SAFETY REPORT 2008

Issued April 2009

45th Edition

ATH, LAX, RVB, TVP, ZNZ.

IF THERE'S AN AIRPORT IDENTIFIER FOR IT, WE'VE HELPED A PILOT LAND THERE.

Year after year, Jeppesen has been an important part of aviation success. Across the globe, technical breakthroughs offer more efficiency, economy and safety to our skies. And while advances in every aspect of flight have inspired a new look to our logo one thing remains unchanged; Jeppesen still stands for trust. Something that was first delivered with a hand-sketched chart seventy-five years ago.

JEPPESEN.COM

JEPPESEN®
A BOEING COMPANY

Cleared to Land.

Frankfurt's new capacities secure the future.

Air traffic is growing – and Frankfurt Airport with it. By 2011 we will complete a new runway. We will incrementally increase our total slot capacity by 50 %. By expanding our existing terminals and building the new Terminal 3, we will be able to increase capacity from 56 to 82 million passengers per year. Frankfurt Airport is fully prepared for the new generation of widebody aircraft. We can guarantee high utilization rates because of our extensive air and rail feeder networks and Europe's most populous airport catchment area. For all growth-oriented airlines, we continue to serve as your reliable airport partner for the future.

Contact us at: marketing@fraport.com, www.fraport.com.

Fraport. The Airport Managers.

Fraport

“IATA is committed to leading the industry in the global effort to enhance safety.”

SAFETY REPORT 2008

Issued April 2009

International Air Transport Association
Montreal – Geneva

45th Edition

NOTICE

DISCLAIMER. The information contained in this publication is subject to constant review in the light of changing government requirements and regulations. No subscriber or other reader should act on the basis of any such information without referring to applicable laws and regulations and/or without taking appropriate professional advice. Although every effort has been made to ensure accuracy, the International Air Transport Association shall not be held responsible for any loss or damage caused by errors, omissions, misprints or misinterpretation of the contents hereof. Furthermore, the International Air Transport Association expressly disclaims any and all liability to any person or entity, whether a purchaser of this publication or not, in respect of anything done or omitted, and the consequences of anything done or omitted, by any such person or entity in reliance on the contents of this publication.

Opinions expressed in advertisements appearing in this publication are the advertiser's opinions and do not necessarily reflect those of IATA. The mention of specific companies or products in advertisement does not imply that they are endorsed or recommended by IATA in preference to others of a similar nature which are not mentioned or advertised.

Senior Vice President
Safety, Operations & Infrastructure
International Air Transport Association
800 Place Victoria
P.O. Box 113
Montreal, Quebec
CANADA H4Z 1M1

Safety Report 2008
Ref. No: 9049-09
ISBN 978-92-9233-201-3

Montreal – Geneva

Table of Contents

It may take hours for your aircraft to reach its destination but its flight data will be in your hands within minutes

WIRELESS GROUNDLINK

With Teledyne Controls' Wireless GroundLink® (WGL) solution, 100% data recovery is now possible. WGL eliminates physical media handling, putting an end to data loss.

Adopted by 50 operators worldwide, the Wireless GroundLink® system (WGL) is a proven solution for automating data transfer between the aircraft and your flight safety department. By providing unprecedented recovery rates and immediate access to flight data, WGL helps improve the integrity and efficiency of your Flight Data Monitoring (FDM) activities. With the right data at your fingertips, not only can you reduce operating risk and closely monitor safety, but you can also yield additional benefits across your organization, such as fuel savings and lower maintenance costs. Even more, the Wireless GroundLink system will provide an efficient solution for ground-based ACARS messaging, allowing the transfer of non-time-critical messages at a fraction of the cost of VHF or SATCOM communications. For as little as $24 dollars per month* in communication costs, all your data can be quickly and securely in your hands.

** May vary based on usage, cellular provider and country*

Call **+1 310-765-3600** or watch a short movie at:
www.teledynecontrols.com/wglmovie

Automatic Transmission | Cellular Technology | Secure-Encrypted Data | Back Office Integration | Low Operating Cost

Installation of the Wireless GroundLink system is offered today by Boeing and Airbus as a forwardfit option or a retrofit Service Bulletin.

TELEDYNE CONTROLS
A Teledyne Technologies Company

“Defeating the crisis together – taking actions to benefit our members.”

Foreword

Dear Colleagues,

Safety continues to be the number one priority. In fact, 2008 was another successful year with a decline in the number of fatalities around the globe. The accident rate was 0.81 Western-built jet hull losses per million sectors flown in 2008. IATA member airlines surpassed the industry's performance in terms of safety with an accident rate of 0.52 Western-built jet hull losses per million sectors flown.

IATA continues to aid its members through these difficult times. Our priority remains on safety and our focus includes fortifying existing programmes like the IATA Operational Safety Audit (IOSA), the IATA Safety Audit for Ground Operations (ISAGO), the Safety Trend Evaluation, Analysis and Data Exchange System (STEADES) as well as studying new ideas and introducing new initiatives, like the Global Safety Information Centre (GSIC), which will enable airlines to benchmark their safety performance with other operators around the world.

IATA is committed to leading the industry in the global effort to continuously enhance safety.

This 45th edition of the IATA Safety Report includes valuable information about the global 2008 safety performance. The improvements from the previous year, 2007, are a true attestation to our industry's commitment to safety. However, we must continue to review existing processes and evaluate new ideas to improve the results. This report is a key tool that should be used to communicate safety information across the industry and assist us in improving safety on a global scale.

I wish to thank the IATA Operations Committee (OPC), the Safety Group (SG) and the Accident Classification Task Force (ACTF) for their cooperation and expertise essential for the creation of this report.

Günther Matschnigg
Senior Vice President
Safety, Operations & Infrastructure

Safety Report 2008 - Executive Summary

The goal of the IATA Safety Report is to present prevention strategies with the intent of enhancing safety within the air transport industry. These strategies are based on the analytical findings of accidents that occurred in 2008. In total, 109 accidents occurred in 2008. Compared to 2007, the breakdown is as follows:

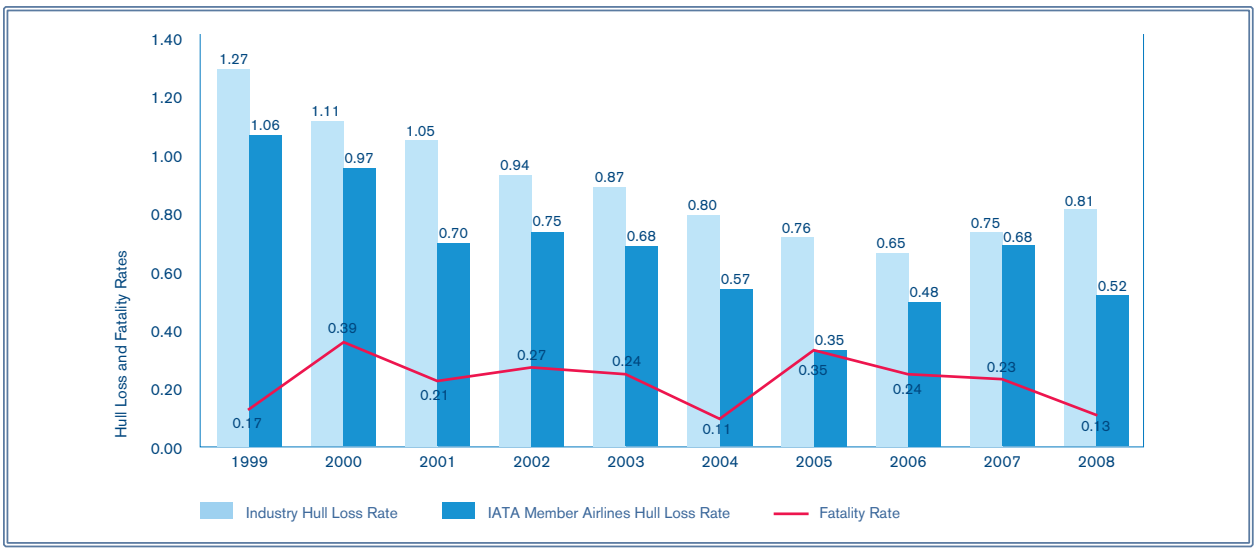
	Jet	Turboprop	Western-built Jet Hull Loss Rate	Fatal Accidents	Fatalities
2008	66	43	0.81	23	502
2007	57	43	0.75	20	692

In 2008, the number of fatalities and the fatality rate continued to decline despite the increase in traffic. From a regional perspective, the accident rates in the Commonwealth of Independent States (CIS), Latin America and the Caribbean, the Middle East and North Africa, North America and Europe increased in contrast to 2007. In Africa, Asia / Pacific and North Asia, the accident rates decreased in 2008 compared to 2007.

Overall, IATA member airlines surpassed the industry in terms of safety, with an accident rate of 0.52 Western-built jet hull losses per million sectors flown. The accident rate for member airlines declined in comparison to 2007.

Based on the findings from accident analyses, IATA has developed the following prevention strategies to address the top safety issues:

Western-built Jet Hull Loss and Passenger Fatality Rates (1999-2008)



Runway Excursion Prevention

- Runway excursion was the most frequent type of accident in 2008, accounting for 25% of accidents
- Over half (57%) of runway excursions resulted in a hull loss and 14% of them involved fatalities
- Flight crew handling errors, deficient airport facilities and aircraft malfunctions were among the top contributing factors in this type of accident

Prevention Strategy: IATA will launch the Runway Safety Toolkit in 2009, which will address runway excursions, incursions and runway confusion.

Ground Damage Reduction

- Ground damage was the second most predominant type of accident, following runway excursions
- Ground damage events accounted for 17% of all of last year's accidents; half of these involved IATA member airlines
- Well over a third (38%) of ground damage accidents cited ground events, such as errors by ground handling personnel, as a contributing factor

Prevention Strategy: Following the launch of the IATA Safety Audit for Ground Operations (ISAGO) in 2008, IATA will conduct 80 ISAGO audits in 2009, improving safety while reducing ramp injuries and damage.

Safety Management System Implementation

- In almost a third (30%) of accidents, deficient safety management on the part of the Operator was noted as a contributing factor
- This includes deficiencies with regards to the Operator's safety policies and objectives, risk management, safety assurance and safety promotion
- The majority (69%) of accidents involving deficiencies in the Operator's safety management also implicated deficient regulatory oversight by the State

Prevention Strategy: IATA will deliver new guidance material on Safety Management Systems (SMS) and continue to assist airlines with SMS implementation at an individual and a regional level.

Safety Enhancement in Maintenance Operations

- 15% of accidents in 2008 involved maintenance events
- In over half (57%) of the accidents involving a maintenance event, deficiencies in the Operator's maintenance operations were also noted as a contributing factor
- These include: deficiencies in technical documentation, unrecorded maintenance, the use of bogus parts, unapproved modifications and deficient training of maintenance personnel

Prevention Strategy: IATA will launch a revised safety strategy in 2009, which includes a focus on safety management in maintenance operations.

Regional Safety Issues

- Operators based in the Commonwealth of Independent States (CIS) and Latin America and the Caribbean, had the highest regional accident rates in 2008 and experienced the highest increase in their accident rates, when compared to 2007
- Almost a third (30%) of the accidents involving CIS Operators were fatal; over a quarter (26%) of those implicating Latin American and the Caribbean-based carriers, also resulted in fatalities
- Aircraft malfunctions, deficiencies in the Operator's safety management and the State's regulatory oversight as well as non-adherence to Standard Operating Procedures by flight crews were among the top contributing factors to accidents involving Operators from these two regions

Prevention Strategy: IATA will continue to help its member airlines and partner with non-member airlines, States and other industry stakeholders to improve safety by addressing regional issues and by using well established tools such as the IATA Operational Safety Audit (IOSA), ISAGO and SMS.

In 2009, IATA focuses on aiding its members through these difficult times, while maintaining safety as a priority. The Global Aviation Safety Roadmap was produced and developed in the interest of establishing a single level of aviation safety worldwide by the Industry Safety Strategy Group (ISSG). IATA plays a key role in this group and in the regional implementation of the roadmap. IATA's safety strategy is coordinated with the roadmap in order to reduce duplication and align efforts worldwide. Through this and other initiatives, IATA is continuing its work with airlines, regulatory authorities and other industry stakeholders to fortify existing safety programmes and introduce new initiatives, which will enhance operational safety on a global scale.

“Our priority remains on safety.”

What makes Bombardier different? **IT'S HOW WE THINK.**
Every challenge we face gives us opportunities to stretch our imaginations and push the limits of our technical expertise. We find inspired answers to difficult questions every day. As a world leader in the design and manufacturing of aircraft, offering complete in-service support, we are constantly pushing the boundaries of innovation. You could call it original thinking. We call it ingenuity.

aero.bombardier.com

BOMBARDIER

At Boeing, our passion is to build the finest commercial airplanes in the world. Whether the standard is safety, comfort or affordability, every Boeing plane is built to be the best of its class. It's a commitment to our customers and their passengers that knows no end.

BOEING

Using Incidents
to Prevent Accidents

Incident analysis on a global scale

IATA STEADES (the Safety Trend Evaluation, Analysis and Data Exchange System) features the largest database of de-identified incident reports available to the industry. Providing a secure forum for the sharing and analysis of safety data, STEADES can be used to develop a comprehensive list of prevention strategies for your organisation.

Integrate STEADES in your business

- Benchmark against comparable organisations
- Make better investment decisions by assessing specific safety issues
- Anticipate operational challenges at specific airports
- Determine whether your safety concerns are shared by others

Become part of a growing community of over 80 airlines that regularly share safety data.

Join STEADES

- Query the Global Incident Database
- Receive Trend Analysis Reports
- Benchmark your airline
- Share safety data

For more information, visit www.iata.org/steades

Section 1

1

IATA Annual Safety Report

Founded in 1945, the International Air Transport Association (IATA) represents, leads and serves the airline industry. IATA's membership includes 230 airlines comprising approximately 93% of scheduled international air traffic. IATA's global reach extends to 115 nations through 73 offices in 67 countries.

IATA works closely with experts from its member airlines, manufacturers, professional associations and federations, international aviation organisations and other industry stakeholders to develop and revise its safety strategy and to determine lessons learned from aircraft accidents.

PURPOSE OF THE SAFETY REPORT 2008

The purpose of the Safety Report 2008 is to assist the airline industry in managing safety by identifying areas of concern and issues arising from the analysis of accidents that occurred during the year 2008.

The Safety Report 2008 was produced at the beginning of 2009. The report presents a detailed summary of statistics, trends and contributing factors involved in 2008's accidents. Based on these findings, prevention strategies are developed, with the goal of enhancing operational safety.

SAFETY REPORT FORMAT

In addition to presenting areas of concern and prevention strategies, the Safety Report also provides safety management tools. The enclosed CD-ROM is divided into the following sections:

- **Safety Report**, containing an electronic version of the report
- **Supporting Documents**, containing additional material supporting issues covered in the report
- **Safety Manager's Toolkit**, containing useful and practical material
- **CEO / COO Brief**, containing an executive summary and a PowerPoint presentation on the report findings
- **Graphic Material**, all the Safety Report's charts, graphs and illustrations available in electronic format

Image courtesy of Boeing

1

ACCIDENT CLASSIFICATION TASK FORCE

The IATA Operations Committee (OPC) and its Safety Group (SG) created the Accident Classification Task Force (ACTF) in order to analyse accidents, identity contributing factors, determine trends and areas of concern relating to operational safety and to develop prevention strategies related thereto, which are incorporated into the annual IATA Safety Report.

The ACTF is composed of safety experts from IATA, member airlines, original equipment manufacturers, professional associations and federations and other industry stakeholders. The group is instrumental in the analysis process, in order to produce a safety review based on subjective evaluations for the classification of accidents. The data analysed and presented in this report is extracted from a variety of sources, including Airclaims Ltd. and States' accident investigation boards. Once assembled, the ACTF validates each accident report using their expertise to develop an accurate assessment of the events.

ACTF Membership:

Capt. Georges Merkovic
AIR FRANCE

Mr. Jean Daney
AIRBUS INDUSTRIE

Dr. Dieter Reisinger
AUSTRIAN AIRLINES (Chairman)

Capt. David C. Carbaugh
THE BOEING COMPANY

Mr. David Fisher
BOMBARDIER AEROSPACE

Capt. Mattias Pak
CARGOLUX AIRLINES INTERNATIONAL

Mr. Mišo Klarić
CROATIA AIRLINES

Mr. Savio dos Santos
EMBRAER AVIATION INTERNATIONAL

Mr. Don Bateman
HONEYWELL

Mr. Martin Maurino
IATA

Capt. Karel Mündel
IFALPA

Mr. Bert Ruitenberg
IFATCA

Capt. Keiji Kushino
JAPAN AIRLINES INTERNATIONAL

Mr. Richard Fosnot
JEPPESEN

Capt. Joachim Fleger
LUFTHANSA GERMAN AIRLINES

Capt. Jean-Lucien Tarrillon
RÉGIONAL

Capt. Ayedh N. Al-Motairy
SAUDI ARABIAN AIRLINES

Capt. Peter Eggler
SWISS INTERNATIONAL AIR LINES

Mr. Gustavo Rocha
TAM LINHAS AÉREAS

Capt. Carlos dos Santos Nunes
TAP AIR PORTUGAL

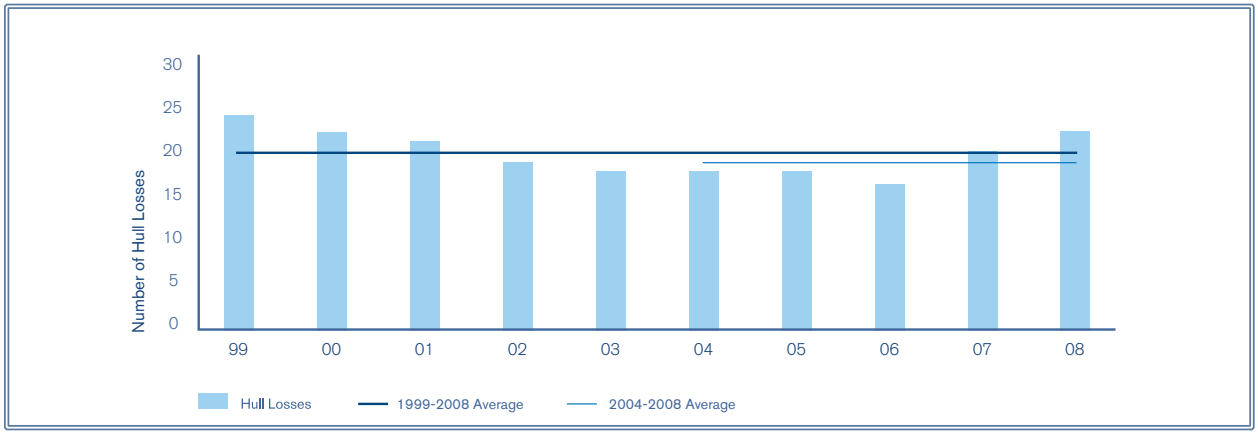
Section 2

2

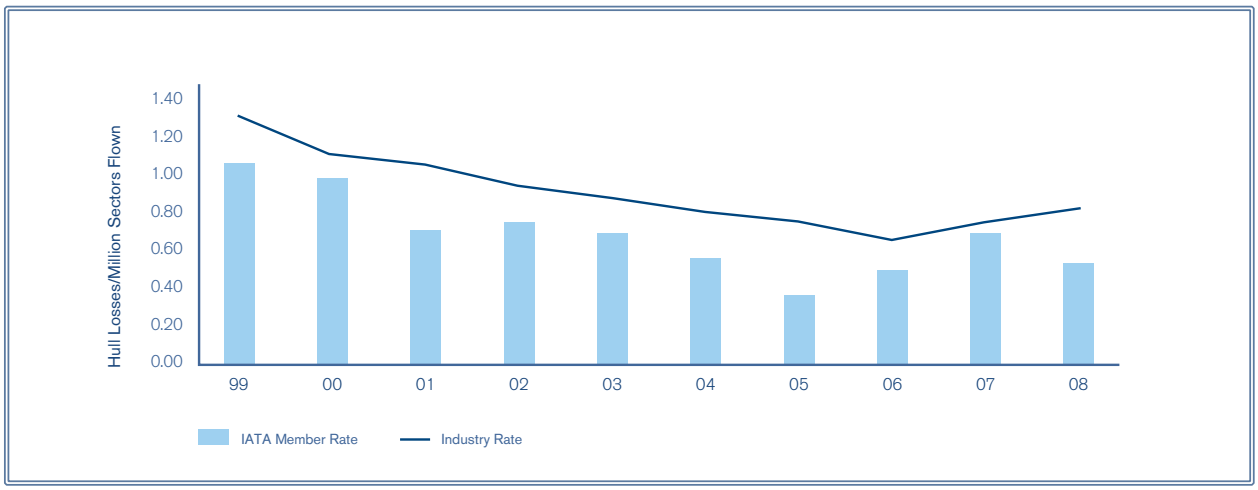
Decade in Review

ACCIDENT / FATALITY STATISTICS AND RATES

Western-built Jet Aircraft Hull Losses (1999-2008)



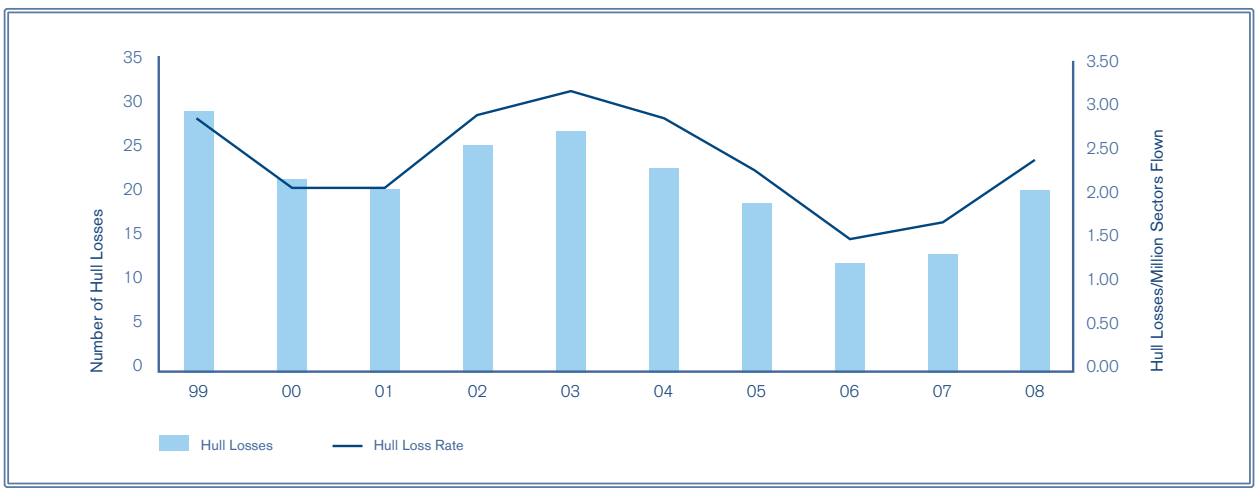
Western-built Jet Aircraft Hull Loss Rate: IATA Member Airlines vs. Industry (1999-2008)



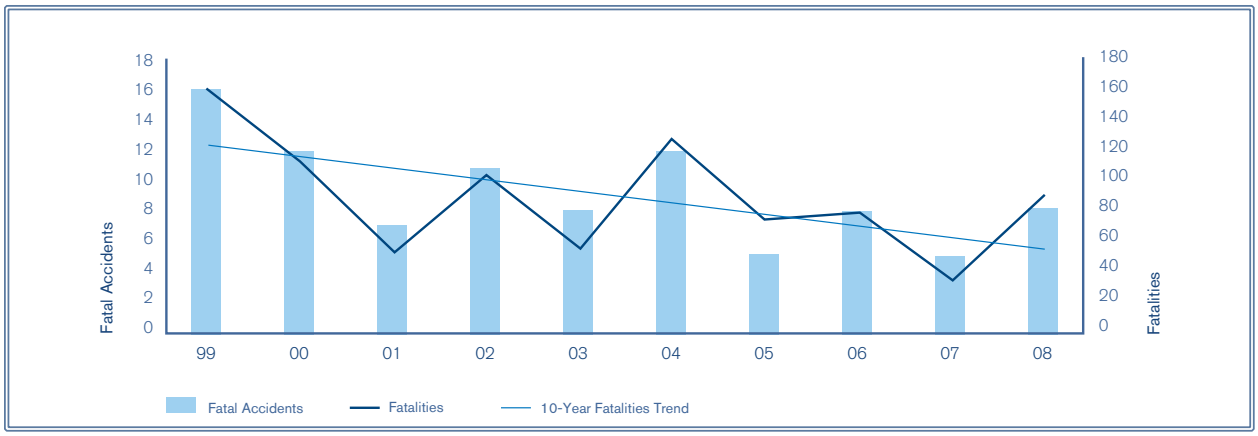
Western-built Jet Aircraft: Fatal Accidents and Fatalities (1999-2008)

Western-built Jet Aircraft: Passengers Carried and Passenger Fatality Rate (1999-2008)

Western-built Turboprop Aircraft Hull Losses and Accident Rate (1999-2008)



Western-built Turboprop Aircraft: Fatal Accidents and Fatalities (1999-2008)

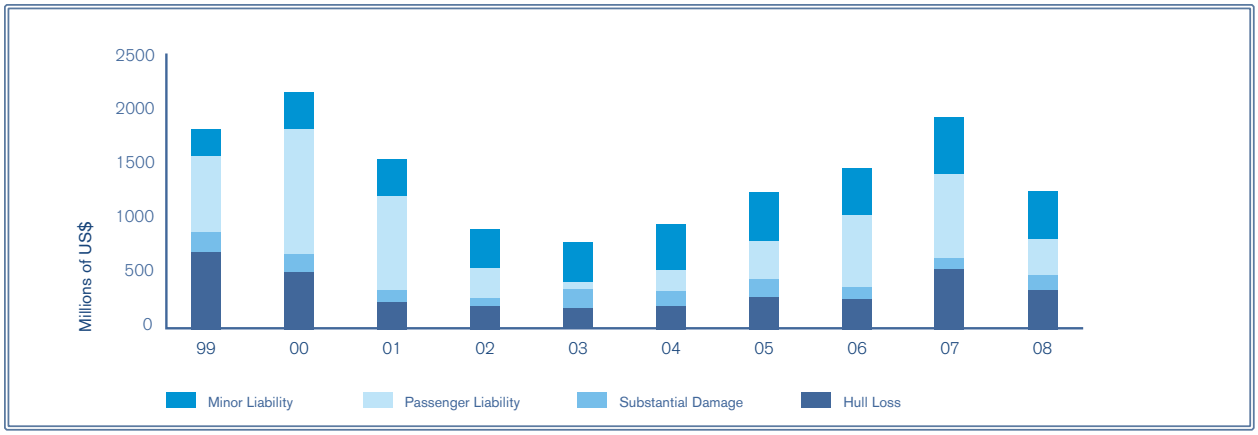


ACCIDENT COSTS

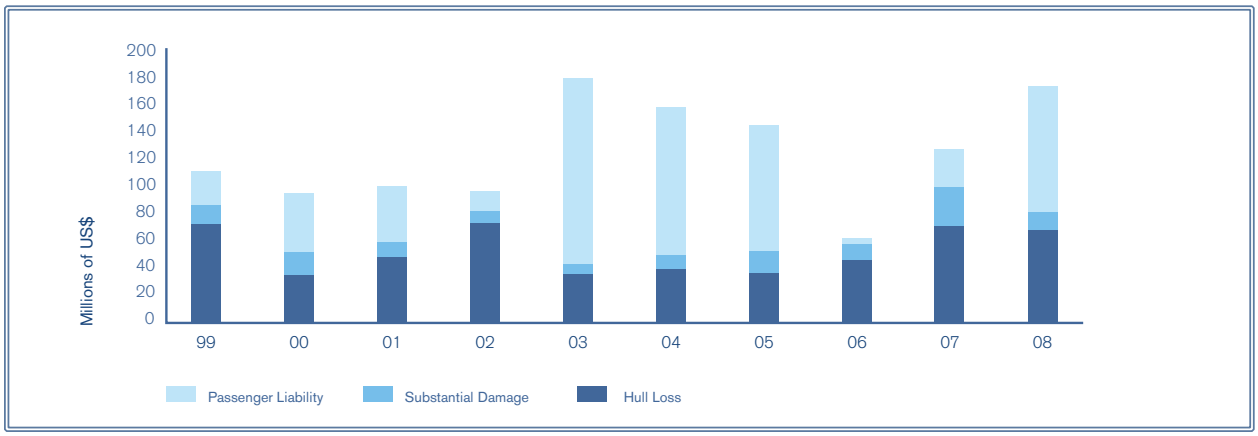
IATA has obtained the estimated costs for all losses involving Western-built aircraft over the last 10 years, as well as current year estimates for the Eastern-built fleet.

The figures presented in this section are from operational accidents excluding security-related events and acts of violence. All amounts are expressed in US dollars.

Western-built Jet Aircraft: Accident Costs (1999-2008)



Western-built Turboprop Aircraft: Accident Costs (1999-2008)



“IATA continues to aid its members through these difficult times.”

Section 3

3

Year 2008 in Review

AIRCRAFT ACCIDENTS

There were a total of 109 accidents in 2008. Summaries of all the year's accidents are presented in **Annex 4**.

Fleet Size, Hours and Sectors Flown

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
World Fleet (end of year)	21,514	7,345	1,724	2,577
Hours Flown (millions)	53.34	6.91	1.10	0.60
Sectors (landings) (millions)	27.25	8.24	0.50	0.41

Operational Accidents

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
Hull Loss:	22	20	3	8
Substantial Damage:	38	15	3	0
Total Accidents:	60	35	6	8
Fatal Accidents:	8	8	1	6

3

Operational Hull Loss Rates

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
Hull Losses (per million sectors):	0.81	2.43	6.03	19.48
Hull Losses (per million hours):	0.41	2.89	2.72	13.26

Passengers Carried

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
Passengers Carried (millions):	2,483	135	31	7
Estimated Change in Passengers Carried Since 2007:	+3.8%	+8.9%	-8.8%	0%

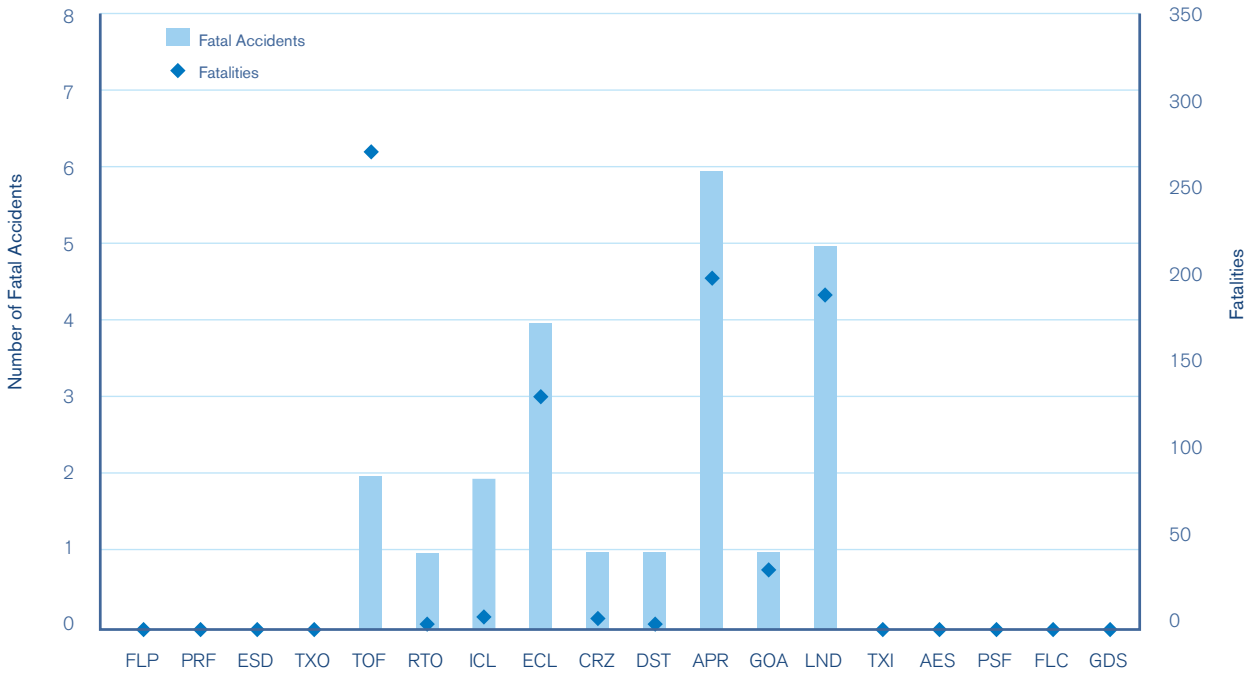
Western-built Jet Aircraft Fatal Accidents per Operator Region

	AFI	ASPAC	CIS	EUR	LATAM	MENA	NAM	NASIA
Accidents:	3	11	6	14	7	6	12	1
Fatal Accidents:	1	0	2	1	2	1	1	0
Fatalities (crew and passengers):	3	0	153	154	6	33	1	0

Fatalities per Aircraft Type

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
Passenger Fatalities:	333	68	4	34
Crew Fatalities:	17	16	0	30
Total Fatalities:	350	84	4	64

Fatal Accidents and Fatalities per Phase of Flight



Phase of Flight: Definitions

FLP	Flight Planning	**DST**	Descent
PRF	Pre-flight	**APR**	Approach
ESD	Engine Start/Depart	**GOA**	Go-around
TXO	Taxi-out	**LND**	Landing
TOF	Take-off	**TXI**	Taxi-in
RTO	Rejected Take-off	**AES**	Arrival/Engine Shutdown
ICL	Initial Climb	**PSF**	Post-flight
ECL	En Route Climb	**FLC**	Flight Close
CRZ	Cruise	**GDS**	Ground Servicing

AIRCRAFT ACCIDENTS PER REGION

3

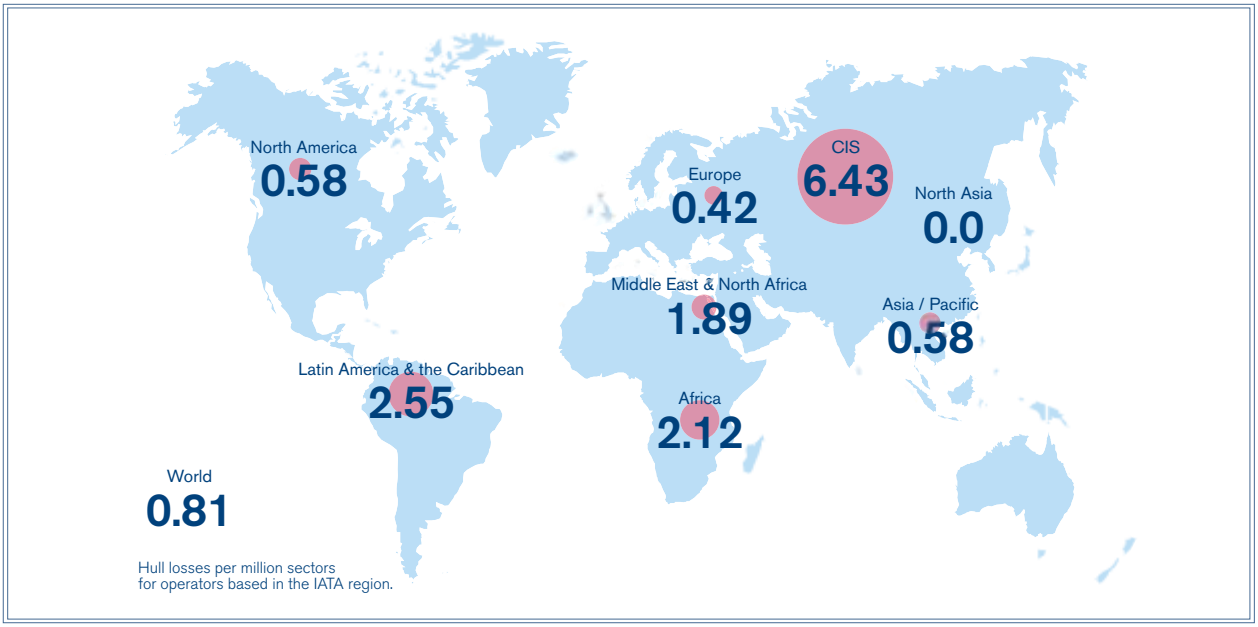
Western-built Aircraft Accidents per Operator Region

To calculate regional accident rates, IATA determines the accident region based on the operator's country. Moreover, the operator's country is specified in the operator's Air Operator Certificate (AOC).

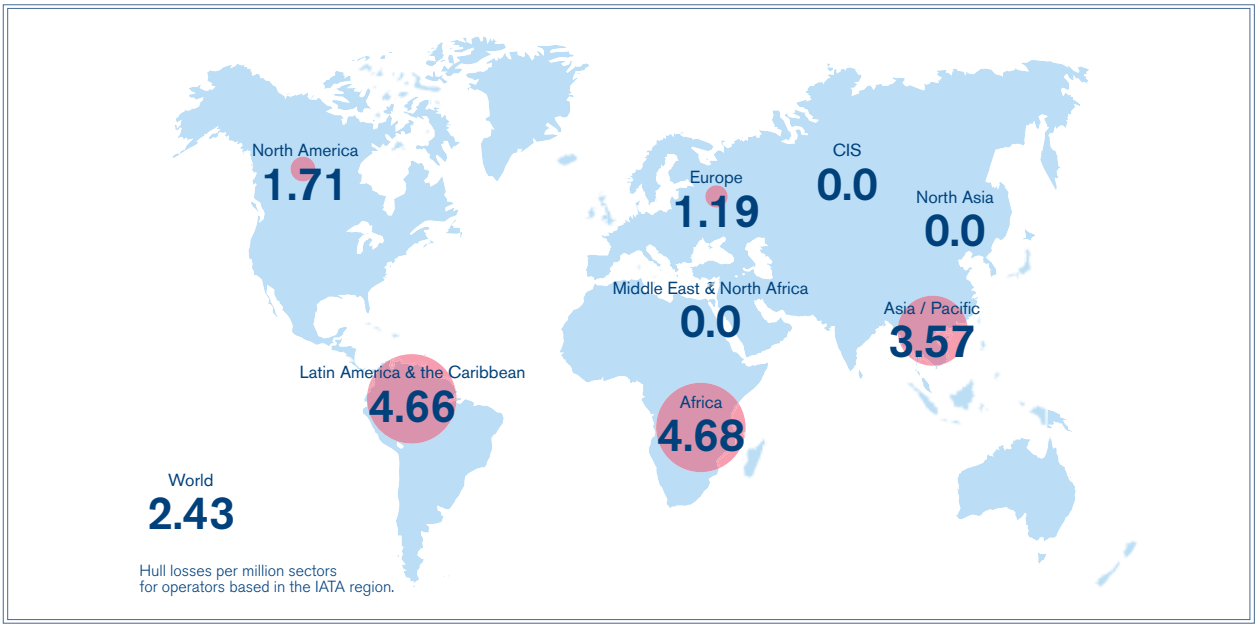
For example, if a Canadian-registered operator has an accident in Europe, this accident is counted as a "North American" accident as far as regional accident rates are concerned.

For a complete list of countries assigned per region, please consult **Annex 1**.

Western-built Jet Aircraft Hull Loss Rate per Operator Region

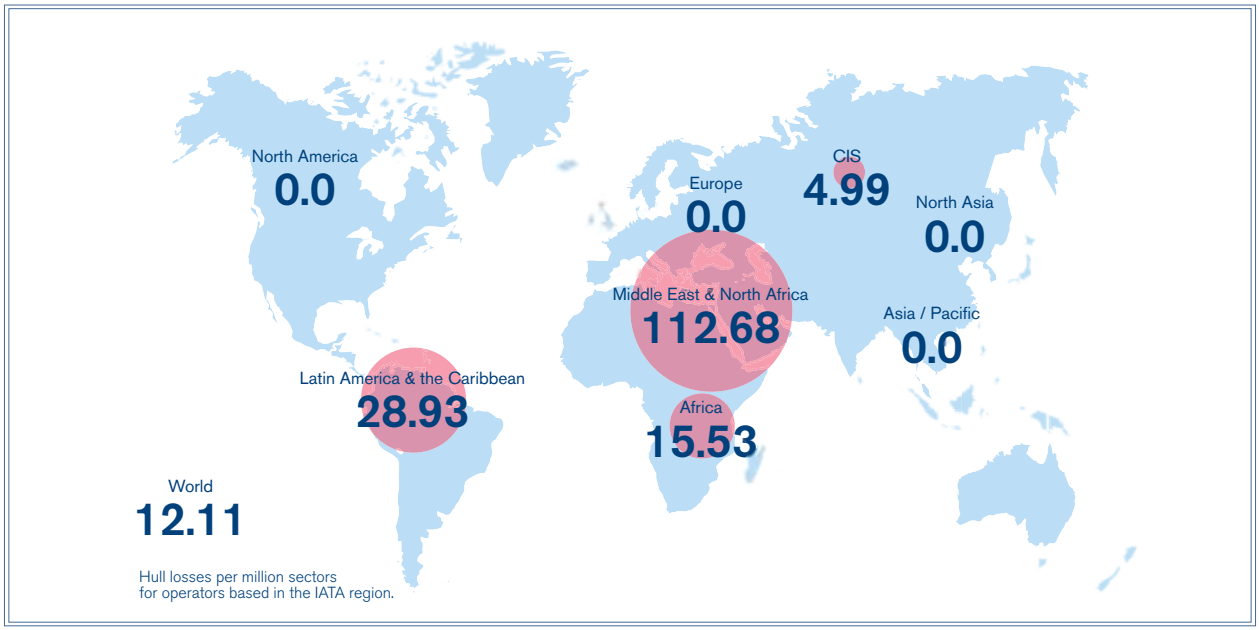


Western-built Turboprop Aircraft Hull Loss Rate per Operator Region



Eastern-built Aircraft Accidents per Operator Region

Eastern-built Aircraft (All Types) Hull Loss Rate per Operator Region



“IATA member airlines surpassed the industry’s performance in terms of safety.”

Section 4

4

In-Depth Accident Analysis 2008

INTRODUCTION TO TEM FRAMEWORK

The Human Factors Research Project at The University of Texas in Austin developed Threat and Error Management (TEM) as a conceptual framework to interpret data obtained from both normal and abnormal operations. For many years, IATA has worked closely with the University of Texas Human Factors Research Team, the International Civil Aviation Organisation (ICAO), member airlines and manufacturers to apply TEM to its many safety activities.

Fig. 4.1 Threat and Error Management Framework

This section presents some definitions that will be helpful to understand the analysis contained in this report. The TEM framework is illustrated in Figure 4.1.

Latent Conditions: Conditions present in the system before the accident, made evident by triggering factors. These often relate to deficiencies in organisational processes and procedures.

Threat: An event or error that occurs outside the influence of the flight crew, but which requires flight crew attention and management to properly maintain safety margins.

Flight Crew Error: An observed flight crew deviation from organisational expectations or crew intentions.

Undesired Aircraft State (UAS): A *flight-crew-induced* aircraft state that clearly reduces safety margins; a safety-compromising situation that results from ineffective threat / error management. An undesired aircraft state is recoverable.

End State: An end state is a reportable event. An end state is unrecoverable.

Distinction between "Undesired Aircraft State" and "End State": An unstable approach is recoverable. This is a UAS. A runway excursion is *unrecoverable*. Therefore, this is an End State.

Note: these definitions are valid for accident analysis conducted from the flight crew perspective. Definitions of threats, errors and undesired states vary for cabin crew-centered analysis. These definitions are presented in Section 7, entitled "Cabin Operations Safety".

4

ACCIDENT CLASSIFICATION SYSTEM

At the request of member airlines, manufacturers and other organisations involved in the Safety Report, IATA developed an accident classification system based on the Threat and Error Management (TEM) framework.

The purpose of the taxonomy:

- Acquire more meaningful data
- Extract further information / intelligence
- Formulate relevant mitigation strategies / safety recommendations

Unfortunately, some accidents do not contain sufficient information at the time of the analysis to adequately assess contributing factors. When an event cannot be properly classified due to lack of information, it is classified under the "insufficient information" category. It should also be noted that the contributing factors that have been classified do not always reflect all the factors that played a part in an accident but rather those known at the time of the analysis. Hence there is a need for Operators and States to improve their reporting cultures.

Important note: *In the in-depth analysis presented in Sections 4-5-6-7, the percentages shown with regards to contributing factors (e.g., % of threats and errors noted) are based on the number of accidents that contained sufficient information to be classified, not on the total number of events. Accidents classified as "insufficient information" are excluded from this part of the analysis.*

However, accidents classified as "insufficient information" are part of the overall statistics (e.g., % of accidents that were fatal or resulted in a Hull Loss).

Annex 1 contains definitions and detailed information regarding of the types of accidents and aircraft types that are included in the Safety Report analysis.

The complete IATA TEM-based accident classification systems for both flight and cabin crew are presented in **Annexes 2** and **3**, respectively.

ORGANISATIONAL AND FLIGHT CREW-AIMED COUNTERMEASURES

Every year, the ACTF classifies accidents and, with the benefit of hindsight, determines actions or measures that could have been taken to prevent an accident. These proposed countermeasures can include overarching issues within an organisation or a particular country, or involve performance of front line personnel, such as pilots or ground personnel.

Countermeasures are aimed at two levels:

- The first set is aimed at the operator or the State responsible for oversight: these countermeasures are based on activities, processes or systemic issues internal to the airline operation or State's oversight activities
- The other set of countermeasures are aimed at the flight crews, to help them manage threats or their own errors while on the line

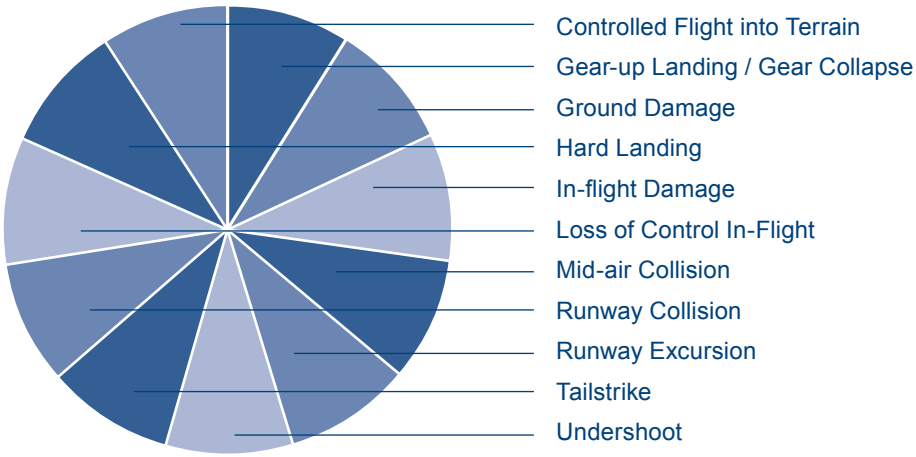
Countermeasures for other personnel, such as air traffic controllers, ground crew, cabin crew or maintenance staff, are important but they are not considered at this time.

Each event was coded with potential counter-measures that, with the benefit of hindsight, could have altered the outcome of events. A statistical compilation of the top countermeasures is presented in Section 8 of this report.

ANALYSIS BY ACCIDENT CATEGORIES AND REGIONS

- This section presents an in-depth analysis of the 2008 occurrences by accident categories, as illustrated in the sample Figure 4.2
- Definitions of these categories can be found in **Annex 2**

Figure 4.2 – Accident Categories (End States)



Referring to these accident categories helps an operator to:

- Structure safety activities and set priorities
- Avoid “forgetting” key risk areas, when a type of accident does not occur on a given year
- Provide resources for well-identified prevention strategies
- Address these categories both systematically and continuously within the airline’s safety management system

Section 5 displays an in-depth regional accident analysis (by region of the involved operator). Section 6 presents an in-depth analysis of accidents involving cargo aircraft and Section 7 is dedicated to accidents involving cabin safety issues, such as passenger evacuations.

4

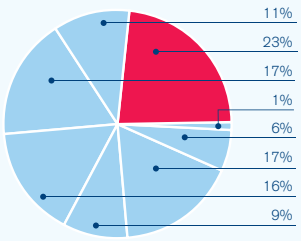
Year 2008 Aircraft Accidents

109 Accidents

IATA Members	30%
Hull Losses	49%
Fatal	21%

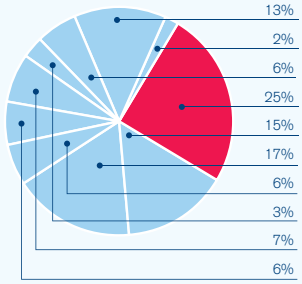
65% Passenger
31% Cargo
4% Ferry
61% Jet
39% Turboprop

Accidents per Operator Region



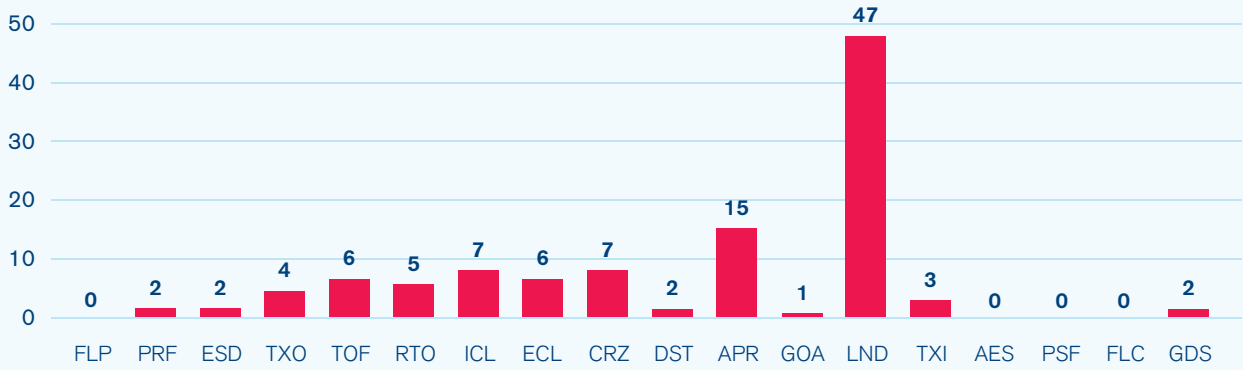
11%	Middle East & North Africa
23%	North America
17%	Asia / Pacific
1%	North Asia
6%	Africa
17%	Latin America & the Caribbean
16%	Europe
9%	CIS

Breakdown per Accident Category



13%	Loss of Control In-flight
2%	Runway Collision
6%	Undershoot
25%	Runway Excursion
15%	In-flight Damage
17%	Ground Damage
6%	Hard Landing
3%	Tailstrike
7%	Gear-up Landing / Gear Collapse
6%	Controlled Flight Into Terrain
0%	Mid-air Collision

Accidents per Phase of Flight*



Phase of Flight: Definitions

FLP	Flight Planning	**DST**	Descent
PRF	Pre-flight	**APR**	Approach
ESD	Engine Start / Depart	**GOA**	Go-around
TXO	Taxi-out	**LND**	Landing
TOF	Take-off	**TXI**	Taxi-in
RTO	Rejected Take-off	**AES**	Arrival / Engine Shutdown
ICL	Initial Climb	**PSF**	Post-flight
ECL	En Route Climb	**FLC**	Flight Close
CRZ	Cruise	**GDS**	Ground Servicing

Year 2008 Aircraft Accidents
Continued

Top Contributing Factors**

Latent Conditions (deficiencies in...)

- **30%** Safety management
- **27%** Regulatory oversight
- **16%** Flight operations: Training systems
- **13%** Flight operations: SOPs & checking
- **12%** Maintenance operations: SOPs & checking

Threats

Environmental

- **29%** Meteorology
  - Wind / windshear / gusty wind (**36%** of all these events)
  - Poor visibility / IMC (**32%** of all these events)
  - Thunderstorms (**25%** of all these events)
  - Icing conditions (**16%** of all these events)
- **20%** Airport facilities
  - Poor signage / faint markings / runway or taxiway closure (**53%** of all these events)
  - Inadequate overrun area / trench / ditch or structures in close proximity to runway / taxiway (**37%** of all these events)
  - Contaminated runway or taxiway / poor braking action (**26%** of all these events)
- **13%** Lack of visual reference
- **6%** Terrain / obstacles

Airline

- **42%** Aircraft malfunction
  - Contained engine failure / powerplant malfunction (**35%** of all malfunctions)
  - Fire / smoke (**20%** of all malfunctions)
  - Other (**15%** of all malfunctions)
  - Gear / tire (**13%** of all malfunctions)
  - Extensive / uncontained engine failure (**10%** of all malfunctions)
- **15%** Maintenance events
- **9%** Ground events

Flight Crew Errors (relating to...)

- **38%** Manual handling / flight controls
- **33%** SOP adherence / SOP cross-verification
  - Intentional non-compliance (**63%** of all these events)
  - Unintentional non-compliance (**47%** of all these events)
- **13%** Callouts
- **9%** Failure to go-around after destabilisation during approach
- **9%** Pilot-to-pilot communication

Undesired Aircraft States (UAS)

- **19%** Vertical, lateral or speed deviations
- **15%** Long, floated, bounced, firm, off-centreline or crabbed landing
- **13%** Unstable approach
- **11%** Loss of aircraft control while on the ground
- **7%** Continued landing after unstable approach

Additional Classifications

- **4%** Spatial disorientation & spatial / somatogravic illusion
- **2%** Fatigue
- **1%** Incapacitation

Correlations of Interest

In **37%** of all runway excursions, inadequate airport facilities and flight crew errors relating to manual handling / flight controls were also noted.

In **28%** of accidents where an aircraft malfunction was cited as a contributing factor, a maintenance event was also noted.

Overall, in **57%** of the accidents involving a maintenance event, deficiencies in the Operator's maintenance organisation were also noted as a contributing factor.

69% of accidents involving deficiencies in safety management at the Operator level also implicated deficient regulatory oversight by the State of the Operator.

In **43%** of accidents where a long, floated, bounced, firm or off-centreline landing was cited also noted flight crew manual handling / flight control errors and deficiencies in flight crew training.

Note: 12% of accidents were not classified due to insufficient data.
* See Annex 1 for "Phase of Flight" definitions
** See Annex 2 for "Contributing Factors" definitions

4

Controlled Flight into Terrain

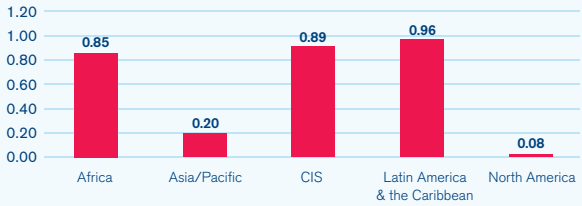
7 Accidents

IATA Members	0%
Hull Losses	100%
Fatal	100%
Accident Rate*	0.19

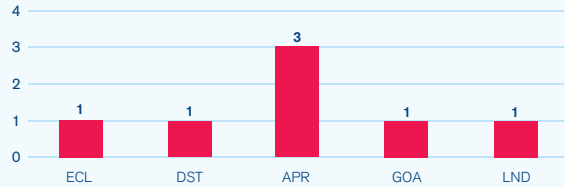
43% Passenger | 43% Cargo | 14% Ferry

29% Jet | 71% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

- **67%** Regulatory oversight
- **67%** Safety management
- **33%** Flight operations: Training systems
- **33%** Ops planning & scheduling
- **33%** Technology & equipment

Threats

Environmental

- **83%** Lack of visual reference
- **50%** Terrain / obstacles
- **33%** NAV Aids: Ground-based navigation aid malfunction, lack or unavailability

Airline

- **17%** Operational pressure
- **17%** Aircraft malfunction

Flight Crew Errors (relating to...)

- **67%** SOP adherence / SOP cross-verification
  - Intentional non-compliance (**50%** of all these events)
  - Unintentional non-compliance (**50%** of all these events)
- **33%** Manual handling / flight controls
- **33%** Pilot-to-pilot communication

Undesired Aircraft States (UAS)

- **50%** Vertical, lateral or speed deviations

Additional Classifications

- **33%** Spatial disorientation & spatial / somatogravic illusion
- **17%** Fatigue

Correlations of Interest

In all the CFIT accidents where deficient safety management (on the part of the Operator) was cited, deficient regulatory oversight was also noted as a contributing factor.

In all the CFIT accidents that involved manual handling / flight control errors, the flight crew was suffering from spatial disorientation and lacked visual references.

In **33%** of CFIT accidents, the flight crew committed errors relating to SOP adherence / SOP cross-verification and the aircraft underwent vertical, lateral or speed deviations prior to impacting terrain.

Accident Scenarios of Interest

Scenario 1:

The Operator in question has deficiencies with regards to flight training and the regulatory oversight by the State of the Operator is deemed to be inadequate. On the day of the accident, the flight crew lacks visual references. Miscommunication occurs between the flight crew members. They commit errors with regards to SOP adherence / SOP cross-verification and the aircraft undergoes vertical, lateral or speed deviations. It impacts terrain and is destroyed.

This scenario is common to 33% of all accidents involving a controlled flight into terrain.

Scenario 2:

On the day of the accident, the flight crew lacks visual references. They commit manual handling / flight controls errors. The flight crew becomes spatially disorientated. Subsequently, the aircraft impacts terrain and is destroyed.

This scenario is common to 33% of all accidents involving a controlled flight into terrain.

Note: 17% of CFIT accidents were not classified due to insufficient data.

* Accidents per million sectors flown for all aircraft types

** See Annex 1 for "Phase of Flight" definitions

*** See Annex 2 for "Contributing Factors" definitions

Loss of Control In-flight

14 Accidents

IATA Members	21%
Hull Losses	100%
Fatal	79%
Accident Rate*	0.38

43% Passenger

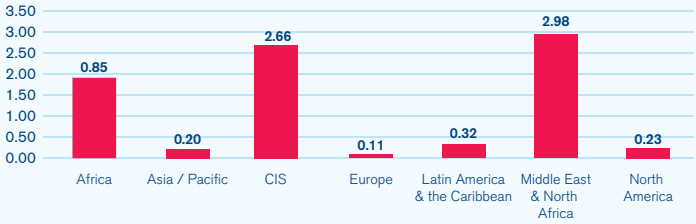
50% Cargo

7% Ferry

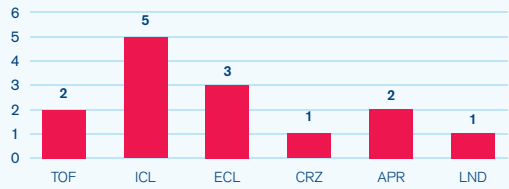
50% Jet

50% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

- **60%** Safety management
- **50%** Flight operations: SOPs & checking
- **40%** Flight operations: Training systems
- **40%** Maintenance operations: SOPs & checking
- **30%** Regulatory oversight
- **30%** Management decisions

Threats

Environmental

- **70%** Meteorology
  - Poor visibility / IMC (**42%** of all these events)
  - Thunderstorms (**29%** of all these events)
  - Icing conditions (**29%** of all these events)
- **30%** Lack of visual reference

Airline

- **50%** Aircraft malfunction
  - Contained engine failure / powerplant malfunction (**60%** of all malfunctions)
- **30%** Maintenance events

Flight Crew Errors (relating to...)

- **80%** SOP adherence / SOP cross-verification
  - Intentional non-compliance (**63%** of all these events)
  - Unintentional non-compliance (**50%** of all these events)
- **50%** Manual handling / flight controls
- **30%** Pilot-to-pilot communication

Undesired Aircraft States (UAS)

- **50%** Vertical, lateral or speed deviations
- **50%** Operation outside aircraft limitations
- **30%** Abrupt aircraft control

Additional Classifications

- **20%** Spatial disorientation & spatial / somatogravic illusion
- **10%** Fatigue
- **10%** Incapacitation

Correlations of Interest

In the majority (**86%**) of accidents involving meteorology, flight crew errors relating to SOP adherence / SOP cross-verification were also noted.

In **80%** of accidents involving aircraft malfunctions, deficiencies in maintenance operations relating to SOPs & checking were also noted as a contributing factor.

In **67%** of all accidents involving lack of visual references and manual handling / flight controls errors, deficiencies in flight crew training were also noted.

Accident Scenarios of Interest

Scenario 1:

The Operator in question has deficiencies with regards to flight crew training. On the day of the accident, the flight crew faces several environmental and airline threats such as icing conditions, a lack of visual reference or aircraft malfunction. They do not adhere to SOPs and operate the aircraft outside its limitations. The flight crew loses control and the aircraft is destroyed.

This scenario is common to 30% of all the loss of control in-flight accidents.

Scenario 2:

While operating in adverse weather, the flight crew commits errors relating to manual handling / flight controls and does not adhere to SOPs. Miscommunication occurs between the flight crew members. The aircraft undergoes vertical, lateral or speed deviations. The flight crew abruptly controls the aircraft and subsequently loses control. The aircraft is destroyed.

This scenario is common to 30% of all the loss of control in-flight accidents.

Scenario 3:

The Operator in question has deficiencies with regards to safety management. On the day of the accident, the flight crew faces poor visibility or a lack of visual reference. They commit manual handling / flight controls errors. The aircraft undergoes vertical, lateral or speed deviations. The flight crew suffers from spatial disorientation and loses control.

This scenario is common to 20% of all the loss of control in-flight accidents.

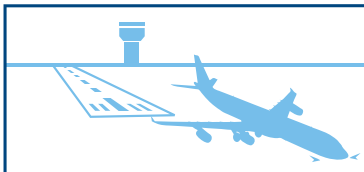
Note: 29% of Loss of Control accidents were not classified due to insufficient data.

* Accidents per million sectors flown for all aircraft types

** See Annex 1 for "Phase of Flight" definitions

*** See Annex 2 for "Contributing Factors" definitions

4



Runway Excursion

28 Accidents

IATA Members	25%
Hull Losses	57%
Fatal	14%
Accident Rate*	0.77

68% Passenger

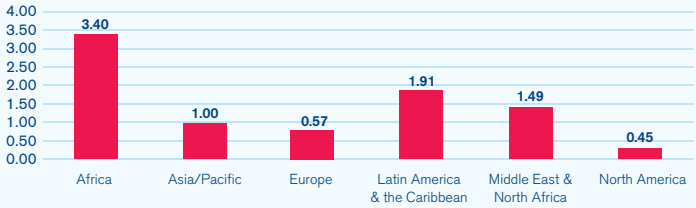
25% Cargo

7% Ferry

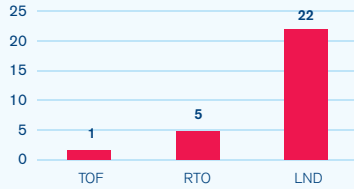
57% Jet

43% Turboprop

Accident Rates per Region of Operator*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

- **42%** Safety management
- **31%** Regulatory oversight
- **15%** Flight operations: Training systems

Threats

Environmental

- **46%** Airport facilities
  - Inadequate overrun area / trench / ditch or structures in close proximity to runway (**58%** of all these events)
  - Contaminated runway / poor braking action (**42%** of all these events)
- **35%** Meteorology
  - Wind / windshear / gusty wind (**67%** of all these events)
  - Icing conditions (**33%** of all these events)
  - Poor visibility / IMC (**33%** of all these events)

Airline

- **46%** Aircraft malfunction
  - Contained engine failure / powerplant malfunction (**67%** of all malfunctions)
- **12%** Maintenance events

Flight Crew Errors (relating to...)

- **69%** Manual handling / flight controls
- **38%** SOP adherence / SOP cross-verification
- **19%** Callouts

Undesired Aircraft States (UAS)

- **27%** Long, floated, bounced, firm, off-centreline or crabbed landing
- **15%** Continued landing after unstable approach
- **15%** Vertical, lateral or speed deviations
- **12%** Rejected take-off after V1

Correlations of Interest

In **75%** of the runway excursions where the flight crew elected to land after an unstable approach, the required callouts had been omitted.

12% of all the runway excursions involved a long landing on a contaminated runway or on one with poor braking action.

In almost a quarter (**23%**) of accidents, a correlation was noted between flight crew manual handling / flight control errors and a long, floated, bounced, firm, off-centreline or crabbed landing prior to departing the runway.

In **38%** of the runway excursions that involved an engine failure, the flight crew rejected the take-off after V1. In **67%** of these rejected take-offs, manual handling / flight control errors were noted as contributing factors.

Accident Scenarios of Interest

Scenario 1:

The flight crew commits manual handling / flight control errors and errors relating to SOP adherence / SOP cross-verification. They elect to land after an unstable approach. The aircraft lands long, or off the centreline, departs the runway and is substantially damaged or destroyed.

This scenario is common to 15% of all runway excursion accidents.

Scenario 2:

The flight is operating in windy / windshear or gusty wind conditions. The flight crew commits manual handling / flight control errors and loses control of the aircraft. It exits the runway and is substantially damaged or destroyed.

This scenario is common to 15% of all runway excursion accidents.

Scenario 3:

The Operator in question has deficiencies with regards to its safety management and operates to an aerodrome with hazardous conditions, such as an inadequate overrun area or structures in close proximity to the runway. On the day of the accident, the flight crew commits errors relating to SOP adherence / SOP cross-verification. The aircraft departs the runway and is substantially damaged or destroyed.

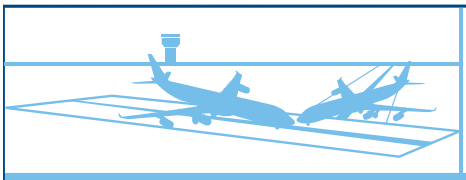
This scenario is common to 12% of all runway excursion accidents.

Note: 7% of Runway Excursion accidents were not classified due to insufficient data.

* Accidents per million sectors flown for all aircraft types

** See Annex 1 for "Phase of Flight" definitions

*** See Annex 2 for "Contributing Factors" definitions



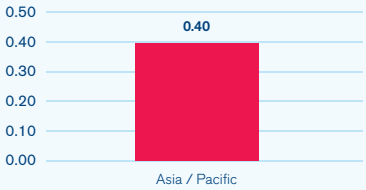
Runway Collision

2 Accidents

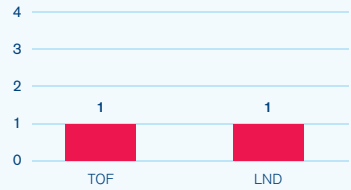
IATA Members	0%
Hull Losses	0%
Fatal	0%
Accident Rate*	0.05

100% Passenger | 0% Cargo | 0% Ferry | 50% Jet | 50% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

Regulatory oversight
(1 case)

Threats

Environmental
Wildlife / birds / foreign objects
(2 cases)

Airport facilities:
Poor signage, faint markings / runway or taxiway closure
(2 cases)

Airline
None identified

Flight Crew Errors (relating to...)

None identified

Undesired Aircraft States (UAS)

None identified

Correlations of Interest

No significant correlations noted.

Accident Scenarios of Interest

No significant scenarios noted.

Note: All Runway Collision accidents were classified.
* Accidents per million sectors flown for all aircraft types
** See Annex 1 for "Phase of Flight" definitions
*** See Annex 2 for "Contributing Factors" definitions

4

In-flight Damage

16 Accidents

IATA Members	**56%**
Hull Losses	**38%**
Fatal	**0%**
Accident Rate*	**0.44**

56% Passenger

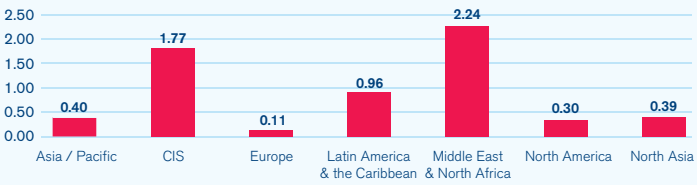
44% Cargo

0% Ferry

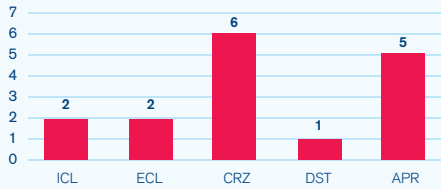
69% Jet

31% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

- **7%** Design
- **7%** Regulatory oversight
- **7%** Safety management
- **7%** Ground operations

Threats

Environmental

29% Meteorology: hail storm

Airline

64% Aircraft malfunction

- Extensive / uncontained engine failure (**33%** of all malfunctions)
- Fire / smoke (**33%** of all malfunctions)
- Contained engine failure / powerplant malfunction (**22%** of all malfunctions)

Flight Crew Errors (relating to...)

None identified

Undesired Aircraft States (UAS)

None identified

Correlations of Interest

67% of in-flight damage accidents resulting in a hull loss involved a contained or uncontained engine failure. **33%** related to an in-flight fire.

Accident Scenarios of Interest

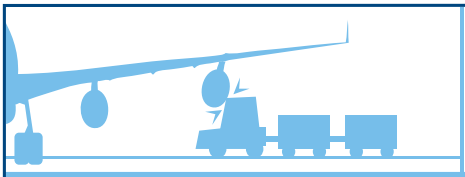
No significant scenarios noted.

Note: 13% of In-flight Damage accidents were not classified due to insufficient data.

* Accidents per million sectors flown for all aircraft types

** See Annex 1 for "Phase of Flight" definitions

*** See Annex 2 for "Contributing Factors" definitions



Ground Damage

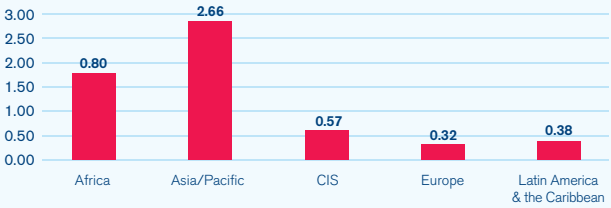
18 Accidents

IATA Members	50%
Hull Losses	22%
Fatal	0%
Accident Rate*	0.49

67% Passenger | 33% Cargo | 0% Ferry

78% Jet | 22% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**

Top Contributing Factors***

Latent Conditions (deficiencies in...)

- **13%** Regulatory oversight
- **13%** Safety management
- **13%** Maintenance operations: SOPs & checking

Threats

Environmental

- **13%** Airport facilities: poor signage, faint markings / runway or taxiway closure

Airline

- **38%** Ground events
- **38%** Aircraft malfunction
  - Fire / smoke (**67%** of all malfunctions)
- **19%** Maintenance events

Flight Crew Errors (relating to...)

- **19%** SOP adherence / SOP cross-verification: intentional non-compliance
- **13%** Ground navigation
- **13%** Flight-to-ground crew communication

Undesired Aircraft States (UAS)

- **19%** Ground navigation

Correlations of Interest

In all the accidents citing inadequate airport facilities such as poor signage, faint markings or runway / taxiway closure, flight crew errors relating to ground navigation were also noted.

33% of the accidents involving an aircraft malfunction also cited maintenance events as a contributing factor.

In **33%** of accidents where ground events were noted as a contributing factor (e.g. improper ground support), communication errors between the flight and the ground crew were also noted.

Accident Scenarios of Interest

Scenario 1:

On the day of the accident, a ground event occurs, such as improper ground support. There is a miscommunication between the flight crew and the ground crew handling the aircraft. The flight crew commits errors relating to SOP adherence / SOP cross-verification. The aircraft is damaged by ground equipment.

This scenario is common to 13% of all the ground accidents.

Note: 11% of Ground Damage accidents were not classified due to insufficient data.
* Accidents per million sectors flown for all aircraft types
** See Annex 1 for "Phase of Flight" definitions
*** See Annex 2 for "Contributing Factors" definitions

4

Undershoot

6 Accidents

IATA Members	17%
Hull Losses	83%
Fatal	17%
Accident Rate*	0.16

83% Passenger

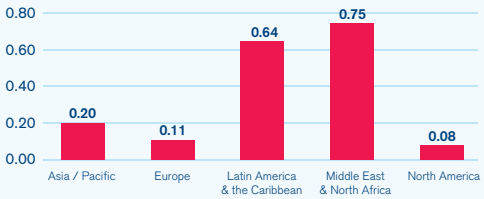
17% Cargo

0% Ferry

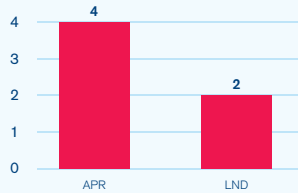
33% Jet

67% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

- **40%** Safety management
- **20%** Regulatory oversight
- **20%** Management decisions

Threats

Environmental

- **60%** Meteorology
- **20%** Lack of visual reference

Airline

- **20%** Aircraft malfunction

Flight Crew Errors (relating to...)

- **60%** Manual handling / flight controls
- **40%** SOP adherence / SOP cross-verification: intentional non-compliance

Undesired Aircraft States (UAS)

- **60%** Vertical, lateral or speed deviations
- **20%** Unstable approach
- **20%** Incorrect aircraft configuration: engine

Correlations of Interest

All the accidents involving vertical, lateral or speed deviations also involved flight crew manual handling / flight controls errors.

In all the accidents where safety management deficiencies (on the part of the Operator) were cited, flight crew errors relating to SOP adherence / SOP cross-verification were also noted as contributing factors.

Accident Scenarios of Interest

Scenario 1:

On the day of the accident, the flight crew is operating in adverse weather conditions. The flight crew commits manual handling / flight controls errors. The aircraft undergoes vertical, lateral or speed deviations and touches down before the runway surface.

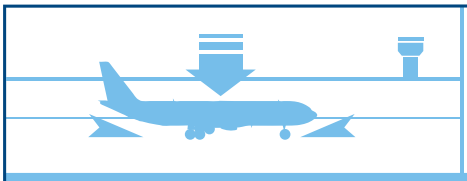
This scenario is common to 40% of all the undershoot accidents.

Note: 17% of Undershoot accidents were not classified due to insufficient data.

* Accidents per million sectors flown for all aircraft types

** See Annex 1 for "Phase of Flight" definitions

*** See Annex 2 for "Contributing Factors" definitions



Hard Landing

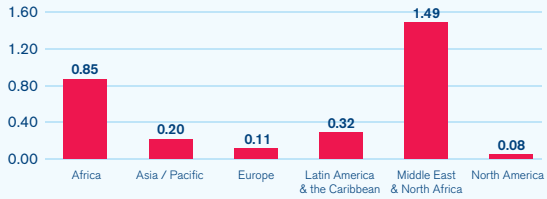
7 Accidents

IATA Members	43%
Hull Losses	14%
Fatal	0%
Accident Rate*	0.19

86% Passenger
14% Cargo
0% Ferry

86% Jet
14% Turboprop

Accident Rates per Operator Region*



Top Contributing Factors**

Latent Conditions (deficiencies in...)

- **29%** Flight operations: SOPs & checking
- **29%** Flight operations: Training systems
- **29%** Change management

Threats

Environmental

- **29%** Meteorology: poor visibility / IMC or wind / windshear / gusty wind
- **29%** Lack of visual reference
- **29%** Airport facilities: poor signage, faint markings / runway closures

Airline

- **14%** Aircraft malfunction: primary flight controls and avionics / flight instruments
- **14%** Maintenance events

Flight Crew Errors (relating to...)

- **86%** Manual handling / flight controls
- **43%** SOP adherence / SOP cross-verification
  - Intentional non-compliance (**67%** of all these events)
  - Unintentional non-compliance (**33%** of all these events)
- **43%** Callouts
- **29%** Failure to go-around after destabilisation during approach

Undesired Aircraft States (UAS)

- **71%** Long, floated, bounced, firm, off-centreline or crabbed landing
- **29%** Vertical, lateral or speed deviations
- **29%** Unstable approach

Correlations of Interest

In all hard landings where a long, floated, firm, off-centreline or crabbed landing was cited, flight crew errors relating to manual handling / flight controls were also noted as contributing factors.

In all accidents where meteorology was cited as a contributing factor, flight crew errors relating to manual handling / flight controls were also noted.

In all the accidents where the crew failed to go-around after a destabilisation during approach, the aircraft touched down long, firm, off-centreline or floated and experienced a hard landing.

Accident Scenarios of Interest

Scenario 1:

The Operator in question has deficiencies with regards to flight crew training and flight operations SOPs and checking. On the day of the accident, the flight crew commits errors relating to manual handling / flight controls. They do not adhere to SOPs and omit approach callouts. Their actions lead to a long, floated, bounced, firm, off-centreline or crabbed landing and subsequent aircraft damage.

This scenario is common to 29% of all the hard landings.

Scenario 2:

The flight crew commits errors relating to manual handling / flight controls. The approach becomes unstable but the flight crew does not go-around. The aircraft touches down hard and is damaged.

This scenario is common to 29% of all the hard landings.

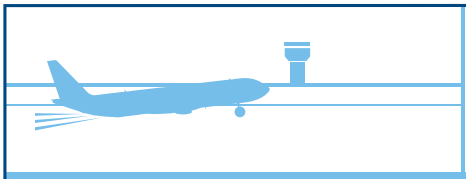
Scenario 3:

The flight is operated into an airport with deficient facilities. The flight crew lacks visual references and commits errors relating to manual handling / flight controls. The aircraft lands long, floats, bounces, lands firmly, or off-centreline and is damaged.

This scenario is common to 29% of all the hard landings.

Note: All Hard Landing accidents were classified.
* Accidents per million sectors flown for all aircraft types
** See Annex 2 for "Contributing Factors" definitions

4



Gear-up Landing / Gear Collapse

8 Accidents

IATA Members	0%
Hull Losses	0%
Fatal	0%
Accident Rate*	0.22

88% Passenger

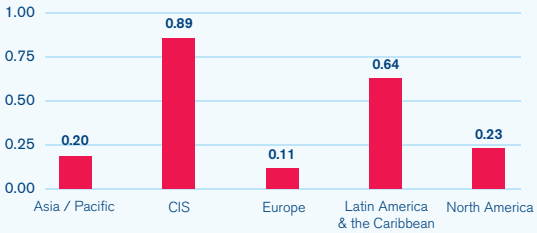
12% Cargo

0% Ferry

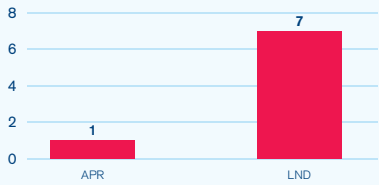
50% Jet

50% Turboprop

Accident Rates per Operator Region*



Accident per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

38% Regulatory oversight

25% Management decisions

Threats

Environmental

13% Wildlife / birds / foreign objects

Airline

63% Aircraft malfunction

- Gear / tire (**60%** of all malfunctions)
- Contained engine failure / powerplant malfunction (**20%** of all malfunctions)
- Secondary flight controls (**20%** of all malfunctions)

50% Maintenance events

13% Manuals / charts / checklists

Flight Crew Errors (relating to...)

25% Checklist

13% SOP adherence / SOP cross-verification: unintentional non-compliance

Undesired Aircraft States (UAS)

25% Incorrect aircraft configuration: landing gear

Correlations of Interest

In **40%** of the accidents citing an aircraft malfunction, maintenance events were also noted.

In all accidents where management decisions were cited as a contributing factor, deficient regulatory oversight was also noted.

All accidents citing incorrect landing gear configuration also involved checklist-related errors by the flight crew.

Accident Scenarios of Interest

Scenario 1:

Prior to the accident, maintenance is conducted on the landing gear and maintenance errors occur. On the day of the accident, the flight crew experience a malfunction relating to the gear and land with the gear retracted or suffer a gear collapse.

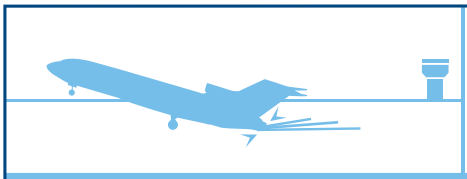
This scenario is common to 25% of all the accidents involving a gear-up landing or a gear collapse during landing.

Scenario 2:

The State of the Operator in question has deficiencies with regards to its regulatory oversight. On the day of the accident, the flight crew commits errors relating to the use of checklists: the checklist is performed from memory, it is omitted or items are missed. There is an incorrect configuration with regards to the landing gear. The landing is carried out with the gear retracted or with an unlocked gear, which collapsed on touchdown.
The aircraft is damaged as a result.

This scenario is common to 13% of all the accidents involving a gear-up landing or a gear collapse during landing.

Note: All Gear-up Landing / Gear Collapse accidents were classified.
* Accidents per million sectors flown for all aircraft types
** See Annex 1 for "Phase of Flight" definitions
*** See Annex 2 for "Contributing Factors" definitions



Tailstrike

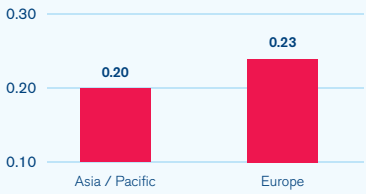
3 Accidents

IATA Members	33%
Hull Losses	0%
Fatal	0%
Accident Rate*	0.08

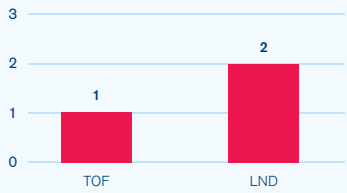
67% Passenger | 33% Cargo | 0% Ferry

100% Jet | 0% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

Design **(1 case)**

Regulatory oversight **(1 case)**

Management decisions **(1 case)**

Safety management **(1 case)**

Flight operations: Training systems **(1 case)**

Threats

Environmental

Meteorology: wind / windshear / gusty wind **(1 case)**

Airline

None identified

Flight Crew Errors (relating to...)

Manual handling / flight controls **(2 cases)**

SOP adherence / SOP cross-verification: unintentional non-compliance **(1 case)**

Callouts **(1 case)**

Failure to go-around after destabilisation during approach **(1 case)**

Undesired Aircraft States (UAS)

Long, floated, bounced, firm, off-centreline or crabbed landing **(2 cases)**

Vertical, lateral or speed deviations **(1 case)**

Incorrect aircraft configuration: flight controls / automation **(1 case)**

Correlations of Interest

No significant correlations noted.

Accident Scenarios of Interest

No significant scenarios noted.

Note: 33% of Tailstrike accidents were not classified due to insufficient data.

* Accidents per million sectors flown for all aircraft types

** See Annex 1 for "Phase of Flight" definitions

*** See Annex 2 for "Contributing Factors" definitions

4 TREND ANALYSIS

Accidents Overview (2006-2008)

	Total Accidents	IATA Members	Hull Losses	Fatal	Fatalities	Passenger	Cargo	Ferry	Jet	Turboprop
2008	109	33	53	23	502	71	34	4	66	43
2007	100	35	45	20	692	81	16	3	57	43
2006	77	31	34	20	855	59	18	0	46	31

Accidents per Category (2006-2008)

	Controlled Flight into Terrain	Loss of Control In-flight	Runway Excursion	Runway Collision	Mid-air Collision	In-flight Damage	Ground Damage	Undershoot	Hard Landing	Gear-up Landing / Gear Collapse	Tailstrike
2008	7	14	28	2	0	16	18	6	7	8	3
2007	5	13	26	0	0	9	19	5	6	15	2
2006	9	5	22	1	1	3	7	N/A	N/A	N/A	8

Note: IATA's accident classification system was redesigned in 2007. Therefore, not all accident categories are represented in the 2006 breakdown. This is why some accident categories are noted as "N/A" (not applicable). For this same reason, the breakdown of accidents per category in 2006 does not add up to the total number of accidents in that year. Under the old breakdown, these cases were coded differently.

Section 5

5

In-Depth Regional Accident Analysis

Following the same model as the in-depth analysis by accident category presented in Section 4, this section presents an overview of occurrences and their contributing factors broken down by region of the involved operators.

The purpose of this section is to identify common issues that can be shared by operators located in the same region, in order to develop adequate prevention strategies.

Note: IATA determines the accident region based on the operator's country. Moreover, the operator's country is specified in the operator's Air Operator Certificate (AOC).

For example, if a Canadian-registered operator has an accident in Europe, this accident is counted as a "North American" accident.

For a complete list of countries assigned per region, please consult ***Annex 1****.*

5

Africa

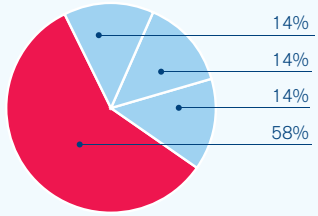
7 Accidents

IATA Members	14%
Hull Losses	71%
Fatal	43%

57% Passenger | 43% Cargo | 0% Ferry | 43% Jet | 57% Turboprop

Accidents per Phase of Flight*

Breakdown per Accident Category



14% Hard Landing
14% Controlled Flight into Terrain
14% Loss of Control In-flight
58% Runway Excursion

Top Contributing Factors**

Latent Conditions (deficiencies in...)

- **29%** Regulatory oversight
- **29%** Safety management
- **14%** Technology & equipment
- **14%** Flight operations: SOPs & checking and training systems

Threats

Environmental
- **29%** Airport facilities
- **14%** Meteorology: thunderstorms
- **14%** Nav Aids: ground navigation aid malfunction, lack or unavailability
- **14%** Terrain / obstacles

Airline
- **57%** Aircraft malfunction: contained engine failure / powerplant malfunction

Flight Crew Errors (relating to...)

- **57%** SOP adherence / SOP cross-verification
  - Intentional non-compliance (**50%** of all these events)
  - Unintentional non-compliance (**50%** of all these events)
- **43%** Manual handling / flight controls
- **29%** Callouts
- **14%** Automation
- **14%** Pilot-to-pilot communication

Undesired Aircraft States (UAS)

- **29%** Long, floated, bounced, firm, off-centreline or crabbed landing

Correlations of Interest

In all accidents where deficient safety management (on the part of the Operator) was cited, deficient regulatory oversight was also noted as a contributing factor.

75% of all runway excursions, involving African Operators, cited aircraft malfunction as a contributing factor.

All accidents leading to long, floated, bounced, firm, off-centreline or crabbed landing involved flight crew manual handling / flight control errors.

Note: All accidents were classified.
* See Annex 1 for "Phase of Flight" definitions
** See Annex 2 for "Contributing Factors" definitions

Asia / Pacific

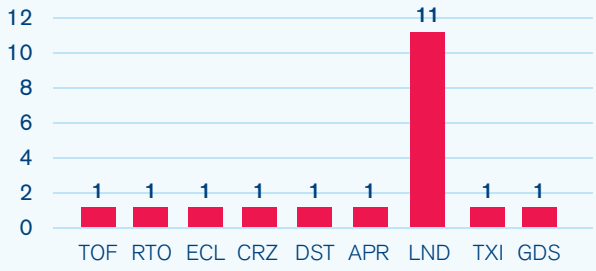
19 Accidents

IATA Members	26%
Hull Losses	37%
Fatal	11%

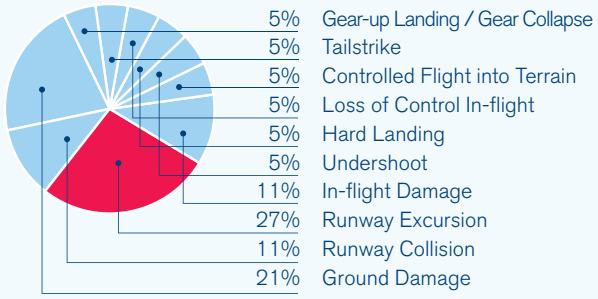
74% Passenger | 26% Cargo | 0% Ferry | 58% Jet | 42% Turboprop

5

Accidents per Phase of Flight*



Breakdown per Accident Category



Top Contributing Factors**

Latent Conditions (deficiencies in...)

- **47%** Regulatory oversight
- **41%** Safety management
- **12%** Flight operations: training systems
- **12%** Maintenance Operations: SOPs & checking and training systems

Threats

Environmental

- **35%** Airport Facilities
  - Poor signage, faint markings / runway or taxiway closure (**50%** of all these events)
  - Inadequate overrun area / trench / ditch or structures in close proximity to runway / taxiway (**50%** of all these events)
- **24%** Meteorology
  - Wind / windshear / gusty winds (**50%** of all these events)
- **12%** Lack of visual reference
- **12%** Wildlife / birds / foreign object

Airline

- **41%** Aircraft malfunction
  - Gear / tire (**29%** of all malfunctions)
  - Fire / smoke (**29%** of all malfunctions)
  - Other (**29%** of all malfunctions)
- **18%** Maintenance events

Flight Crew Errors (relating to...)

- **35%** Manual handling / flight controls
- **35%** SOP adherence / SOP cross-verification
  - Unintentional non-compliance (**67%** of all these events)
  - Intentional non-compliance (**50%** of all these events)
- **12%** Callouts

Undesired Aircraft States (UAS)

- **18%** Long, floated, bounced, firm, off-centreline or crabbed landing
- **12%** Vertical, lateral or speed deviations
- **12%** Unstable approach
- **12%** Continued landing after unstable approach

Correlations of Interest

75% of runway excursions took place at an airport with an inadequate overrun area.

60% of all runway excursions cited an aircraft malfunction as a contributing factor.

50% of the ground damage events involved an onboard fire.

Note: 11% of accidents were not classified due to insufficient data.

* See Annex 1 for "Phase of Flight" definitions

** See Annex 2 for "Contributing Factors" definitions

5

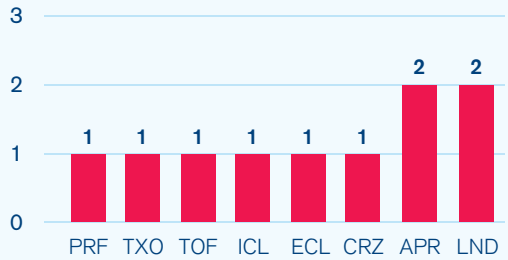
Commonwealth of Independent States (CIS)

10 Accidents

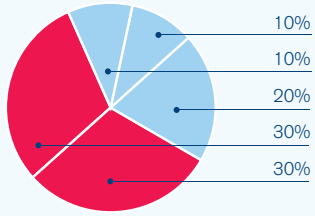
IATA Members	50%
Hull Losses	60%
Fatal	30%

70% Passenger | 20% Cargo | 10% Ferry | 80% Jet | 20% Turboprop

Accidents per Phase of Flight*



Breakdown per Accident Category



Top Contributing Factors**

Latent Conditions (deficiencies in...)

- **56%** Safety management
- **44%** Flight operations: SOPs & checking
- **33%** Flight operations: training systems
- **33%** Regulatory oversight

Threats

Environmental

- **33%** Meteorology
  - Poor visibility / IMC (**67%** of all these events)
  - Icing conditions (**33%** of all these events)
- **11%** Lack of visual reference
- **11%** Air traffic services
- **11%** Nav Aids: ground navigation aid malfunction, lack or unavailability

Airline

- **78%** Aircraft malfunction
  - Fire / smoke (**43%** of all malfunctions)
  - Contained engine failure / powerplant malfunction (**29%** of all malfunctions)
  - Extensive / uncontained engine failure (**14%** of all malfunctions)
  - Secondary flight controls (**14%** of all malfunctions)
  - Electrical power generation failure (**14%** of all malfunctions)
  - Other (**14%** of all malfunctions)
- **22%** Ground events
- **22%** Manuals / charts / checklists

Flight Crew Errors (relating to...)

- **56%** SOP adherence / SOP cross-verification
  - Intentional non-compliance (**60%** of all these events)
  - Unintentional non-compliance (**40%** of all these events)
- **33%** Crew to external communication
- **33%** Pilot-to-pilot communication
- **22%** Manual handling / flight controls
- **22%** Abnormal checklist

Undesired Aircraft States (UAS)

- **33%** Vertical, lateral or speed deviations
- **22%** Abrupt aircraft control
- **22%** Unstable approach

Correlations of Interest

80% of accidents involving deficiencies in safety management (on the part of the Operator) also noted deficient flight operations (SOPs & checking) as a contributing factor.

In **43%** of accidents relating to an aircraft malfunction, miscommunication between the flight crew members was also noted as a contributing factor.

In all accidents involving vertical, lateral or speed deviations, flight crew non-adherence to SOPs and pilot-to-pilot miscommunication were also noted.

Note: 10% of accidents were not classified due to insufficient data.
* See Annex 1 for "Phase of Flight" definitions
** See Annex 2 for "Contributing Factors" definitions

Europe

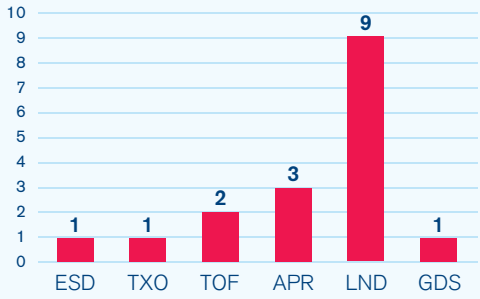
17 Accidents

IATA Members	41%
Hull Losses	29%
Fatal	6%

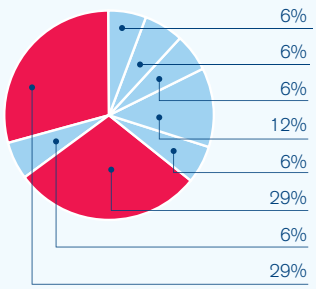
71% Passenger | **23%** Cargo | **6%** Ferry

82% Jet | **18%** Turboprop

Accidents per Phase of Flight*



Breakdown per Accident Category



- 6% Gear-up Landing / Gear Collapse
- 6% Hard Landing
- 6% Undershoot
- 12% Tailstrike
- 6% Loss of Control In-flight
- 29% Runway Excursion
- 6% In-flight Damage
- 29% Ground Damage

Top Contributing Factors**

Latent Conditions (deficiencies in...)

- **20%** Safety management
- **20%** Flight operations: SOPs & checking
- **13%** Management decisions
- **13%** Design

Threats

Environmental

- **47%** Meteorology
  - Wind / windshear / gusty wind (**57%** of all these events)
  - Poor visibility / IMC (**43%** of all these events)
- **33%** Airport facilities
  - Poor signage, faint markings / runway or taxiway closure (**80%** of all these events)
- **13%** Lack of visual reference

Airline

- **27%** Aircraft malfunction
- **13%** Operational pressure
- **13%** Maintenance events
- **13%** Ground events

Flight Crew Errors (relating to...)

- **40%** Manual handling / flight controls
- **27%** SOP adherence / SOP cross-verification
- **13%** Communication
- **13%** Callouts
- **13%** Failure to go-around after destabilisation during approach

Undesired Aircraft States (UAS)

- **20%** Vertical, lateral or speed deviations
- **20%** Long, floated, bounced, firm, off-centreline or crabbed landing
- **20%** Loss of control while on the ground

Correlations of Interest

33% of accidents involving flight crew manual handling errors also cited deficiencies in flight crew training.

Ground events, such as errors by ground handling personnel, contributed to **66%** of ground damage accidents involving European Operators.

50% of the accidents involving non-adherence to SOPs by the flight crew also cited operational pressure as a contributing factor.

Note: 12% of accidents were not classified due to insufficient data.

* See Annex 1 for "Phase of Flight" definitions

** See Annex 2 for "Contributing Factors" definitions

5

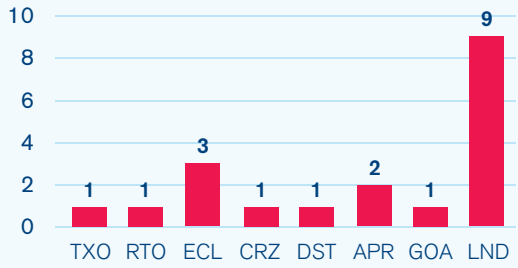
Latin America & the Caribbean

19 Accidents

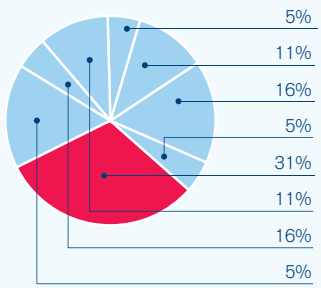
IATA Members	21%
Hull Losses	68%
Fatal	26%

84% Passenger | 5% Cargo | 11% Ferry | 42% Jet | 58% Turboprop

Accidents per Phase of Flight*



Breakdown per Accident Category



5%	Ground Damage
11%	Undershoot
16%	Controlled Flight into Terrain
5%	Loss of Control In-flight
31%	Runway Excursion
11%	Gear-up Landing / Gear Collapse
16%	In-flight Damage
5%	Hard Landing

Top Contributing Factors**

Latent Conditions (deficiencies in...)

- **44%** Regulatory oversight
- **31%** Safety management
- **19%** Maintenance operations: SOPs & checking

Threats

Environmental

- **25%** Meteorology
  - Wind / windshear / gusty wind (**50%** of all these events)
- **19%** Terrain / obstacles
- **13%** Lack of visual reference
- **13%** Airport facilities

Airline

- **50%** Aircraft malfunction
  - Contained engine failure / powerplan malfunction (**38%** of all malfunctions)
  - Extensive / uncontained engine failure (**25%** of all malfunctions)
  - Other (**25%** of all malfunctions)
  - Gear / tire (**13%** of all malfunctions)
  - Primary flight controls (**13%** of all malfunctions)
  - Avionics / flight instruments (**13%** of all malfunctions)
- **25%** Maintenance events

Flight Crew Errors (relating to...)

- **38%** SOP adherence / SOP cross-verification
  - Intentional non-compliance (**67%** of all these events)
  - Unintentional non-compliance (**33%** of all these events)
- **31%** Manual handling / flight controls
- **19%** Checklist
- **13%** Callouts

Undesired Aircraft States (UAS)

- **19%** Vertical, lateral or speed deviation
- **13%** Long, floated, bounced, firm, off-centreline or crabbed landing
- **13%** Controlled flight towards terrain
- **13%** Loss of aircraft control while on the ground
- **13%** Incorrect aircraft configuration: landing gear
- **13%** Incorrect aircraft configuration: engine

Correlations of Interest

50% of aircraft malfunctions were linked to a maintenance event, such as an error by maintenance personnel, and poor regulatory oversight by the State of the Operator.

50% of runway excursions were linked to incorrect aircraft configurations.

In **57%** of accidents where deficient safety management (on the part of the Operator) was cited, poor regulatory oversight was also noted as a contributing factor.

Note: 16% of accidents were not classified due to insufficient data.

* See Annex 1 for "Phase of Flight" definitions

** See Annex 2 for "Contributing Factors" definitions

Middle East & North Africa

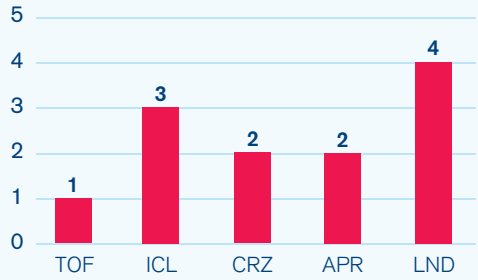
12 Accidents

IATA Members	42%
Hull Losses	50%
Fatal	42%

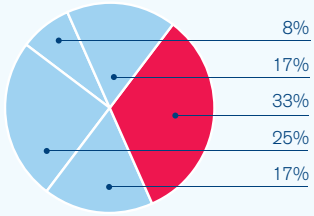
50% Passenger | 50% Cargo | 0% Ferry | 75% Jet | 25% Turboprop

5

Accidents per Phase of Flight*



Breakdown per Accident Category



Top Contributing Factors**

Latent Conditions (deficiencies in...)

33% Safety management

22% Flight operations: training systems

Threats

Environmental

44% Meteorology

- Icing conditions (**50%** of all these events)
- Wind / windshear / gusty winds (**25%** of all these events)
- Thunderstorms (**25%** of all these events)

Airline

22% Aircraft malfunction

Flight Crew Errors (relating to...)

44% Manual handling / flight controls

33% SOP adherence / SOP cross-verification: intentional non-compliance

Undesired Aircraft States (UAS)

33% Long, floated, bounced, firm, off-centreline or crabbed landing

22% Vertical, lateral or speed deviations

22% Unstable approach

Correlations of Interest

67% of accidents citing deficient safety management (on the part of the Operator) also implicated deficiencies in flight crew training.

In **50%** of accidents classified under loss of control in-flight, adverse weather and flight crew non-adherence to SOPs were cited as contributing factors.

In all accidents involving long, floated, bounced, firm, off-centreline or crabbed landing, flight crew errors relating to manual handling / flight controls were also noted.

Note: 25% of accidents were not classified due to insufficient data.

* See Annex 1 for "Phase of Flight" definitions

** See Annex 2 for "Contributing Factors" definitions

5

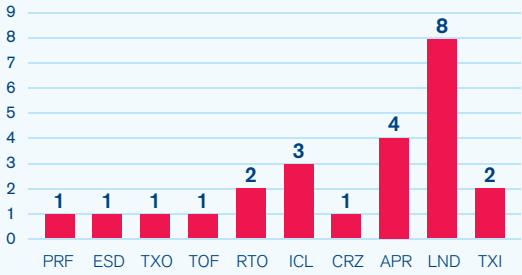
North America

24 Accidents

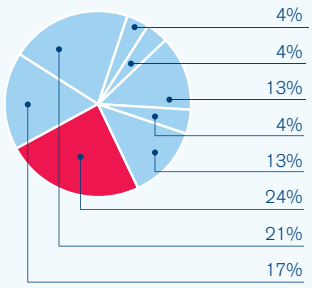
IATA Members	21%
Hull Losses	46%
Fatal	17%

46% Passenger | 54% Cargo | 0% Ferry | 50% Jet | 50% Turboprop

Accidents per Phase of Flight*



Breakdown per Accident Category



- 4% Undershoot
- 4% Hard Landing
- 13% Gear-up Landing / Gear Collapse
- 4% Controlled Flight into Terrain
- 13% Loss of Control In-flight
- 24% Runway Excursion
- 21% Ground Damage
- 17% In-flight Damage

Top Contributing Factors**

Latent Conditions (deficiencies in...)

- **18%** Regulatory oversight
- **18%** Safety management
- **14%** Flight operations: training systems
- **14%** Maintenance operations: SOPs & checking

Threats

Environmental

- **23%** Meteorology
  - Poor visibility / IMC (**40%** of all these events)
  - Wind / windshear / gusty wind (**20%** of all these events)
  - Thunderstorms (**20%** of all these events)
  - Icing conditions (**20%** of all these events)
- **18%** Lack of visual reference
- **14%** Airport facilities

Airline

- **32%** Aircraft malfunction
  - Contained engine failure / powerplant malfunction (**43%** of all malfunctions)
- **18%** Ground events
- **18%** Maintenance events

Flight Crew Errors (relating to...)

- **45%** Manual handling / flight controls
- **18%** SOP adherence / SOP cross-verification
  - Unintentional non-compliance (**75%** of all these events)
  - Intentional non-compliance (**50%** of all these events)
- **14%** Failure to go-around after destabilisation during approach

Undesired Aircraft States (UAS)

- **23%** Vertical, lateral or speed deviations
- **14%** Unstable approach
- **14%** Loss of aircraft control while on the ground

Correlations of Interest

In all the accidents where vertical, lateral or speed deviations were noted, a lack of visual reference and flight crew errors relating to manual handling / flight control were also cited.

83% of runway excursion accidents were linked to flight crew manual handling / flight control errors.

In **60%** of accidents involving ground damage, a ground event, such as improper ground support, was also cited as a contributing factor.

Note: 8% of accidents were not classified due to insufficient data.

* See Annex 1 for "Phase of Flight" definitions

** See Annex 2 for "Contributing Factors" definitions

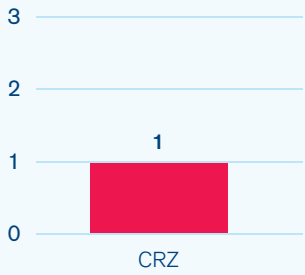
North Asia

1 Accident

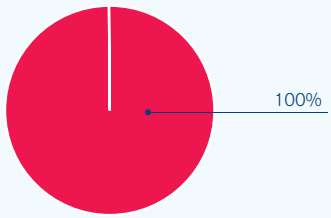
IATA Members	**1 case**
Hull Losses	**0%**
Fatal	**0%**

100% Passenger | **0%** Cargo | **0%** Ferry | **100%** Jet | **0%** Turboprop

Accidents per Phase of Flight*



Breakdown per Accident Category



Top Contributing Factors**

Latent Conditions (deficiencies in...)

None identified

Threats

Environmental
None identified

Airline
Aircraft malfunction
Fire / smoke
(1 case)

Flight Crew Errors (relating to...)

None identified

Undesired Aircraft States (UAS)

None identified

Correlations of Interest

No significant correlations noted.

Note: All accidents were classified.
* See Annex 1 for "Phase of Flight" definitions
** See Annex 2 for "Contributing Factors" definitions

5

Accidents Overview (2006-2008)

	Africa	Asia / Pacific	Commonwealth of Independent States (CIS)	Europe	Latin America & the Caribbean	Middle East & North Africa	North America	North Asia
2008	7	19	10	17	19	12	24	1
2007	12	23	3	19	12	6	21	4
2006	5	15	4	14	15	6	17	1

Section 6

6

Analysis of Cargo Aircraft Accidents

YEAR 2008 CARGO OPERATOR REVIEW

Cargo versus Passenger Operations for Western-built Jet Aircraft

	Fleet Size End of 2008	HL	HL per 1000 Aircraft	SD	Total	Operational Accidents per 1000 Aircraft
Cargo	3,302	5	1.51	6	11	3.33
Passenger	18,212	17	0.93	32	49	2.69
Total	21,514	22	1.02	38	60	2.79

HL = Hull Loss SD = Substantial Damage

Cargo versus Passenger Operations for Western-built Turboprop Aircraft

	Fleet Size End of 2008	HL	HL per 1000 Aircraft	SD	Total	Operational Accidents per 1000 Aircraft
Cargo	2,960	9	3.04	8	17	5.74
Passenger	4,385	11	2.51	7	18	4.10
Total	7,345	20	2.72	15	35	4.77

HL = Hull Loss SD = Substantial Damage

6

Cargo Aircraft Accidents

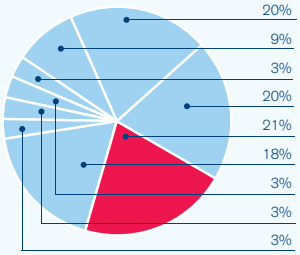
34 Accidents

41% Jet

59% Turboprop

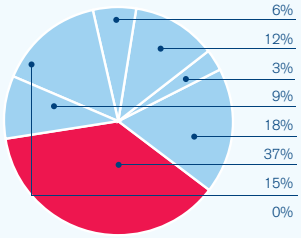
IATA Members	9%
Hull Losses	62%
Fatal	29%

Breakdown per Accident Category



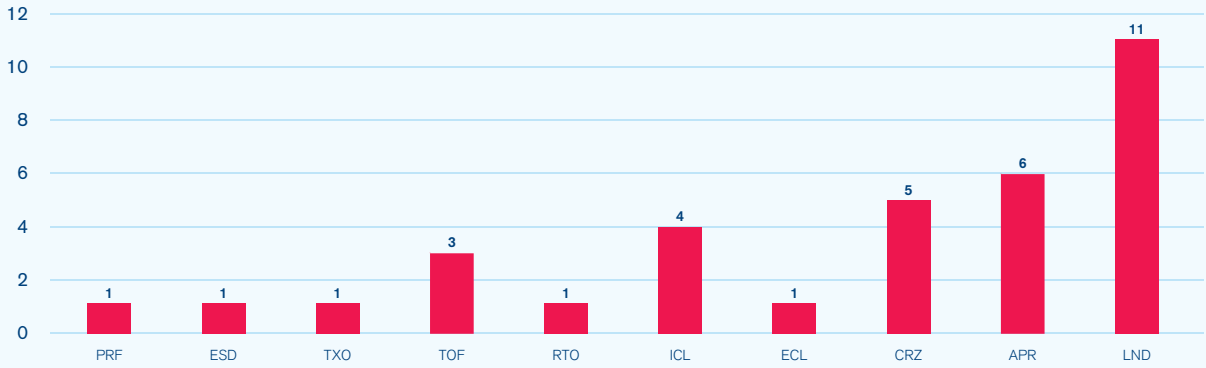
20%	Loss of Control In-flight
9%	Controlled Flight into Terrain
3%	Tailstrike
20%	Runway Excursion
21%	In-flight Damage
18%	Ground Damage
3%	Undershoot
3%	Hard Landing
3%	Gear-up Landing / Gear Collapse
0%	Mid-air Collision
0%	Runway Collision

Accidents per Operator Region (raw numbers)



6%	CIS
12%	Europe
3%	Latin America & the Caribbean
9%	Africa
18%	Middle East & North Africa
37%	North America
15%	Asia / Pacific
0%	North Asia

Accidents per Phase of Flight*



Cargo Aircraft Accidents
Continued

Top Contributing Factors**

Latent Conditions (deficiencies in...)

- **29%** Regulatory oversight
- **25%** Safety management
- **11%** Flight operations
- **11%** Operations planning and scheduling
- **7%** Maintenance operations

Threats

Environmental

- **25%** Meteorology
  - Thunderstorms (**29%** of all these events)
  - Poor visibility / IMC (**29%** of all these events)
  - Wind / windshear / gusty wind (**29%** of all these events)
  - Icing conditions (**14%** of all these events)
- **25%** Lack of visual reference
- **14%** Airport facilities
  - Inadequate overrun area / trench / ditch or structures in close proximity to runway or taxiway (**50%** of all these events)
  - Poor signage, faint markings / runway or taxiway closure (**25%** of all these events)
  - Contaminated runway / taxiway – poor breaking action (**25%** of all these events)

Airline

- **43%** Aircraft malfunction
  - Contained engine failure / powerplant malfunction (**50%** of all malfunctions)
  - Fire / smoke (**33%** of all malfunctions)
- **7%** Ground events

Flight Crew Errors (relating to...)

- **43%** Manual handling / flight controls
- **32%** SOP adherence / SOP cross-verification
- **14%** Callouts
- **11%** Failure to go-around after destabilisation during approach
- **11%** Communication
  - Pilot-to-pilot (**67%** of all these events)
  - With ground crew (**33%** of all these events)

Undesired Aircraft States (UAS)

- **21%** Vertical, lateral or speed deviations
- **18%** Unstable approach
- **14%** Continued landing after unstable approach
- **14%** Loss of aircraft control while on the ground
- **11%** Abrupt aircraft control
- **11%** Operation outside aircraft limitations

Correlations of Interest

In all of the accidents where deficient safety management (on the part of the Operator) was cited as a contributing factor, deficiencies in regulatory oversight were also noted.

17% of accidents relating to aircraft malfunctions also involved deficiencies in the Operator's Maintenance activities.

Ground crew errors, such as incorrect cargo loading, contributed to **7%** of accidents. None of these cases resulted in a loss of control of the aircraft.

Note: 18% of Cargo Aircraft accidents were not classified due to insufficient data.
* See Annex 1 for "Phase of Flight" definitions
** See Annex 2 for "Contributing Factors" definitions

“Cabin safety is a key area, which impacts on operational safety.”

Section 7

Cabin Operations Safety

NEW CABIN OPERATIONS SAFETY SECTION

Following the same model as the in-depth analysis by accident category, presented in Section 4, which focuses on accidents from a flight crew perspective, this section presents an overview of accidents that involved cabin operations aspects, their contributing factors and correlation between these factors. A detailed list of all the accidents analysed in this section can be found at **Annex 5**.

The purpose of this section is to identify safety-related issues in cabin operations and assist airlines in improving cabin safety.

INTRODUCTION TO TEM FRAMEWORK

The Human Factors Research Project at The University of Texas in Austin developed Threat and Error Management (TEM) as a conceptual framework to interpret data obtained from both normal and abnormal operations. For many years, IATA has worked closely with the University of Texas Human Factors Research Team, the International Civil Aviation Organisation (ICAO) and its member airlines and manufacturers to apply TEM to its many safety activities.

The Safety Report 2008 marks the first year that IATA presents a TEM-based accident classification system designed specifically for cabin crew and cabin operations-related events.

Figure 7.1 Threat and Error Management Framework

This section presents some definitions that will be helpful to understand the analysis contained in this report. The TEM framework is illustrated in Figure 7.1.

Latent Conditions: Conditions present in the system before the accident, made evident by triggering factors. *Note: these are the same categories as for flight crew.*

Threat: An event or error that occurs outside the influence of the cabin crew, but which requires crew attention and management if safety margins are to be maintained.

Cabin Crew Error: An observed cabin crew deviation from organisational expectations or crew intentions.

Undesired Cabin / Aircraft State: A cabin-crew-induced cabin / aircraft state that clearly reduces safety margins; a safety-compromising situation that results from ineffective error management. An undesired state is recoverable.

End State: A reportable event. An end state is unrecoverable. End states (or "accident categories") in cabin operations remain the same as for the flight crew taxonomy but include additional end states.

Note: these definitions are valid for accident analysis conducted from the cabin crew perspective. Definitions of threats, errors and undesired states vary for flight crew-centered analysis. These definitions are presented in Section 4, entitled "In-Depth Accident Analysis 2008".

ACCIDENT CLASSIFICATION SYSTEM FOR CABIN OPERATIONS

At the request of member airlines, manufacturers and other organisations involved in the Safety Report, IATA developed an accident classification system based on the Threat and Error Management (TEM) framework.

The purpose of the new cabin operations-specific taxonomy:

- Acquire more meaningful data relating to cabin events
- Extract further information / intelligence
- Formulate relevant mitigation strategies / safety recommendations

Unfortunately, some accidents do not contain sufficient information at the time of the analysis to adequately assess contributing factors. When an event cannot be properly classified due to lack of information, it is classified under the "insufficient information" category. It should also be noted that the contributing factors that have been classified do not always reflect all the factors that played a part in an accident but rather those known at the time of the analysis. Hence there is a need for Operators and States to improve their reporting cultures.

Important note: In the in-depth analysis presented this section, the percentages shown with regards to contributing factors (e.g., % of threats and errors noted) are based on the number of accidents that contained sufficient information to be classified, not on the total number of events. Accidents classified as "insufficient information" are excluded from this part of the analysis.

However, accidents classified as "insufficient information" are part of the overall statistics (e.g., % of accidents that were fatal or resulted in a Hull Loss).

Annex 1 contains definitions and detailed information regarding of the types of accidents and aircraft types that are included in the Safety Report analysis. The complete IATA TEM-based accident classification system for cabin operations is presented in **Annex 3**.

Cabin Safety-related Events

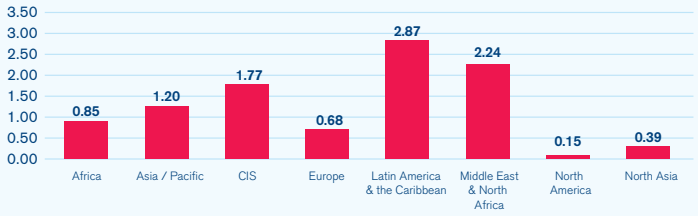
30 Accidents

IATA Members	40%
Hull Losses	70%
Fatal	20%
Accident Rate*	0.82

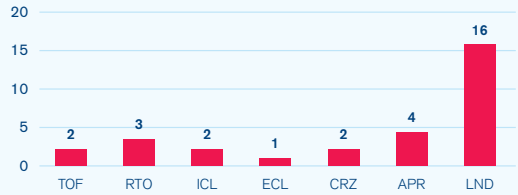
70% Jet

30% Turboprop

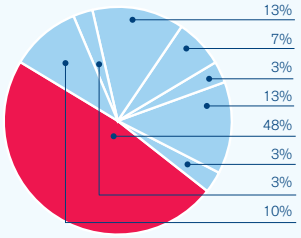
Accident Rates per Operator Region*



Accidents per Phase of Flight**

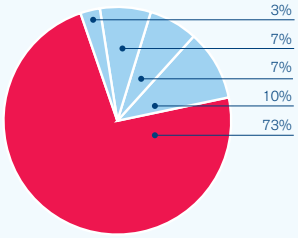


Breakdown per Accident Category



13%	Undershoot
7%	Gear-up Landing / Gear Collapse
3%	Ground Damage
13%	Loss of Control In-flight
48%	Runway Excursion
3%	Controlled Flight into Terrain
3%	Runway Collision
10%	In-flight Damage

Breakdown per Additional Categories



3%	Ditching
7%	Decompression
7%	Onboard Fire (excluding post-crash)
10%	Other
73%	Passenger Evacuation

Top Contributing Factors***

Latent Conditions (deficiencies in...)

- **48%** Safety management
- **30%** Regulatory oversight
- **15%** Management decisions

Threats

Environmental

- **22%** Airport facilities: trench / ditch / inadequate overrun area

Airline

- **37%** Flight deck events
- **33%** Fire / smoke
- **33%** Abnormal / emergency operations
- **26%** Engine failure
- **22%** Gear / tire / brake malfunction
- **19%** Structural failure
- **15%** Exit / escape slide malfunction

Passenger

- **7%** Non-compliance to cabin crew instructions

Cabin Crew Errors (relating to...)

- **7%** Exits
- **4%** Passenger
- **4%** Shouted commands

Undesired States

- **4%** Passengers not braced for forced landing
- **4%** Exits unmanned by cabin crew
- **4%** Uncommanded evacuation
- **4%** Incorrect configuration: escape slides

Correlations of Interest

78% of accidents were associated to an aircraft malfunction, such as an engine failure or a gear collapse.

77% of accidents involving fire or smoke related to a post-crash fire.

53% of accidents occurred during the landing phase. **75%** of these involved an evacuation.

Note: 10% of these accidents were not classified due to insufficient data.

* Accidents per million sectors flown for all aircraft types

** See Annex 1 for "Phase of Flight" definitions

*** See Annex 3 for "Contributing Factors" definitions

7

Passenger Evacuation

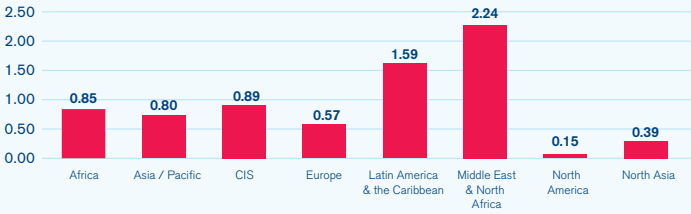
22 Accidents

IATA Members	45%
Hull Losses	68%
Fatal	14%
Accident Rate*	0.60

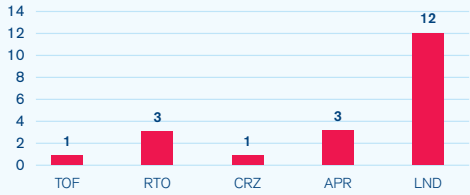
82% Jet

18% Turboprop

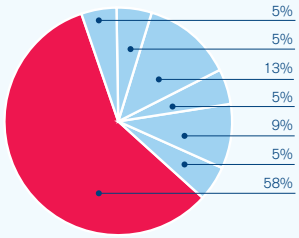
Accident Rates per Operator Region*



Accidents per Phase of Flight**



Breakdown per Accident Category



5%	Gear-up Landing / Gear Collapse
5%	Runway Collision
13%	Undershoot
5%	In-flight Damage
9%	Loss of Control In-flight
5%	Ground Damage
58%	Runway Excursion

Top Contributing Factors***

Latent Conditions (deficiencies in...)

- **41%** Safety management
- **18%** Regulatory oversight

Threats

Environmental

- **27%** Airport facilities: trench / ditch / inadequate overrun area
- **9%** Meteorology

Airline

- **36%** Flight deck event
- **32%** Fire / smoke
- **27%** Gear / tire / brake failure
- **23%** Engine failure
- **18%** Exit / escape slide malfunction
- **9%** Structural failure

Passenger

- **9%** Non-compliance to cabin crew instructions

Cabin Crew Errors (relating to...)

- **9%** Exits
- **5%** Passenger
- **5%** Shouted commands

Undesired States

- **5%** Passengers not braced for forced landing
- **5%** Exits unmanned by cabin crew
- **5%** Uncommanded evacuation
- **5%** Incorrect configuration: escape slides

Correlations of Interest

In **15%** of evacuations that took place following runway excursion, the aircraft passed through an inadequate overrun area (e.g., colliding with a brick wall) and a fire broke out onboard.

In **67%** of evacuations initiated following an undershoot, the landing gear sheared off and/or penetrated the cabin. In a third (**33%**) of these evacuations, the Public Address (PA) system was affected.

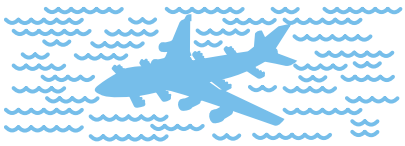
In **14%** of evacuations, which involved fire or smoke, some exits or escape slides malfunctioned.

Note: All the Evacuations were classified.

* Accidents per million sectors flown for all aircraft types

** See Annex 1 for "Phase of Flight" definitions. Events are classified by the phase of flight, in which the accident occurred, which may not necessarily coincide with the time of the evacuation. For example, an event involving an in-flight fire leading to an emergency descent followed by an evacuation is classified as having occurred during cruise flight.

*** See Annex 3 for "Contributing Factors" definitions



Ditching

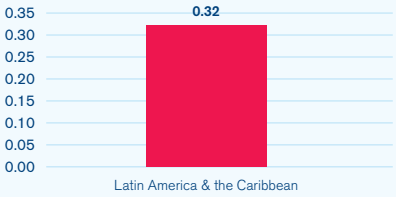
1 Accident

IATA Members	0%
Hull Losses	100%
Fatal	100%
Accident Rate*	0.03

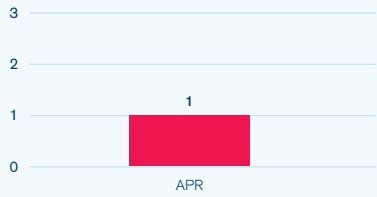
0% Jet

100% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

None identified

Threats

Environmental
None identified

Airline
Abnormal / emergency operations **(1 case)**

Aircraft / cabin malfunction: engine failure **(1 case)**

Passenger
None noted

Cabin Crew Errors (relating to...)

None identified

Undesired States

None identified

Correlations of Interest

No significant correlations noted.

Note: All the Ditching accidents were classified.
* Accidents per million sectors flown for all aircraft types
** See Annex 1 for "Phase of Flight" definitions
*** See Annex 3 for "Contributing Factors" definitions

7

Onboard Fire

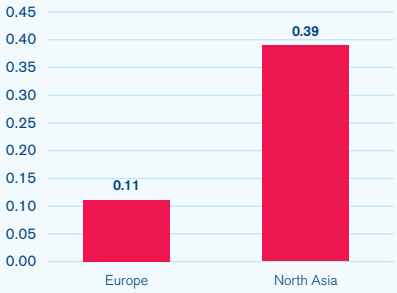
2 Accidents

IATA Members	50%
Hull Losses	50%
Fatal	0%
Accident Rate*	0.05

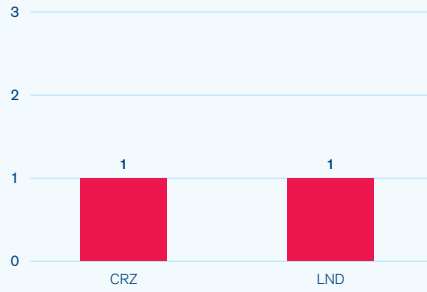
100% Jet

0% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

None identified

Threats

Environmental
None identified

Airline
Abnormal / emergency operations
(1 case)

Exit / escape slide malfunction
(1 case)

Passenger
None identified

Cabin Crew Errors (relating to...)

None identified

Undesired States

None identified

Note: both cases resulted in an evacuation.

Correlations of Interest

No significant correlations noted.

Note: All the Onboard Fire accidents were classified.
* Accidents per million sectors flown for all aircraft types
** See Annex 1 for "Phase of Flight" definitions
*** See Annex 3 for "Contributing Factors" definitions

Decompression

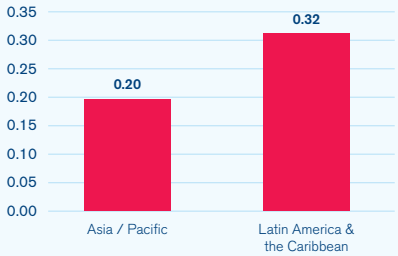
2 Accidents

IATA Members	50%
Hull Losses	50%
Fatal	0%
Accident Rate*	0.05

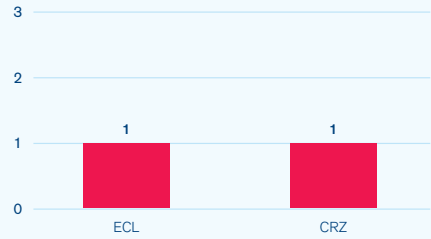
50% Jet

50% Turboprop

Accident Rates per Operator Region*



Accidents per Phase of Flight**



Top Contributing Factors***

Latent Conditions (deficiencies in...)

None identified

Threats

Environmental
None identified

Airline
Abnormal / emergency operations **(2 cases)**

Aircraft / cabin malfunction:
Engine failure **(1 case)**
Structural failure **(2 cases)**
Cabin systems malfunction **(1 case)**
Cabin equipment malfunction **(1 case)**

Passenger
None identified

Cabin Crew Errors (relating to...)

None identified

Undesired States

None identified

Correlations of Interest

No significant correlations noted.

Note: All the Decompression accidents were classified.
* Accidents per million sectors flown for all aircraft types
** See Annex 1 for "Phase of Flight" definitions
*** See Annex 3 for "Contributing Factors" definitions

7

SUMMARY OF FINDINGS

- Out of the 109 accidents, 30 contained a cabin operations safety dimension
- 40% of these accidents involved IATA members
- 70% of accidents occurred on jet aircraft
- 70% of accidents resulted in a hull loss; while 20% resulted in fatalities
- Over half (53%) of accidents occurred during the landing phase

In terms of accident categories, the breakdown is as follows:

- The predominant accident category was passenger evacuations, which accounted for 73% of all cabin-related events
- 7% of accidents involved a decompression
- Another 7% involved an onboard fire (this excludes post-crash fires)
- One accident involved an attempted ditching, in which there were no survivors
- The remaining 10% of accidents involved events such as runway excursions, where IATA was unable to ascertain the conditions in the passenger cabin e.g. if an evacuation was carried out after the aircraft departed the runway

FOCUS ON: PASSENGER EVACUATIONS

In the majority (86%) of evacuations that occurred during 2008, all occupants survived the accident. On the other hand, in the majority (68%) of these accidents, the aircraft was destroyed or damaged beyond repair (hull loss).

Over half of evacuations (58%) were initiated following a runway excursion. Fire or smoke was present in almost a third (32%) of evacuations. Most of these cases relate to a post-crash fire. In 18% of evacuations, an emergency exit or escape slide malfunction (e.g., slide fails to deploy) was noted. Over a quarter of evacuations (27%) took place in an inadequate overrun area (e.g., a ditch), which can contribute to the extent of the damage in the cabin, delay the arrival of the emergency response teams or impede passenger egress from the cabin.

Few cabin crew errors were determined in the evacuations analysed; most of which were deemed to be well managed.

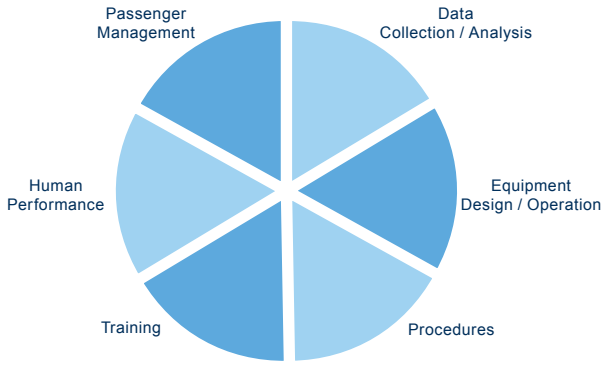
IATA CABIN OPERATIONS SAFETY

Cabin safety is a key area, which impacts on operational safety. The role of cabin crew was historically seen as limited to evacuations in a post-accident scenario. Although this remains an essential duty of every cabin crew, today the role of cabin crew goes beyond passenger evacuations.

Cabin crew have a responsibility to manage safe and efficient operations, working hand-in-hand with the flight crew. Moreover, as demonstrated in many events, cabin crew play an important role in preventing serious incidents and accidents that can be linked to issues such as in-flight fires, unruly passengers or decompressions.

It is for this reason that IATA focuses on cabin safety and develops standards, procedures and best practices to ensure safety in all aspects of cabin operations. It works with cabin safety experts from member airlines, manufactures and industry stakeholders to address various topics such as passenger management, cabin equipment and cabin crew training.

Figure 7.2 IATA Cabin Operations Safety Areas



IATA CABIN OPERATIONS SAFETY INITIATIVES IN 2008

During 2008, IATA worked on specific issues of concern to the Industry in terms of cabin safety, such as:

- Lithium battery fires
- Use of mobile phones
- Decompression
- Passengers with reduced mobility
- Medical diversions

IOSA & CABIN OPERATIONS SAFETY

The IATA Operational Safety Audit (IOSA) manual contains a section dedicated to cabin operations and addresses key elements of cabin safety. IOSA includes standards for:

- Cabin operations management and control
- Cabin crew training and qualification
- Line operations
- Equipment and cabin systems

More information on IOSA, as well as a free downloadable version of the IOSA Standards Manual, which includes the complete set of cabin operations standards, can be found at www.iata.org/iosa.

CABIN OPERATIONS SAFETY TOOLKIT

IATA member airlines expressed the need to target two areas in order to improve safety and efficiency in cabin operations: cabin crew turbulence-related injuries and inadvertent slide deployments. These issues pose a safety risk and cost the airline industry millions of dollars every year.

To help the industry, IATA developed the "Cabin Operations Safety Toolkit", which brings together safety expertise from member airlines, manufacturers and industry associations.

It contains training material, procedures, incident analysis and other useful tools to assist airlines target these issues. The toolkit is free of charge and can be downloaded from the IATA website, at www.iata.org/training/toolkit.

More information can be found at www.iata.org/cabin_safety.

Image courtesy of Airbus

“Runway excursion was the most frequent type of accident in 2008.”

Section 8

8

Report Findings and IATA Prevention Strategies

TOP FINDINGS

- 109 accidents in 2008: 30% involved IATA members
- 21% of all accidents were fatal
- 65% involved passenger aircraft, 31% involved cargo aircraft and 4% involved ferry flights
- 61% on Jet aircraft and 39% on Turboprops
- 49% of accidents resulted in a Hull Loss and 51% in Substantial Damage
- The majority (43%) of accidents occurred during landing

	Top 3 Contributing Factors
Latent conditions (deficiencies in...)	1. Safety management 2. Regulatory oversight 3. Flight operations: training systems
Threats	1. Aircraft malfunction 2. Meteorology 3. Airport facilities
Flight crew errors relating to…	1. Manual handling / flight controls 2. SOP adherence / cross-verification 3. Pilot-to-pilot communication
Undesired Aircraft States	1. Vertical, lateral or speed deviations 2. Long, floated, bounced, firm or off-centreline landing 3. Unstable approach
End States	1. Runway excursion 2. Ground damage 3. In-flight damage

PROPOSED COUNTERMEASURES

Every year, the ACTF classifies accidents and, with the benefit of hindsight, determines actions or measures that could have been taken to prevent an accident. These proposed countermeasures can include issues within an organisation or a particular country, or involve performance of front line personnel, such as pilots or ground personnel. They are valid for accidents involving both Eastern and Western-built Jet and Turboprop aircraft.

Based on the statistical analysis, this section presents some countermeasures that can help airlines enhance safety, in line with the ACTF analysis of all accidents in 2008.

The following tables present the top five counter-measures, which should be addressed along with a brief description for each.

The last column of each table presents the percentage (%) of accidents where countermeasures could have been effective, according to the analysis conducted by the ACTF.

Countermeasures are aimed at two levels:

- The Operator or the State responsible for oversight. These countermeasures are based on activities, processes and systemic issues internal to the airline operation or State's oversight activities
- Another set of countermeasures are aimed at flight crew, to help them manage threats or their own errors during operations

Countermeasures for other areas, such as ATC, ground crew, cabin crew or maintenance staff, are important but are not considered at this time.

Countermeasures for the Operator and the State

Subject	Description	% of accidents where countermeasures could have been effective
Safety management (Operator)	The Operator should implement a safety management system accepted by the State that, as a minimum: • Identifies safety hazards • Ensures that remedial action necessary to maintain an acceptable level of safety is implemented • Provides for continuous monitoring and regular assessment of the safety level achieved • Aims to make continuous improvements to the overall level of safety	**30%**
Regulatory oversight by the State of the Operator	States must be responsible for establishing a safety programme, in order to achieve an acceptable level of safety, encompassing the following responsibilities: • Safety regulation • Safety oversight • Accident / incident investigation • Mandatory / voluntary reporting systems • Safety data analysis and exchange • Safety assurance • Safety promotion	**27%**
Flight Operations: Training systems (Operator)	Adequate training must be in place including: language skills, a set minimum qualification of flight crews, continual assessment of training and training resources including training manuals or computer-based training (CBT) devices.	**16%**
Flight Operations: SOPs & checking (Operator)	Ensure the Operator addresses clearly: Standard Operating Procedures (SOPs), operational instructions and / or policies, company regulations, and controls to assess compliance with regulations and SOPs.	**13%**
Maintenance Operations: SOPs & checking (Operator, even if outsourced)	Ensure the Operator addresses clearly: Standard Operating Procedures (SOPs), operational instructions and / or policies, company regulations, and controls to assess compliance with regulations and SOPs for maintenance activities, whether these are conducted in-house or they are outsourced. • Includes verification of proper technical documentation, records of maintenance activities and the use of approved parts / modifications	**12%**

Countermeasures for the Flight Crews

Subject	Description	% of accidents where countermeasures could have been effective
Monitor / cross-check	Crew members should actively monitor and cross-check flight path, aircraft performance, systems and other crew members. Aircraft position, settings, and crew actions are verified.	**28%**
Overall crew performance	Overall, crew members should perform well as risk managers. Includes Flight, Cabin, Ground crew as well as their interactions with ATC.	**21%**
Contingency management	Crew members should develop effective strategies to manage threats to safety (i.e., threats and their consequences are anticipated; use all available resources to manage threats).	**16%**
Communication environment	Environment for open communication is established and maintained. Good cross talk – flow of information is fluid, clear, and direct. No social or cultural disharmonies. Right amount of hierarchy gradient. Flight Crew member reacts to assertive callout of other crew member(s).	**9%**
Leadership	• **Captain** should show leadership and coordinated flight deck activities (e.g., In command, decisive, and encourages crew participation). • **First Officer** (FO) is assertive when necessary and is able to take over as the leader (e.g., F/O speaks up and raises concerns).	**9%**

Image courtesy of Embraer

8

ACTF DISCUSSION & STRATEGIES

The following section presents the issues discussed at the January 2009 ACTF meeting, following the classification of the year's accidents. The ACTF felt that the following topics should be noted.

Adapt Briefing to the Situation Which You Expect

Background:

- Flight crews tend to brief at length on standard operating procedures, despite knowing that the actual approach or departure path is likely to differ from that which is published

Objective: Briefing should not only include published procedures, but specifically address anticipated threats.

Discussion: Tailored Briefing

- Threats included in the briefing can relate to:
  - Special considerations due to adverse weather and airport conditions
  - Calculation of landing distance with current conditions, applying an ample safety margin
  - Runway changes
  - Approach briefing
  - Be go-around minded: rejected landings and go-around instructions
  - Visual approaches
  - Airport construction / hazards affecting standard taxi routes
  - Thunderstorm location and effect on go-around options

Unstable / Destabilised Approaches

Background:

- Definition of an unstable approach can depend upon the operation
- Flying unstable approaches can become a habit, depending on the operational environment and restrictions
- In 15% of all the runway excursions of 2008, the flight crew continued to land after an unstable approach

Objective: Understand and prevent unstable approaches, by effective approach management.

Discussion: Enhanced Simulator Training

- Airlines should be aware of common deviations from SOPs and take corrective actions
- Airlines can use a Flight Data Analysis (FDA) programme to understand why unstable approaches occur
- FDA can help the airline determine correlations of interest between unstable approaches and specific airports (e.g., ATC restrictions), individual pilots, specific fleets, etc.
- Airlines should address not only unstable approaches but also destabilisation after being stabilised, especially at low altitude (below MDA/DH) and consequently go-arounds / rejected landings

Note: The go-around decision-making process is discussed below.

Go-Around: Training & Awareness Raising Issues

Background:

- During the execution of certain go-arounds, it is necessary for flight crews to deviate from published procedures to accommodate ATC requirements
- Level busts are a concern due to ATC requests requiring flight crews to level off at an altitude below that published in the go-around procedure
- For certain aircraft types, go-arounds initiated with TOGA thrust result in a high rate of climb, creating potential for configuration exceedences
- Due to the infrequent execution of the go-around procedure, flight crew proficiency may be a factor in mitigating the threats identified in these situations

Objective: Train flight crews to improve the go-around decision-making process and increase proficiency with respect to execution of non-standard go-around procedures.

Discussion: Enhanced Simulator Training

- Airlines should not limit training scenarios to the initiation of a go-around at approach minimum or missed approach point
- Create unexpected go-around scenarios at intermediate altitudes with instructions that deviate from the published procedure – this addresses both the go-around decision-making and execution
- Include training on go-around execution with all engines operating, including level-off at a low altitude
- Introduce destabilised approach simulator training scenarios, which emphasise that deviations from the stabilised approach profile at low altitudes (below MDA / DH) should require execution of a go-around
- Ensure training addresses assertiveness amongst first officers as well as Captains' attitude towards them

Maintenance-related Factors in Accidents

Background:

- Maintenance events played a contributing role in almost 15% of all the accidents in 2008
- Half of the events relating to gear-up landing or gear collapse were linked to maintenance issues
- How can airlines maintain proper oversight over maintenance activities, whether these are run in-house or as an outsourced function?

Objective: Ensure acceptable level of safety in maintenance activities.

Discussion: SMS and Maintenance Organisations

- Airlines need to ensure that operations and maintenance communicate appropriately
- As per ICAO regulation, Maintenance Organisations must implement a Safety Management System (SMS)
- Data collection systems need to be in place to ensure these organisations can capture hazards relating to maintenance activities and mitigate associated risks
- Airlines need to work with their Maintenance Organisations (internal or external) to ensure information is fed into the SMS and corrective actions are taken

Upset Recovery Training

Background:

- "Loss of control in-flight" accidents were generally fatal and resulted in hull losses
- In almost half of the loss of control in-flight accidents, deficiencies in flight crew training were cited as contributing factors

Objective: Training for upset recovery was noted as a key method to prevent a loss of control in-flight.

Discussion: Upset recovery training and CRM

- The manufacturers have worked extensively to prevent upsetting aircraft in-flight
- However, Operators need to train for spatial disorientation
- Training needs to emphasise how crews should handle spatial disorientation
- The role of the Pilot Monitoring (PM) and Crew Resource Management (CRM) are tools for preventing spatial disorientation
- Operators should ensure upset recovery training is conducted and be in accordance with the guidelines published in the Airplane Upset Recovery Training Aid Rev 1

For more information, visit:
www.faa.gov/other_visit/aviation_industry/airline_operators/training/

Also, see Upset Recovery Training documentation on the Safety Report CD-ROM.

Ground Damage / Inappropriate Ground Handling Procedures

Background:

- Ground damage was the second type of accident reported, after runway excursions
- Despite the high number of accidents reported, much of the ground damage that occurs in the industry remains unreported
- The lack of standardisation can contribute to ground handling errors that result in damage to aircraft (e.g., during pushback)
- Single-man pushback operations have become more common within the industry. The group noted a correlation between this type of operation and cases resulting in damage to aircraft
- De-icing remains an issue of concern as accidents relating to ice / frost build-up on critical surfaces of flight are repeated

Objective: Reduce ground damage accidents and incidents.

Discussion: ISAGO

- The IATA Safety Audit for Ground Operations (ISAGO) tackles this issue, and will be discussed later in this section
- De-icing decision: airline must ensure that there is a clear definition of responsibilities relating to de-icing / anti-icing and that training covers this issue in an adequate manner (this must ensure auditing of third party facilities providing this service)

360° Turns to Lose Height

Background:

- Some accidents linked to spatial disorientation involved the flight crew performing 360° turns to lose height on final approach

Objective: Avoiding the use of 360° turns to lose height on final approach.

Discussion:

- The group was not in favour of using 360° as a countermeasure to lose height. A 360° appears to be an easy manoeuvre but pilots then find themselves in a difficult situation
- If the flight crew find themselves high and/or fast, they should opt for a go-around
- During training, the airline can discuss the challenges of conducting 360° and its associated risks, to discourage flight crews from executing this manoeuvre
- The group felt that it is best not to conduct 360° training in a simulator as it can have negative effect for pilots who are able to accomplish it and might attempt it on the line
- Airlines can use their Flight Data Analysis programme to determine and track how often this occurs in their operations and whether it is an issue that needs to be addressed
- ATC should not use or encourage a 360° manoeuvre as a means to “save the approach”

QFE Operations

Background:

- Issues in high altitude airports relating to misreading the conversion table
- Problem of low transition altitude
- Procedure design: at departure, conversion of feet-meters values is done during high climb rate, which has the potential of a level bust occurring

Objective: Standardisation from ICAO is required.

Discussion:

- The group discussed the need for ICAO standardisation
- Reconsideration of the layout used in the conversion table. Design choices can induce human error

Continuation of Airline Operation during Severe Weather

Background:

- Recently, a large storm system (wind, icy conditions, etc.) over Europe was linked to multiple occurrences involving airlines that operated in these severe weather conditions

Objective: Airlines should implement Standard Operating Procedures (SOPs) with regards to operations in severe weather conditions.

Discussion: Contingency planning and the need to work closely with meteorology offices to adjust the departure / arrival time according to the weather forecast and to give crews an adequate situational awareness of the weather system

- The ACTF discussed the continuation of airline operation during severe weather (wind, icy conditions) patterns across large geographical areas – airlines can establish a “severe weather conditions” task force to address this issue internally
- Airlines should develop a contingency plan, involving: dispatch, crew support and clearly defined guidance at an organisational level on who is responsible to cease operations
- Station managers can be trained to provide updates on the weather situation at destination – some airlines provide station management training, which includes basic flying knowledge (shortened PPL theory) to enhance their awareness of safe operations

Runway Excursions Following Rejected Take-offs

Background:

- 18% of all the runway excursions in 2008 occurred following a rejected take-off
- In some cases, the choice of runway played a role in the runway excursion

Objective: Use of realistic rejected take-off simulator training; not limited to a fire or a malfunction

Discussion: Preventing a runway excursion following a rejected take-off

- Prior to take-off, the flight crew should brief the rejected take-off SOPs and carry out a "touch drill" as part of the SOP
- The flight crew should use the full runway length for take-off when performance is runway length limited; this should be supported as a company SOP
- The flight crew should consider using the most favorable runway (the longest) for take-off

Low Altitude vs. High Altitude Go-arounds

Background:

- At the last IATA Incident Review Meeting (IRM), one airline presented a study that it conducted on go-arounds, using its internal data
- The majority of go-around reports were linked to ATM events and go-arounds carried out due to conflict with other aircraft
- The study also focused on mishandled go-around events:
  - Configuration events (e.g., gear before flap)
  - Flap exceedances
  - Altitude busts – mostly on complex go-arounds or low-level off requirements
  - Late decisions despite awareness of situation

Objective: Ensure that a go-around is a manoeuvre to mitigate a threat and that it does not represent a threat in itself

Discussion: Executing go-arounds in different situations

- At the IRM, the group discussed low altitude go-around vs. high altitude ones. High altitude go-arounds usually result in level busts since they are unexpected
- The majority cases involve mishandled configuration events related to gear before flaps
- Usually, go-arounds are executed under abnormal situations and are unexpected (e.g., loss of engine). IATA and airlines should work with ANSP and procedures providers on go-arounds with all engines operating. A go-around is a manoeuvre to mitigate a threat and should not represent a threat in itself
- IATA will conduct a similar go-around study based on incident reports submitted to the STEADES programme

8

THE USE OF TECHNOLOGY FOR ACCIDENT PREVENTION

Technology and CFIT Accident Prevention

In 2008, 6% of all accidents involved a Controlled Flight into Terrain (CFIT). All of these events were fatal and all events resulted in a hull loss. The majority of CFIT accidents involved aircraft without adequate technology / equipment, such as Enhanced-Ground Proximity Warning System (E-GPWS) also known as Terrain Awareness Warning System (TAWS).

Ground Proximity Warning System (GPWS)

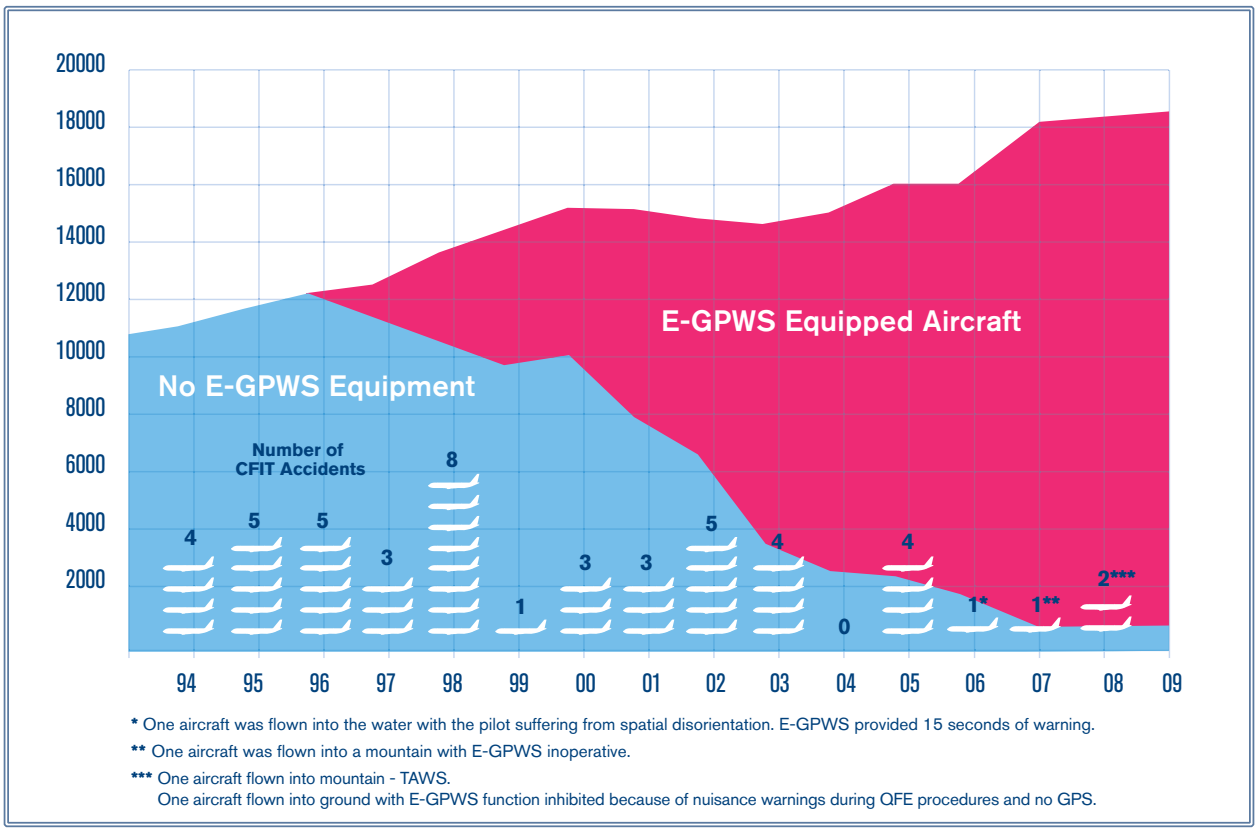
- Beginning in the 1970s, Ground Proximity Warning Systems (GPWS) were widely fitted on commercial transport aircraft and were successful in preventing many CFIT accidents.
- There were still accidents due to a major drawback of GPWS performance that was limited by the downward looking aircraft radio altimeter, which could not see terrain ahead of the aircraft especially in precipitous terrain.
- Furthermore, GPWS automatic warnings were inhibited in full landing configuration (i.e., gear down and flaps selected) to prevent unwanted warnings across undulating terrain and there were CFIT accidents short of the runway with a stable approach and no GPWS warnings.

Enhanced-Ground Proximity Warning System (E-GPWS) / TAWS

These GPWS limitations were addressed in E-GPWS equipment, which was first installed in 1996. The world's Western-built large commercial jet fleet fitted with E-GPWS / TAWS has grown to 97% of the fleet with over 320,000,000 departures.

- Since 1996, approximately 40 large commercial jet aircraft have been involved in CFIT accidents, most not fitted with E-GPWS, as shown in Figure 8.1.
- E-GPWS / TAWS has been designed to overcome GPWS limitations providing flight crews with a terrain display to help provide situational awareness to terrain and provide more warning time for the pilot to take corrective action of approaching terrain.
- The system consists of a global terrain database; a Global Positioning System (GPS) input from the aircraft GPS or an internal GPS in the E-GPWS computer itself, computers and the existing signals to the GPWS.

FIGURE 8.1 GPWS versus E-GPWS Active World's Large Commercial Jet Fleet



* One aircraft was flown into the water with the pilot suffering from spatial disorientation. E-GPWS provided 15 seconds of warning.

** One aircraft was flown into a mountain with E-GPWS inoperative.

*** One aircraft flown into mountain - TAWS.
One aircraft flown into ground with E-GPWS function inhibited because of nuisance warnings during QFE procedures and no GPS.

Image courtesy of Honeywell

- An inferior position data choice is to use data from the Flight Management System (FMS). Unfortunately, this can cause many unwanted warnings from FMS map shifts where there is scare VOR DME updating of the FMS aircraft position. It can also cause a problem with altimeter errors, especially in States where QFE altimeter setting standards are still in use. In these aircraft, the E-GPWS equipment often ends up being inhibited.
- Unfortunately the FMS can be subject to Map Shift, or faulty ground navigation position updating and AIP coordinates that may not agree to WGS-84 coordinates used by E-GPWS / TAWS terrain, obstacle and runway end position.
- E-GPWS / TAWS units combine the aircraft current position with the terrain database and present the information to the crew on the navigation display, giving a picture of significant terrain relative to the aircraft. An SOP that has one ND on Weather and the Other ND on Terrain and ranged appropriately is recommended for every take-off and initial approach.
- GPS track, ground speed, with data from the aircraft air data computers and roll attitude is used to predict the aircraft flight path in terms of horizontal and vertical profile.
- E-GPWS / TAWS gives the flight crew visual and aural warnings of proximity to terrain. When a hazardous condition occurs, a nominal alert time of 60 seconds is given by an aural “terrain” message, followed with a nominal 30 seconds of warning to “pull up” en-route, but with shorter times as the runway is approached. Figure 8.1 indicates the increase in the number of aircraft fitted with E-GPWS / TAWS and the related decrease in the number of CFIT accidents. E-GPWS has been hailed as one of the greatest CFIT prevention tools that the industry has seen, but it will only be reliable if the software and database are kept up to date. This leads to a growing concern that there may be a CFIT accident to an aircraft capable of avoiding a CFIT accident because an E-GPWS with outdated information provides a misleading sense of comfort.

GPS

To get the most CFIT risk reduction from E-GPWS, the airline needs to complete the following:

- Provide a GPS position directly to the E-GPWS unit
- Use the latest software and database
- Keep the system maintained
- Use a Terrain Display take-off and landing

The advantages of using GPS direct to the E-GPWS are, independence from the FMS, independence from altimetry errors, altimeter setting errors or various altimeter setting standards used such as QFE. Unwanted warnings are significantly reduced with the use of GPS. There are approximately 7,000 large aircraft using a GPS engine internal to E-GPWS. Unfortunately, there remain some 5,500 large commercial jet aircraft without GPS direct to E-GPWS. Many of these aircraft may fly in areas where VOR DME updates are scarce (FMS map shift) and QFE setting standards that cause many unwanted warnings.

Software

It is highly recommended that Obstacles and Peaks Alerts and Geometric Altitude software functions be pinned up by means of a rear jumper. No jumper is necessary for Geometric Altitude on Boeing aircraft. Software is updated by means of a PCMCIA card. If the E-GPWS was Type Certified by Airbus or Boeing, the operator may need to coordinate with them. Otherwise, the airline can use an amended Supplemental Type Certificate to the original Supplemental Type Certificate.

It is important to keep the Terrain / Obstacle / Runway WGS-84 databases current. Terrain databases from Honeywell can be downloaded from their website:

http://www.honeywell.com/sites/aero/Egpws-Home.htm

Operators can also sign up with Honeywell to receive email notifications when new databases are released and a PCMCIA card from Honeywell. The PCMCIA card is inserted into the front of the E-GPWS computer (power on), while on the aircraft and the front panel button pressed, and the database is loaded within 30 minutes. Obstacle databases for various States are slowly becoming available.

Technology and Runway Misidentification Prevention

Runway incursions, wrong runway take-offs, wrong runway landings, take-off and landing on taxiways are a continuing risk leading to a possible runway accident. Although few accidents involving a runway collision occurred during 2008, this remains a safety concern, particularly in light of the many such incidents reported worldwide. The risk can be reduced by:

- Tools for the Controller such as radar surveillance
- Improved runway taxi identification, traffic lighting and other monitoring sensors
- The use of SOPs that can help increase awareness
- Tools can also reduce the risk for the pilot such as:
  - A Class 2/3 Moving Map displays showing runway / taxiway / aircraft position
  - Aural advisories

The Runway Awareness and Advisory System (RAAS) is a software function that can be hosted on existing E-GPWS equipment. No new hardware, aircraft wiring, or change to the cockpit is necessary. See figure 8.2.

- RAAS uses the E-GPWS world's runway database, aural advisories and GPS positions that exist in the present E-GPWS equipment (some 1,000 aircraft are currently fitted)
- A "virtual box" is placed around the complete runway in software and complements the use of electronic moving maps. The aircraft's position related to the runway box and runway itself can give awareness advisories
- RAAS will aurally advise the pilots that they are about to enter a runway (the virtual box approximates the ICAO holding line and expands with ground speed as the runway box is approached)
- A second advisory occurs when the aircraft is aligned on the runway (runway heading ± 20 degrees)
- These two advisories are the only advisories the pilots should ever hear unless some unusual condition exists – taxiway take-off, insufficient runway length
- Their purpose is to encourage runway awareness and the operator should carefully consider the type and audio volume of the advisory

Figure 8.2 Runway Awareness and Advisory System

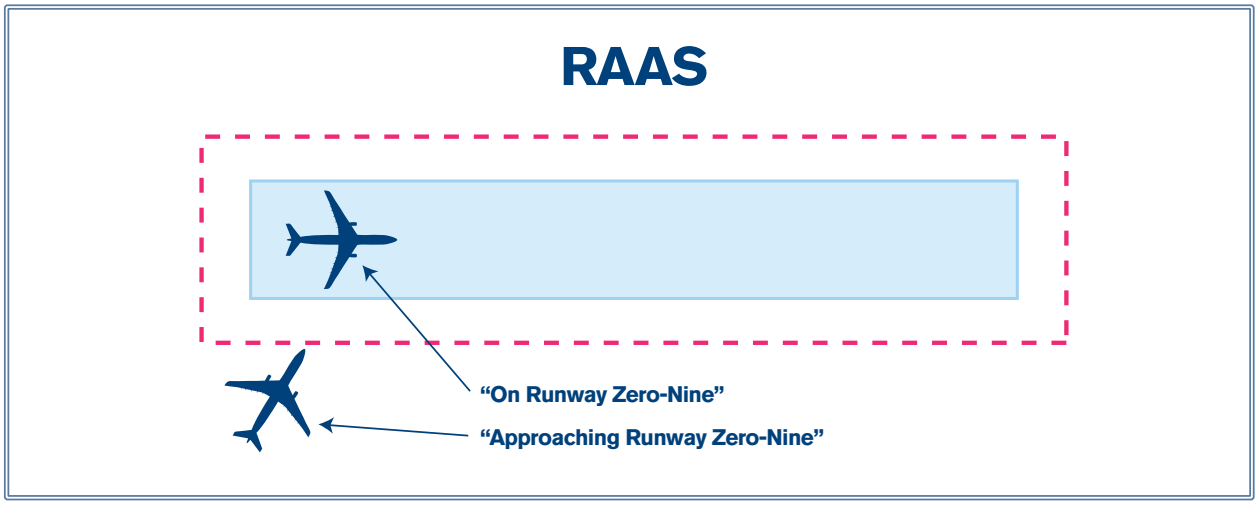


Image courtesy of Honeywell

IATA SAFETY STRATEGY

The IATA Six-point Safety Programme reflects the strategic direction that IATA has taken to ensure the continuous improvement of the industry's safety record. Established in close cooperation with our member airlines, the programme focuses not on one aspect, but on a whole system to improve operational safety.

The Six-point Safety programme addresses areas of global concern and targets specific regional challenges.

The segments of the programme are shown below. More information on this programme can be found at: www.iata.org/safety

IATA Operational Safety Audit (IOSA)

IOSA is the world's first airline safety audit programme based on internationally harmonised standards.

The programme is designed to help airlines share audit resources and reduce the overall number of audits performed, but most importantly it aims at improving safety levels throughout the entire airline industry.

IATA oversees the accreditation of audit and training organisations, ensures continuous development of the IOSA standards and recommended practices and manages the central database of IOSA audit reports.

IATA also implements effective quality assurance to provide overall programme standardisation and to ensure that the programme is meeting airline needs as effectively as possible. IOSA is a condition of IATA Membership. More information on this programme can be found at: www.iata.org/iosa

IATA Safety Audit for Ground Operations (ISAGO)

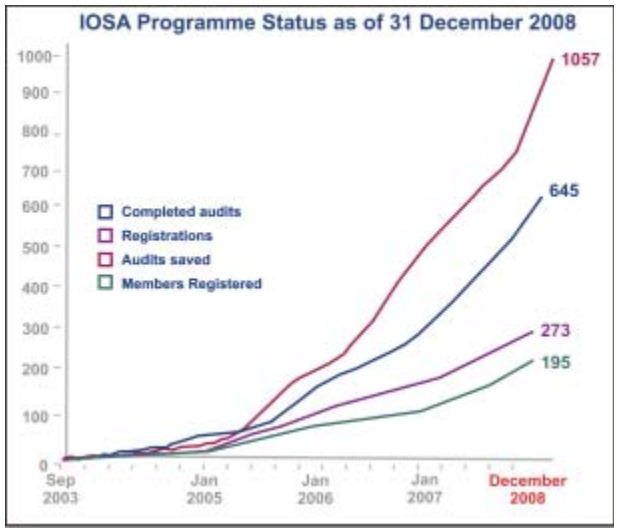
Modeled on the successful IOSA framework, IATA has developed the industry's first global standard for the oversight and auditing of ground handling companies.

ISAGO is intended to bring the same improvement in safety and efficiency for ground handlers as IOSA achieves for airlines. The primary aim of the programme is to drastically reduce aircraft damage and personal injuries in the ground environment, while driving down the number of redundant audits.

ISAGO is built upon a backbone of audit standards applicable to all ground handling companies worldwide, coupled with uniform sets of standards tailored to the specific activities of any ground handler.

ISAGO audits are conducted at both corporate and station levels of ground handling companies, mainly using existing airline audit resources managed by IATA through an Audit Pool.

More information on this programme can be found at: www.iata.org/isago



8

Partnership for Safety Plus

Partnership for Safety (PfS) was created to assist members in developing nations prepare for an IOSA audit. During its implementation phase from 2005 up to the end of 2007, over 200 airlines received assistance in the form of awareness seminars, individual gap audits and specialised training courses. As a result of these efforts, the airlines were able to meet the IATA membership requirement of conducting an IOSA audit by the end of 2007.

To continue to help its members in 2008, IATA developed PfS Plus. It focused on helping airlines to close the findings from their initial audits, and later to assist them in preparing for their renewal audits by maintaining ongoing IOSA compliance. The key element of PfS Plus was "Corrective Action Reports (CARs) Closing" course aimed at helping airlines close findings. Eight of these courses were held in several locations. Additionally, PfS Plus targeted two countries where safety concerns were expressed – Indonesia and Brazil. In Indonesia, the programme was offered to all Indonesian carriers, to enable them to prepare for an IOSA audit. In Brazil, the emphasis was on improving infrastructure, operating procedures and training in order to promote safety enhancements.

A total of 58 airlines were assisted through PfS Plus in 2008 and 98 airlines benefited from training courses sponsored by the IATA Airline Training Fund (IATF). After a very successful three-year run, the PfS programme came to a close at the end of 2008. This coincided with the deadline for all IATA member airlines to be IOSA registered by December 31, 2008 in order to be a part of the association.

Operations

Hazard identification and risk management are required to maintain an acceptable level of safety across operations. IATA works on sharing safety data in order to reduce serious incidents such as runway incursions, runway excursions, level busts and miscommunication. IATA also encourages airlines to collect data on threats perceived in their operations and successful threat management strategies. This includes voluntary crew reporting systems and flight data analysis programmes. This area also covers aspects related to cabin operations.

Infrastructure Safety

Runway safety remains a concern. A quarter of all accidents last year involved a runway excursion. Although few accidents last year involved a runway incursion, airlines continue to report serious incidents of this nature.

The IATA Runway Safety Toolkit will address the issues linked to runway safety enhancement, including measures that will mitigate the consequences of runway excursions and the establishment of a standard for braking-action measuring and reporting.

The main focus of the infrastructure safety segment is runway excursions / incursions prevention. The Toolkit will be available in the second quarter of 2009.

Safety Management System

A Safety Management System (SMS) is a systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures. As per ICAO requirements, service providers are responsible for establishing an SMS, which is accepted and overseen by their State. Service providers include: aircraft operators, maintenance organisations, Air Navigation Service Providers (ANSPs) and certified aerodromes. Under the requirements, the service provider must implement an SMS accepted by their State that, as a minimum:

- Identifies safety hazards
- Ensures that remedial action necessary to maintain an acceptable level of safety is implemented
- Provides for continuous monitoring and regular assessment of the safety level achieved
- Aims to make continuous improvement to the overall level of safety

Working with ICAO, IATA has been assisting airlines and other service providers prepare for the SMS ICAO requirements, which came into effect on January 01, 2009. During 2008, seminars on SMS planning and implementation were held in South America, Europe, Asia and the Middle East. They were attended by airlines, Civil Aviation Authorities, ANSPs, maintenance organisations and aerodrome operators.

IATA also provides SMS training courses through its Training and Development Institute. Course schedules can be obtained at:

www.iata.org/training/calendar

Safety Data Management and Analysis

The Safety Trend Evaluation, Analysis & Data Exchange System (STEADES) programme is built upon a database that contains incident reports from participating airlines. Participants have the opportunity to benchmark their specific operation against all (or part) of the STEADES database. This offers them the possibility to answer the question: “How effectively are we managing operational risks?” by comparing to other, similar, operations.

In 2009, the database will be expanded with more relevant data and with more interactive opportunities for members, under the Global Information Safety Center (GSIC) project. It will serve as an umbrella, under which all of the data sources that IATA manages will be combined. These include data from STEADES, IOSA, ISAGO, Flight Data Analysis (FDA) and the Safety Report.

Participation in STEADES is free for IATA member airlines. IATA also provides a Flight Data Analysis Service. More information on this programme can be found at: www.iata.org/steades

Maintenance

Maintenance events, such as errors by maintenance crews, played a contributing role in approximately 15% of the accidents that occurred in 2008. To address this issue, IATA included a new segment to its existing Six-point Safety Programme, which addresses Safety Management in Maintenance Operations. This segment will be developed throughout 2009.

SUMMARY OF MAIN FINDINGS AND IATA PREVENTION STRATEGIES

In 2008, the number of fatalities and the fatality rate continued to decline despite the increase in traffic. From a regional perspective, the accident rates in the Commonwealth of Independent States (CIS), Latin America and the Caribbean, the Middle East and North Africa, North America and Europe increased in contrast to 2007. In Africa, Asia / Pacific and North Asia, the accident rates decreased in 2008 compared to 2007.

Overall, IATA member airlines surpassed the industry in terms of safety, with an accident rate of 0.52 western-built jet hull losses per million sectors flown. The accident rate for member airlines declined in comparison to 2007.

Based on the findings from accident analyses, IATA has developed the following prevention strategies to address the top safety issues:

Runway Excursion Prevention

- Runway excursion was the most frequent type of accident in 2008, accounting for 25% of accidents
- Over half (57%) of runway excursions resulted in a hull loss and 14% of them involved fatalities
- Flight crew handling errors, deficient airport facilities and aircraft malfunctions were among the top contributing factors in this type of accident

Prevention Strategy: IATA will launch the Runway Safety Toolkit in 2009, which will address runway excursions, incursions and runway confusion.

Ground Damage Reduction

- Ground damage was the second most predominant type of accident, following runway excursions
- Ground damage events accounted for 17% of all of last year’s accidents; half of these involved IATA member airlines
- Well over a third (38%) of ground damage accidents cited ground events, such as errors by ground handling personnel, as a contributing factor

Prevention Strategy: Following the launch of the IATA Safety Audit for Ground Operations (ISAGO) in 2008, IATA will conduct 80 ISAGO audits in 2009, improving safety while reducing ramp injuries and damage.

Safety Management System Implementation

- In almost a third (30%) of accidents, deficient safety management on the part of the Operator was noted as a contributing factor
- This includes deficiencies with regards to the Operator's safety policies and objectives, risk management, safety assurance and safety promotion
- The majority (69%) of accidents involving deficiencies in the Operator's safety management also implicated deficient regulatory oversight by the State

Prevention Strategy: IATA will deliver new guidance material on Safety Management Systems (SMS) and continue to assist airlines with SMS implementation at an individual and a regional level.

Safety Enhancement in Maintenance Operations

- 15% of accidents in 2008 involved a maintenance event
- In over half (57%) of the accidents involving a maintenance event, deficiencies in the Operator's maintenance operations were also noted as a contributing factor
- These include: deficiencies in technical documentation, unrecorded maintenance, the use of bogus parts, unapproved modifications and deficient training of maintenance personnel

Prevention Strategy: IATA will launch a revised safety strategy in 2009, which includes a focus on safety management in maintenance operations.

Regional Safety Issues

- Operators based in the Commonwealth of Independent States (CIS) and Latin America and the Caribbean, had the highest regional accident rates in 2008 and experienced the highest increase in their accident rates, when compared to 2007
- Almost a third (30%) of the accidents involving CIS Operators were fatal; over a quarter (26%) of those implicating Latin American and the Caribbean-based carriers, also resulted in fatalities
- Aircraft malfunctions, deficiencies in the Operator's safety management and the State's regulatory oversight as well as non-adherence to Standard Operating Procedures by flight crews were among the top contributing factors to accidents involving Operators from these two regions

Prevention Strategy: IATA will continue to help its member airlines and partner with non-member airlines, States and other industry stakeholders to improve safety by addressing regional issues and by using well established tools such as the IATA Operational Safety Audit (IOSA), ISAGO and SMS.

In 2009, IATA focuses on aiding its members through these difficult times, while maintaining safety as a priority. IATA is continuing its work with airlines, regulatory authorities and other industry stakeholders to fortify existing safety programmes and introduce new initiatives, which will enhance operational safety on a global scale.

Image courtesy of Bombardier

Annex 1

A1

Definitions

Accident: an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

- a person is fatally injured as a result of:

  (a) being in the aircraft;

  (b) direct contact with any part of the aircraft, including parts which have become detached from the aircraft; or

  (c) direct exposure to jet blast

except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew;

- the aircraft sustains damage or structural failure which:

  (a) adversely affects the structural strength, performance or flight characteristics of the aircraft; and

  (b) would normally require major repair or replacement of the affected component

except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennae, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or the aircraft is still missing or is completely inaccessible.

Notes

1. For statistical uniformity only, an injury resulting in death within thirty days of the date of the accident is classified as a fatal injury by ICAO.

2. An aircraft is considered to be missing when the official search has been terminated and the wreckage has not been located.

For purposes of this Safety Report, only operational accidents are classified.

The following types of operations are excluded:

- *Private aviation*
- *Business aviation*
- *Illegal flights (e.g., cargo flights without an airway bill, fire arms or narcotics trafficking)*
- *Humanitarian relief*
- *Crop dusting / agricultural flights*
- *Security-related events (e.g., hijackings)*
- *Experimental / Test flight*

Accident classification: the process by which actions, omissions, events, conditions, or a combination thereof, which led to the accident are identified and categorised.

Aerodrome manager: as defined in applicable regulations and includes the owner of aerodrome.

A1

Aircraft: the involved aircraft, used interchangeably with aeroplane(s).

Aircraft years: means, for the purposes of the Safety Report, the average fleet in service during the year. The figure is calculated by counting the number of days each aircraft is in the airline fleet during the year and then dividing by 365. Periods during which the aircraft is out of service (for repair, storage, parked, etc.) are then excluded.

Air Traffic Service unit: as defined in applicable ATS, Search and Rescue and overflight regulations.

Cabin Safety-related Event: accident involving cabin operations issues, such as a passenger evacuation, an onboard fire, a decompression or a ditching, which requires actions by the operating cabin crew.

Captain: the involved pilot responsible for operation and safety of the aeroplane during flight time.

Commander: the involved pilot, in an augmented crew, responsible for operation and safety of the aeroplane during flight time.

Commonwealth of Independent States (CIS): regional organisation whose participating countries are Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, the Russian Federation, Tajikistan, Turkmenistan, Uzbekistan and Ukraine.

Crewmember: anyone on board a flight who has duties connected with the sector of the flight during which the accident happened. It excludes positioning or relief crew, security staff, etc. (See definition of "passenger" below).

Eastern-built Jet aircraft: commercial Jet transport aeroplane designed in CIS countries or the People's Republic of China.

Eastern-built Turboprop aircraft: commercial Turboprop transport aeroplane designed in CIS countries or the People's Republic of China.

Fatal accident: an accident where at least one passenger or crewmember is killed or later dies of their injuries as a result of an operational accident.

Events such as slips and falls, food poisoning, turbulence or accidents involving on board equipment, which may involve fatalities but where the aircraft sustains minor or no damage, are excluded.

Fatality: a passenger or crewmember who is killed or later dies of their injuries resulting from an operational accident. Injured persons who die more than 30 days after the accident are excluded.

Hazard: condition, object or activity with the potential of causing injuries to personnel, damage to equipment or structures, loss of material, or reduction of ability to perform a prescribed function.

Hull loss: an accident in which the aircraft is destroyed or substantially damaged and is not subsequently repaired for whatever reason including a financial decision of the owner.

IATA accident classification system: refer to Annexes 2 and 3.

IATA regions: IATA determines the accident region based on the operator's country. Moreover, the operator's country is specified in the operator's Air Operator Certificate (AOC).

For example, if a Canadian-registered operator has an accident in Europe, this accident is counted as a "North American" accident.

For a complete list of countries assigned per region, please consult the following table.

IATA REGIONS

Country	IATA Region
Afghanistan	MENA
Albania	EUR
Algeria	MENA
Andorra	EUR
Angola	AFI
Antigua and Barbuda	LATAM
Argentina	LATAM
Armenia	CIS
Australia[1]	ASPAC
Austria	EUR
Azerbaijan	CIS
Bahamas	LATAM
Bahrain	MENA
Bangladesh	ASPAC
Barbados	LATAM
Belarus	CIS
Belgium	EUR
Belize	LATAM
Benin	AFI
Bhutan	ASPAC
Bolivia	LATAM
Bosnia and Herzegovina	EUR
Botswana	AFI
Brazil	LATAM
Brunei Darussalam	ASPAC
Bulgaria	EUR
Burkina Faso	AFI
Burma	ASPAC
Burundi	AFI
Cambodia	ASPAC
Cameroon	AFI
Canada	NAM
Cape Verde	AFI
Central African Republic	AFI
Chad	AFI
Chile	LATAM
China[2]	NASIA
Colombia	LATAM
Comoros	AFI
Congo, Republic of	AFI
Congo, Democratic Republic of	AFI
Costa Rica	LATAM
Côte d'Ivoire	AFI
Croatia	EUR
Cuba	LATAM
Cyprus	EUR
Czech Republic	EUR
Denmark[3]	EUR
Djibouti	AFI
Dominica	LATAM
Dominican Republic	LATAM
East Timor	ASPAC
Ecuador	LATAM
Egypt	MENA
El Salvador	LATAM
Equatorial Guinea	AFI
Eritrea	AFI
Estonia	EUR
Ethiopia	AFI
Fiji Islands	ASPAC
Finland	EUR
France[4]	EUR
Gabon	AFI
Gambia	AFI
Georgia	CIS
Germany	EUR
Ghana	AFI
Greece	EUR
Grenada	LATAM
Guatemala	LATAM
Guinea	AFI
Guinea-Bissau	AFI
Guyana	LATAM
Haiti	LATAM
Honduras	LATAM
Hungary	EUR
Iceland	EUR
India	ASPAC
Indonesia	ASPAC
Iran	MENA
Iraq	MENA
Ireland	EUR
Israel	MENA
Italy	EUR
Jamaica	LATAM
Japan	ASPAC
Jordan	MENA
Kazakhstan	CIS
Kenya	AFI
Kiribati	ASPAC
North Korea	ASPAC
South Korea	ASPAC
Kosovo	EUR
Kuwait	MENA
Kyrgyzstan	CIS
Laos	ASPAC
Latvia	EUR
Lebanon	MENA
Lesotho	AFI
Liberia	AFI
Libya	MENA
Liechtenstein	EUR
Lithuania	EUR
Luxembourg	EUR
Macedonia	EUR
Madagascar	AFI
Malawi	AFI
Malaysia	ASPAC
Maldives	ASPAC
Mali	AFI
Malta	EUR
Marshall Islands	ASPAC
Mauritania	AFI
Mauritius	AFI
Mexico	LATAM
Micronesia	ASPAC
Moldova	CIS
Monaco	EUR
Mongolia	NASIA
Montenegro	EUR
Morocco	MENA
Mozambique	AFI
Namibia	AFI
Nauru	ASPAC
Nepal	ASPAC

A1

Country	IATA Region
Netherlands[5]	EUR
New Zealand[6]	ASPAC
Nicaragua	LATAM
Niger	AFI
Nigeria	AFI
Norway	EUR
Oman	MENA
Pakistan	ASPAC
Palau	ASPAC
Panama	LATAM
Papua New Guinea	ASPAC
Paraguay	LATAM
Peru	LATAM
Philippines	ASPAC
Poland	EUR
Portugal	EUR
Qatar	MENA
Romania	EUR
Russia	CIS
Rwanda	AFI
Saint Kitts and Nevis	LATAM
Saint Lucia	LATAM
Saint Vincent and the Grenadines	LATAM
Samoa	ASPAC
San Marino	EUR
São Tomé and Príncipe	AFI
Saudi Arabia	MENA
Senegal	AFI
Serbia	EUR
Seychelles	AFI
Sierra Leone	AFI
Singapore	ASPAC
Slovakia	EUR
Slovenia	EUR
Solomon Islands	ASPAC
Somalia	AFI
South Africa	AFI
Spain	EUR
Sri Lanka	ASPAC
Sudanthe	MENA
Suriname	LATAM

Country	IATA Region
Swaziland	AFI
Sweden	EUR
Switzerland	EUR
Syria	MENA
Tajikistan	CIS
Tanzania	AFI
Thailand	ASPAC
Togo	AFI
Tonga	ASPAC
Trinidad and Tobago	LATAM
Tunisia	MENA
Turkey	EUR
Turkmenistan	CIS
Tuvalu, Ellice Islands	ASPAC
Uganda	AFI
Ukraine	CIS
United Arab Emirates	MENA
United Kingdom[7]	EUR
United States of America[8]	NAM
Uruguay	LATAM
Uzbekistan	CIS
Vanuatu	ASPAC
Vatican City	EUR
Venezuela	LATAM
Vietnam	ASPAC
Yemen	MENA
Zambia	AFI
Zimbabwe	AFI

[1]Australia includes:
Christmas Island Cocos (Keeling) Islands Norfolk Island Ashmore and Cartier Islands Coral Sea Islands Heard Island and McDonald Islands
[2]China includes:
Hong Kong Macau Taiwan
[3]Denmark includes:
Faroe Islands Greenland
[4]France includes:
French Polynesia New Caledonia Saint-Barthélemy Saint Martin Saint Pierre and Miquelon Wallis and Futuna French Southern and Antarctic Lands
[5]Netherlands include:
Aruba Netherlands Antilles
[6]New Zealand includes:
Cook Islands Niue Tokelau

[7]United Kingdom includes:
England Scotland Wales Northern Ireland Akrotiri and Dhekelia Anguilla Bermuda British Indian Ocean Territory British Virgin Islands Cayman Islands Falkland Islands Gibraltar Montserrat Pitcairn Islands Saint Helena South Georgia and the South Sandwich Islands Turks and Caicos Islands British Antarctic Territory Guernsey Isle of Man Jersey
[8]United States of America include:
American Samoa Guam Northern Mariana Islands Puerto Rico United States Virgin Islands

A1

Incident: an occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.

In-flight Security Personnel: an individual who is trained, authorised and armed by the state and is carried on board an aircraft and whose intention is to prevent acts of unlawful interference.

Investigation: a process conducted for the purpose of accident prevention, which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations.

Investigator in charge: a person charged, on the basis of his or her qualifications, with the responsibility for the organisation, conduct and control of an investigation.

Involved: directly concerned, or designated to be concerned, with an accident or incident.

Level of safety: how far a level of safety is to be pursued in a given context, assessed with reference to an acceptable risk, based on the current values of society.

Major repair: a repair which, if improperly done, might appreciably affect mass, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness.

Non-operational accident: this definition includes acts of deliberate violence (sabotage, war, etc.), and accidents that occur during crew training, demonstration and test flights. Sabotage is believed to be a matter of security rather than flight safety, and crew training, demonstration and test flying are considered to involve special risks inherent to these types of operations.

Also included in this category are:

- Non-airline operated aircraft (e.g., military or government operated, survey, aerial work or parachuting flights);
- Accidents where there has been no intention of flight

Occurrence: any unusual or abnormal event involving an aircraft, including but not limited to an incident.

Operational accident: an accident which is believed to represent the risks of normal commercial operation, generally accidents which occur during normal revenue operations or positioning flights.

Operator: a person, organisation or enterprise engaged in or offering to engage in aircraft operation.

Passenger: anyone on board a flight who, as far as may be determined, is not a crewmember. Apart from normal revenue passengers this includes off-duty staff members, positioning and relief flight crew members, etc., who have no duties connected with the sector of the flight during which the accident happened. Security staff are included as passengers as their duties are not concerned with the operation of the flight.

Person: any involved individual, including an aerodrome manager and / or a member of an air traffic services unit.

Phase of flight: the phase of flight definitions applied by IATA were developed by the Air Transport Association (ATA). They are presented in the following table.

PHASE OF FLIGHT DEFINITIONS

Flight Planning (FLP) This phase begins when the flight crew initiates the use of flight planning information facilities and becomes dedicated to a flight based upon a route and an airplane; it ends when the crew arrives at the aircraft for the purpose of the planned flight or the crew initiates a “Flight Close” phase.

Pre-flight (PRF) This phase begins with the arrival of the flight crew at an aircraft for the purpose of flight; it ends when a dedication is made to depart the parking position and / or start the engine(s). It may also end by the crew initiating a “Post-flight” phase.

Note: The Pre-flight phase assumes the aircraft is sitting at the point at which the aircraft will be loaded or boarded, with the primary engine(s) not operating. If boarding occurs in this phase, it is done without any engines operating. Boarding with any engine operating is covered under Engine Start/Depart.

Engine Start / Depart (ESD) This phase begins when the flight crew take action to have the aircraft moved from the parked position and / or take switch action to energise the engine(s); it ends when the aircraft begins to move forward under its own power or the crew initiates an “Arrival/Engine Shutdown” phase.

Note: The Engine Start / Depart phase includes: the aircraft engine(s) start-up whether assisted or not and whether the aircraft is stationary with more than one engine shutdown prior to Taxi-out, i.e., boarding of persons or baggage with engines running. It includes all actions of power back for the purpose of positioning the aircraft for Taxi-out.

Taxi-out (TXO) This phase begins when the crew moves the aircraft forward under its own power; it ends when thrust is increased for the purpose of Take-off or the crew initiates a “Taxi-in” phase.

Note: This phase includes taxi from the point of moving under its own power, up to and including entering the runway and reaching the Take-off position.

Take-off (TOF) This phase begins when the crew increases the thrust for the purpose of lift-off; it ends when an Initial Climb is established or the crew initiates a “Rejected Take-off” phase.

Rejected Take-off (RTO) This phase begins when the crew reduces thrust for the purpose of stopping the aircraft prior to the end of the Take-off phase; it ends when the aircraft is taxied off the runway for a “Taxi-in” phase or when the aircraft is stopped and engines shutdown.

Initial Climb (ICL) This phase begins at 35 ft above the runway elevation; it ends after the speed and configuration are established at a defined maneuvering altitude or to continue the climb for the purpose of cruise. It may also end by the crew initiating an “Approach” phase.

Note: Maneuvering altitude is based upon such an altitude to safely maneuver the aircraft after an engine failure occurs, or pre-defined as an obstacle clearance altitude. Initial Climb includes such procedures applied to meet the requirements of noise abatement climb, or best angle/rate of climb.

En Route Climb (ECL) This phase begins when the crew establishes the aircraft at a defined speed and configuration enabling the aircraft to increase altitude for the purpose of cruising; it ends with the aircraft established at a predetermined constant initial cruise altitude at a defined speed or by the crew initiating a “Descent” phase.

Cruise (CRZ) The cruise phase begins when the crew establishes the aircraft at a defined speed and predetermined constant initial cruise altitude and proceeds in the direction of a destination; it ends with the beginning of Descent for the purpose of an approach or by the crew initiating an “En Route Climb” phase.

Descent (DST) This phase begins when the crew departs the cruise altitude for the purpose of an approach at a particular destination; it ends when the crew initiates changes in aircraft configuration and / or speeds to facilitate a landing on a particular runway. It may also end by the crew initiating an “En Route Climb” or “Cruise” phase.

Approach (APR) This phase begins when the crew initiates changes in aircraft configuration and / or speeds enabling the aircraft to maneuver for the purpose of landing on a particular runway; it ends when the aircraft is in the landing configuration and the crew is dedicated to land on a specific runway. It may also end by the crew initiating an “Initial Climb” or “Go-around” phase.

Go-around (GOA) This phase begins when the crew aborts the descent to the planned landing runway during the Approach phase, it ends after speed and configuration are established at a defined maneuvering altitude or to continue the climb for the purpose of cruise (same as end of “Initial Climb”).

A1

Landing (LND) This phase begins when the aircraft is in the landing configuration and the crew is dedicated to touch down on a specific runway; it ends when the speed permits the aircraft to be maneuvered by means of taxiing for the purpose of arriving at a parking area. It may also end by the crew initiating a “Go-around” phase.

Taxi-in (TXI) This phase begins when the crew begins to maneuver the aircraft under its own power to an arrival area for the purpose of parking; it ends when the aircraft ceases moving under its own power with a commitment to shut down the engine(s). It may also end by the crew initiating a “Taxi-out” phase.

Arrival / Engine Shutdown (AES) This phase begins when the crew ceases to move the aircraft under its own power and a commitment is made to shutdown the engine(s); it ends with a dedication to shutting down ancillary systems for the purpose of securing the aircraft. It may also end by the crew initiating an “Engine Start / Depart” phase.

Note: The Arrival / Engine Shutdown phase includes actions required during a time when the aircraft is stationary with one or more engines operating while ground servicing may be taking place, i.e., deplaning persons or baggage with engine(s) running, and or refueling with engine(s) running.

Post-flight (PSF) This phase begins when the crew commences the shutdown of ancillary systems of the aircraft for the purpose of leaving the flight deck; it ends when the cockpit and cabin crew leaves the aircraft. It may also end by the crew initiating a “Pre-flight” phase.

Flight Close (FLC) This phase begins when the crew initiates a message to the flight-following authorities that the aircraft is secure, and the crew is finished with the duties of the past flight; it ends when the crew has completed these duties or begins to plan for another flight by initiating a “Flight Planning” phase.

Ground Servicing (GDS) This phase begins when the aircraft is stopped and available to be safely approached by ground personnel for the purpose of securing the aircraft and performing the duties applicable to the arrival of the aircraft, aircraft maintenance, etc.; it ends with completion of the duties applicable to the departure of the aircraft or when the aircraft is no longer safe to approach for the purpose of ground servicing. (e.g., Prior to crew initiating the “Taxi-out” phase.)

Note: This phase was identified by the need for information that may not directly require the input of cockpit or cabin crew. It is acknowledged as an entity to allow placement of the tasks required of personnel assigned to service the aircraft.

Products: refer, in terms of accident costs, to those liabilities which fall on parties other than the involved operator.

Risk: the assessment, expressed in terms of predicted probability and severity, of the consequence(s) of a hazard, taking as reference the worst foreseeable situation.

Safety: the state in which the risk of harm to persons or property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.

Sector: the operation of an aircraft between takeoff at one location and landing at another (other than a diversion).

Serious Injury: an injury which is sustained by a person in an accident and which:

- Requires hospitalisation for more than 48 hours, commencing within seven days from the date the injury was received; or
- Results in a fracture of any bone (except simple fractures of fingers, toes or nose); or
- Involves lacerations which cause severe haemorrhage, or nerve, muscle or tendon damage;
- Involves injury to any internal organ; or
- Involves second or third-degree burns, or any burns affecting more than five percent of the surface of the body; or
- Involves verified exposure to infectious substances or injurious radiation

Serious Incident: an incident involving circumstances indicating that an accident nearly occurred (note the difference between an accident and a serious incident lies only in the result).

Sky Marshal: see In-flight Security Personnel.

Substantial Damage: means damage or structural failure, which adversely affects the structural strength, performance or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component.

Notes:

1. Bent fairing or cowling, dented skin, small punctured holes in the skin or fabric, minor damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wing tips are not considered "substantial damage" for the purpose of this Safety Report.

2. The ICAO Annex 13 definition is unrelated to cost and includes many incidents in which the financial consequences are minimal.

Western-built Jet: Commercial Jet transport aeroplane with a maximum certificated takeoff mass of more than 15,000 kg, designed in Western Europe, the Americas or Indonesia.

Western-built Turboprop: Commercial Turboprop transport aeroplane with a maximum certificated takeoff mass of more than 5,700 kg, designed in Western Europe, the Americas or Indonesia. Single-engine aircraft are excluded.

“Ground damage was the second most predominant type of accident, following runway excursions.”

Annex 2

A2

Accident Classification Taxonomy Flight Crew

1 Latent Conditions

Definition: Conditions present in the system before the accident and triggered by various possible factors.

Latent Conditions (deficiencies in…)	Examples
Design	↗ Design shortcomings ↗ Manufacturing defects
Regulatory Oversight	↗ Deficient regulatory oversight by the State or lack thereof
Management Decisions	↗ Cost cutting ↗ Stringent fuel policy ↗ Outsourcing and other decisions, which can impact operational safety
Safety Management	Absent or deficient: ↗ Safety policy and objectives ↗ Safety risk management (including hazard identification process) ↗ Safety assurance (including Quality Management) ↗ Safety promotion
Change Management	↗ Deficiencies in monitoring change; in addressing operational needs created by, for example: expansion or downsizing ↗ Deficiencies in the evaluation to integrate and / or monitor changes to establish organisational practices or procedures ↗ Consequences of mergers or acquisitions
Selection Systems	↗ Deficient or absent selection standards
Operations Planning and Scheduling	↗ Deficiencies in crew rostering and staffing practices ↗ Issues with flight and duty time limitations ↗ Health and welfare issues

A2

1 Latent Conditions (cont'd)

Technology and Equipment	↗ Available safety equipment not installed (E-GPWS, predictive wind-shear, TCAS / ACAS, etc.)
Flight Operations	See the following breakdown
Flight Operations: Standard Operating Procedures and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs
Flight Operations: Training Systems	↗ Omitted training, language skills deficiencies, qualifications and experience of flight crews, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices
Cabin Operations	See the following breakdown
Cabin Operations: Standard Operating Procedures and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs
Cabin Operations: Training Systems	↗ Omitted training, language skills deficiencies, qualifications and experience of cabin crews, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices
Ground Operations	See the following breakdown
Ground Operations: SOPs and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs
Ground Operations: Training Systems	↗ Omitted training, language skills deficiencies, qualifications and experience of ground crews, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices

1 Latent Conditions (cont'd)

Maintenance Operations	See the following breakdown
Maintenance Operations: SOPs and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs ↗ Includes deficiencies in technical documentation, unrecorded maintenance and the use of bogus parts / unapproved modifications
Maintenance Operations: Training Systems	↗ Omitted training, language skills deficiencies, qualifications and experience of maintenance crews, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices
Dispatch	See the following breakdown
Dispatch: Standard Operating Procedures and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs
Dispatch: Training Systems	↗ Omitted training, language skills deficiencies, qualifications and experience of dispatchers, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices
Other	↗ Not clearly falling within the other latent conditions

Note: All areas such as Training, Ground Operations or Maintenance include outsourced functions for which the operator has oversight responsibility.

A2

2 Threats

Definition: An event or error that occurs outside the influence of the flight crew, but which requires crew attention and management if safety margins are to be maintained.

Mismanaged threat: A threat that is linked to or induces a flight crew error.

Environmental Threats	Examples
Meteorology	See the following breakdown
	↗ Thunderstorms
	↗ Poor visibility / IMC
	↗ Wind / wind shear / gusty wind
	↗ Icing conditions
Lack of Visual Reference	↗ Darkness / black hole effect ↗ Environmental situation, which can lead to spatial disorientation
Air Traffic Services	↗ Tough-to-meet clearances / restrictions ↗ Reroutes ↗ Language difficulties ↗ Controller errors ↗ Failure to provide separation (air / ground)
Wildlife / Birds / Foreign Object	↗ Self-explanatory
Airport Facilities	See the following breakdown
	↗ Poor signage, faint markings ↗ Runway / taxiway closures
	↗ Contaminated runways / taxiways ↗ Poor braking action
	↗ Trenches / ditches ↗ Inadequate overrun area ↗ Structures in close proximity to runway / taxiway

2 Threats (cont'd)

Navigational Aids	See the following breakdown
	↗ Ground navigation aid malfunction ↗ Lack or unavailability (e.g., ILS)
	↗ NAV aids not calibrated – unknown to flight crew
Terrain / Obstacles	↗ Self-explanatory
Traffic	↗ Self-explanatory
Other	↗ Not clearly falling within the other environmental threats
Airline Threats	Examples
Aircraft Malfunction	↗ Technical anomalies / failures See breakdown (on the next page)
MEL item	↗ MEL items with operational implications
Operational Pressure	↗ Operational time pressure ↗ Missed approach / diversion ↗ Other non-normal operations
Cabin Events	↗ Cabin events ↗ Cabin crew errors ↗ Distractions / interruptions
Ground Events	↗ Aircraft loading events ↗ Fueling errors ↗ Agent interruptions ↗ Improper ground support ↗ Improper de-icing / anti-icing
Dispatch / Paperwork	↗ Load sheet errors ↗ Crew scheduling events ↗ Late paperwork changes or errors
Maintenance Events	↗ Aircraft repairs on ground ↗ Maintenance log problems ↗ Maintenance errors
Dangerous Goods	↗ Carriage of articles or substances capable of posing a significant risk to health, safety or property when transported by air
Manuals / Charts / Checklists	↗ Incorrect / unclear chart pages or operating manuals ↗ Checklist layout / design issues
Other	↗ Not clearly falling within the other airline threats

2 Threats (cont'd)

Aircraft Malfunction Breakdown (Technical Threats)	Examples
Extensive / Uncontained Engine Failure	↗ Damage due to non-containment
Contained Engine Failure / Power plant Malfunction	↗ Engine overheat ↗ Propeller failure ↗ Failure affecting power plant components
Gear / Tire	↗ Failure affecting parking, taxi, take-off or landing
Brakes	↗ Failure affecting parking, taxi, take-off or landing
Flight Controls	See the following breakdown
Primary Flight Controls	↗ Failure affecting aircraft controllability
Secondary Flight Controls	↗ Failure affecting flaps, spoilers
Structural Failure	↗ Failure due to flutter, overload ↗ Corrosion / fatigue ↗ Engine separation
Fire / Smoke (Cockpit / Cabin / Cargo)	↗ Fire due to aircraft systems ↗ Other fire causes
Avionics, Flight Instruments	↗ All avionics except autopilot and FMS ↗ Instrumentation, including standby instruments
Autopilot / FMS	↗ Self-explanatory
Hydraulic System Failure	↗ Self-explanatory
Electrical Power Generation Failure	↗ Loss of all electrical power, including battery power
Other	↗ Not clearly falling within the other aircraft malfunction threats

3 Flight Crew Errors

Definition: An observed flight crew deviation from organisational expectations or crew intentions.

Mismanaged error: An error that is linked to or induces additional error or an undesired aircraft state.

Aircraft Handling Errors	Examples
Manual Handling / Flight Controls	↗ Hand flying vertical, lateral, or speed deviations ↗ Approach deviations by choice (e.g., flying below the GS) ↗ Missed runway / taxiway, failure to hold short, taxi above speed limit ↗ Incorrect flaps, speed brake, autobrake, thrust reverser or power settings
Ground Navigation	↗ Attempting to turn down wrong taxiway/runway ↗ Missed taxiway / runway / gate
Automation	↗ Incorrect altitude, speed, heading, autothrottle settings, mode executed, or entries
Systems / Radio / Instruments	↗ Incorrect packs, altimeter, fuel switch settings, or radio frequency dialed
Other	↗ Not clearly falling within the other errors
Procedural Errors	**Examples**
Standard Operating Procedures adherence / Standard Operating Procedures Cross-verification	↗ Intentional or unintentional failure to cross-verify (automation) inputs ↗ Intentional or unintentional failure to follow SOP ↗ PF makes own automation changes ↗ Sterile cockpit violations
Checklist	See the following breakdown
Normal Checklist	↗ Checklist performed from memory or omitted ↗ Wrong challenge and response ↗ Checklist performed late or at wrong time ↗ Checklist items missed
Abnormal Checklist	↗ Checklist performed from memory or omitted ↗ Wrong challenge and response ↗ Checklist performed late or at wrong time ↗ Checklist items missed
Callouts	↗ Omitted takeoff, descent, or approach callouts
Briefings	↗ Omitted departure, takeoff, approach, or handover briefing; items missed ↗ Briefing does not address expected situation

3 Flight Crew Errors (cont'd)

Documentation	See the following breakdown
	↗ Wrong weight and balance information, wrong fuel information
	↗ Wrong ATIS, or clearance recorded
	↗ Misinterpreted items on paperwork
	↗ Incorrect or missing log book entries
Failure to go-around after destabilisation during approach	↗ Flight crew does not execute a go-around after stabilisation requirements are not met
Other Procedural	↗ Administrative duties performed after top of descent or before leaving active runway ↗ Incorrect application of MEL
Communication Errors	Examples
Crew to External Communication	See breakdown
With Air Traffic Control	↗ Flight crew to ATC – missed calls, misinterpretation of instructions, or incorrect read-backs ↗ Wrong clearance, taxiway, gate or runway communicated
With Cabin Crew	↗ Errors in Flight to Cabin Crew communication ↗ Lack of communication
With Ground Crew	↗ Errors in Flight to Ground Crew communication ↗ Lack of communication
With Dispatch	↗ Errors in Flight Crew to Dispatch ↗ Lack of communication
With Maintenance	↗ Errors in Flight to Maintenance Crew ↗ Lack of communication
Pilot-to-Pilot Communication	↗ Within-crew miscommunication ↗ Misinterpretation

4 Undesired Aircraft States (UAS)

Definition: A flight-crew-induced aircraft state that clearly reduces safety margins; a safety-compromising situation that results from ineffective error management. An undesired aircraft state is **recoverable**.

Mismanaged UAS: A UAS that is linked to or induces additional flight crew errors.

Undesired Aircraft States	Breakdown
Aircraft Handling	↗ Abrupt Aircraft Control
	↗ Vertical, Lateral or Speed Deviations
	↗ Unnecessary Weather Penetration
	↗ Unauthorised Airspace Penetration
	↗ Operation Outside Aircraft Limitations
	↗ Unstable Approach
	↗ Continued Landing after Unstable Approach
	↗ Long, Floated, Bounced, Firm, Off-Centreline Landing ↗ Landing with excessive crab angle
	↗ Rejected Take-off after V1
	↗ Controlled Flight Towards Terrain
	↗ Other
Ground Navigation	↗ Proceeding towards wrong taxiway / runway
	↗ Wrong taxiway, ramp, gate or hold spot
	↗ Runway / taxiway incursion
	↗ Ramp movements, including when under marshalling
	↗ Loss of aircraft control while on the ground
	↗ Other

4 Undesired Aircraft States (UAS) (cont'd)

Incorrect Aircraft Configurations	↗ Brakes, Thrust Reversers, Ground Spoilers
	↗ Systems (Fuel, Electrical, Hydraulics, Pneumatics, Air Conditioning, Pressurisation / Instrumentation
	↗ Landing Gear
	↗ Flight Controls / Automation
	↗ Engine
	↗ Weight & Balance
	↗ Other

5 End States

Definition: An end state is a reportable event. It is **unrecoverable**.

End States	Definitions
Controlled Flight into Terrain (CFIT)	↗ In-flight collision with terrain, water, or obstacle without indication of loss of control
Loss of Control In-flight	↗ Loss of aircraft control while in-flight
Runway Collision	↗ Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle, person or wildlife on the protected area of a surface designated for the landing and take-off of aircraft and resulting in a collision
Mid-air Collision	↗ Collision between aircraft in flight
Runway Excursion	↗ A veer off or overrun off the runway surface
In-flight Damage	Damage occurring while airborne, including: ↗ Weather-related events, technical failures, bird strikes and fire / smoke / fumes
Ground Damage	Damage occurring while in the ground, including: ↗ Occurrences during (or as a result of) ground handling operations ↗ Collision while taxiing to or from a runway in use (excluding a runway collision) ↗ Foreign object damage ↗ Fire / smoke / fumes

5 End States (cont'd)

Undershoot	↗ A touchdown off the runway surface
Hard Landing	↗ Any hard landing resulting in substantial damage
Gear-up Landing / Gear Collapse	↗ Any gear-up landing / collapse resulting in substantial damage (without a runway excursion)
Tailstrike	↗ Tailstrike resulting in substantial damage

6 Flight Crew Countermeasures

The following list includes countermeasures that the flight crew can take. Countermeasures from other areas, such as ATC, ground operations personnel and maintenance staff, are not considered at this time.

Team Climate		
Countermeasure	Definition	Example Performance
Communication Environment	Environment for open communication is established and maintained	Good cross talk – flow of information is fluid, clear, and direct. No social or cultural disharmonies. Right amount of hierarchy gradient. Flight Crew member reacts to assertive callout of other crew member(s).
Leadership	See the following breakdown	
	Captain should show leadership and coordinated flight deck activities	In command, decisive, and encourages crew participation
	FO is assertive when necessary and is able to take over as the leader	FO speaks up and raises concerns.
Overall crew performance	Overall, crew members should perform well as risk managers	Includes Flight, Cabin, Ground crew as well as their interactions with ATC
Other	Not clearly falling within the other categories	

6 Flight Crew Countermeasures (cont'd)

Planning		
SOP briefing	The required briefing should be interactive and operationally thorough	Concise and not rushed. Bottom lines are established
Plans stated	Operational plans and decisions should be communicated and acknowledged	Shared understanding about plans – "Everybody on the same page"
Contingency management	Crew members should develop effective strategies to manage threats to safety	Threats and their consequences are anticipated. Use all available resources to manage threats
Other	Not clearly falling within the other categories	
Execution		
Monitor / Cross-check	Crew members should actively monitor and cross-check flight path, aircraft performance, systems and other crew members	Aircraft position, settings, and crew actions are verified
Workload management	Operational tasks should be prioritised and properly managed to handle primary flight duties	Avoid task fixation. Do not allow work overload
Automation management	Automation should be properly managed to balance situational and / or workload requirements	Brief automation setup. Effective recovery techniques from anomalies
Taxiway / Runway management	Crew members use caution and kept watch outside when navigating taxiways and runways	Clearances are verbalised and understood – airport and taxiway charts or aircraft cockpit moving map displays are used when needed
Other	Not clearly falling within the other categories	
Review / Modify		
Evaluation of plans	Existing plans should be reviewed and modified when necessary	Crew decisions and actions are openly analysed to make sure the existing plan is the best plan
Inquiry	Crew members should not be afraid to ask questions to investigate and / or clarify current plans of action	"Nothing taken for granted" attitude – Crew members speak up without hesitation
Other	Not clearly falling within the other categories	

7 Additional Classifications

Additional Classification	Breakdown
Insufficient Data	Accident does not contain sufficient data to be classified
Incapacitation	Crew member unable to perform duties due to physical or psychological impairment
Fatigue	Crew member unable to perform duties due to fatigue
Spatial disorientation and Spatial / Somatogravic illusion (SGI)	SGI is a form of spatial disorientation that occurs when a shift in the resultant gravitoinertial force vector created by a sustained linear acceleration is misinterpreted as a change in pitch or bank attitude

A3 Annex 3

Accident Classification Taxonomy Cabin Crew

1 Latent Conditions

Definition: Conditions present in the system before the accident, made evident by triggering factors.

Note: these are the same categories as for flight crew.

Latent Conditions (deficiencies in…)	Examples
Design	↗ Design shortcomings ↗ Manufacturing defects
Regulatory Oversight	↗ Deficient regulatory oversight by the State or lack thereof
Management Decisions	↗ Cost cutting ↗ Stringent fuel policy ↗ Outsourcing and other decisions, which can impact operational safety
Safety Management	Absent or deficient: ↗ Safety policy and objectives ↗ Safety risk management (including hazard identification process) ↗ Safety assurance (including Quality Management) ↗ Safety promotion
Change Management	↗ Deficiencies in monitoring change; in addressing operational needs created by, for example: expansion or downsizing ↗ Deficiencies in the evaluation to integrate and / or monitor changes to establish organisational practices or procedures ↗ Consequences of mergers or acquisitions
Selection Systems	↗ Deficient or absent selection standards

1 Latent Conditions (cont'd)

Operations Planning and Scheduling	↗ Deficiencies in crew rostering and staffing practices ↗ Issues with flight and duty time limitations ↗ Health and welfare issues
Technology and Equipment	↗ Available safety equipment not installed (E-GPWS, predictive wind-shear, TCAS / ACAS, etc.)
Flight Operations	See the following breakdown
Flight Operations: Standard Operating Procedures and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs
Flight Operations: Training Systems	↗ Omitted training, language skills deficiencies; qualifications and experience of flight crews, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices
Cabin Operations	See the following breakdown
Cabin Operations: Standard Operating Procedures and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs
Cabin Operations: Training Systems	↗ Omitted training, language skills deficiencies; qualifications and experience of cabin crews, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices
Ground Operations	See the following breakdown
Ground Operations: Standard Operating Procedures and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs
Ground Operations: Training Systems	↗ Omitted training, language skills deficiencies; qualifications and experience of ground crews, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices

1 Latent Conditions (cont'd)

Maintenance Operations	See the following breakdown
Maintenance Operations: Standard Operating Procedures and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs ↗ Includes deficiencies in technical documentation, unrecorded maintenance and the use of bogus parts / unapproved modifications
Maintenance Operations: Training Systems	↗ Omitted training, language skills deficiencies; qualifications and experience of maintenance crews, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices
Dispatch	See the following breakdown
Dispatch: Standard Operating Procedures and Checking	↗ Deficient or absent: (1) Standard Operating Procedures (SOPs), (2) operational instructions and / or policies, (3) company regulations, (4) controls to assess compliance with regulations and SOPs
Dispatch: Training Systems	↗ Omitted training, language skills deficiencies; qualifications and experience of dispatchers, operational needs leading to training reductions, deficiencies in assessment of training or training resources such as manuals or CBT devices
Other	↗ Not clearly falling within the other latent conditions

Note: All areas such as Training, Ground Operations or Maintenance include outsourced functions for which the operator has oversight responsibility.

2 Threats

Definition: An event or error that occurs outside the influence of the cabin crew, but which requires crew attention and management if safety margins are to be maintained.

Mismanaged threat: A threat that is linked to or induces a cabin crew error.

A3

Environmental threats	Examples
Meteorology	↗ Adverse weather / turbulence
Airport Facilities	See the following breakdown
	↗ Trenches / ditches ↗ Inadequate overrun area ↗ Structures in close proximity to runway / taxiway that impede evacuation or post crash survivability
	↗ Inadequate airport emergency response
Other	↗ Not clearly falling within the other environmental threats

Airline threats	Examples
Operational	↗ Time pressures / delays ↗ Flight diversion ↗ Traffic and ground congestion
Abnormal / Emergency Operations	↗ Rejected take-off ↗ Emergency landing / ditching ↗ Decompression
Configuration	↗ Particular cabin / galley configuration ↗ Systems / safety equipment and / or its location differ from other aircraft in the fleet
MEL item	↗ MEL items with operational implications
Flight Deck Events	↗ Pilot incapacitation ↗ Flight crew error / distraction / interruption
Ground Events	↗ Aircraft loading events ↗ Fueling errors ↗ Agent interruptions ↗ Improper ground support ↗ Improper de-icing / anti-icing ↗ Faulty service equipment boarded ↗ Catering crew errors
Dispatch / paperwork	↗ Passenger load errors ↗ Crew scheduling events ↗ Late paperwork changes or errors

2 Threats (cont'd)

Maintenance Events	↗ Aircraft repairs on ground ↗ Maintenance log / cabin defect logbook problems ↗ Maintenance errors
Dangerous Goods	↗ Carriage of articles or substances capable of posing a significant risk to health, safety or property when transported by air
Manuals / Checklists	↗ Incorrect / unclear pages or operating manuals ↗ Checklist layout / design issues
Aircraft / Cabin Malfunction	See the following breakdown
Engine Failure	↗ Contained or uncontained engine failure ↗ Fragments penetrating the cabin
Gear / Tire / Brakes	↗ Failure affecting parking, taxi, take-off or landing ↗ Gear penetrating aircraft cabin ↗ Gear collapse affecting the use of exits
Fire / Smoke / Fumes	↗ Fire / smoke / fumes due to aircraft systems ↗ Post-crash fire
Structural failure	↗ Break-up of fuselage ↗ Damage inside the cabin impeding egress ↗ Damage resulting in slow / rapid decompression
Exit / Escape slide malfunction	↗ Failure of escape slides to deploy ↗ Exits obstructed due to malfunction or structural damage
Cabin equipment malfunction	↗ Unserviceable portable equipment (fire extinguishers, O_2 bottles, etc.)
Cabin systems malfunction	↗ Failure affecting: electrical systems (including battery power), lighting systems, electronic systems (control panels, IFE), water systems, cabin pressurisation or communication systems
Other	↗ Not clearly falling within the other aircraft malfunction threats

2 Threats (cont'd)

Passenger threats	Examples
Abusive or unruly passengers	↗ Includes physical / verbal abuse towards cabin crew and other passengers, as well as cases of intoxication
Passengers smoking in the cabin or lavatory	↗ Self-explanatory
Passengers standing during turbulence / critical phases	↗ Passengers are not seated during take-off, landing, turbulence, etc.
Baggage not stowed	↗ Passengers do not stow baggage during critical phases of flight / turbulence
Undeclared dangerous goods in the cabin	↗ Passenger boards articles or substances in the cabin, which are capable of posing a significant risk to health, safety or property when transported by air
Medical events	↗ Medical situation involving passenger
Non-compliance to cabin crew instructions	↗ Passengers refuse to leave baggage behind during evacuation ↗ Passengers attempt to use blocked exits ↗ Passengers begin an evacuation without the crew's instruction ↗ Passengers disregard any other order given by the cabin crew

A3

3 Cabin Crew Errors

Definition: An observed cabin crew deviation from organisational expectations or crew intentions.

Mismanaged error: An error that is linked to or induces additional error or an undesired aircraft or cabin state.

Cabin Management Errors	Examples
Passenger	↗ Passengers allowed to stand during critical phases / turbulence ↗ Cabin not secured before take-off and landing
Medical emergencies and first-aid	Errors in handling: ↗ Life-threatening medical emergencies ↗ Cardiopulmonary resuscitation (CPR) ↗ Treatment of injuries ↗ Treatment of illnesses and diseases ↗ First-aid medical equipment and supplies
Emergency assignments	↗ Errors in assignment of duties during planned or unplanned emergency
Exits	↗ Cabin crew do not arm doors for flight ↗ Cabin crew open doors in wrong mode ↗ Cabin crew allow exits / areas around exits / exit routes to be obstructed ↗ Crew allow non-Able Bodied Passengers (ABP) to be seated at overwing exits
Systems / Equipment	↗ Incorrect system settings / use ↗ Incorrect use of equipment (e.g. Halon extinguisher vs. water) ↗ Crew exceed limitations for resetting tripped electrical system circuit breakers during flight ↗ Crew do not stow / secure equipment ↗ Crew do not pre-flight check equipment
Cabin baggage	↗ Crew do not stow / secure baggage
Other	↗ Not clearly falling within the other errors

3 Cabin Crew Errors (cont'd)

Procedural Errors	Examples
SOP adherence / SOP Cross-verification	↗ Intentional / unintentional failure to follow SOP ↗ Sterile cockpit violations
Checklist	See the following breakdown
Normal Checklist	↗ Checklist performed from memory or omitted ↗ Checklist performed late or at wrong time ↗ Checklist items missed
Abnormal Checklist	↗ Checklist performed from memory or omitted ↗ Checklist performed late or at wrong time ↗ Checklist items missed
Shouted Commands	↗ Omitted / incomplete shouted commands during planned or unplanned emergency
Briefings	↗ Omitted pre-flight crew or handover briefing; items missed ↗ Briefing does not address expected situation ↗ Omitted passenger safety demonstration; items missed; including special needs passengers and emergency exit briefings ↗ Video malfunction not monitored during safety briefing
Documentation	See the following breakdown
	↗ Wrong information entered
	↗ Misinterpreted items on paperwork
	↗ Incorrect or missing log book entries
Other Procedural	↗ Administrative / service duties performed during critical phases of flight ↗ Service procedures violate safety procedures ↗ Other

3 Cabin Crew Errors (cont'd)

Communication Errors	Examples
Crew to External Communication	See the following breakdown
With Flight Crew	↗ Errors in Cabin to Flight Crew communication ↗ Missed calls, misinterpretation of instructions, or incorrect read-backs ↗ Wrong information communicated ↗ Lack of communication
With Ground Crew / Maintenance	↗ Errors in Cabin Crew to Ground / Maintenance communication ↗ Lack of communication
With Passengers	↗ Errors in Cabin Crew to Passenger communication ↗ Lack of communication ↗ Able Bodied Passengers and / or Passengers with Reduced Mobility (PRMs) not briefed on emergency procedures ↗ Language barriers
Cabin Crew-to-Cabin Crew Communication	↗ Within-cabin crew miscommunication ↗ Lack of communication ↗ Misinterpretation

4 Undesired Cabin / Aircraft States

Definition: A cabin-crew-induced cabin / aircraft state that clearly reduces safety margins; a safety-compromising situation that results from ineffective error management. An undesired state is **recoverable**.

Mismanaged Undesired State: An Undesired State that is linked to or induces additional cabin crew errors.

A3

Undesired Cabin / Aircraft States	Examples
Cabin management	↗ Cabin / galley not secured
	↗ Crew not seated / seatbelt not fastened
	↗ Seats / tray tables not in up-right position ↗ Curtains & dividers not open for take-off and landing
	↗ Crew rest area not vacated for landing
	↗ Passengers not braced for forced landing
	↗ Isles / exits obstructed
	↗ Exits unmanned by cabin crew
	↗ Exits not manned by able bodied passengers
	↗ Passengers unaware of how to open exits
	↗ Inappropriate exits opened by cabin crew (fire, water, debris, unusual a/c pitch)
	↗ Delays in commencing evacuation
	↗ Uncommanded evacuation
	↗ Fire / smoke not monitored (including post-extinguishment)
	↗ Other
Ground states	↗ Passengers smoking during refueling
	↗ Designated evacuation doors left unarmed or unmanned, passengers not briefed on SOPs during refueling
	↗ Isles / exits obstructed
	↗ Oversize / overweight baggage boarded
	↗ Unclaimed baggage left on board
	↗ Doors left armed during a stopover
	↗ Other
Incorrect cabin configuration	↗ Cabin systems (electrical, lighting, electronic, water, communication)
	↗ Escape slides
	↗ Galley systems
	↗ Safety equipment
	↗ Other

A3

5 End States

Definition: An end state is a reportable event. It is **unrecoverable**.

End States	Definitions
Controlled Flight into Terrain (CFIT)	↗ In-flight collision with terrain, water, or obstacle without indication of loss of control
Loss of Control In-flight	↗ Loss of aircraft control while in-flight
Runway Collision	↗ Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle, person or wildlife on the protected area of a surface designated for the landing and take-off of aircraft and resulting in a collision
Mid-air Collision	↗ Collision between aircraft in flight
Runway Excursion	↗ A veer off or overrun off the runway surface
In-flight Damage	Damage occurring while airborne, including: ↗ Weather-related events, technical failures, bird strikes and fire / smoke / fumes
Ground Damage	Damage occurring while in the ground, including: ↗ Occurrences during (or as a result of) ground handling operations ↗ Collision while taxiing to or from a runway in use (excluding a runway collision) ↗ Foreign object damage ↗ Fire / Smoke / Fumes
Undershoot	↗ A touchdown off the runway surface
Hard Landing	↗ Any hard landing resulting in substantial damage
Gear-up Landing / Gear Collapse	↗ Any gear-up landing / collapse resulting in substantial damage (without a runway excursion)
Tailstrike	↗ Tailstrike resulting in substantial damage

Note: End States (or "accident categories") remain the same as for the flight crew taxonomy but include the following "Additional End States for Cabin".

5 End States (cont'd)

Additional End States (Cabin)	Definitions
Rapid deplaning	↗ Passengers exit aircraft via jet bridge or stairs
Evacuation	↗ Passengers exit aircraft via escape slides or gaps in fuselage
Ditching	↗ Water landing / evacuation

Annex 4 2008 Accidents Summary

A4

DATE	MANUFACTURER	AIRCRAFT	OPERATOR	LOCATION	PHASE	SERVICE	ORIGIN	JET/TURBOPROP	SEVERITY	SUMMARY
2008-01-02	Fokker	F.100	Iran Air	Mehrabad Airport, Tehran, Iran	ICL	Passenger	Western-built	Jet	Hull Loss	Loss of control after take-off
2008-01-02	NAMC	YS-11	Zest Airways	Masbate Airport, Philippines	LND	Passenger	Western-built	Turboprop	Substantial Damage	Runway excursion on landing
2008-01-03	Boeing	B737	Atlas Blue	St Gatien Airport, Deauville, France	LND	Passenger	Western-built	Jet	Substantial Damage	Runway excursion on landing
2008-01-04	Let	L-410 Turbolet	Transaven	In Caribbean Sea, off Isla los Roques, Venezuela	APR	Passenger	Eastern-built	Turboprop	Hull Loss	Ditching following double engine failure
2008-01-08	Airbus	A321	Aigle Azur	Houari Boumediene Airport, Algiers, Algeria	LND	Passenger	Western-built	Jet	Substantial Damage	Tailstrike during landing
2008-01-09	BAE SYSTEMS	BAe-146	Blue Air	Bacau Airport, Romania	LND	Passenger	Western-built	Jet	Substantial Damage	Runway excursion during landing
2008-01-14	Hawker Beechcraft	1900	Alpine Air Express	In Pacific Ocean, 7 miles S. of Lihue Municipal Airport, Hawaii, USA	APR	Cargo	Western-built	Turboprop	Hull Loss	Controlled flight into terrain (CFIT)
2008-01-15	Airbus	A300	Air Atlanta Icelandic	Charles de Gaulle Airport, Paris, France	LND	Cargo	Western-built	Jet	Substantial Damage	Runway excursion on landing
2008-01-17	Boeing	B777	British Airways	Heathrow Airport, London, UK	APR	Passenger	Western-built	Jet	Hull Loss	Undershoot
2008-01-18	Bombardier	CRJ	SkyWest Airlines	San Francisco Airport, CA, USA	ESD	Passenger	Western-built	Jet	Substantial Damage	Collision with other aircraft during pushback
2008-01-25	Antonov	An-12	Aero Service (Congo Brazzaville)	A Neto Airport, Pointe Noire, Congo	LND	Cargo	Eastern-built	Turboprop	Hull Loss	Runway excursion on landing
2008-01-26	Indonesian Aerospace	C-212	Dirgantara Air Service	(near) Long Apung, Indonesia	APR	Cargo	Western-built	Turboprop	Hull Loss	Controlled flight into terrain (CFIT)
2008-01-27	Hawker Beechcraft	125/ Hawker	Elbe Air Lufttransport	Osnova Airport, Kharkov, Ukraine	LND	Ferry	Western-built	Turboprop	Substantial Damage	Runway excursion on landing
2008-01-28	Bombardier	Dash 8	Aires Colombia	Eldorado International Airport, Bogota, Colombia	LND	Passenger	Western-built	Turboprop	Hull Loss	Runway excursion on landing
2008-01-28	Boeing	B737	Merpati Nusantara Airlines	Mopah Airport, Merauke, Indonesia	LND	Passenger	Western-built	Jet	Substantial Damage	Runway collision with animal
2008-02-01	Fokker	F.27	Atlantic Airlines	Edinburgh Airport, Edinburgh, UK	ESD	Cargo	Western-built	Turboprop	Hull Loss	Ground damage
2008-02-01	Boeing	B727	Lloyd Aereo Boliviano	(near) Trinidad, Bolivia	APR	Passenger	Western-built	Jet	Hull Loss	Undershoot
2008-02-02	Boeing	B747	Atlas Air	Lome Tokoin Airport, Togo	ICL	Cargo	Western-built	Jet	Hull Loss	Aircraft damaged by unrestrained cargo
2008-02-05	M7 Aerospace	Metro	McNeely Charter Service	Ankeny Regional Airport, Iowa, USA	TOF	Cargo	Western-built	Turboprop	Substantial Damage	Loss of control during take-off roll

DATE	MANUFACTURER	AIRCRAFT	OPERATOR	LOCATION	PHASE	SERVICE	ORIGIN	JET/TURBOPROP	SEVERITY	SUMMARY
2008-02-07	Boeing	B717	Airlink – QantasLink	Darwin International Airport, Northern Territory, Australia	LND	Passenger	Western-built	Jet	Substantial Damage	Hard landing
2008-02-13	BAE SYSTEMS	Jetstream 31	SASCA	Los Roques Airport, Venezuela	LND	Passenger	Western-built	Turboprop	Hull Loss	Undershoot
2008-02-14	Bombardier	CRJ	Belavia	Zvartnots Airport, Yerevan, Armenia	ICL	Passenger	Western-built	Jet	Hull Loss	Loss of control during take-off
2008-02-18	Ilyushin	Il-76	Volga-Dnepr Airlines	Ras al Khaimah Airport, UAE	APR	Cargo	Eastern-built	Jet	Hull Loss	In-flight engine fire
2008-02-19	ATR	ATR 72	Air Bagan	Putao Airport, Putao, Myanmar	RTO	Passenger	Western-built	Turboprop	Hull Loss	Runway excursion after rejected take-off
2008-02-21	ATR	ATR 42	Santa Barbara Airlines	La Cara del Indio, (near) Merida, Venezuela	ECL	Passenger	Western-built	Turboprop	Hull Loss	Controlled flight into terrain (CFIT)
2008-02-25	Boeing	B777	Aeromexico	Benito Juarez International Airport, Mexico City, Mexico	TXO	Passenger	Western-built	Jet	Substantial Damage	Ground collision with obstacle
2008-02-25	Embraer	EMB-110 Bandeirante	LeAir Charter	Lynden Pindling Airport, Nassau, Bahamas	LND	Passenger	Western-built	Turboprop	Substantial Damage	Gear-up landing
2008-02-25	Airbus	A320	United Airlines	Jackson Hole Airport, Wyoming, USA	LND	Passenger	Western-built	Jet	Substantial Damage	Runway excursion on landing
2008-03-01	Boeing	B747	Dragonair	Manchester International Airport, Manchester, UK	LND	Cargo	Western-built	Jet	Substantial Damage	Damaged on landing
2008-03-06	Transall	C-160	Manunggal Air	Wamena, Papua, Indonesia	LND	Cargo	Western-built	Turboprop	Hull Loss	Destroyed by fire on ground
2008-03-10	Boeing	B737	Adam Air	Hang Nadim Airport, Batam, Indonesia	LND	Passenger	Western-built	Jet	Hull Loss	Runway excursion on landing
2008-03-10	Boeing	B777	Saudi Arabian Airlines	(near) King Khaled Airport, Riyadh, Saudi Arabia	APR	Passenger	Western-built	Jet	Substantial Damage	In-flight damage to wing
2008-03-14	Boeing	B737	Air Algerie	Setif Airport, Setif, Algeria	LND	Passenger	Western-built	Jet	Substantial Damage	Hard landing
2008-03-19	M7 Aerospace	Do-328	Cirrus Airlines	Mannheim City Airport, Mannheim, Germany	LND	Passenger	Western-built	Turboprop	Hull Loss	Runway excursion on landing
2008-03-24	Boeing	B737	Aerosvit Airlines	Pulkovo Airport, St. Petersburg, Russia	TXO	Passenger	Western-built	Jet	Substantial Damage	Aircraft collided with tug
2008-03-25	Boeing	B747	Air Atlanta Icelandic	Zia International Airport, Dhaka, Bangladesh	LND	Passenger	Western-built	Jet	Hull Loss	Fire due to fuel leak
2008-03-27	ATR	ATR 72	Kingfisher Airlines	Bangalore Airport, Bangalore, India	TOF	Passenger	Western-built	Turboprop	Substantial Damage	Runway collision with animal

Annex 4 2008 Accidents Summary (Cont'd)

DATE	MANUFACTURER	AIRCRAFT	OPERATOR	LOCATION	PHASE	SERVICE	ORIGIN	JET/TURBOPROP	SEVERITY	SUMMARY
2008-04-03	Antonov	An-28	Blue Wing Airlines	Benzdorp, Suriname	GOA	Passenger	Eastern-built	Turboprop	Hull Loss	Controlled flight into terrain (CFIT)
2008-04-09	M7 Aerospace	Metro	Airtex Aviation	in sea, off Bundeena, New South Wales, Australia	ECL	Cargo	Western-built	Turboprop	Hull Loss	Loss of control in-flight
2008-04-11	Antonov	An-32	Kata Transportation Company	Kishinev Airport, Chisinau, Moldova	APR	Cargo	Eastern-built	Turboprop	Hull Loss	Undershoot
2008-04-12	Embraer	EMB-110 Bandeirante	Business Air	Potsdam Municipal Airport, Potsdam, New York	LND	Cargo	Western-built	Turboprop	Substantial Damage	Runway excursion on landing
2008-04-15	Boeing	DC-9	Hewa Bora Airways	Goma International Airport, Goma, DRC	RTO	Passenger	Western-built	Jet	Hull Loss	Runway excursion following rejected take-off
2008-04-20	Ilyushin	Il-62	Cubana	in flight, between Santo Domingo and Havana	ECL	Passenger	Eastern-built	Jet	Hull Loss	Uncontained engine failure
2008-04-21	Embraer	EMB-110 Bandeirante	RICO Linhas Aereas	Coari Airport, Coari, Brazil	LND	Passenger	Western-built	Turboprop	Hull Loss	Runway excursion on landing
2008-04-22	BAE SYSTEMS	BAe-146	Carpatair	Otopeni International Airport, Bucharest, Romania	LND	Passenger	Western-built	Jet	Substantial Damage	Runway excursion on landing
2008-04-29	Airbus	A330	Air France	Senou Airport, Bamako, Mali	LND	Passenger	Western-built	Jet	Substantial Damage	Hard landing
2008-04-29	Fokker	F.50	Blue Bird Aviation	Wajir Airport, Wajir, Kenya	LND	Cargo	Western-built	Turboprop	Hull Loss	Runway excursion on landing
2008-05-01	Saab	340	Prince Edward Air	St. John's International Airport, St. John's, Newfoundland and Labrador, Canada	TXO	Cargo	Western-built	Turboprop	Substantial Damage	Aircraft collided with hangar
2008-05-02	Hawker Beechcraft	1900	Flex Air	(near) Rumbek, Sudan	ECL	Passenger	Western-built	Turboprop	Hull Loss	Loss of control in-flight
2008-05-04	Airbus	A321	Airblue	Quetta International Airport, Quetta, Pakistan	LND	Passenger	Western-built	Jet	Substantial Damage	Tailstrike on landing
2008-05-16	Boeing	B777	Air India	Chhatrapati Shivaji International Airport, Mumbai, India	GDS	Passenger	Western-built	Jet	Substantial Damage	Ground damage
2008-05-16	Boeing	B727	Asia Pacific Airlines	Pohnpei, Federated States of Micronesia	LND	Cargo	Western-built	Jet	Substantial Damage	Runway excursion on landing
2008-05-23	Hawker Beechcraft	1900	Alpine Air Express	Logan International Airport, Billings, Montana, USA	ICL	Cargo	Western-built	Turboprop	Hull Loss	Loss of control in-flight
2008-05-24	Airbus	A321	Air Ivoire	Cadjehoun Airport, Cotonou, Benin	LND	Passenger	Western-built	Jet	Substantial Damage	Hard landing

DATE	MANUFACTURER	AIRCRAFT	OPERATOR	LOCATION	PHASE	SERVICE	ORIGIN	JET/TURBOPROP	SEVERITY	SUMMARY
2008-05-25	Boeing	B747	Kalitta Air	Zaventem International Airport, Brussels, Belgium	RTO	Cargo	Western-built	Jet	Hull Loss	Runway excursion following rejected take-off
2008-05-26	Antonov	An-12	Moskavia Airlines	(near) Chelyabinsk, Russia	ECL	Ferry	Eastern-built	Turboprop	Hull Loss	Loss of control in-flight
2008-05-30	Airbus	A320	TACA International Airlines	Toncontin International Airport,Tegucigalpa, Honduras	LND	Passenger	Western-built	Jet	Hull Loss	Runway excursion on landing
2008-05-31	Fokker	F.50	MASWings	Sibu Airport, Sibu, Malaysia	LND	Passenger	Western-built	Turboprop	Substantial Damage	Gear-up landing
2008-06-10	Airbus	A310	Sudan Airways	Khartoum, Sudan	LND	Passenger	Western-built	Jet	Hull Loss	Runway excursion on landing
2008-06-16	Boeing	B777	Air Canada	(near) Toronto, Ontario, Canada – CYYZ	APR	Passenger	Western-built	Jet	Substantial Damage	Aircraft damaged by hail
2008-06-16	Tupolev	Tu-154	Caspian Airlines	Isfahan Airport, Isfahan, Iran	ICL	Passenger	Eastern-built	Jet	Substantial Damage	Aircraft struck structure on take-off
2008-06-18	Boeing	B737	Comair – Commercial Airways	Durban International Airport, Durban, South Africa	LND	Passenger	Western-built	Jet	Substantial Damage	Runway excursion on landing
2008-06-19	Airbus	A319	China Eastern Airlines	in flight, (near) Changsha, China	CRZ	Passenger	Western-built	Jet	Substantial Damage	In-flight fire
2008-06-27	Antonov	An-12	Juba Air Cargo	near Malakal, Sudan	CRZ	Cargo	Eastern-built	Turboprop	Hull Loss	Loss of control in-flight
2008-06-28	Boeing	B767	ABX Air	San Francisco International, CA, USA	PRF	Cargo	Western-built	Jet	Hull Loss	Ground damage – fire
2008-06-30	Ilyushin	Il-76	Ababeel Aviation	Khartoum International Airport, Khartoum, Sudan	TOF	Cargo	Eastern-built	Jet	Hull Loss	Loss of control in-flight
2008-06-30	Tupolev	Tu-154	Aeroflot Russian Airlines	Pulkovo International Airport, St Petersburg, Russia	TOF	Passenger	Eastern-built	Jet	Substantial Damage	Uncontained engine failure during take-off run
2008-07-03	Boeing	B777	Pakistan International Airlines	in flight, (near) Milan, Italy	DST	Passenger	Western-built	Jet	Substantial Damage	Aircraft damaged by hail
2008-07-05	Ilyushin	Il-76	Click Airways International	in flight, (near) Zaheden, Iran	CRZ	Cargo	Eastern-built	Jet	Substantial Damage	Uncontained engine failure during cruise
2008-07-06	Boeing	DC-9	USA Jet Airlines	Plan de Guadelupe International Airport, Saltillo, Mexico	LND	Cargo	Western-built	Jet	Hull Loss	Loss of control in-flight
2008-07-07	Boeing	B747	Kalitta Air	(near) Madrid, Colombia	ICL	Cargo	Western-built	Jet	Hull Loss	Loss of control in-flight
2008-07-23	Fokker	F.27	TAM – Transporte Aereo Militar	(near) Estancia Esperanza, 70nm from Guayaramerin, Bolivia	ECL	Passenger	Western-built	Turboprop	Hull Loss	Uncontained engine failure resulting in decompression

Annex 4 2008 Accidents Summary (Cont'd)

DATE	MANUFACTURER	AIRCRAFT	OPERATOR	LOCATION	PHASE	SERVICE	ORIGIN	JET/TURBOPROP	SEVERITY	SUMMARY
2008-07-25	Boeing	B747	Qantas	In-flight, 475 km northwest of Manila, Philippines	CRZ	Passenger	Western-built	Jet	Substantial Damage	Structural failure in-flight resulting in decompression
2008-07-29	Boeing	B777	Vietnam Airlines	Narita International Airport, Tokyo, Japan	TXI	Passenger	Western-built	Jet	Substantial Damage	Engine fire on ground
2008-07-31	Hawker Beechcraft	125/ Hawker	East Coast Jets Inc.	Degner Regional Airport, Owatonna, Minnesota, USA	LND	Passenger	Western-built	Turboprop	Hull Loss	Runway excursion
2008-08-05	Airbus	A320	Lufthansa	Manchester Airport, UK	TXO	Passenger	Western-built	Jet	Substantial Damage	Ground collision with another aircraft
2008-08-11	Hawker Beechcraft	1900	Prince Edward Air	Montreal–Pierre Elliott Trudeau Airport, Quebec, Canada	LND	Cargo	Western-built	Turboprop	Substantial Damage	Gear collapse on landing
2008-08-12	M7 Aerospace	Metro	Baires Fly	In-Flight, between Buenos Aires and Viracopos	CRZ	Cargo	Western-built	Turboprop	Substantial Damage	Aircraft damaged by hail
2008-08-13	Fokker	F.27	Fly540	50 km from Airstrip, Mogadishu	APR	Cargo	Western-built	Turboprop	Hull Loss	Controlled flight into terrain (CFIT)
2008-08-15	Boeing	B737	Jet2	In-flight,(near) Bergamo, Italy	APR	Passenger	Western-built	Jet	Substantial Damage	Aircraft damaged by hail
2008-08-20	Boeing	MD-80	Spanair	Madrid Barajas International Airport, Spain	TOF	Passenger	Western-built	Jet	Hull Loss	Loss of control during take-off
2008-08-23	Bombardier	Dash 8	Aires Colombia	Ernesto Cortissoz Airport, Barranquilla, Colombia	LND	Passenger	Western-built	Turboprop	Substantial Damage	Gear collapse on landing
2008-08-24	Boeing	B737	flyglobespan	Edinburgh Airport, Edinburgh, UK	GDS	Passenger	Western-built	Jet	Substantial Damage	Aircraft struck by baggage vehicle
2008-08-24	Boeing	B737	Itek Air	Dzhany-Dzher,(near) Bishkek, Kyrgyzstan	LND	Passenger	Western-built	Jet	Hull Loss	Controlled flight into terrain (CFIT)
2008-08-27	Boeing	B737	Sriwijaya Air	Jambi Sultan Taha Syarifudn Airport, Indonesia	LND	Passenger	Western-built	Jet	Hull Loss	Runway excursion on landing
2008-08-30	Boeing	B737	Conviasa	(near) Patasacha, Ecuador	DST	Ferry	Western-built	Jet	Hull Loss	Controlled flight into terrain (CFIT)
2008-08-31	M7 Aerospace	Metro	McNeely Charter Service	in flight,(near) Carlsbad, USA	CRZ	Cargo	Western-built	Turboprop	Substantial Damage	Door torn off during flight
2008-09-01	Boeing	DC-8	Heavylift International	El Fasher Airport, El Fasher, Sudan	LND	Cargo	Western-built	Jet	Substantial Damage	Hard landing
2008-09-06	Airbus	A330	TAM Linhas Aereas	New York JFK Aiport, USA	LND	Passenger	Western-built	Jet	Substantial Damage	Hard landing
2008-09-07	Hawker Beechcraft	1900	Great Lakes Airlines	Lambert International Airport, St. Louis, Missouri, USA	TXI	Passenger	Western-built	Turboprop	Substantial Damage	Ground damage
2008-09-12	Boeing	B747	Air Atlanta Icelandic	Riyadh – King Khaled International, Saudi Arabia	LND	Cargo	Western-built	Jet	Substantial Damage	Damaged on landing

DATE	MANUFACTURER	AIRCRAFT	OPERATOR	LOCATION	PHASE	SERVICE	ORIGIN	JET/TURBOPROP	SEVERITY	SUMMARY
2008-09-14	Boeing	B737	Aeroflot-Nord	(near) Perm, Russia	APR	Passenger	Western-built	Jet	Hull Loss	Loss of control during approach
2008-09-22	Fokker	F.28	ICARO Air	Mariscal Sucre International Airport, Quito, Ecuador	RTO	Passenger	Western-built	Jet	Hull Loss	Runway excursion on take-off
2008-10-01	Boeing	B737	KD-Avia	Khrabrovo Airport, Kaliningrad, Russia	LND	Passenger	Western-built	Jet	Substantial Damage	Gear-up landing
2008-10-10	Embraer	EMB-110 Bandeirante	Taxi Aereo Weiss	Curitiba – Afonso Pena International, Brazil	LND	Ferry	Western-built	Turboprop	Substantial Damage	Runway excursion on landing
2008-10-16	Boeing	B737	Rutaca	Caracas – Simon Bolivar Airport, Venezuela	LND	Passenger	Western-built	Jet	Hull Loss	Runway excursion on landing
2008-10-27	Boeing	B747	Cargo B Airlines	Brussels, Belgium	TOF	Cargo	Western-built	Jet	Substantial Damage	Tailstrike on take-off
2008-11-01	Indonesian Aerospace	C-212	Arctic Transportation Services	(near) Toksook Bay, Alaska, USA	APR	Cargo	Western-built	Turboprop	Hull Loss	Damaged during emergency landing
2008-11-06	M7 Aerospace	Do-328	Express Air	Torea Airport, Fak Fak, Indonesia	LND	Passenger	Western-built	Turboprop	Hull Loss	Undershoot
2008-11-10	Boeing	B737	Ryanair	Ciampino Airport, Rome, Italy	APR	Passenger	Western-built	Jet	Substantial Damage	Gear collapse during landing
2008-11-10	Antonov	An-12	Veteran Airlines	43 miles from Pointe Noire, Congo	CRZ	Cargo	Eastern-built	Turboprop	Hull Loss	In-flight fire
2008-11-13	Antonov	An-12	British Gulf International Airlines	Al Asad Air Base area, Fallujah, Iraq	ICL	Cargo	Eastern-built	Turboprop	Hull Loss	Loss of control on climb
2008-11-16	Boeing	B747	Transaero	Dabolim International Airport, Goa, India	PRF	Passenger	Western-built	Jet	Substantial Damage	Aircraft struck by other aircraft while awaiting pushback
2008-11-27	BAE SYSTEMS	Jetstream 31	Northwestern Air	Fort Smith Airport, Fort Smith, Northwest Territories, Canada	LND	Passenger	Western-built	Turboprop	Hull Loss	Hard landing
2008-12-03	Boeing	DC-9	Northwest Airlines	Dane County Regional Airport – Truax Field (MSN), Madison, Wisconsin	TXI	Passenger	Western-built	Jet	Substantial Damage	Collision with tug
2008-12-14	Bombardier	CRJ	Air Wisconsin	Philadelphia, PA, USA	LND	Passenger	Western-built	Jet	Substantial Damage	Gear-up landing
2008-12-14	M7 Aerospace	Do-228	Summit Air Charters	(near) Cambridge Bay, Nunavut, Canada	APR	Passenger	Western-built	Turboprop	Substantial Damage	Undershoot
2008-12-15	Bombardier	CRJ	Mesa Airlines	Chicago Airport, Illinois, USA	LND	Passenger	Western-built	Jet	Substantial Damage	Gear collapse on landing
2008-12-20	Boeing	B737	Continental Airlines	Denver Airport, Colorado, USA	RTO	Passenger	Western-built	Jet	Hull Loss	Runway excursion following rejected take-off

Annex 5 2008 Cabin Safety-related Events Summary

DATE	MANUFACTURER	AIRCRAFT	OPERATOR	LOCATION	PHASE	ORIGIN	JET/TURBOPROP	SEVERITY	SUMMARY
2008-01-02	Fokker	F.100	Iran Air	Mehrabad Airport, Tehran, Iran	ICL	Western-built	Jet	Hull Loss	Loss of control after take-off / evacuation
2008-01-02	NAMC	YS-11	Zest Airways	Masbate Airport, Philippines	LND	Western-built	Turboprop	Substantial Damage	Runway excursion on landing / evacuation
2008-01-03	Boeing	B737	Atlas Blue	St Gatien Airport, Deauville, France	LND	Western-built	Jet	Substantial Damage	Runway excursion on landing / evacuation
2008-01-04	Let	L-410 Turbolet	Transaven	In Caribbean Sea, off Isla los Roques, Venezuela	APR	Eastern-built	Turboprop	Hull Loss	Ditching following double engine failure / no survivors out of 14 on board
2008-01-17	Boeing	B777	British Airways	Heathrow Airport, London, UK	APR	Western-built	Jet	Hull Loss	Undershoot / evacuation
2008-01-28	Bombardier	Dash 8	Aires Colombia	Eldorado International Airport, Bogota, Colombia	LND	Western-built	Turboprop	Hull Loss	Runway excursion on landing / evacuation
2008-02-01	Boeing	B727	Lloyd Aereo Boliviano	(near) Trinidad, Bolivia	APR	Western-built	Jet	Hull Loss	Undershoot / evacuation
2008-02-13	BAE SYSTEMS	Jetstream 31	SASCA	Los Roques Airport, Venezuela	LND	Western-built	Turboprop	Hull Loss	Undershoot / evacuation
2008-02-14	Bombardier	CRJ	Belavia	Zvartnots Airport, Yerevan, Armenia	ICL	Western-built	Jet	Hull Loss	Loss of control during take-off / evacuation
2008-02-25	Airbus	A320	United Airlines	Jackson Hole Airport, Wyoming, USA	LND	Western-built	Jet	Substantial Damage	Runway excursion on landing / evacuation
2008-03-10	Boeing	B737	Adam Air	Hang Nadim Airport, Batam, Indonesia	LND	Western-built	Jet	Hull Loss	Runway excursion on landing / evacuation
2008-03-19	M7 Aerospace	Do-328	Cirrus Airlines	Mannheim City Airport, Mannheim, Germany	LND	Western-built	Turboprop	Hull Loss	Runway excursion on landing / evacuation
2008-03-25	Boeing	B747	Air Atlanta Icelandic	Zia International Airport, Dhaka, Bangladesh	LND	Western-built	Jet	Hull Loss	Fire due to fuel leak / evacuation
2008-03-27	ATR	ATR 72	Kingfisher Airlines	Bangalore Airport, Bangalore, India	TOF	Western-built	Turboprop	Substantial Damage	Runway collision with animal / evacuation
2008-04-15	Boeing	DC-9	Hewa Bora Airways	Goma International Airport, Goma, DRC	RTO	Western-built	Jet	Hull Loss	Runway excursion following rejected take-off / evacuation with fatalities (91 survivors out of 94 on board)
2008-04-22	BAE SYSTEMS	BAe-146	Carpatair	Otopeni International Airport, Bucharest, Romania	LND	Western-built	Jet	Substantial Damage	Runway excursion on landing / evacuation
2008-05-30	Airbus	A320	TACA International Airlines	Toncontin International Airport,Tegucigalpa, Honduras	LND	Western-built	Jet	Hull Loss	Runway excursion on landing / evacuation with fatalities (132 survivors out of 135 on board)

DATE	MANUFACTURER	AIRCRAFT	OPERATOR	LOCATION	PHASE	ORIGIN	JET/TURBOPROP	SEVERITY	SUMMARY
2008-06-10	Airbus	A310	Sudan Airways	Khartoum, Sudan	LND	Western-built	Jet	Hull Loss	Runway excursion on landing / evacuation with fatalities (181 survivors out of 214 on board)
2008-06-19	Airbus	A319	China Eastern Airlines	in flight, (near) Changsha, China	CRZ	Western-built	Jet	Substantial Damage	In-flight fire / emergency descent and evacuation
2008-07-23	Fokker	F.27	TAM - Transporte Aereo Militar	(near) Estancia Esperanza, 70nm from Guayaramerin, Bolivia	ECL	Western-built	Turboprop	Hull Loss	Uncontained engine failure resulting in decompression
2008-07-25	Boeing	B747	Qantas	in flight, 475 km northwest of Manila, Philippines	CRZ	Western-built	Jet	Substantial Damage	Structural failure in-flight resulting in decompression
2008-08-20	Boeing	MD-80	Spanair	Madrid Barajas International Airport, Spain	TOF	Western-built	Jet	Hull Loss	Loss of control during take-off / fatalities (18 survivors out of 172 on board)
2008-08-23	Bombardier	Dash 8	Aires Colombia	Ernesto Cortissoz Airport, Barranquilla, Colombia	LND	Western-built	Turboprop	Substantial Damage	Gear collapse on landing
2008-08-24	Boeing	B737	Itek Air	Dzhany-Dzher,(near) Bishkek, Kyrgyzstan	LND	Western-built	Jet	Hull Loss	Controlled flight into terrain (CFIT) / fatalities (25 survivors out of 90 on board)
2008-08-27	Boeing	B737	Sriwijaya Air	Jambi Sultan Taha Syarifudn Airport, Indonesia	LND	Western-built	Jet	Hull Loss	Runway excursion on landing / evacuation
2008-09-22	Fokker	F.28	ICARO Air	Mariscal Sucre International Airport, Quito, Ecuador	RTO	Western-built	Jet	Hull Loss	Runway excursion on take-off / evacuation
2008-10-16	Boeing	B737	Rutaca	Caracas - Simon Bolivar Airport, Venezuela	LND	Western-built	Jet	Hull Loss	Runway excursion on landing / evacuation
2008-11-06	M7 Aerospace	Do-328	Express Air	Torea Airport, Fak Fak, Indonesia	LND	Western-built	Turboprop	Hull Loss	Undershoot
2008-11-10	Boeing	B737	Ryanair	Ciampino Airport, Rome, Italy	APR	Western-built	Jet	Substantial Damage	Gear collapse during landing / evacuation
2008-12-20	Boeing	B737	Continental Airlines	Denver Airport, Colorado, USA	RTO	Western-built	Jet	Hull Loss	Runway excursion following rejected take-off / evacuation

LIST OF ACRONYMS

ACAS Airborne Collision Avoidance Systems
ACTF IATA Accident Classification Task Force
AES Arrival/Engine Shutdown (ATA Phase of Flight)
AFI Africa (IATA Regions)
AIP Aeronautical Information Publication
ANSP Aviation Navigation Service Provider
AOC Air Operator's Certificate
APR Approach (ATA Phase of Flight)
ASPAC Asia / Pacific (IATA Regions)
ATA Air Transport Association
ATC Air Traffic Control
CA Captain
CBT Computer Based Training
CEO Chief Executive Officer
CFIT Controlled Flight Into Terrain
CIS Commonwealth of Independent States (IATA Regions)
COO Chief Operating Officer
CRM Crew Resource Management
CRZ Cruise (ATA Phase of Flight)
CSWG IATA Cabin Safety Working Group
CVR Cockpit Voice Recorder
DFDR Digital Flight Data Recorder
DGB IATA Dangerous Goods Board
DGR Dangerous Goods Regulations
DH Decision Height
DST Descent (ATA Phase of Flight)
ECL En Route Climb (ATA Phase of Flight)
E-GPWS Enhanced Ground Proximity Warning System
ERPTF IATA Emergency Response Planning Task Force
ESD Engine Start/Depart (ATA Phase of Flight)
ETOPS Extended-Range Twin-Engine Operations
EUR Europe (IATA Regions)
FAA Federal Aviation Authority
FDA Flight Data Analysis
FLC Flight Close (ATA Phase of Flight)
FLP Flight Planning (ATA Phase of Flight)
FMS Flight Management System
FO First Officer
FOQA Flight Operations Quality Assurance
FSF Flight Safety Foundation
GDS Ground Servicing (ATA Phase of Flight)
GOA Go-around (ATA Phase of Flight)
GPS Global Positioning System
GPWS Ground Proximity Warning System

GSIC	Global Safety Information Center
HL	Hull Loss
ICAO	International Civil Aviation Organisation
ICL	Initial Climb (ATA Phase of Flight)
IFALPA	International Federation of Air Line Pilots' Associations
IFATCA	International Federation of Air Traffic Controllers' Associations
INOP	Inoperative
IOSA	IATA Operational Safety Audit
IRM	Incident Review Meeting
ISAGO	IATA Safety Audit for Ground Operations
ITDI	IATA Training and Development Institute
ITQI	IATA Training and Qualification Initiative
LATAM	Latin America and the Caribbean (IATA Regions).
LND	Landing (ATA Phase of Flight)
LOSA	Line Operations Safety Audit
MDA	Minimum Descent Altitude
MEL	Minimum Equipment List
MENA	Middle East and North Africa (IATA Regions)
MSTF	IATA Multidivisional Safety Task Force
NAM	North America (IATA Region)
NASIA	North Asia (IATA Regions)
NAVaids	Navigational Aids
NOTAM	Notices to Airmen
OPC	IATA Operations Committee
PCMCIA	Personal Computer Memory Card International Association
PED	Portable Electronic Device
PF	Pilot Flying
PFS	IATA Partnership for Safety Programme
PM	Pilot Monitoring
PRF	Pre-Flight (ATA Phase of Flight)
PSF	Post-flight (ATA Phase of Flight)
QAR	Quick Access Recorder
RA	Resolution Advisory
RAAS	Runway Awareness and Advisory System
RTO	Rejected Take-off (ATA Phase of Flight)
SD	Substantial Damage
SG	IATA Safety Group
SMS	Safety Management System
SOP	Standard Operating Procedures
STEADES	Safety Trend Evaluation, Analysis and Data Exchange System
TAWS	Terrain Awareness Warning System
TCAS	Traffic Alert and Collision Avoidance System
TCAS RA	Traffic Alert and Collision Avoidance System Resolution Advisory

LIST OF ACRONYMS (Cont'd)

TEM	Threat and Error Management
TIPH	Taxi into Position and Hold
TOF	Take-off (ATA Phase of Flight)
TXI	Taxi-in (ATA Phase of Flight)
TXO	Taxi-out (ATA Phase of Flight)
UAS	Undesired Aircraft State
WGS-84	World Geodetic System 1984

www.iata.org/SAFETY

Printed in Canada

Ref. No: 9049-09
ISBN 978-92-9233-201-3