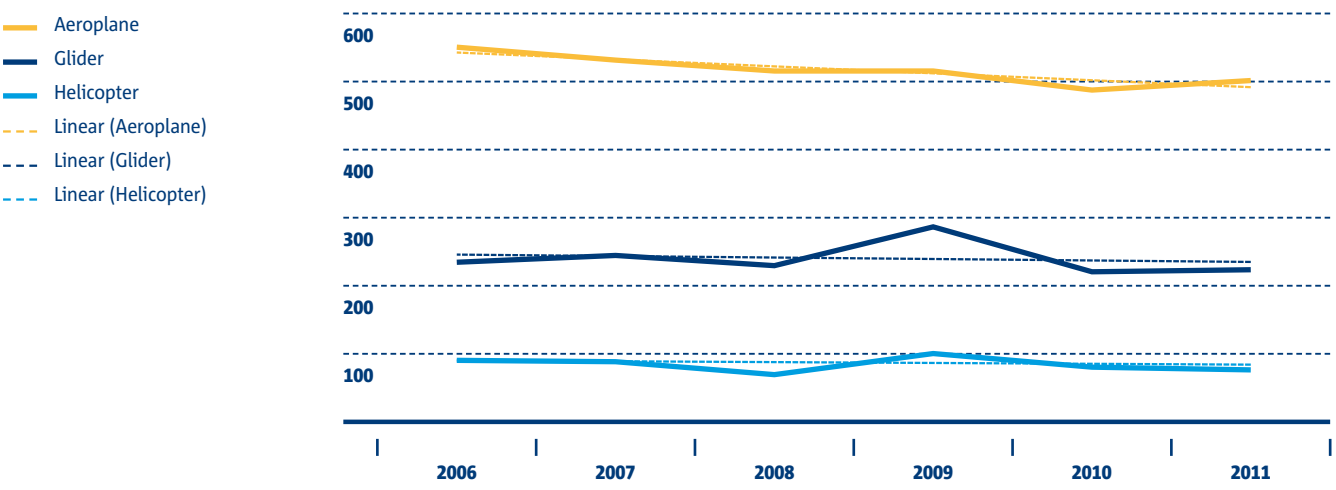


FIGURE 6-1 shows that that the number of accidents in EASA States of aircraft with MTOM below 2250 kg has an overall slightly decreasing trend for the most populous aircraft categories (Aeroplanes, Helicopters and Gliders), as shown in **FIGURE 6-1**. Some other aircraft categories, namely Balloons, Dirigibles, Gyroplanes and Microlights (the latter are outside the remit of EASA) show an increasing trend in the last 6 years.

FIGURE 6-2

FATAL ACCIDENTS BY TYPE OF OPERATION – ACCIDENTS IN EASA MS WITH AIRCRAFT BELOW 2 250 KG (2006 – 2011)

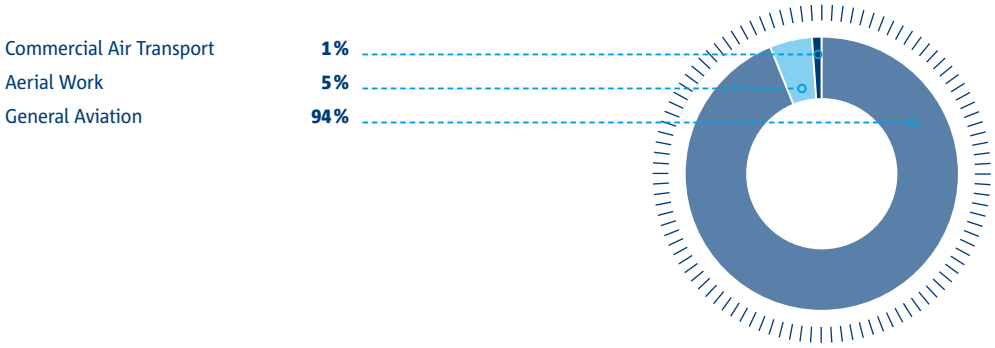
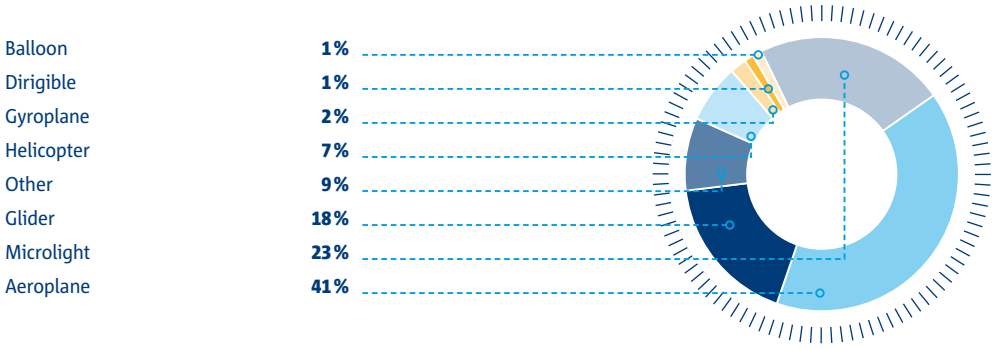


FIGURE 6-3

FATAL ACCIDENTS BY AIRCRAFT CATEGORY – ACCIDENTS IN EASA MS WITH AIRCRAFT BELOW 2 250 KG (2006 – 2011)



6.1 FATAL ACCIDENTS

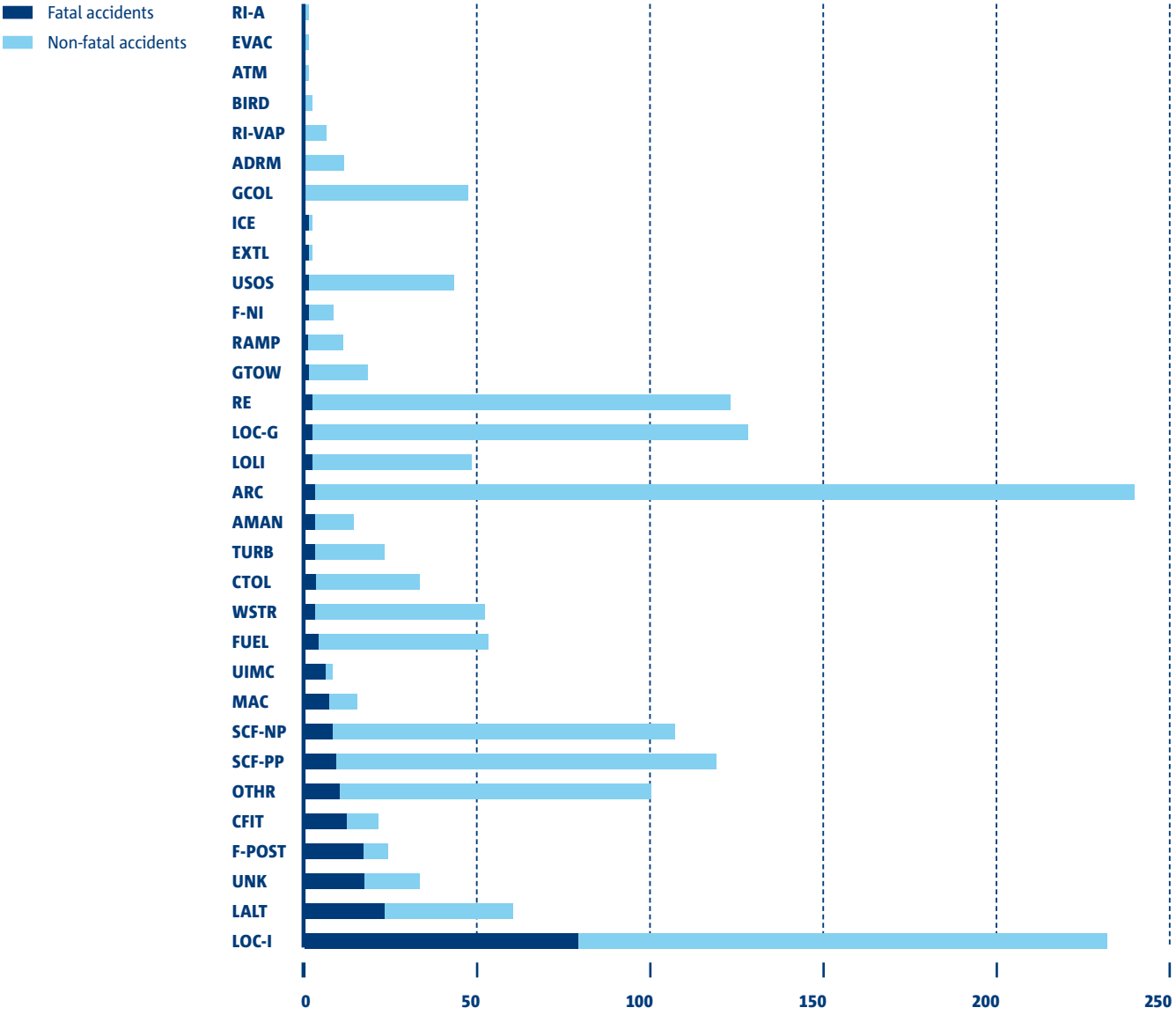
FIGURE 6-2 shows the distribution of fatal accidents per type of operation. The vast majority of fatal accidents in EASA States, of aircraft below 2 250 kg, involved General Aviation (94 %) operations. About 5 % of fatal accidents involved Aerial Work and there are almost no fatal accidents in Commercial Air Transport. One accident (from the 1100) had an "Unknown" type of operation and the percentage is about 0,1 %.

FIGURE 6-3 shows the distribution of fatal accidents per aircraft category. The majority (41 %) of light aircraft involved in fatal accidents 2006 – 2011 were aeroplanes. Microlight aircraft were involved half as much, 23 %, closely followed by gliders with 18 % (motorgliders are included). Balloons are very seldom involved in fatal accidents but in 2011 three fatal accidents occurred.

6.2 ACCIDENT CATEGORIES

The CICTT accident categories were applied by the reporting States to the set of light aircraft accidents for the period 2006 – 2011. The accident categories had been, historically, developed to permit the tracing of the safety efforts for fixed wing air transport operations. Additional categories, more appropriate for General Aviation operation and adequate for light aircraft,

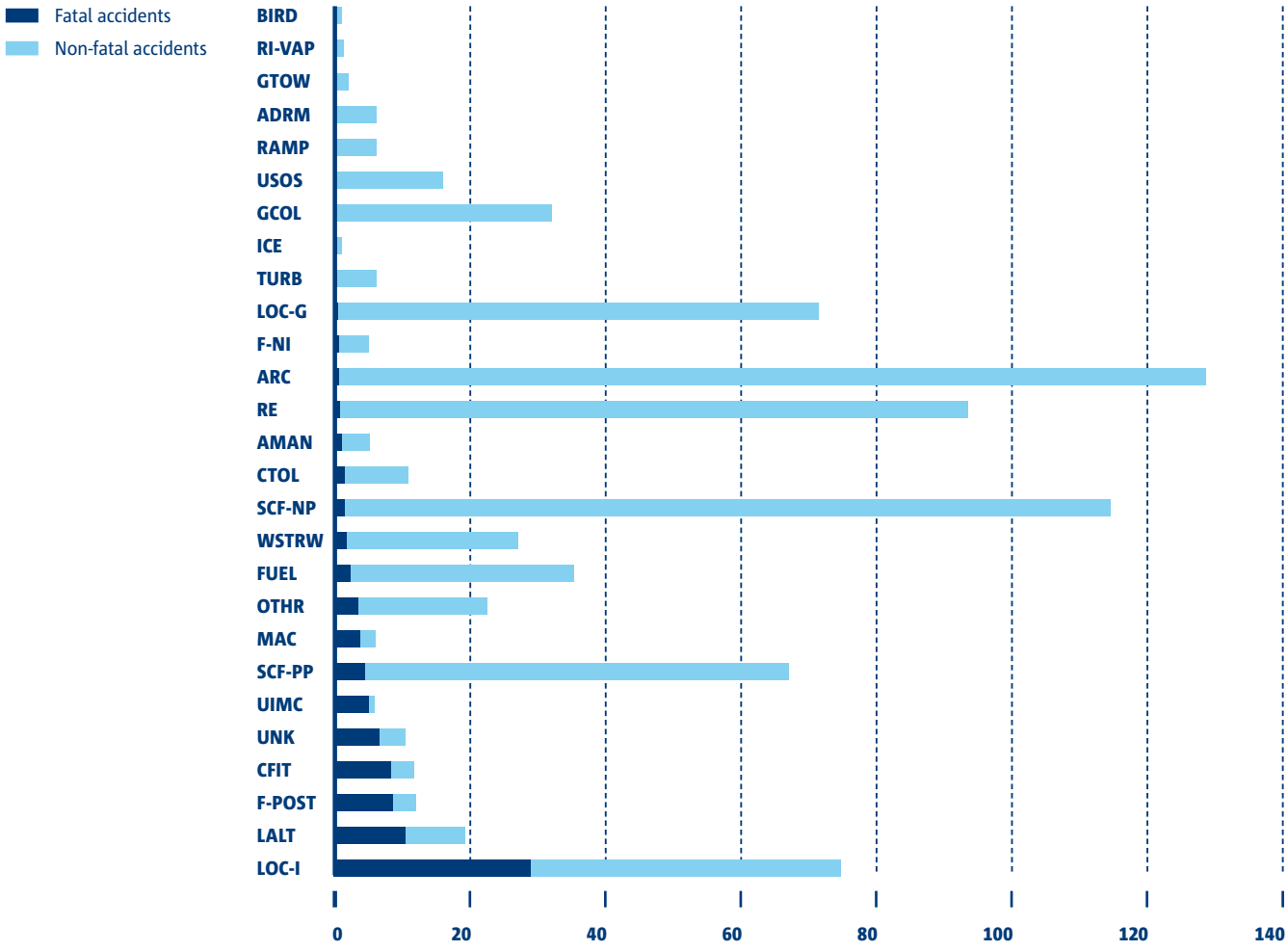
FIGURE 6-4 **ACCIDENT CATEGORIES FOR ALL FATAL AND NON-FATAL ACCIDENTS – ACCIDENTS IN EASA MS WITH AIRCRAFT BELOW 2 250 KG (2006 – 2011)**



rotary wing and gliders, were recently introduced and are already being used in this Review. These are CTOL, GTOW, LOLI and UIMC **(SEE DEFINITIONS AT APPENDIX 1)**. In most cases the new categories were not applied to records before 2010. The analysis may suffer from the non-uniform coding of occurrences by the States although an effort was made to correct the obvious miscoding.

In previous editions of the Annual Safety Review a general figure for all aircraft categories was presented. This figure is retained for comparison purposes, however it is recognized that the accident categories are more correctly represented if separated by the aircraft category (e.g. aeroplanes, helicopters and gliders).

FIGURE 6-5 ACCIDENT CATEGORIES FOR AEROPLANE FATAL AND NON-FATAL ACCIDENTS – IN EASA MS WITH AEROPLANES BELOW 2 250 KG (2006 – 2011)



The highest number of fatal accidents were categorized as 'Loss of Control in Flight' (LOC-I) and 'Low altitude' (LALT). LOC-I is also one of the most significant categories in non-fatal occurrences and as it is shown in the figure that follow this applies for all categories of aircraft.

The 'Unknown' (UNK) category is still the fifth most frequent in fatal accidents. This is assigned when the category could not be determined during the investigation or if the investigation was not finished. As accidents are more in-depth investigated, the number of accidents assigned under this category should be reduced.

FIGURE 6-5 shows that the category assigned most frequently to fatal accidents involving aeroplanes was LOC-I. This is followed by LALT and F-POST, which may eventually have been assigned together with LOC-I. The figure also shows that there is a high number of fatal accidents involving 'Unintended flight into Instrument Meteorological Conditions' (UIMC). As this is one of the new categories and not used before 2010, the value in the graph understates it's importance.

FIGURE 6-6 **ACCIDENT CATEGORIES FOR HELICOPTER FATAL AND NON-FATAL ACCIDENTS – IN EASA MS WITH HELICOPTERS BELOW 2 250 KG (2006 – 2011)**

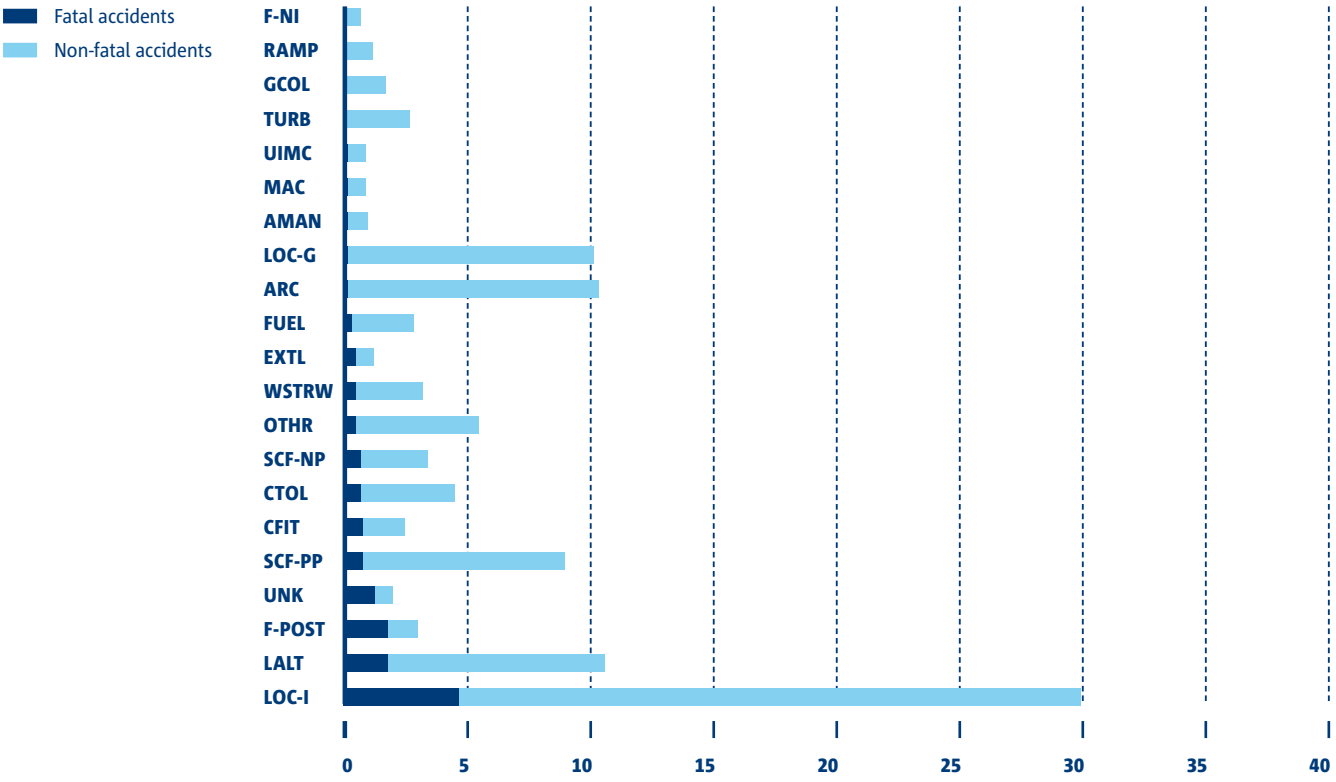


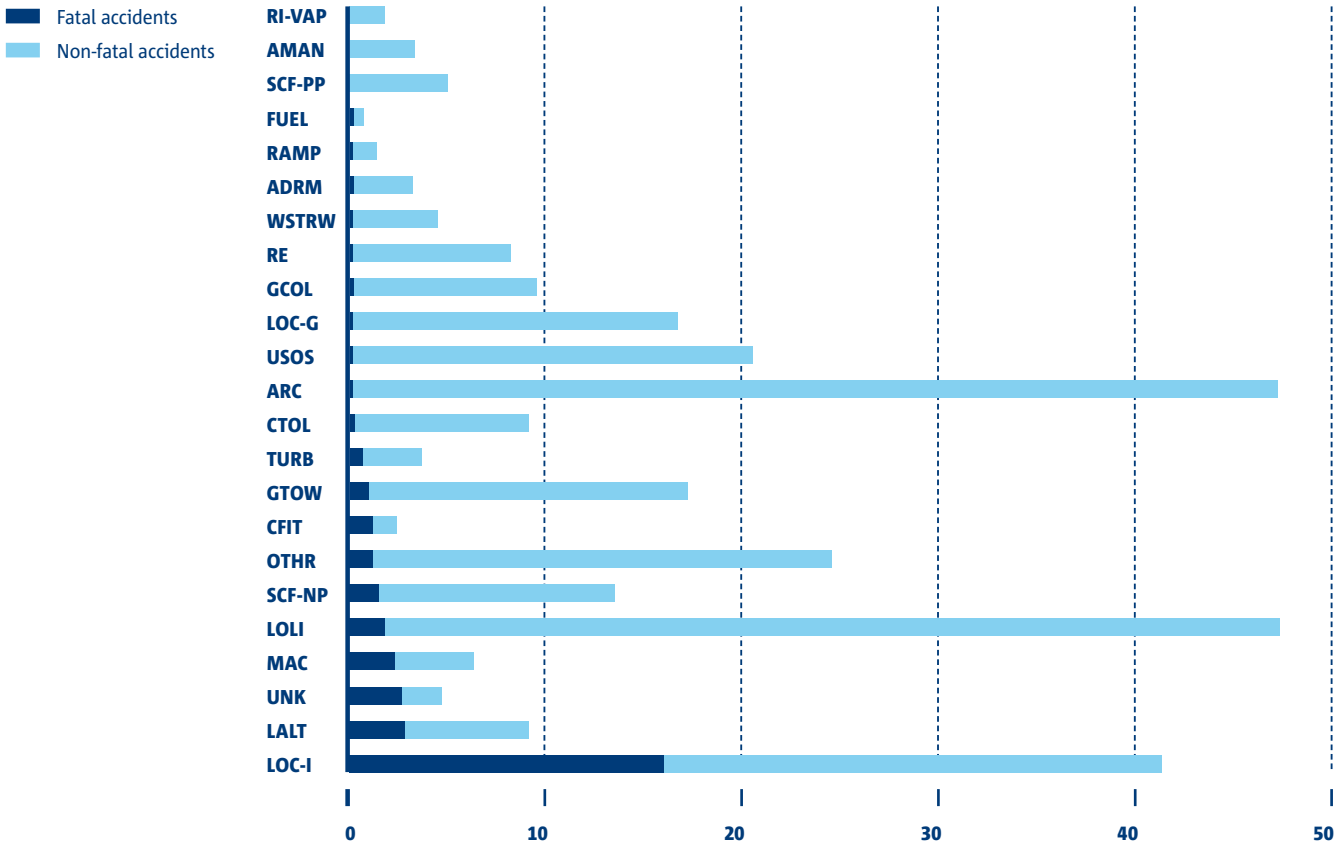
FIGURE 6-6 shows that for helicopters LOC-I is the most important category, in terms of fatal accidents but also as the most frequent one. The second most important is LALT.

FIGURE 6-7 shows the accident categories in aircraft category Glider. LOC-I is the most important category also for gliders, having the highest number of fatal accidents assigned.

To be noted is the high incidence of 'Mid-Air proximity or collisions' (MAC) for glider compared to helicopters and aeroplanes. This may in part be explained by the fact that in many cases several gliders share the same area in the sky, but also due to the difficulty in communicating and being seen.

As in previous years, exposure data for light aircraft continues to be unavailable. The number of hours flown by light aeroplanes and helicopters is not recorded by the National Authorities in the great majority of the States. Operating hours regarding gliders, balloons and aircraft like the so-called "homebuilt" are also not recorded, or are, in several States, entrusted to associative organizations and not retrieved by the authorities. Exposure Data for Microlight (including Microlight aeroplanes, helicopters, gyroplanes and gliders) and for "Others" are usually entrusted to the aircraft owner, who very seldom records or provides it. An accurate estimate of flight hours or movements is needed to allow a meaningful analysis of data and provide a measure of the safety status.

FIGURE 6-7 ACCIDENT CATEGORIES FOR GLIDER FATAL AND NON-FATAL ACCIDENTS – IN EASA MS WITH GLIDERS BELOW 2 250 KG (2006 – 2011)



7. The European Central Repository (ECR)

For approximately 20 years, the European Commission has been developing the concept of a centralised aviation safety data collection process, which is known as the European Coordination Centre for Accident and Incident Reporting Systems (ECCAIRS). Under this process, all safety occurrences from EASA Member States are collected in a centralised database – the European Central Repository (ECR).

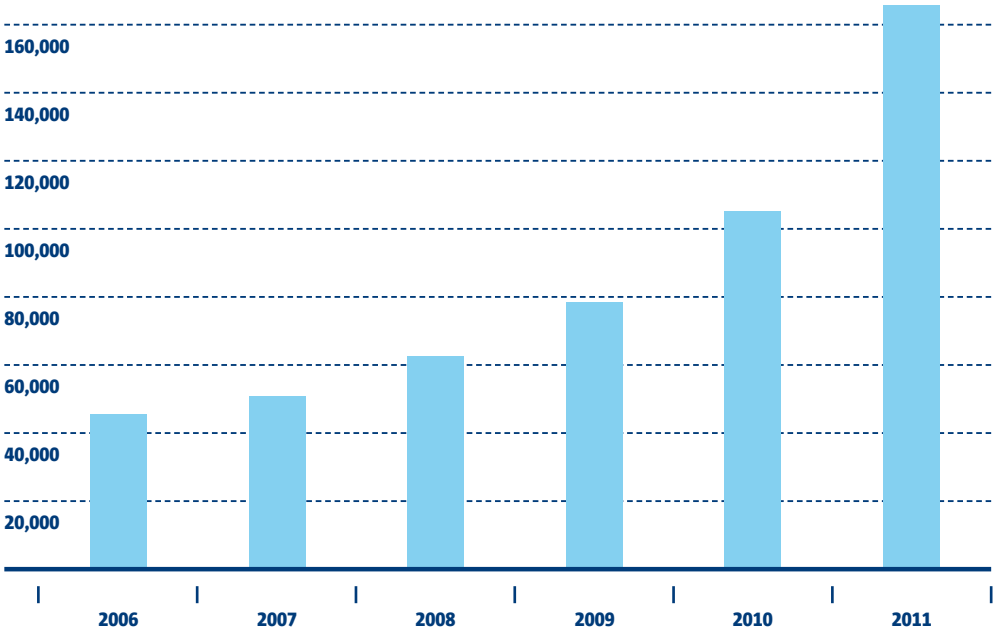
European Directive 2003/42/EC on occurrence reporting in civil aviation placed an obligation on Member States to make 'all relevant safety-related information' stored in their databases available to the competent authorities of other Member States and the European Commission and to ensure that their databases were compatible with software developed by the European Commission (i.e. ECCAIRS software). Furthermore, Member States were obliged to integrate their occurrence data into the ECR according to Commission Regulation (EC) No 1321/2007. By the end of 2011, all of the Member States are now integrating their data into the ECR.

The integration of occurrences is vital in providing the widest possible source of pan-European safety data, which enables EASA and its Member States to better understand the safety issues of the Aviation Community. The more information available within the ECR, the greater the collective understanding of these issues will be and the better placed experts and specialists can be to develop the sustainable solutions desired by both the aviation industry and the travelling public. Although the ECR is still in its infancy, the increase in both the amount of information it holds and the improvement in the quality of the data means that the ECR is already beginning to show great promise as a credible and vital safety resource. In this Chapter, there are some key statistics available from the ECR and more usefully, a number of developing trends that can help inform the work of those whose task it is to improve safety further still.

7.1 THE ECR AT A GLANCE

At the end of 2011 the ECR contained 625,267 occurrences, this was an increase of over 200,000 over the previous year (includes both incidents and accidents). This increase is not necessarily due to an increase in safety occurrences over the past 12 months, but is largely due to the endeavours of States in integrating their occurrence data into the ECR. The distribution of occurrences per year is presented in **FIGURE 7-1**. It is worth bearing in mind that some States have provided their historical data while others are integrating only the occurrence data reported after the date the integration was started.

FIGURE 7-1 DISTRIBUTION OF OCCURRENCES PER YEAR IN THE ECR



With the increasing amount of information at hand within the ECR, it is worthwhile to consider the type of operation to which occurrences apply. **FIGURE 7-2** provides a breakdown of the occurrences in the ECR by type of operation. Whilst 50 % of occurrences currently in the ECR have no information regarding the operation type, the amount of information provided concerning operation type has increased slightly in 2011. Where information was available, the vast majority, 43 %, related to Commercial Air Transport whilst 6 % related to General Aviation and the remainder was split between Aerial Work and State Flights.

Within the ECR, the severity of occurrence, or occurrence class as it is formally described, has also seen a reduction in the share of unknown data from 18 % in 2010 to only 1 % in 2011. This improvement highlights the positive trend of improved data quality within the ECR. **FIGURE 7-3** provide a breakdown of the occurrences in the ECR by occurrence class. The majority of occurrences are classified as incidents, 76 % and only 3 % of the reports relate to accidents[3].

A breakdown of the top 10 occurrence categories found in the ECR data, as shown in **FIGURE 7-4**, provides an understanding of the types of occurrences that involved accidents and incidents in aviation.

Note: [3] It is interesting to note that the Heinrich Ratio suggests a 1 to 29 ratio between accidents and incidents, a figure which bears a close relationship to the statistics identified within the ECR.

The majority of occurrences were classified as 'Other', which highlights the importance of initiatives to improve the classification process to minimise the use of 'Unknown' or 'Other' categories. Moreover, work is being carried out to identify trends in the types of occurrence classified as 'Other' in order to determine the need for the introduction of new occurrence categories. ATM/CNS and 'System or component failure or malfunction [non-powerplant]' (SCF-NP) were next most numerous occurrence categories found in the ECR.

FIGURE 7-2 **DISTRIBUTION OF OCCURRENCES BY TYPE OF OPERATION IN THE ECR**

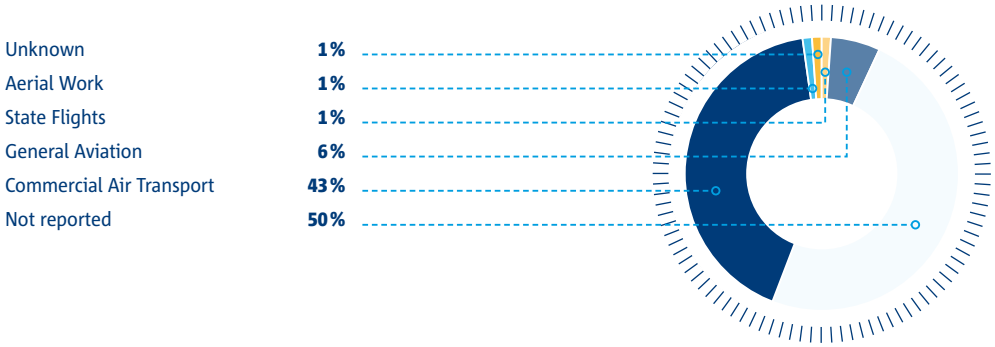


FIGURE 7-3 **DISTRIBUTION OF OCCURRENCES BY OCCURRENCE CLASS IN THE ECR**

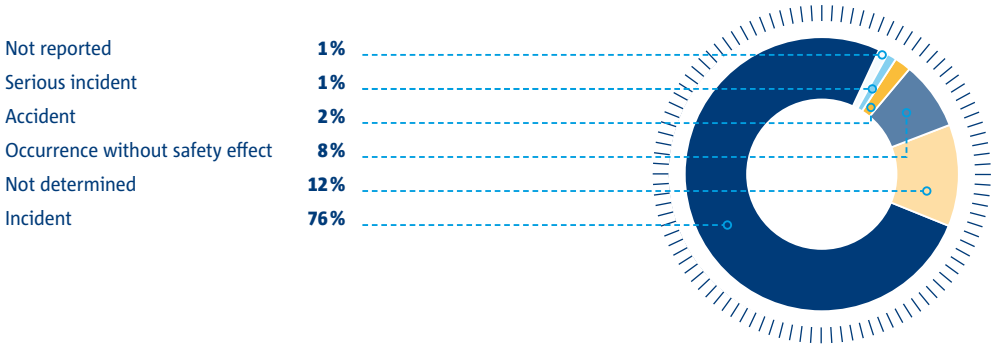


FIGURE 7-4 **THE TOP 10 OCCURRENCE CATEGORIES IN THE ECR**

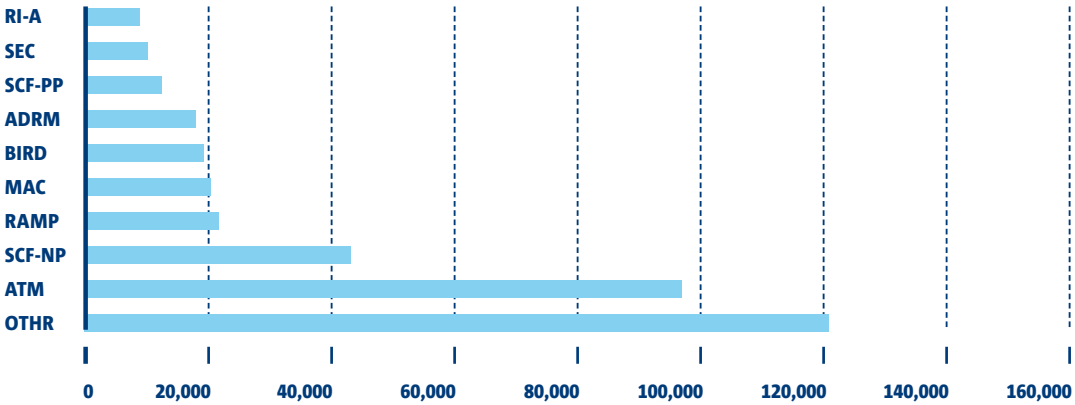


FIGURE 7-5 **DISTRIBUTION BY THE FIRST EVENT IN THE ECR**

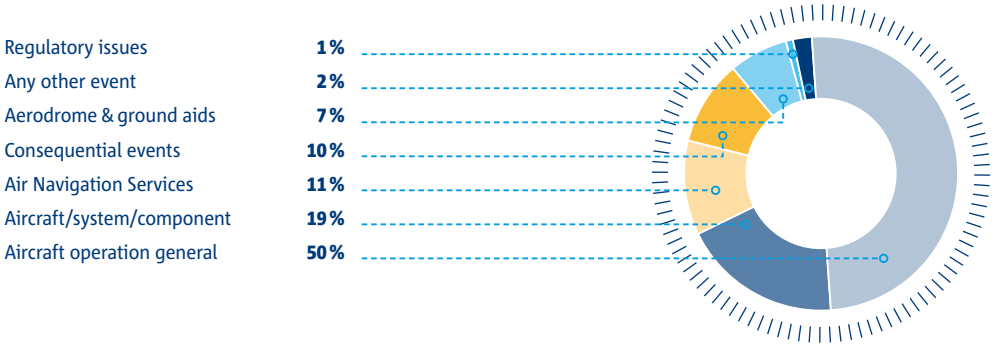
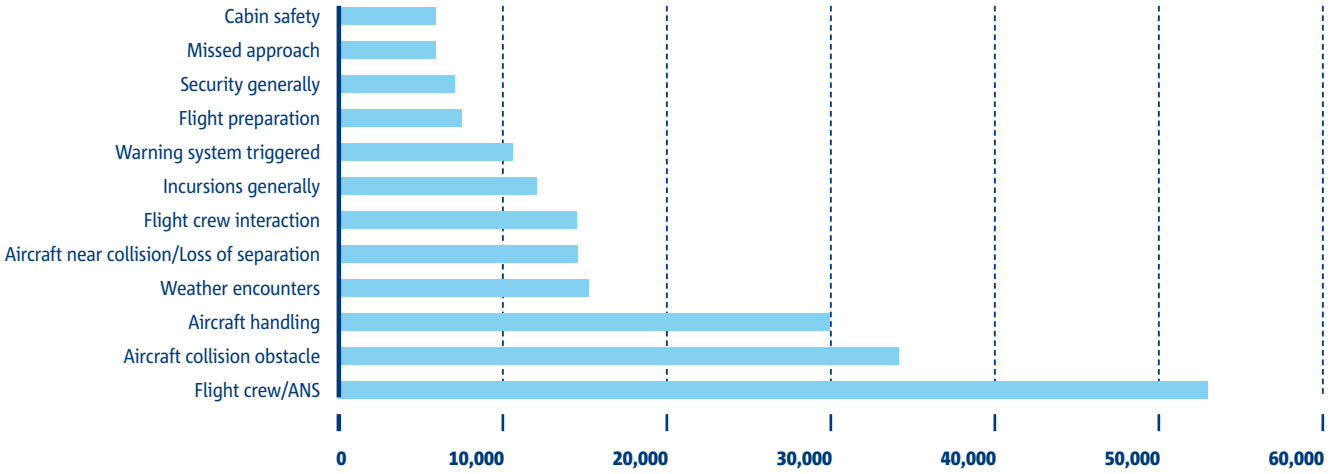


FIGURE 7-6 **DISTRIBUTION OF OCCURRENCE EVENTS IN THE CATEGORY OF AIRCRAFT OPERATION GENERAL IN THE ECR**



Critical events during an occurrence are coded, using standardised event types, and these are captured in the chronological order in which events took place. Distribution by the first event is presented in **FIGURE 7-5**. The majority of first event types were Aircraft operation general, Aircraft/system/component, and Air Navigation services.

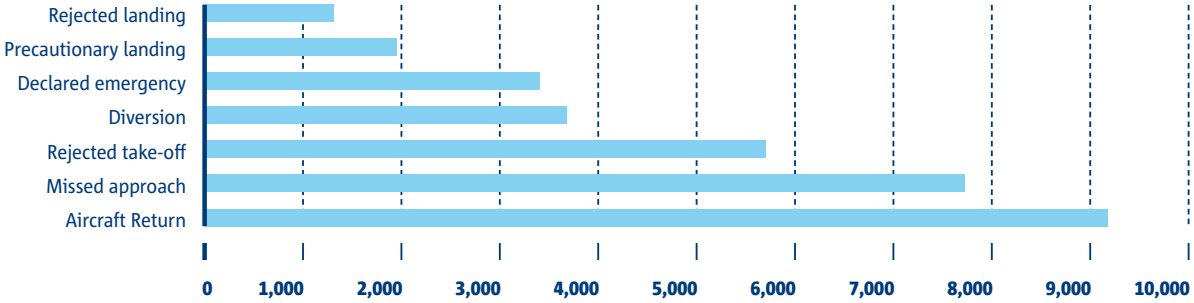
Despite the fact that there is still some unknown or unclassified data, it is encouraging that the ECR is starting to become a meaningful source of information that can be used for analysis. For example, using the information in **FIGURE 7-5** concerning the events involving Aircraft Operation General, this information can be further analysed in more detail.

FIGURE 7-6 shows that the major events affecting aircraft operation are Flight Crew interaction with ANS, Aircraft Collisions with Terrain or Obstacles and Aircraft Handling.

7.2 CONSEQUENCES OF OCCURRENCES

The ECR is also able to provide information concerning the consequences of safety occurrences, which is shown in **FIGURE 7-7**. Of the data within the ECR, only 6 % of occurrences resulted in any type of consequence being reported. Where occurrences did lead to any consequences, the most prevalent were 'Aircraft Return' (turning back to their point of departure), 'Missed Approaches' and 'Rejected Take-Offs'.

FIGURE 7-7 **DISTRIBUTION OF OCCURRENCE EVENTS INVOLVING CONSEQUENCES IN THE ECR**



7.3 USE OF ECR DATA FOR SAFETY ANALYSIS

With the increasing amount of useful information in the ECR, there have been opportunities in 2011 to use data for a range of analysis tasks within EASA and also in cooperation with EASA MS. **FIGURE 7-8** provides details of the increasing number of reported laser illumination attacks against aircraft that that has been the reason for the actions of the Agency in developing ways to reduce the risk of this type of occurrence.

FIGURE 7-8 **DISTRIBUTION OF LASER ILLUMINATION OCCURRENCES IN THE ECR**

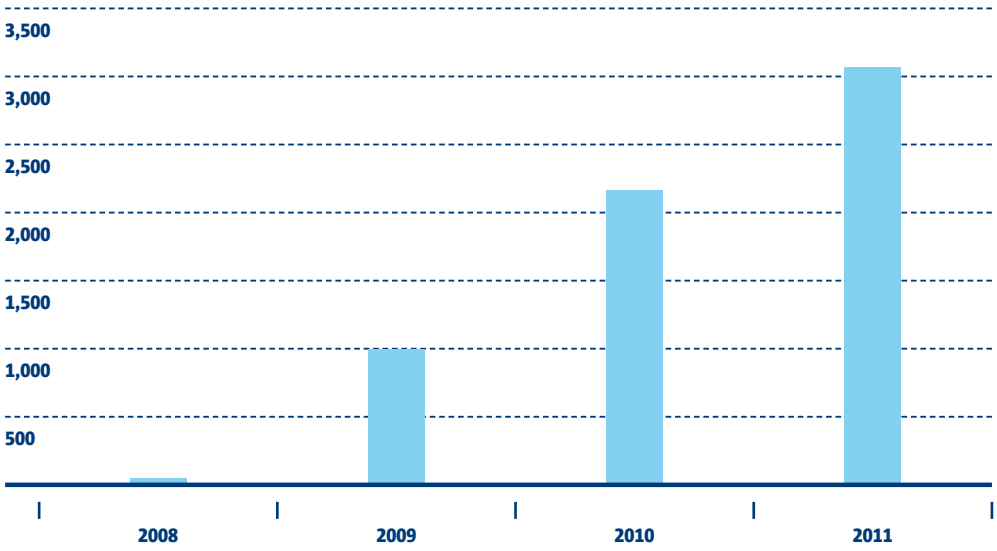
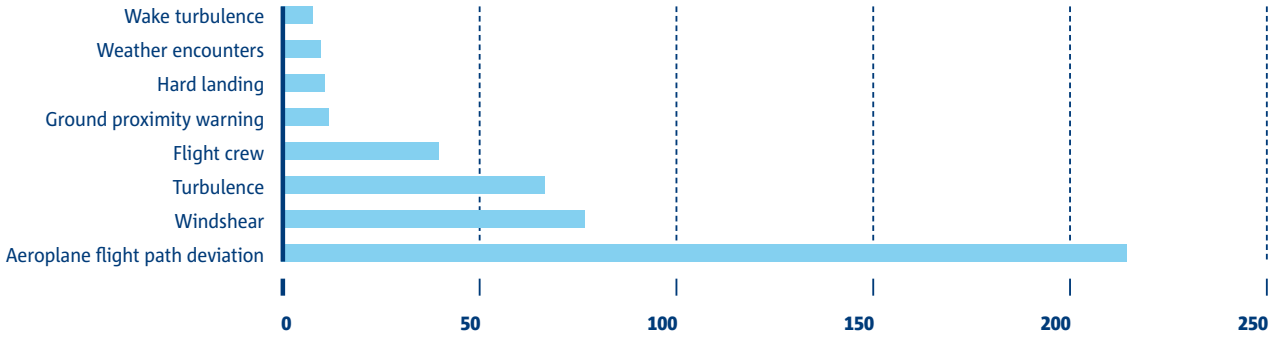


FIGURE 7-9 **DISTRIBUTION OF FIRST EVENT TYPE FOR LOC-I OCCURRENCES IN THE ECR**



In 2011, the subject of the EASA Safety Conference was on the issue of 'Loss of Control in Flight' (LOC-I). **FIGURE 7-9** provides details of the first event type for occurrences with the occurrence category of LOC-I for aircraft with a mass greater than 5 700 kg.

The most numerous event type is Aeroplane Flight Path Deviation, which is a likely event for a LOC-I occurrence. It is interesting to note that the second most numerous event type is windshear. This data from the ECR supports an action in the European Aviation Safety Plan (EASp) for EASA to develop regulations to require predictive wind shear warning systems in commercial air transport operations.

During 2011 the ECR passed a milestone that has seen all EASA MS now integrating their data into the ECR. Despite the continual improvement in data quality, it is vital that this effort continues. For the ECR to provide the best possible information to the whole European Aviation Community, it is vital that the data within it is of the greatest possible detail. The task to improve data quality will continue over the coming years and the establishment of a European Network of Safety Analysts, lead by EASA and involving the National Aviation Authorities of Member States is already starting to provide real benefits in this area. Efforts will also continue to resolve any restrictions to the narratives and notes within the ECR. This will greatly improve the effective use of the data by enabling activities such as the verification of occurrence classification.

8. Aerodromes

Due to the nature of flight operations, nearly 90 % of occurrences occur at or near an aerodrome, however, most of them are not related directly to any aerodrome safety issues. This Chapter contains an overview of safety matters related to Aerodromes in EASA MS. It includes accidents, serious incidents and also incidents which have occurred in EASA MS.

Data from 2007 and onwards have been used because reporting in EASA MS has significantly improved from that year onwards. This improvement in reporting of occurrences can sometimes create challenges in drawing conclusions when comparing between succeeding years. Nonetheless useful conclusions on safety issues can be drawn even with such limitations.

8.1 Runway excursions

Figure 8-1 shows that the number of severe runway excursions in EASA MS has shown an improvement in recent years. Both accidents and serious incidents involving runway excursions show an overall declining trend. The number of incidents reported shows an increasing trend. The opposite direction of these trends between severe and less severe runway excursions is likely due to improved reporting.

Figure 8-2 presents the number of occurrences involving a runway excursion in EASA MS aerodromes, divided by phase of flight when the excursion happened as well as the occurrence class. The figure shows that most of the runway excursions have occurred during the landing phase. It also shows that the severity of runway excursions during take-off is higher than in other phases of flight, as more than half were accidents. The lowest severity are runway excursion during the taxi phase and this is likely because of the low speed of the aircraft during that phase.

8.2 Bird strikes

Very few bird strikes lead to damage significant enough for an accident to occur. **Figure 8-3** shows the number of bird strikes at EASA MS aerodromes. The number of incidents reported has increased to more than double of what it was in 2007. This increase is substantial after 2009, following a high profile accident involving a bird strike in the United States in January of that year. In the same period the number of serious incidents and accidents has not followed the trend of incidents. The most likely reason for this disparity is increased awareness of the safety issue and improved reporting of such occurrences.

FIGURE 8-1

OCCURRENCES INVOLVING A RUNWAY EXCURSION AT EASA MS AERODROMES, BY OCCURRRENCE CLASS (2007 – 2011)

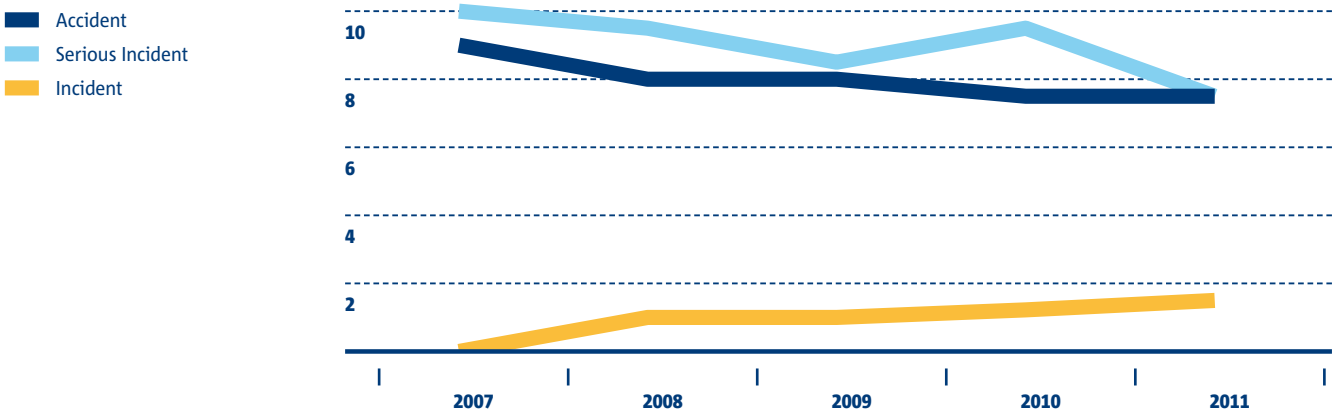


FIGURE 8-2

OCCURRENCES INVOLVING A RUNWAY EXCURSION AT EASA MS AERODROMES BY OCCURRENCE CLASS AND PHASE OF FLIGHT (2007 – 2011)

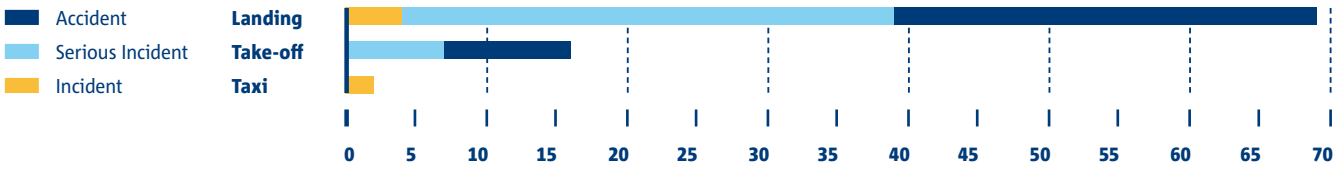
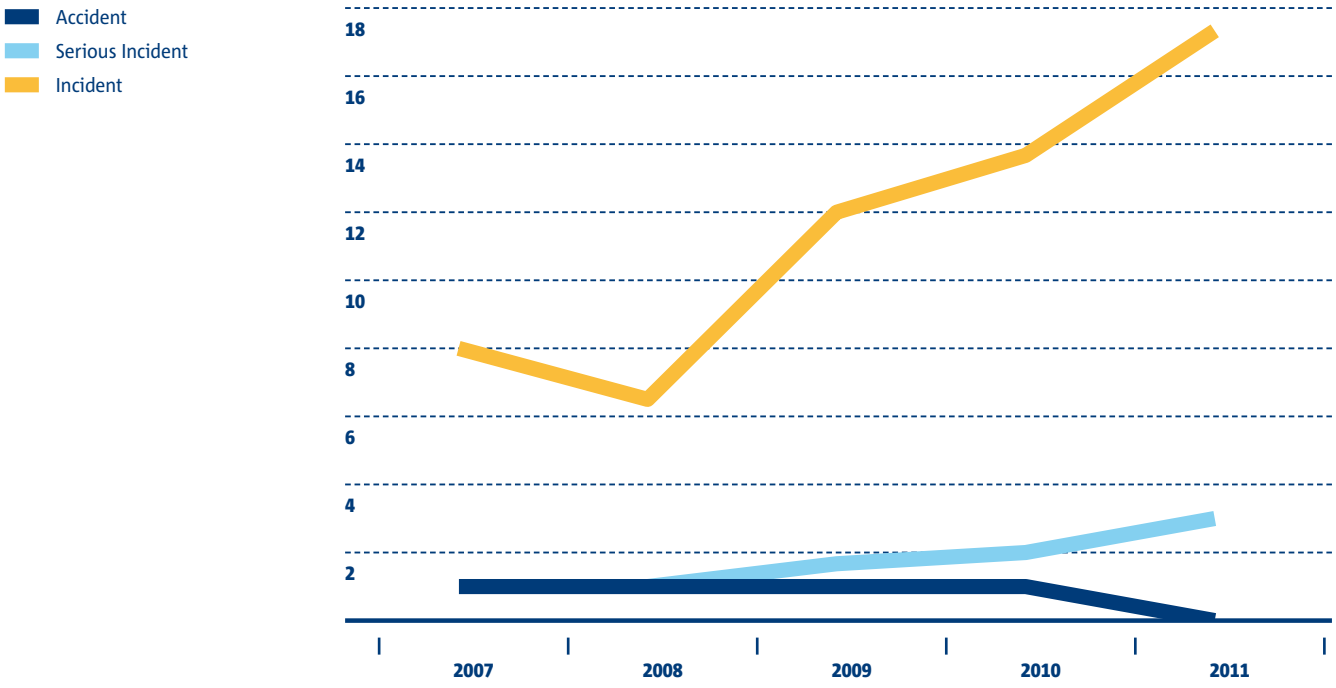


FIGURE 8-3

OCCURRENCES INVOLVING BIRD STRIKES AT EASA MS AERODROMES BY OCCURRENCE CLASS (2007 – 2011)



9. Air Traffic Management (ATM)

The Air Traffic Management (ATM) system comprises of airborne and ground-based functions (air traffic services, airspace management and air traffic flow management) to ensure the safe and efficient movement of aircraft during all phases of flight operations. The provision of safe Air Traffic Services, as part of the ATM system in the pan-European environment, remains one of the main objectives of Member States and Air Navigation Service Providers. For the second time, a specific Chapter on ATM has been incorporated in the EASA Annual Safety Review, based on safety data provided by EASA Member States through the EUROCONTROL Annual Summary Template (AST) reporting mechanism.

This Chapter contains information on accidents and incidents in relation to ATM. The sources of the data, as well as the occurrence category definitions, differ from those of other chapters in this Review. Instead of CICTT categories, in similar figures of this report, this chapter uses occurrence categories developed specifically for ATM since 2000. The analysis in the ATM chapter includes accidents which occurred within an EASA MS and involved at least one aircraft with MTOM of 2250kg and above; and incidents which occurred within an EASA MS with no MTOM restrictions.

The data used in this chapter are obtained from the mandatory safety data reported to EUROCONTROL by its 39 Member States . For the purpose of this report, the analysis is limited to to data pertaining to the Member States of EASA only.

The 'Safety Analysis Function EUROCONTROL and associated Repository' (SAFER) system is EUROCONTROL's principal tool in its safety data analysis work, and consists of a European ATM Safety Data Repository based on mandatory and voluntary safety data reports. SAFER is designed to provide the ATM component of the European Commission's (EC) aviation-wide reporting system, based on ECCAIRS.

9.1 ATM RELATED ACCIDENTS

FIGURE 9-1 depicts the distribution of the accidents between ATM related accident categories in 2011. Of these accidents only two were fatal. The most significant accident category in terms of number of accidents is the 'collision between aircraft moving on the ground and vehicle/person/obstruction(s)'. In 2011 no accidents occurred involving aircraft airborne (near the ground) with objects on the ground.

During the investigation process two levels of ATM involvement can be allocated: Direct contribution – where the ATM event or item was judged to be directly in the causal chain of events and Indirect contribution – where the ATM event potentially increased the level of severity.

FIGURE 9-2 presents the number of accidents where ATM is indicated as having a contribution (i.e. at least one ATM contributory factor was in the chain of events. Since 2006 the number of such accidents has decreased. As mentioned earlier, the definition of these categories differs from those of other Chapters. For 2011 preliminary data are reported. In 2010 two non-fatal accidents (one runway excursion and another collision on the ground between aircraft and vehicle) were indicated as having an Indirect ATM Contribution. Preliminary 2011 data indicates no accidents with ATM contribution.

FIGURE 9-1 ACCIDENT CATEGORIES FOR ATM RELATED ACCIDENTS IN EASA MS (2011)

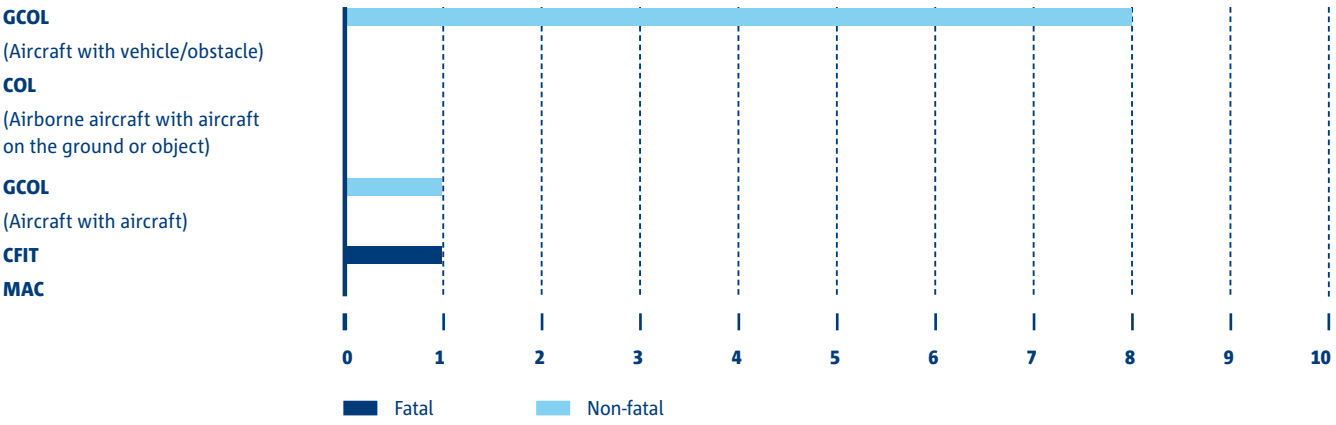
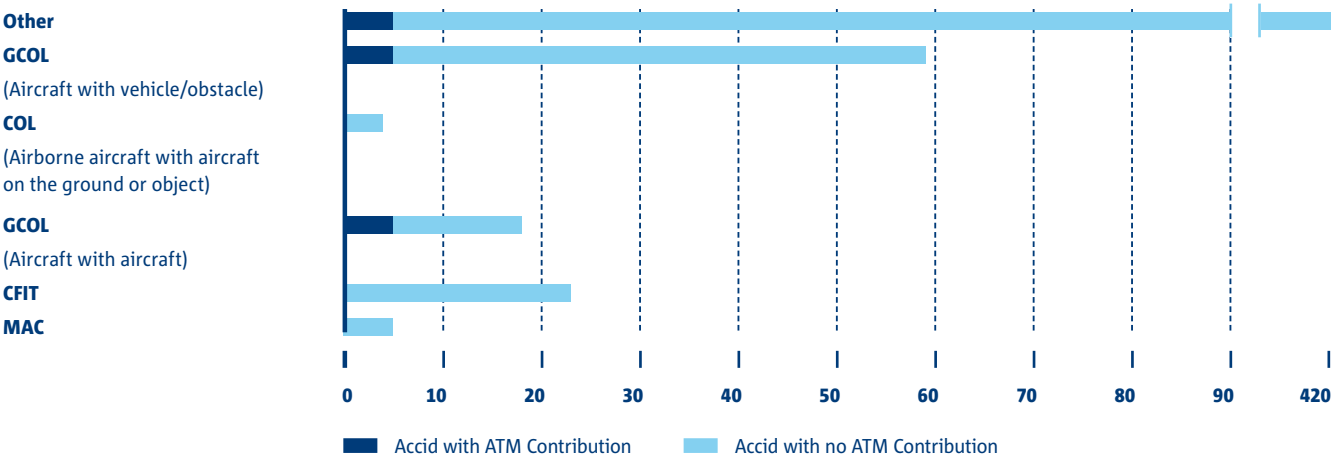


FIGURE 9-2 ACCIDENT CATEGORIES FOR ATM RELATED ACCIDENTS IN EASA MS (2005 – 2011)



Out of the 17 accidents where ATM was indicated as having a contribution, six are in the category of 'Ground collision' (GCOL) between aircraft, five GCOL between an aircraft and a vehicle or obstacle and six in the category 'Other'. In the same period a total number of 529 accidents were reported to EUROCONTROL.

9.2 ATM RELATED INCIDENTS

9.2.1 INCIDENT CATEGORIES

An ATM related incident means that it is relevant to ATM, however it does not necessarily have an ATM contribution. A short overview of the number of incidents reported in each category since 2005 is presented in the **FIGURE 9-3**. An incident can be classified in more than one category (e.g. an incident classified as a Runway incursion can also be categorised as a deviation from an Air Traffic Control clearance).

Incident categories that are reported in large numbers are: 'Unauthorised penetration of airspace' (UAP), (also known as Airspace Infringements), 'Aircraft deviation from ATC clearance' (CLR), (which includes the Level Busts), 'Separation minima infringement' (SMI) and 'Runway incursions' (RI). Incidents involving 'inadequate aircraft separation' are categorised under 'IS'. The two latter categories are discussed in more detail in the next section. **FIGURE 9-4** shows that only a fraction of the ATM related incidents are having an ATM contribution in the chain of events.

For each ATM related incident the associated risk is required to be assessed and classified. Risk is defined as the combination between the severity posed by the incident and its likelihood to re-occur[4].

FIGURE 9-3 INCIDENT CATEGORIES OF ATM RELATED INCIDENTS (2005 – 2011)

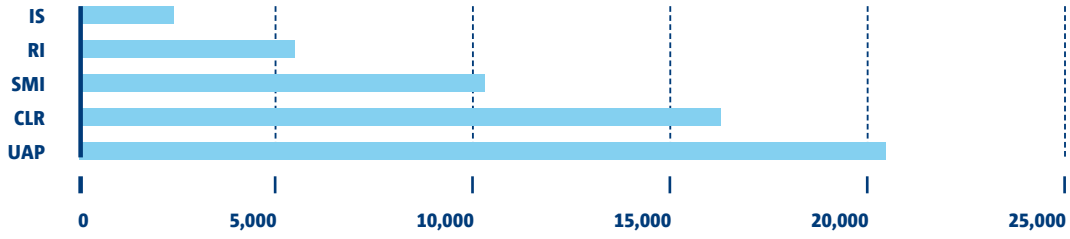
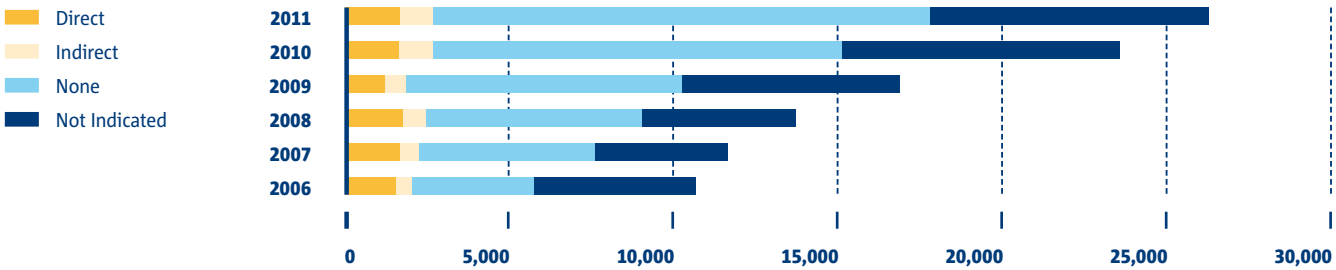
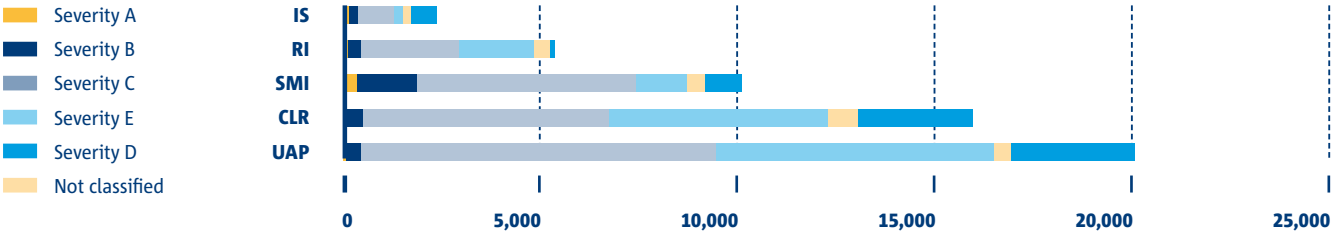


FIGURE 9-4 NUMBER OF ATM RELATED INCIDENTS BY ATM CONTRIBUTION



Note: [4] methodology: http://www.eurocontrol.int/src/gallery/content/public/documents/deliverables/esarr2_awareness_package/eam2gui5_e10_ri_web.pdf (Risk Assessment Tool methodology as per EC Reg. 691/2010)

FIGURE 9-5 **NUMBER OF ATM RELATED INCIDENTS BY CATEGORY AND SEVERITY (2005 – 2011)**



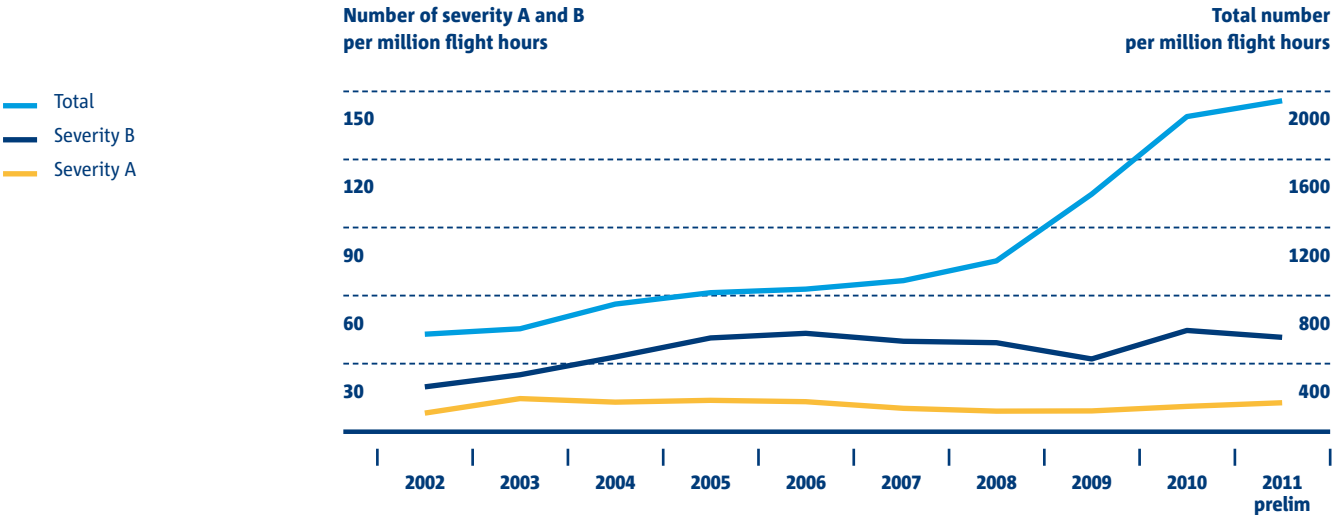
The risk bearing incidents are considered as those with the highest severity classes: 'Serious incidents' (severity A) and 'Major incidents' (severity B). The other severity classes are: 'Significant' (severity C), 'No safety effect' (E), 'Not determined' (D). **FIGURE 9-5** shows the number of incidents by severity and incident category.

The category that has the largest proportion of risk bearing incidents (severity A and B) is the 'Separation minima infringements' (SMI). This category refers to occurrences in which the defined minimum separation between aircraft has been lost. Many of the incidents that have resulted in a loss of separation and categorised as risk bearing are also categorised as Deviation from ATC Clearance or Unauthorised Penetration of Airspace, also known as Airspace Infringements.

9.2.2 INCIDENT RATES AND TRENDS

The reporting of ATM related incidents is improving. The main incident categories have shown a stable trend of similar or decreasing severity over recent years.

FIGURE 9-6 **RATE OF ATM RELATED INCIDENTS BY SEVERITY (INCIDENTS PER 1 MILLION FLIGHT HOURS) 2011 BASED ON PRELIMINARY DATA REPORTED**



Comparing the number of incidents with the level of traffic can give meaningful results on the safety trends. The figures in this section show two trends: The rate of incidents reported, per million flight hours and independent of their severity; and the rate of risk bearing incidents (severity A and B). For Runway Incursions a rate per million aircraft movements-departures/arrivals is used.

Based upon the preliminary data reported for 2011, **FIGURE 9-6** shows a continuous increase in the total number of incidents reported, both in absolute numbers and their rate (against the traffic levels, expressed in flight hours). The increase in the rate of all incidents reported is a positive step forward, in the sense of a "Just Culture"[5] environment, including a reporting culture, which should enable a better view of the underlying safety issues affecting ATM.

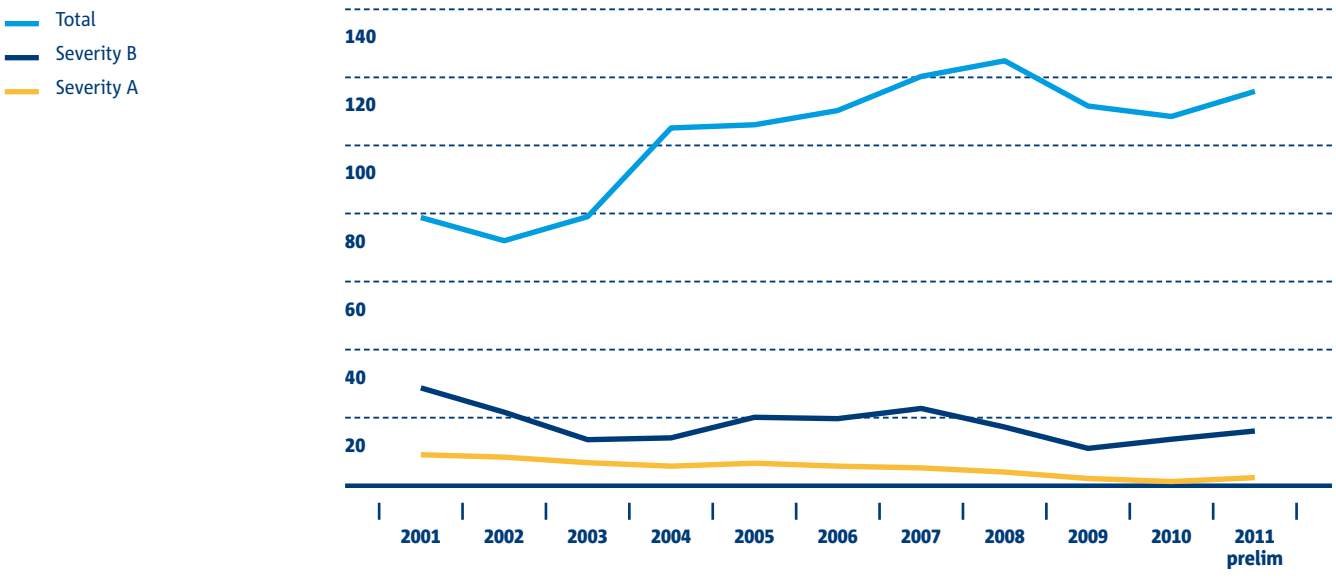
After a few years of a decreasing rate of serious incidents (severity A) 2011 shows an increase. The major incidents (severity B), have shown a stable trend in the period 2005–2009, 2010 showed a considerable increase followed by a decrease in 2011.

FIGURE 9-7 shows the rate of 'Separation minima infringements' (SMI) per million flight hours. For SMI it is useful to calculate the rate using the number of flight hours, as this best represents the time during which the airspace is occupied by an aircraft.

SMI refer to occurrences in which defined minimum separation between aircraft, has been lost. With the exception of 2009 and 2010, overall the total number of incidents reported in this category is increasing every year. Amongst all types of incidents, SMI typically take the longest time to be investigated, and consequently their number may change in the future. The SMI under severity A have a decreasing trend until 2010 followed by an increase in 2011. A similar increase in severity B is indicated in the preliminary data of 2011.

FIGURE 9-7

RATE OF SEPARATION MINIMA INFRINGEMENTS BY SEVERITY (INCIDENTS PER 1 MILLION FLIGHT HOURS) – 2011 BASED ON PRELIMINARY DATA REPORTED



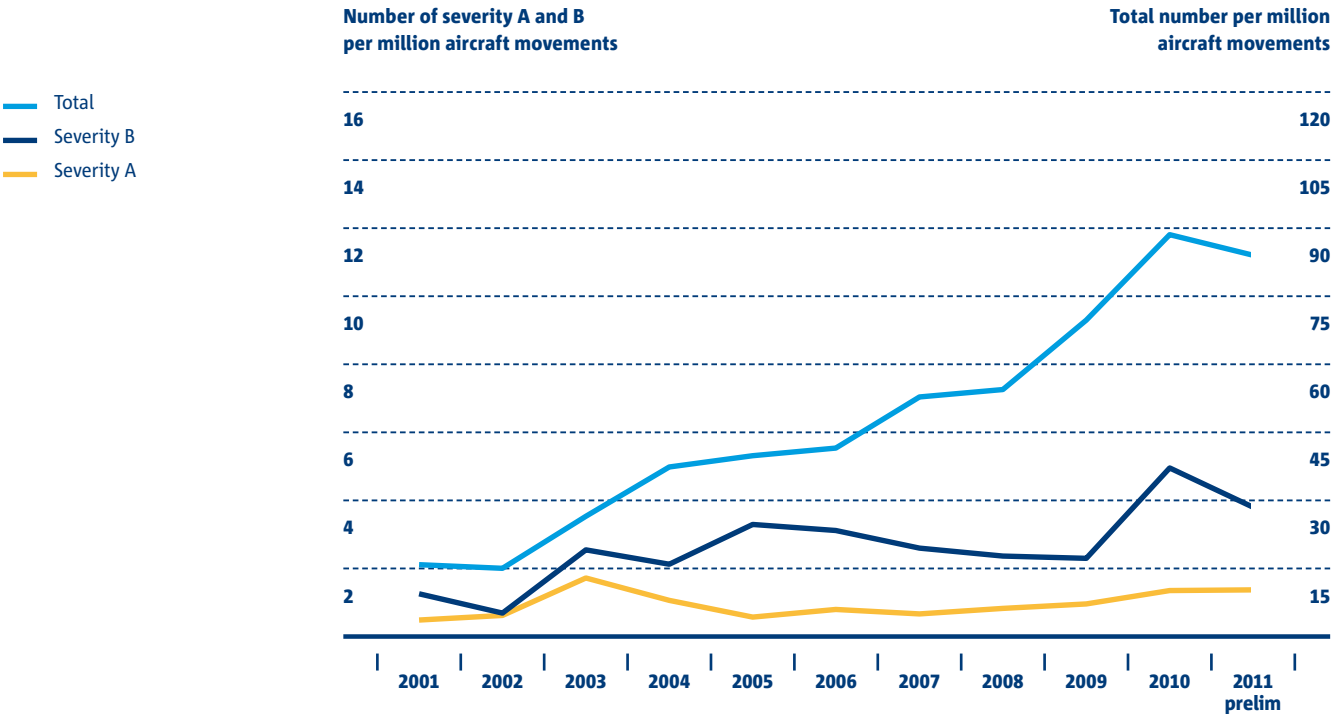
Note: [5]"Just Culture" means a culture in which front line operators or others are not punished for actions, omissions or decisions taken by them that are commensurate with their experience and training, but where gross negligence, wilful violations and destructive acts are not tolerated. Commission Regulation (EU) No 691/2010

FIGURE 9-8 shows the rate of runway incursion incidents reported has an overall increasing trend. For runway incursions it is useful to calculate the rate using the number of movements as this represents the frequency a runway is used.

For aviation and ATM a key indicator is the number of runway incursions. The number of incursions reported in Europe increased over the years, with the exception of 2011, especially due to improved awareness after the publication of the European Action Plan for the Prevention of Runway Incursions in 2003. In addition, the change of the ICAO definition of runway incursion effectively enlarged the scope of occurrences included in this definition.

The rate of risk bearing runway incursions varies in the last years. The rate of serious incidents (severity A) is in 2011 at the same level with the previous year after it showed a slight increase over time. The rate of major incidents (severity B) decreased until 2009, but the data for 2010 showed a considerable increase. However, preliminary 2011 data indicates a possible reverse, although at a higher level than 2009.

FIGURE 9-8 RATE OF RUNWAY INCURSIONS BY SEVERITY (INCIDENTS PER 1 MILLION AIRCRAFT MOVEMENTS) – 2011 BASED ON PRELIMINARY DATA REPORTED



9.3 CLOSING REMARK

This Chapter provided an overview on reporting and analysis of ATM related accidents and incidents. For more specific ATM Safety information and analysis please refer to the EUROCONTROL website in general and to the SRC website in particular:
http://www.eurocontrol.int/articles/safety-regulation-commission-src


DLH8W
F230
F370
F250
RYR4476
F140
AFR184
F330
BTI69R
F370
RYR482Y
F245
SWR781
F290
F009
DIAVI
F270
BCY202
F300
F310
F320

10. Agency's Safety Actions

Many actions are underway to act in response to the results of the analysis work. In this regards, EASA publishes every year the EUROPEAN AVIATION SAFETY PLAN (EASp).

The EASp describes what the major risks in Europe's aviation system are and the numerous actions that are underway to mitigate them. Actions in the EASp encompass not only the work that is carried out by the Agency, but also the efforts of the Member States, the aviation industry and other stakeholders like Eurocontrol, the Performance Review Body or the European Commission. This work complements what is done by the Member States to mitigate safety risks at their level.

In order to provide a clear picture of the activities performed by the various safety initiatives and teams, a report on the progress made and main products developed is included with each update of the EASp.

Information on the European Aviation Safety Plan is available at **www.easa.europa.eu/sms**.

APPENDICES

Appendix 1: Definitions and acronyms

General

Aerial Work (AW)	An aircraft operation in which an aircraft is used for specialised services such as agriculture, construction, photography, surveying, observation and patrol, search and rescue, or aerial advertisement.
ANS	Air Navigation Services
ASR	EASA Annual Safety Review
AST	Annual Summary Template
ATC	Air Traffic Control
ATM	Air Traffic Management
Commercial air transport (CAT)	An aircraft operation involving the transport of passengers, cargo or mail for remuneration or hire.
CICTT	CAST-ICAO Common Taxonomy Team
CNS	Communications, Navigations and Surveillance
EASA	European Aviation Safety Agency
EASA MS	European Aviation Safety Agency Member States. These States are the 27 European Union Member States plus Iceland, Liechtenstein, Norway and Switzerland.
EASp	European Aviation Safety Plan
ECCAIRS	European Co-Ordination Centre for Aviation Incident Reporting Systems
ECR	European Central Repository for occurrences
EU	European Union
Fatal accident	An accident that resulted in at least one fatality, flight crew and/or passenger or on the ground, within 30 days of the accident. *(Source: ICAO Annex 13)*
Flight information region (FIR)	Region of airspace with specific dimensions, in which a flight information service and an alerting service are provided.
General Aviation (GA)	An aircraft operation other than a commercial air transport operation or an aerial work operation.
HEMS	Helicopter Emergency Medical Service
ICAO	International Civil Aviation Organisation
Light aircraft	Aircraft with a maximum certificated take-off mass below 2 250 kg.
MTOM	Maximum certificated take-off mass
SAFER	Safety Analysis Function Eurocontrol and associated Repository
Scheduled air service	An air service open to use by the general public and operated according to a published timetable or with such a regular frequency that it constitutes an easily recognisable systematic series of flights which are open to direct booking by members of the public.
SMS	Safety Management System
Third country operated aircraft	An aircraft which is not used or operated under control of a competent authority of an EASA Member State.

Occurrence categories

ARC	Abnormal runway contact
AMAN	Abrupt manoeuvre
ADRM	Aerodrome
ATM/CNS	Air Traffic Management/Communication Navigation Surveillance

BIRD	Collision / near Collision with bird(s)
CABIN	Cabin safety event
CFIT	Controlled flight into or toward terrain
CTOL	Collision with obstacle(s) during take-off and landing
EVAC	Evacuation
EXTL	External load related occurrence
F-NI	Fire/smoke (non-impact)
F-POST	Fire/smoke (post-impact)
FUEL	Fuel related
GCOL	Ground collision
GTOW	Glider towing related event
RAMP	Ground handling
ICE	Icing
LOC-G	Loss of control — Ground
LOC-I	Loss of control — In-flight
LOLI	Loss of lifting conditions en-route
LALT	Low altitude operation
MAC	Airprox/TCAS alert/loss of separation/near midair collisions/midair collision
OTHR	Other
RE	Runway excursion
RI-A	Runway incursion — Animal
RI-VAP	Runway incursion — Vehicle, aircraft or person
SEC	Security related
SCF-NP	System/component failure or malfunction (non-powerplant)
SCF-PP	System/component failure or malfunction (powerplant)
TURB	Turbulence encounter
UIMC	Unintended Flight in IMC
USOS	Undershoot/overshoot
UNK	Unknown or undetermined
WSTRW	Windshear or thunderstorm

Accident categories can be used to classify occurrence at a high level to permit analysis of the data. The CICTT has developed the accident categories used in this Annual Safety Review. For further details on this team and the accident categories see the website **http://intlaviationstandards.org/index.html**.

ATM Accident categories acronyms

CLR	Deviation of ATC Clearance
IS	Inadequate Separation
MAC	Mid-Air Collision
SMI	Separation Minima Infringement
UAP	Unauthorised Penetration of Airspace
RI	Runway Incursion is an occurrence involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and take-off of aircraft.
COL	Collision with a vehicle, person or aircraft, while an aircraft is on the ground

Appendix 2: List of figures and tables

List of figures

LIST OF TABLES

Appendix 3: List of fatal accidents (2011)

Note: Aeroplanes, MTOM above 2 250 kg, commercial air transport

Aircraft operated by EASA MS operators

Date	State of occurrence	Aircraft type	Type of operation	Fatalities on board	Ground fatalities	CICTT Categories
10/02/2011	Ireland	Swearingen SA227/Metro III	Passenger	6	0	LOC-I: Loss of control – inflight

Aircraft operated by third country operators

Date	State of occurrence	Aircraft type	Type of operation	Fatalities on board	Ground fatalities	CICTT Categories
01/01/2011	Russian Federation	Tupolev Tu-154	Passenger	3	0	F-NI: Fire/smoke (non-impact)
09/01/2011	Iran, Islamic Republic of	Boeing 727-200	Passenger	78	0	LOC-I: Loss of control – inflight
						UNK: Unknown or undetermined
05/02/2011	Australia	Cessna 310	Ferry/positioning	1	0	UNK: Unknown or undetermined
14/02/2011	Honduras	Let- L410A	Passenger	14	0	CFIT: Controlled flight into or toward terrain
14/02/2011	Congo, the Democratic Republic of	Let- L410UVP	Cargo	2	0	CFIT: Controlled flight into or toward terrain
21/03/2011	Congo – the Republic of	Antonov An-12	Cargo	4	19	F-POST: Fire/smoke (post-impact)
						LOC-I: Loss of control – inflight
						SCF-PP: Powerplant failure or malfunction
						UNK: Unknown or undetermined
30/03/2011	United States	Beechcraft Baron 58	Passenger	2	0	UNK: Unknown or undetermined
30/03/2011	United States	Cessna 310	Passenger	2	0	CFIT: Controlled flight into or toward terrain
31/03/2011	Canada	De Havilland DHC3 Otter	Air taxi	1	0	UNK: Unknown or undetermined

Date	State of occurrence	Aircraft type	Type of operation	Fatalities on board	Ground fatalities	CICTT Categories
04/04/2011	Congo, the Democratic Republic of	Bombardier CRJ 100/200	Passenger	32	0	USOS: Undershoot/overshoot
						WSTRW: Windshear or thunderstorm.
						UNK: Unknown or undetermined
10/04/2011	United States	Cessna 402	Ferry/positioning	1	0	UNK: Unknown or undetermined
02/05/2011	United States	Beechcraft 18	Cargo	1	0	SCF-PP: Powerplant failure or malfunction
07/05/2011	Papua	Xian MA-60	Passenger	25	0	UNK: Unknown or undetermined
18/05/2011	Argentina	Saab 340	Passenger	22	0	ICE: Icing
						LOC-I: Loss of control – inflight
25/05/2011	India	Pilatus PC-12	Emergency Medical Service	7	3	UNK: Unknown or undetermined
25/05/2011	United States	Beechcraft Baron 58	Passenger	4	0	UNK: Unknown or undetermined
20/06/2011	Russian Federation	Tupolev Tu 134	Passenger	44	0	CFIT: Controlled flight into or toward terrain
						F-POST: Fire/smoke (post-impact)
30/06/2011	Canada	De Havilland DHC 2 Mk I Beaver	Air taxi	5	0	UNK: Unknown or undetermined
04/07/2011	Canada	Cessna 208 Caravan	Passenger	1	0	F-POST: Fire/smoke (post-impact)
						RE: Runway excursion
06/07/2011	Afghanistan	Ilyushin IL-76	Cargo	9	0	UNK: Unknown or undetermined
08/07/2011	Congo, the Democratic Republic of	Boeing 727-100	Passenger	73	0	CFIT: Controlled flight into or toward terrain
						WSTRW: Windshear or thunderstorm.
11/07/2011	Russian Federation	Antonov AN-24	Passenger	5	0	F-NI: Fire/smoke (non-impact)
						SCF-PP: Powerplant failure or malfunction
13/07/2011	Brazil	Let 410UVP	Passenger	16	0	LOC-I: Loss of control – inflight
						SCF-PP: Powerplant failure or malfunction
28/07/2011	Korea Republic of	Boeing 747-400	Cargo	2	0	F-NI: Fire/smoke (non-impact)
						UNK: Unknown or undetermined
09/08/2011	Russian Federation	Antonov An-12	Cargo	11	0	F-NI: Fire/smoke (non-impact)
						SCF-PP: Powerplant failure or malfunction
						UNK: Unknown or undetermined
20/08/2011	Canada	Boeing 737-200	Passenger	12	0	CFIT: Controlled flight into or toward terrain
02/09/2011	United States	Cessna 207 Skywagon	Cargo	1	0	MAC: AIRPROX/near miss/midair collision
02/09/2011	United States	Cessna 208 Caravan	Cargo	1	0	MAC: AIRPROX/near miss/midair collision

Date	State of occurrence	Aircraft type	Type of operation	Fatalities on board	Ground fatalities	CICTT Categories
06/09/2011	Bolivia	Swearingen SA227/Metro III	Passenger	8	0	CFIT: Controlled flight into or toward terrain
						UNK: Unknown or undetermined
07/09/2011	Russian Federation	Yakovlev Yak-42	Passenger	44	0	LOC-I: Loss of control – inflight
						RE: Runway excursion
						CTOL: Collisions with obstacle(s) during take-off/landing
09/09/2011	Indonesia	Cessna 208 Caravan	Cargo	2	0	UNK: Unknown or undetermined
20/09/2011	Haiti	Beechcraft Airliner 99	Passenger	3	0	UNK: Unknown or undetermined
22/09/2011	Canada	De Havilland DHC6-300	Passenger	2	0	LOC-I: Loss of control – inflight
						UNK: Unknown or undetermined
						CTOL: Collisions with obstacle(s) during take-off/landing
22/09/2011	Indonesia	Pilatus PC-6B	Air taxi	3	0	UNK: Unknown or undetermined
23/09/2011	United States	De Havilland DHC3	Passenger	1	0	CTOL: Collisions with obstacle(s) during take-off/landing
25/09/2011	Nepal	Beechcraft 1900	Sightseeing	19	0	CFIT: Controlled flight into or toward terrain
29/09/2011	Indonesia	CASA 212 Aviocar	Passenger	18	0	UNK: Unknown or undetermined
04/10/2011	Canada	Cessna 208 Caravan	Passenger	2	0	UNK: Unknown or undetermined
13/10/2011	Papua New Guinea	De Havilland DHC8-100	Passenger	28	0	F-POST: Fire/smoke (post-impact)
						UNK: Unknown or undetermined
14/10/2011	Botswana	Cessna 208 Caravan	Passenger	8	0	UNK: Unknown or undetermined
27/10/2011	Canada	Beechcraft King Air 100	Air taxi	1	0	LOC-I: Loss of control – inflight
						SCF-PP: Powerplant failure or malfunction
						UNK: Unknown or undetermined
23/11/2011	Indonesia	Cessna 208 Caravan	Cargo	1	0	UNK: Unknown or undetermined
28/11/2011	United States	Piper PA-31P	Passenger	3	0	FUEL: Fuel related
09/12/2011	United States	Cessna 421	Air taxi	4	0	LOC-I: Loss of control – inflight
						UNK: Unknown or undetermined
10/12/2011	Philippines	Beechcraft 65	Ferry/positioning	3	11	F-POST: Fire/smoke (post-impact)
						LOC-I: Loss of control – inflight
17/12/2011	Indonesia	Pacific Aerospace 750XL	Emergency Medical Service	2	0	RE: Runway excursion

Acknowledgements
The authors wish to acknowledge the contribution made by the Member States and to thank them for their support in the conduct of this work and in the preparation of this report. The authors also wish to acknowledge ICAO and NLR and for their support in the conduct of this work.

Photocredits
Cover: *Bananastock* / Inside front cover (from left to right): *Vasco Morao; Vasco Morao; Vasco Morao; Alexander Schleicher; Fotolia; Eurocontrol; iStock; ZLT Zeppelin Luftschifftechnik GmbH & Co; iStock* / Page 6: *Bananastock* / Page 8: *Bananastock* / Page 11: *iStock* / Page 14: *iStock* / Page 26: *Rotorflug GmbH* / Page 33: *iStock* / Page 34: *Zeppelin* / Page 42: *Harald Richter* / Page 49: *iStock* / Page 52: *Vasco Morao* / Page 59: *Eurocontrol* / Page 61: *Janick Cox* / Inside back cover: *iStock* / Backcover, flapper (from left to right): *Linda Philippens; Vasco Morao; Vasco Morao; iStock; Vasco Morao; EASA; iStock; iStock*

Design
Thomas Zimmer, Goltsteinstraße 28 – 30, 50968 Cologne, Germany

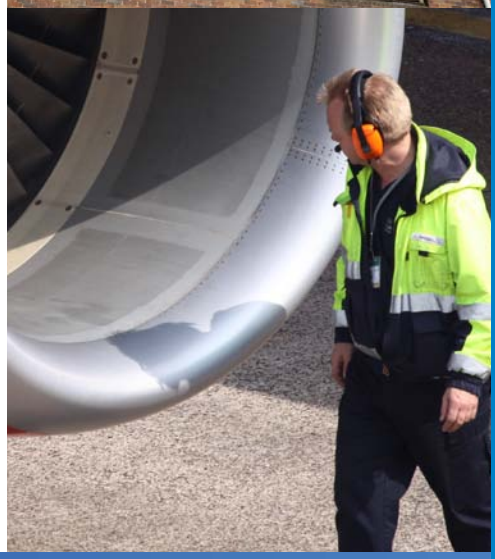
EUROPEAN AVIATION SAFETY AGENCY
Safety Analysis Section
Safety Analysis and Research
Postfach 10 12 53
D-50452 Cologne

Tel. +49 (221) 89 99 00 00
Fax +49 (221) 89 99 09 99
E-mail: asr@easa.europa.eu

978-92-9210-130-5

Information on EASA is available on the Internet (**www.easa.europa.eu**).

For further information about aviation safety and more EASA publications visit our website **easa.europa.eu** or simply scan the QR-Code below:



EUROPEAN AVIATION SAFETY AGENCY
AGENCE EUROPÉENNE DE LA SÉCURITÉ AÉRIENNE
EUROPÄISCHE AGENTUR FÜR FLUGSICHERHEIT

Postal address
Postfach 10 12 53
50452 Cologne
Germany

Visiting address
Ottoplatz 1
50679 Cologne
Germany

Tel. +49_221_89990-000
Fax +49_221_89990-999
Mail info@easa.europa.eu
Web www.easa.europa.eu

ISBN 978-92-9210-130-5

An Agency of the European Union.