IATA

Safety Report

Issued April 2006

2005 Edition

Safety Report

Issued April 2006

2005 Edition

International Air Transport Association
Montreal – Geneva

Safety Report
Ref. No: 9049-06
ISBN 92-9195-752-6

Montreal – Geneva

Table of Contents

FOREWORD

Dear Colleagues,

It is with pleasure that I present to you the 42nd edition of the IATA Safety Report. It is the result of a collective effort between the safety experts of IATA, its Member Airlines and the aeronautical industry stakeholders. We have worked together early in the New Year to uncover safety concerns and develop prevention strategies to ensure the continuous enhancement of safety.

IATA is optimistic about achieving the safety goal to reduce the accident rate by 25% by 2006. In 2005, IATA Member Airlines accounted for 94% of all scheduled international traffic. Yet, they were only involved in just over a quarter of all the accidents worldwide, surpassing the industry on safety.

During the past year, the IATA Operational Safety Audit (IOSA) continued its expansion as a global programme, built on ICAO standards and industry best practices. IOSA has now become an internationally recognised and accepted evaluation system implemented consistently throughout the industry. As IATA strives to provide the necessary tools to improve safety worldwide, IOSA, along with the Safety Trend Evaluation, Analysis & Data Exchange System (STEADES) Programme, for incident analysis, and the Flight Data Analysis (FDA) Service, for the enhancement of normal operations, allow IATA to obtain a comprehensive view of the issues facing the industry and permit it to best respond with proactive solutions.

I wish to thank the IATA Safety Group (SG) and its Accident Classification Task Force (ACTF) as well as the entire team at IATA.

The Safety Report will contribute to the achievement of our goal and to the ongoing efforts to improve safety worldwide.

Günther Matschnigg
Senior Vice President
Safety, Operations & Infrastructure

LIST OF ACRONYMS

AACO — Arab Air Carriers Organization
ACAS — Airborne Collision Avoidance Systems
ACWG — IATA Accident Classification Working Group
ACI — Airports Council International
ATDI — IATA Aviation Training and Development Institute
AENA — Spanish Aviation Authority
AES — Arrival/Engine Shutdown (ATA Phase of Flight)
AF — Africa (IATA Regions)
AGAS — European Action Group for ATM Safety
AIP — Aeronautical Information Publication
ALA — Approach and Landing Accidents
ALAR — Approach and Landing Accident Reduction
ANSP — Aviation Navigation and Satellite Programs
APP — Approach (ATA Phase of Flight)
AS/PAC — Asia/Pacific (IATA Regions)
ASC — Airports Services Committee
ASG — IATA Airside Safety Group
ASR — Air Safety Reports
ATA — Air Transport Association
ATC — Air Traffic Control
ATOS — Air Transportation Oversight System (FAA)
ATSP — Air Traffic Service Provider
BASIS — British Airways Safety Information System
CAP — UK Civil Aviation Publication
CASA — Civil Aviation Safety Authority
CAST — Commercial Aviation Safety Team
CBT — Computer Based Training
CFIT — Controlled Flight Into Terrain
COSCAP — Co-operative Development Of Operational Safety and Continuing Airworthiness Programmes
CRM — Crew Resource Management
CRZ — Cruise (ATA Phase of Flight)
CSWG — IATA Cabin Safety Working Group
CVR — Cockpit Voice Recorded
DFDR — Digital Flight Data Recorder
DGAC — Dominican Republic CAA
DGB — IATA Dangerous Goods Board
DGR — Dangerous Goods Regulations
DST — Descent (ATA Phase of Flight)
EAGOSH — The European Ground Safety Council
ECL — En Route Climb (ATA Phase of Flight)
EGPWS — Enhanced Ground Proximity Warning System
ERPWG — IATA Emergency Response Planning Working Group
ESD — Engine Start/Depart (ATA Phase of Flight)
ETOPS — Extended-Range Twin-Engine Operations
FAA — Federal Aviation Authority
FDM — Flight Data Monitoring
FDR — Flight Data Recording
FE — Far East
FLC — Flight Close (ATA Phase of Flight)
FLP — Flight Planning (ATA Phase of Flight)
FO — First Officer
FOC — IATA Flight Operations Committee
FOQA — Flight Operations Quality Assurance
FPA — Flight Procedure Authorisations
FSF — Flight Safety Foundation
GAIN — Global Aviation Incident Network
GASAG — Global Aviation Security Action Group
GDS — Ground Servicing (ATA Phase of Flight)
GOA — Go-around (ATA Phase of Flight)
GPWS — Ground Proximity Warning System
HF HWG — Human Factors Harmonisation Working Group
HFWG — IATA Human Factors Working Group
HL — Hull Loss
IACA — International Air Carriers Association
ICAEA — International Civil Aviation English Association
ICAO — International Civil Aviation Organization
ICL — Initial Climb (ATA Phase of Flight)
IFALPA — International Federation of Air Line Pilots' Associations
IFATCA — International Federation of Air Traffic Controllers' Associations
IFSP — In Flight Security Personnel
IGHC — IATA Ground Handling Council
INTERPOL — International Criminal Police Organization
IOSA — IATA Operational Safety Audit
IRM — Incident Review Meeting
ISASI — International Society of Air Safety Investigators
ITF — International Transport Workers Federation
JAA — Joint Aviation Authority
LAHSO — Land-and-Hold Short Operations
LND — Landing (ATA Phase of Flight)
LOC — Loss of Control
LOSA — Line Operations Safety Audit
MANPADS — Man Portable Air Defense Systems
METWG — IATA Meteorological Working Group
MIG — Mathematicians Implementation Group
MSTF — IATA Multidivisional Safety Task Force
NAM — North American (IATA Region)
NASP — National Aviation Security Programme
NAT — North Atlantic (IATA Region)
NBIA — New Bangkok International Airport
NE — Near East (IATA Region)
NLR — National Aerospace Laboratory NLR, The Netherlands
NOTAM — Notices to Airmen
OPC — IATA Operations Committee
OQS — Operational Quality Standards
PA — Public Announcement
PAAST — Pan American Aviation Safety Team
PED — Personal Electronic Device
PRF — Pre-Flight (ATA Phase of Flight)
PRIOR — Programme for International Operator Readiness
PSF — Post-flight (ATA Phase of Flight)
QAR — Quick Access Recorder
RA — Resolution Advisory
RDPS — Radar Data Processing System
RIPP — Runway Incursion Prevention Programme
RTC/RCG — Regional Technical Conference
RTL — Regional Team Leaders
RTO — Rejected Take-off (ATA Phase of Flight)
SA — South America (IATA Region)
SAC — IATA Safety Committee
SAFA — Safety Assessment of Foreign Aircraft
SARAST — South Asia Regional Aviation Safety Teams
SBS — Safety Bulletin System
SCCM — Senior Cabin Crew Member
SD — Substantial Damage
SEARAST — Southeast Asia Regional Aviation Safety Teams
SISG — Safety Improvement Sub Group
SMS — Safety Management System
SMSS — Safety Management Support System
SOP — Standard Operating Procedures
SRC — Safety Regulation Commission
STEADES — Safety Trend Evaluation, Analysis and Data Exchange System
SWAP — Safety With Answers Provided
TAWS — Terrain Awareness Warning System
TCAS — Traffic Alert and Collision Avoidance System
TCAS RA — Traffic Alert and Collision Avoidance System Resolution Advisory
TEM — Threat and Error Management
TIPH — Taxy into Position and Hold
TOF — Taxi-off (ATA Phase of Flight)
TOPM — Technical Operations Policy Manual
TXI — Taxi-in (ATA Phase of Flight)
TXO — Taxi-out (ATA Phase of Flight)
UK CAA — UK Civil Aviation Authority
UKFSC — UK Flight Safety Committee
V/S — Vertical Speed
VNAV — Vertical Navigation
WMO — AMDAR — The World Meteorological Organisation — Aircraft Meteorological Data Reporting

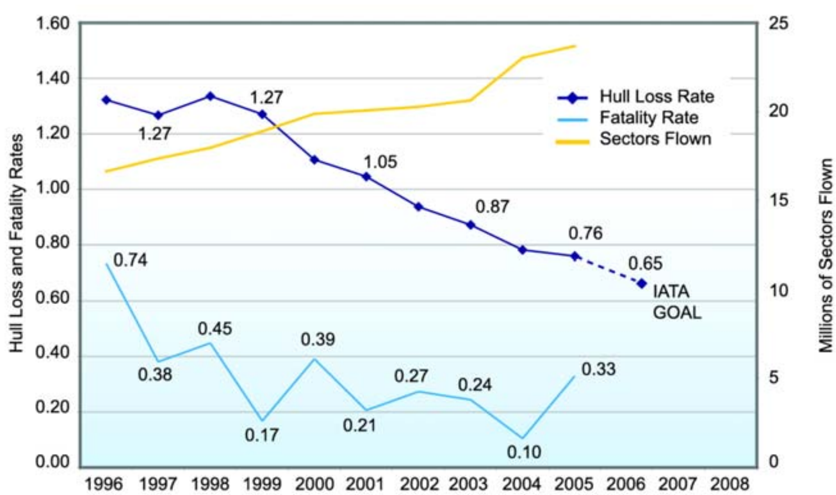
EXECUTIVE SUMMARY

The goal of the IATA Safety Report is to present prevention strategies to enhance safety of the air transport industry. These strategies are based on the analytical findings of accidents that occurred in the year 2005.

In total, 111 accidents occurred in 2005. Compared to the previous year, the breakdown is as follows:

Year	Jet	Turbo-prop	Western-built Jet Hull Loss Rate	Fatal Accidents	Fatalities
2004	58	45	0.78	25	428
2005	58	53	0.76	26	1035

Western-built Jet Traffic, Hull Loss & Passenger Fatality Rates 1996-2005



Despite the increase in the passenger fatality rate in 2005, the Western-built Jet Hull Loss rate showed a continued decrease to 0.76 Hull Losses per million sectors flown. The Eastern-built Jet Hull Loss rate also decreased to 2.18 Hull Losses per million sectors flown in 2005.

The Hull Loss rates for Western-built Turboprop aircraft were markedly reduced, with 2005 achieving the lowest Turboprop accident rate of the decade. Concerning the Eastern-built Turboprop aircraft accidents, 14 were Hull Losses and 6 aircraft were Substantially Damaged. Therefore, compared with 2004, the number of accidents experienced by the Eastern-built Turboprop fleet has significantly increased.

In 2005, the most frequently noted contributor in accidents involving both Jet and Turboprop aircraft was flight crew proficiency. In over a third of the events where flight crew proficiency issues were noted, inadequate training and adverse weather conditions were also contributing factors. Adverse weather conditions were among the top five contributing factors in both Jet and Turboprop aircraft accidents, noted in over a quarter of events. Analysis also determined a link between accidents that involved deficient airline safety management and poor regulatory oversight by the State of the operator for both Jet and Turboprop accidents.

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

Passenger fatalities & the accident rate: Despite the reduction in the accident rate in 2005, the public perception of safety was affected by a series of fatal accidents. Less than a quarter of all the year's accidents accounted for the majority of all fatalities. Over half of all fatal passenger flights involved low cost / charter operators. Flight crew proficiency issues relating to inadequate training and standards / checking were highlighted in accidents involving this type of operation.

Prevention Strategy: From 2006 onward, any airline wanting to join IATA will pass an IOSA audit first; all IATA existing Members will have to be IOSA accredited by the end of 2007 to retain IATA membership. This will enable all types of operators to implement internationally recognised standards and an accepted evaluation system designed to assess their operational management and control systems, particularly useful for start up or small-size airlines.

Approach and landing accidents (ALA) & runway excursions: Over half of all the accidents in 2005 occurred during the approach and landing phases of flight. Notably, almost half of ALA accidents involved a runway excursion. Flight crew proficiency issues, deficient training on behalf of the operator and adverse weather conditions all played a contributing role in the majority of events. Unsuitable overrun areas also contributed to the severity of landing accidents and the subsequent fatalities.

Prevention Strategy: IATA and its Safety Group have created a new section of the Six-point Safety Programme that will address flying operations issues, including approach and landing accidents.

Cargo operations & Part 135 carriers: Cargo operations represented almost 20% of the year's accidents. Over half of all cargo accidents involved Part 135 operators or equivalent. Flight crew proficiency issues, linked to deficient training and adverse weather, played a contributing role in over half of cargo accidents.

Prevention Strategy: IATA will promote the implementation of a safety management system amongst cargo operators and launch IOSA for dedicated cargo carriers to ensure they meet international safety standards.

Safety in Africa: In 2005, 18% of the accidents occurred in the African region, of which almost half were fatal. Events involving flight crew errors were tied to both the deficient organisational safety culture of the operator and the poor regulation of the operating environment.

Prevention Strategy: IATA will continue to implement the Partnership for Safety Programme to enable operators to improve their operational safety through the use of internationally recognised quality audit principles.

Ground damage: These accidents resulted in significant costs to the industry and affected particularly IATA Member Airlines, which were involved in over half of these events. The majority of ground damage accidents related to deficient ground operations.

Prevention Strategy: IATA will continue to implement its Ground Damage Prevention Programme to reduce ground accidents and their associated costs by 10% in 2006.

Detailed information regarding the different types of accidents (e.g. Controlled Flight Into Terrain) is presented in Chapter 4 of this report.

IATA, in collaboration with its Member Airlines and industry stakeholders, focuses its activities to target the issues that affect the air transport industry. Through the Six-point Safety Programme and its valuable sources of safety information, such as IOSA, the Safety Trend Evaluation, Analysis & Data Exchange System (STEADES) Programme and the Flight Data Analysis (FDA) Service, IATA can best determine and prioritise safety concerns and develop strategies to address them.

Despite the constant efforts that make aviation the safest mode of transportation to date, IATA and the industry need to adopt a business-like approach to safety and focus on operational efficiency in order to maintain the constant improvement of this track record.

1 IATA ANNUAL SAFETY REPORT

"Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skilful execution; it represents the wise choice of many alternatives." William A. Foster

Founded in 1945, The International Air Transport Association (IATA) represents, leads and serves the airline industry. IATA's membership includes 265 airlines comprising approximately 94% of all international traffic. IATA's global reach extends to 150 nations through 101 offices in 79 countries.

IATA calls upon the vast and representative expertise of its Member Airlines, industry stakeholders and offices worldwide when determining the lessons learned from accidents.

The Safety Report is created immediately following the year under review. Along side accident statistics and trends examined, the Report presents contributing factors to the year's accidents with the goal of developing prevention strategies to enhance safety.

The first part of the Report looks back at the accidents. The analysis portion of the report involves a look back at the accident trends over the last decade and the year 2005 in detail. The report presents the outcome of the IATA Accident Classification Task Force (ACTF) meeting, during which events are analysed to determine contributing factors, in most cases identified for the first time well ahead of formal accident investigation.

The second part of the Safety Report presents IATA's accident prevention programme, communicating the important safety issues identified by IATA's Operations Committee, the Safety Group and their Task Forces, including those in the Security arena.

1.1 Overview of the Report

1.1.1 Purpose of the Safety Report

The purpose of the Safety Report is fully described in **Appendix A** on the CD-ROM. Its primary purpose is to assist with maintaining safety vigilance by identifying the areas of greatest risk apparent from the experience of aircraft accidents. It aims to offer practical advice to airlines in accident prevention against the backdrop of accidents that have occurred in 2005. The Report is taking an increasing interest in air safety incidents, seeing them as useful pointers for accident prevention. In this way, the Approach and Landing Section at 4.4.1 and the Ground Damage Section at 4.3.7 and 5.4.3 include findings from incident analysis derived from STEADES. Excerpts from STEADES Reports are included on the CD-ROM enclosed at the end of this report. The Safety Report presents trends, analysis and preventative measures.

1.1.2 Safety Report Format

In addition to presenting areas of concern and prevention strategies, the Safety Report also provides tools for safety management. There is a CD-ROM included in the report, which is divided into the following sections:

- **Safety Report,** containing the Report, Appendices and PowerPoint slide support package;
- **Supporting Documents,** containing additional material supporting discussions in the report;
- **Safety Toolkit,** containing useful and practical material for use at airlines;
- **CEO Brief,** containing executive summary and PowerPoint presentation;
- **Web links;** containing links to websites and documents available on the Web that IATA Safety recognises as helpful to airlines.

The additional information serves as an indication of some of the valuable tools for accident prevention, which have come to IATA's attention during 2005.

1.1.3 Accident Classification Task Force

The IATA Safety Group (SG) created the Accident Classification Task Force (ACTF) in order to analyse accidents and identity contributing factors, determine trends and matters of concern in aviation safety worldwide from the accident database available and to develop prevention strategies related thereto, which are incorporated into the annual IATA Safety Report.

The ACTF is composed of airline safety experts from IATA Member Airlines and representatives from the aeronautical industry and regulatory boards. 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 comes from a variety of sources, including Airclaims Ltd., government accident reports and other sources. Once assembled, the ACTF validates each accident report with their expertise to develop as accurate a picture as possible of the events.

Appendix A on the CD-ROM further describes the role of the ACTF in more detail. Membership of the ACTF is as follows:

Dr. Dieter Reisinger	AUSTRIAN AIRLINES (Chair)
Captain Deborah Lawrie	KLM ROYAL DUTCH AIRLINES (Vice-Chair)
Mr. Darryl Watkins	AIR CANADA
Captain Bertrand de Courville	AIR FRANCE
Mr. Jean Daney	AIRBUS INDUSTRIE
Captain Angelo Ledda	ALITALIA LINEE AEREE ITALIANE
Captain David C. Carbaugh	BOEING COMPANY
Mr. James Donnelly	BOMBARDIER
Mr. Alan Rohl	BRITISH AIRWAYS
Mr. Nuno Aghdassi	EMBRAER AVIATION INTERNATIONAL
Mr. Don Bateman	HONEYWELL
Mr. Martin Maurino	IATA
Captain Karel Mündel	IFALPA
Mr. Bert Ruitenberg	IFATCA
Captain Daniel Maurino	ICAO
Captain Keiji Kushino	JAPAN AIRLINES INTERNATIONAL
Mr. Richard Fosnot	JEPPESEN
Mr. Willem Diederichs	LUFTHANSA GERMAN AIRLINES
Captain Abdulhameed S. Al-Ghamdi	SAUDI ARABIAN AIRLINES
Captain Jürg Schmid	SWISS INTERNATIONAL AIR LINES
Captain Carlos dos Santos Nunes	TAP AIR PORTUGAL
Captain Araken O. Salamene	VARIG BRASIL

1.1.4 Report Authority

The Safety Report is sponsored by the IATA Safety Department, approved by the IATA Safety Group (SG) and authorised for distribution by the Operations Committee (OPC).

1.2 IATA SAFETY PROGRAMME

1.2.1 Overview

The IATA Safety Programme is driven primarily by the goals set by the airlines at the IATA Board of Governors (BoG) every year. The BoG 2006 Industry Priorities and OPC Objectives are presented in Chapter 5 of this report.

IATA aligns its safety initiatives with those of the International Civil Aviation Organisation (ICAO), the Flight Safety Foundation (FSF), aeronautical manufacturers, the Air Transport Association (ATA), the International Federation of Air Line Pilots' Associations (IFALPA) and the regulatory authorities.

1.2.2 IATA Multi-divisional Safety Task Force

The IATA Multi-divisional Safety Task Force (MSTF) was established in 2002 to integrate all IATA safety activities, establish priorities to meet industry safety needs and develop metrics to assess the performance of solutions. Meeting about once per month, the participants debate key safety issues from all divisions and work on harmonising efforts to implement safety programmes efficiently.

The MSTF receives strong support from the IATA Director General, the Senior Vice-President, Safety, Operations and Infrastructure and the Director, Safety. The MSTF involves members from multiple divisions and locations around the world. Figure 1.1 illustrates the components that make up the MSTF.

Figure 1.1
IATA Multi-divisional Safety Task Force

1.2.3 IATA Six-point Safety Programme

The IATA Six-point Safety Programme is now well established in close cooperation with the airlines through the SG, OPC and the MSTF. The programme focuses on a system of areas that need to be combined to improve operational safety. The programme addresses areas of global concern, as well as targeting unique regional challenges that are seen as the major impediments to improving safety in those areas. Figure 1.2 illustrates the IATA Six-point Safety Programme. A detailed review of the programme's 2005 achievements and its outlook for 2006 are presented in Chapter 5.

Figure 1.2
IATA Six-point Safety Programme

Safety Auditing

The IATA Operational Safety Audit (IOSA) programme is an internationally recognised and accepted evaluation system designed to assess the operational management and control systems of an airline. Since the first audits began in September 2003, the IOSA programme has continued to grow. By the end of 2005, approximately 140 audits were conducted and over 80 airlines have been listed on the IOSA registry. The airlines audited to date account for almost 70% of total scheduled traffic.

Infrastructure Safety

IATA Member Airlines interact with ATS Providers in 188 ICAO States in the course of their operations. The current global infrastructure is a fragmented and ever expanding collection of different technologies, systems, concepts and services. To halt this proliferation IATA is leading industry and working closely with ICAO to establish globally harmonised and interoperable systems to enhance the safe and efficient operation of air transport.

Damage to aircraft during ground operations costs the airline industry over USD $4 billion per year. The Ground Damage Prevention Programme (GDPP) is a worldwide initiative launched in early 2005 to reduce ground damage to aircrafts.

Safety Data Management & Analysis

IATA's Safety Data Management and Analysis (SDMA) programme is a holistic programme designed to cover the entire spectrum of airline and industry data requirements, from the few accidents to the multitude of normal operations occurrences.

At one end of the spectrum, the Safety Report takes advantage of accident reporting to share the lessons learned among all aviation stakeholders. IATA has compiled, classified and analysed accident data for over 40 years under the Annual IATA Safety Report. However, IATA is well into the transition from the reactive nature of looking at what went wrong in an accident and learning to avoid such recurrences, to identifying accident precursors by using incident data in the IATA's Safety Trend Evaluation, Analysis and Data Exchanges System (STEADES). IATA is now moving towards becoming more proactive and diagnostic by looking at safety data from "normal operations." IATA's new Flight Data Analysis (FDA) Service allows airlines to submit flight data to IATA, have it analysed, then receive information and summary results on their normal operations. Combined, these three elements form IATA's comprehensive SDMA programme covering the entire spectrum of safety data analysis.

Flying Operations

A new segment is included in the Six-point Safety Programme for 2006 entitled: Flying Operations. This segment targets safety issues relating to flight operations and address the go-around decision, flight crew interaction with automation, monitoring skills and distraction both amongst flight and ground crews. It also addresses interaction well as other areas that impact on the safe operation of aircraft, such as ground and cabin operations, maintenance, dispatch and Emergency Response Planning (ERP).

Safety Management Systems

Safety Management is defined as the systematic management of the risks associated with flight operations, related ground operations and aircraft engineering or maintenance activities to achieve high levels of safety performance.

A Safety Management System (SMS) is an explicit element of the corporate management responsibility that is supported by the safety, quality and security functions of an organisation. It sets out a company's safety policy and its intent to manage risk as an integral part of its overall business

IATA developed the SMS Senior Airline Manager's Implementation Guide, published in October 2005. The aim of the IATA SMS guide is to provide airlines with assistance in implementing an SMS to build a safer and more efficient operation. The implementation of a successful Safety Management System can contribute to making safety practices proactive rather than the more traditional reactive approach, and that the adoption of

SMS will provide better and more uniform safety standards throughout the industry.

Cargo Safety

The overall operational conditions of cargo flights are very different from passenger flights with more night flights, high level of cargo charter flights, high number of non-IATA operators and more flights within high risk countries. Even though cargo flights are operated under different commercial conditions as enumerated, the causes of cargo accidents are not generally related to the mishandling of shipments or cargo loading issues but to aircraft and/or flying conditions or to similar causes as found for passenger aircraft accidents.

With a view of constantly improving the air safety of the industry, the cargo division in IATA will develop a stronger industry voice in air cargo safety and security issues. Therefore, the new Director, Cargo Safety & Standards will be working closely with the SO&I safety team.

1.2.4 Global Aviation Safety Roadmap

IATA's Six-point Safety Programme not only has direct relevance to the airlines, but also to the industry at large. From this platform of safety auditing and data management, IATA has been able to work closely in cooperation with other industry stakeholders. One of the outcomes of the ICAO Air Navigation Commission (ANC) consultation with industry meeting, held from 19 to 20 May 2005, was a proposal from industry to develop a common roadmap for aviation safety for consideration by the ANC.

The Industry Safety Strategy Group (ISSG) developed the Global Aviation Safety Roadmap under the leadership of IATA, with the participation of Airbus, Boeing, Airports Council International (ACI), Civil Air Navigation Services Organisation (CANSO), International Federation of Air Line Pilots' Associations (IFALPA) and Flight Safety Foundation (FSF). The roadmap comprises a set of high-level elements that are directed at States, regions and industry with the objective of providing coordination and guidance in the development and application of safety policies and initiatives. The ISSG is continuing its work to develop strategies for regional implementation, including priorities.

The Global Aviation Safety Roadmap contains elements that are directed at ICAO and the States, and others that are directed at industry. There is a necessity for the Commission to review the Global Aviation Safety Roadmap and to assess the need to incorporate elements of the roadmap within ICAO Strategic Objective A - Safety. Some elements of the roadmap directed at industry are not under the direct purview of ICAO and the ISSG has indicated its interest in following up on their implementation. There is therefore a need to coordinate future development and implementation activities to ensure that they remain in concert with each other.

The Global Aviation Safety Roadmap would also be of interest for the Directors General of Civil Aviation Conference (DGCA/2006) on a Global Strategy for Aviation Safety as a major development in the aviation safety arena. It is therefore intended that the roadmap be included as part of the documentation for DGCA/2006.

The implementation of the Global Aviation Safety Roadmap thus now forms a fundamental part of IATA's Safety Programme. A particular priority of the ISSG will be to develop strategies for regional implementation, with emphasis on those regions where assistance will clearly be needed. In the implementation of the Six-point Safety Programme and the industry safety Roadmap, great emphasis will be placed on using the established IATA regional offices.

1.3 IATA REGIONS

At the time of writing the 2005 Safety Report, regions are delineated using the definition set out by IATA. Further information can be found in **Appendix B** of the CD-ROM.

Photo courtesy of Boeing

2 DECADE IN REVIEW

2.1 Background

This chapter presents accident data spanning over 10 years from 1996 to 2005.

IATA has been recording Jet accident statistics since 1959, when the first Jet operational airline accident occurred. ICAO has been monitoring accident statistics since 1947. Collectively, there is now a considerable accident database that enables comprehensive analysis that assists in the development of accident prevention strategies.

Previous editions of the IATA Safety Report have addressed historical statistics, in some cases, going back a number of decades. At present time, this report assesses the year under review in contrast with the statistics for the past decade. The exclusion of data dated from over ten years ago will make the analysis more relevant and meaningful. Much of this data contained references to older aircraft that are no longer in service and to operations that did not benefit from newer technology.

In 2004, IATA committed to an objective of reducing the accident rate by 25% by 2006. Past the midpoint in that three-year window, the industry is well on its way to achieving that goal. In fact, the improvements in aviation safety over the decade have been remarkable. Safe air travel is considered as a given and is expected by passengers. This is due in part to the considerable efforts made by airlines, regulators, the manufacturers and other stakeholders.

Development of new technologies and methods such as Safety Management Systems (SMS), Flight Data Analysis (FDA) and risk analysis techniques have helped to identify safety trends. This has primarily been done through the collection and analysis of incident and flight data from across the airline operation, and the advent of strong Safety Management Systems being deployed in airlines of all sizes has contributed to the remarkable 42% reduction in the accident rate over the last 10 years. The challenge is now to further reduce the rate and achieve the minimum level of acceptable risk possible in air transport. While it might be difficult to determine what can and should be done to continue driving down the accident rate, the industry must not simply reinvent what has already been done with the hope that an updated plan with new focus will net the same gains as in the past.

When reviewing this data, readers should be aware that there is always some minor variance in the accident data provided by IATA, in comparison with ICAO or other agencies. This is due to the use of slightly different parameters for data collection, analysis and presentation used by each organisation. The data used by IATA is obtained from a number of sources, including official reports, first-hand knowledge, and Airclaims input, and is continually updated. In some cases, this may be reflected in some changes to the values presented from previous editions of the Safety Report.

2.2 Accident / Fatality Statistics and Rates

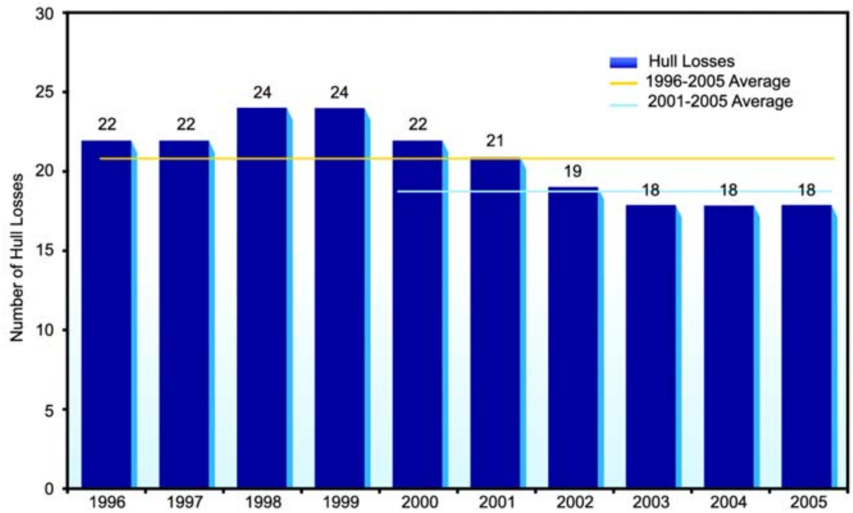
The following section presents the 10-year record of accident and fatality statistics, and their associated rates for Western-built aircraft. As the Eastern-built aircraft fleet has been steadily declining in number and use over the last 10 years, no historical information is presented on these aircraft.

2.2.1 Western-built Jet Aircraft

Western-built Jets have for many years been the industry's dominant aircraft in terms of both number and passengers carried. With the declining use of the Eastern-built fleet and the popularity of regional jets, their importance is even further magnified. Fortunately, Western-built Jets continue to show a very high level of safety. The number of Hull Losses has remained constant over the last three years, although the number is still below the five and 10-year averages. Figure 2.1 shows the Western-built Jet aircraft Hull Losses from 1996 to 2005.

Figure 2.1
Western-built Jet Aircraft Hull Losses (1996-2005)

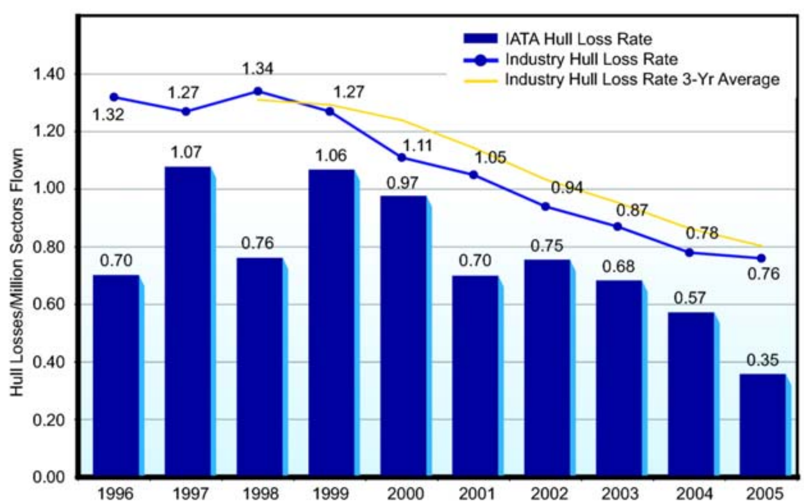
Figure 2.1 shows the Western-built Jet aircraft Hull Losses from 1996 to 2005. The number of Hull Losses has remained constant over the last three years, although the number is still below the five and 10-year averages.



Despite the constant number of Hull Losses over the last few years, an increase in the number of sectors flown has resulted in a steadily decreasing Western-built Jet Hull Loss rate, with 2005 being the lowest on record. Also, the IATA Member Airline Western-built Jet Hull Loss rate has been consistently lower than the industry rate over the decade, with 2005 representing the best rate for IATA members as well. Figure 2.2 presents the Western-built Jet aircraft Hull Loss rate from 1996 to 2005.

Figure 2.2
Western-built Jet Aircraft Hull Loss Rate (1996-2005)

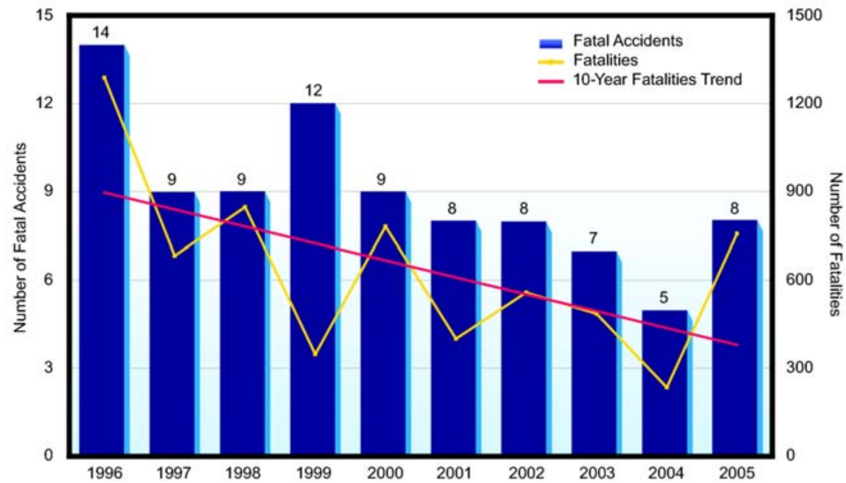
Figure 2.2 presents the Western-built Jet aircraft Hull Loss rate from 1996 to 2005.



After enjoying several years of decline, the number of fatal accidents and fatalities rose sharply in 2005, as seen in Figure 2.3. It should be noted that the number of fatal accidents in 2005 was equal to the 10-year average, however the number of fatalities was significantly above the average for the decade.

Figure 2.3
Western-built Jet Aircraft Fatal Accidents

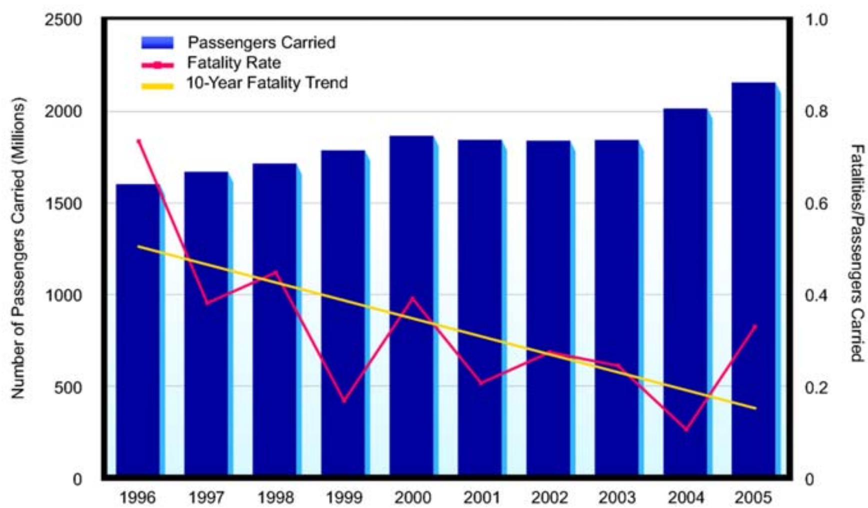
Fatal accidents and fatalities rose sharply in 2005, as seen in Figure 2.3.



The number of passengers carried has continued to increase steadily over the last 10 years, with the 2005 figure of almost 2.2 billion being a record. Air travel on Jet aircraft continues to be amongst the safest modes of travel available for the general public. While the passenger fatality rate has increased in 2005 versus recent years, it is equal to the 10-year average rate (see Figure 2.4).

Figure 2.4
Western-built Jet Aircraft Fatality Rate

The passenger fatality rate has increased in 2005 versus recent years, it is equal to the 10-year average rate.



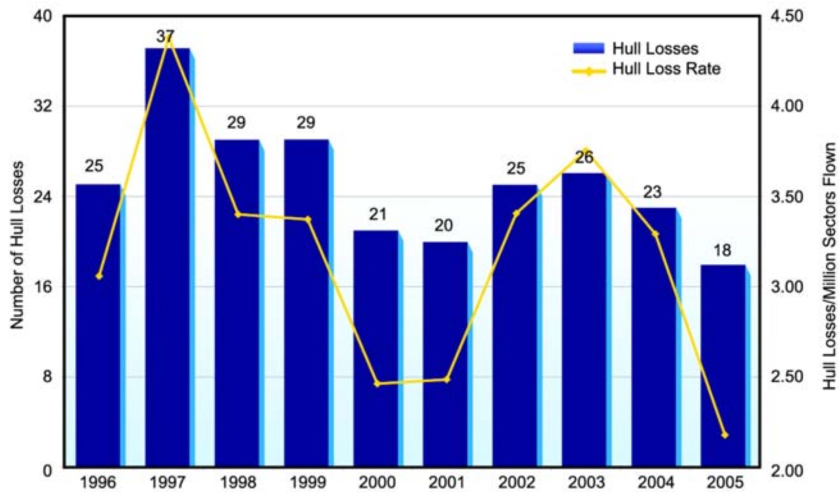
2.2.2 Western-built Turboprop Aircraft

Western-built Turboprop aircraft make up a considerable proportion of the airline fleet. They are predominantly used to support larger markets by providing a feeder service from regional centres into larger cities, or on routes that do not justify Jet aircraft. In many cases, airlines are upgrading their Turboprop fleets to regional jets and sending the older aircraft to operators unable to afford new aircraft. The primary exception to this trend are markets that are too small to justify using the regional jets, making Turboprops the only viable economic option.

Turboprops constituted half of the Hull Loss accidents involving Western-built aircraft that occurred in the year 2005, although this number was below the five-year and 10-year averages for Western-built Turboprops and considerably less than previous years. The corresponding Western-built Turboprop Hull Loss rate has seen a remarkable decline in 2005 versus previous years, and is now the lowest of the decade. Figure 2.5 shows the Western-built Turboprop aircraft Hull Losses from 1996 to 2005.

Figure 2.5
Western-built Turboprop Aircraft Hull Losses (1996-2005)

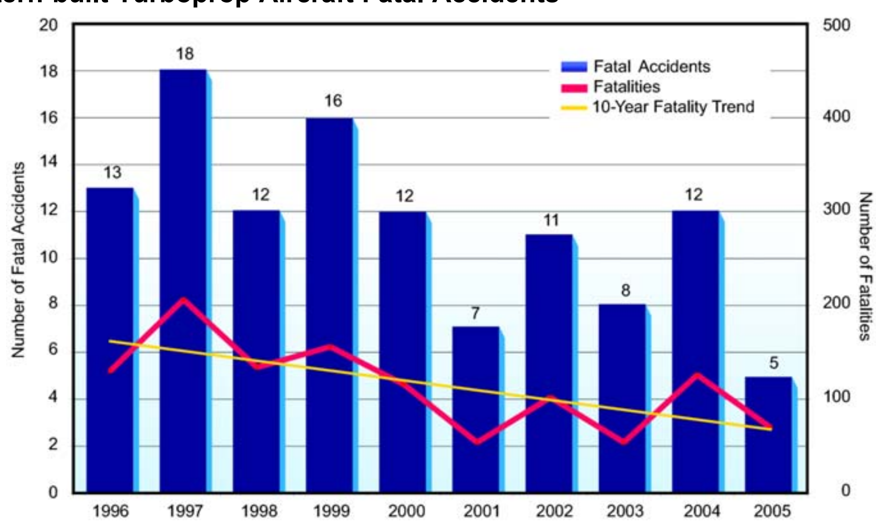
Figure 2.5 shows the Western-built Turboprop aircraft Hull Losses from 1996 to 2005.



The number of accidents and fatalities on Western-built Turboprop aircraft decreased in 2005 and the number of fatalities has bottomed out over the last five years to an average of approximately 90 fatalities per year. The five fatal accidents represent the best performance of the decade. Figure 2.6 presents the Western-built Turboprop aircraft fatal accidents from 1996 to 2005.

Figure 2.6
Western-built Turboprop Aircraft Fatal Accidents

Figure 2.6 presents the Western-built Turboprop aircraft fatal accidents from 1996 to 2005.



2.2.3 Eastern-built Aircraft

The number of accidents and fatalities for the Eastern-built Turboprop aircraft significantly increased in 2005. There were a total of 12 fatal accidents in 2005, which represents 8 more than 2004. There was also an important increase in the number of fatalities involving Eastern-built Turboprop with a total of 200 fatalities. Concerning the Eastern-built Jet aircraft, there was a decrease of 3 fatal accidents since 2004, which account for 1 fatal accident. The number of fatalities also decreased for the Eastern-built Jet aircraft with a total of 8 fatalities in 2005.

2.3 Accident Costs

While accidents have an overwhelming impact on personal safety and airline operations, the financial impact cannot be ignored. A convenient measure for the cost of an accident is the insurance loss estimates claimed against it. It should be noted that accident costs absorbed by the airline and not reported to insurance agencies may not be reflected in these numbers. 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 operational accidents excluding security-related events and acts of violence. All amounts are expressed in US dollars.

2.3.1 Western-built Jet Aircraft

Accident costs over the decade for Western-built aircraft are shown in Figure 2.7. The cost of accidents appears to be cyclical, both for the total amounts and their loss categories. While nowhere near the record high $2.15 billion costs of 2000, the current trend is seeing an increase in the claim amounts for Western-built Jets, and total costs for 2005 were 46% above those of 2003, with a corresponding traffic (sectors flown) increase of only 17% for the same period.

Figure 2.7
Western-built Jet Aircraft 10-Year Insurance Costs

Accident costs over the decade for Western-built aircraft are shown in Figure 2.7.

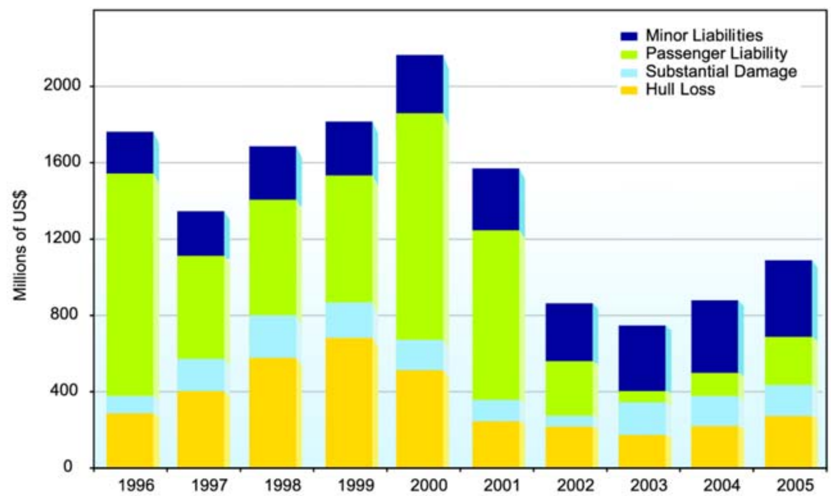
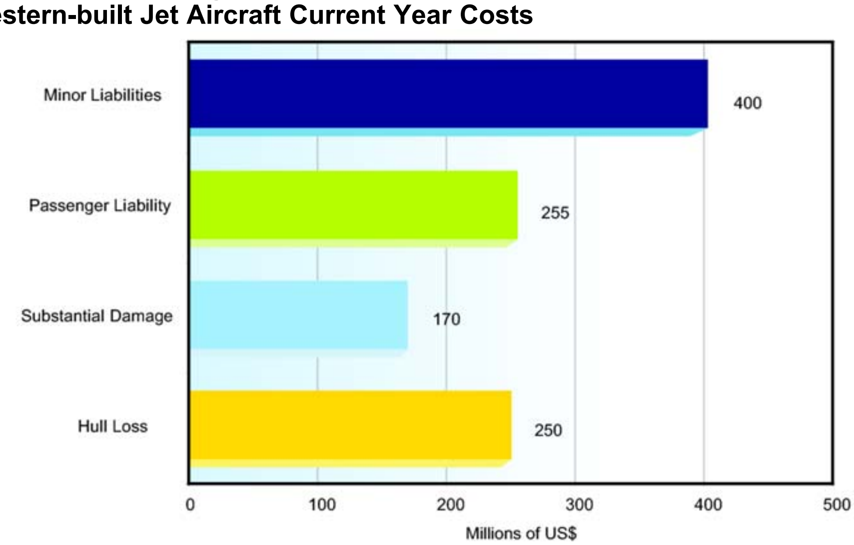


Figure 2.8 shows the costs associated with individual loss categories for the year 2005. As with last year, minor liabilities far overshadow the other categories; however it should be noted that minor liability costs have been steadily trending up over the decade, and that they were not the dominant cost component until as recently as the year 2002.

Figure 2.8
Western-built Jet Aircraft Current Year Costs

Figure 2.8 shows the costs associated with individual loss categories for the year 2005.



2.3.2 Western-built Turboprop Aircraft

Accident costs for Western-built Turboprops have also shown a cyclical pattern over the last 10 years (Figure 2.9), although with the two distinct peaks in 1997 and 2003. While the high reached in 1997 was due to a combination of Hull Loss and passenger liability claims, the 2003 peak is almost solely due to increased passenger liability amounts. While both the passenger liability amounts and total insurance loss estimates have fallen in the last 3 years, passenger liability costs still remain high relative to other loss areas on the Western-built Turboprop fleet. Figure 2.10 illustrates the insurance cost distribution for Western-built Turboprop accidents in 2005. Minor liability loss data is not available on the Western-built Turboprop fleet.

Figure 2.9
Western-built Turboprop 10-Year Costs

Accident costs for Western-built Turboprops have also shown a cyclical pattern over the last 10 years (Figure 2.9).

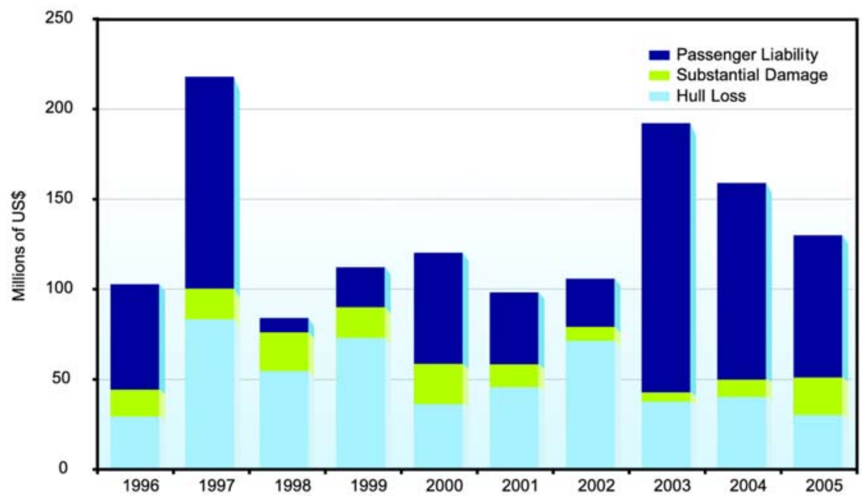
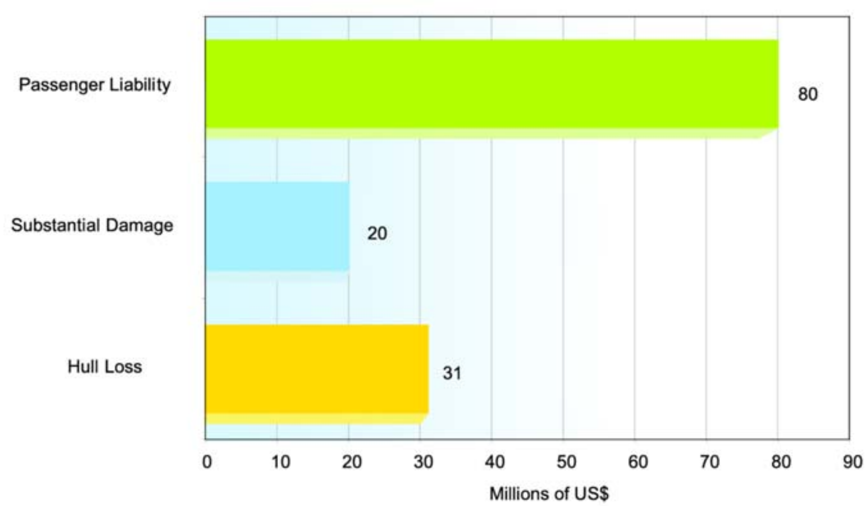


Figure 2.10
Western-built Turboprop Aircraft Current Year Costs

Figure 2.10 illustrates the insurance cost distribution for Western-built Turboprop accidents in 2005.



2.3.3 Eastern-built Aircraft

Cost estimates for Eastern-built aircraft are only available for the current year. This fleet continues to decline in number as older aircraft are removed from service and replaced with more modern equipment. The insurance losses due to accidents involving Eastern-built aircraft are shown in Table 2.1.

TABLE 2.1
Insurance Losses due to Accidents Involving Eastern-built aircraft

Loss Area	Loss Amount (millions)
Hull Losses	15
Substantial Damage	5
Passenger Liability	10
Total Accident Costs	30

2.4 Reflecting on the Decade

The past decade has been a challenging time for the aviation industry. Changes during the decade have resulted in heightened security. The commercial burden of 9/11 and other terrorist threats, as well as SARS has been immense. Deteriorating economic climates and increased competition have pressured companies to make hard decisions to ensure their survival. However, despite these external factors, there have also been many developments within the industry, including Controlled Flight Into Terrain (CFIT) and Approach and Landing Reduction (ALAR) programmes, the widespread introduction of Terrain Collision Avoidance System (TCAS), Enhanced Ground Proximity Warning System (EGPWS), Flight Data Analysis (FDA) and Information Technology in many sectors of the industry. With all this change, it has become essential to implement change management programmes in order to maintain an acceptable level of risk.

2.5 Summary

The review of the decade's accidents is summarised below:

- The number of Western-built Jet Hull Losses has remained constant over the last three years at 18.
- Both the industry-wide and IATA Member Airline Western-built Jet accident rate declined in 2005, and each is now the lowest of the decade. The industry-wide Western-built Jet Hull Loss rate for 2005 was 0.76, while the IATA Member Airline Western-built Jet Hull Loss rate was 0.35.
- The number of fatal accidents involving Western-built Jet aircraft increased in 2005, equaling the decade average of 8.
- The number of fatalities on board Western-built Jet aircraft in 2005 was above the decade average, and the fatality rate rose sharply from the record low of 0.10 achieved in 2004, although the 2005 rate was equal to the 10-year average of 0.33.
- During 2005, the number of Western-built Turboprop Hull Loss decreased to a decade-low of 18. The corresponding Western-built Turboprop Hull Loss rate also decreased to 2.18, representing the best achievement of the decade.
- During the yearly part of the decade, there was a steady reduction in the number of fatal accidents involving Western-built Turboprop aircraft up until 2001 when only seven occurred. However, the number now appears to have leveled off with alternating good and bad years in terms of fatal accidents and associated fatalities. There has been a strong correlation between fatal accidents and fatalities on Western-built Turboprop aircraft over the last 10 years.
- The estimated cost of Western-built Jet Hull Losses has been rising over the past few years, however remains well below the record loss claims of 2.15 billion in 2000. Minor liabilities are an increasing cost component of accidents.
- Accident costs resulting from Western-built Turboprop operations had been relatively stable until 2003 when the amount almost doubled. The trend over the previous few years shows that amounts are gradually reducing to the decade average, with passenger liabilities reducing considerably in the last 3 years.

Photo courtesy of Airbus

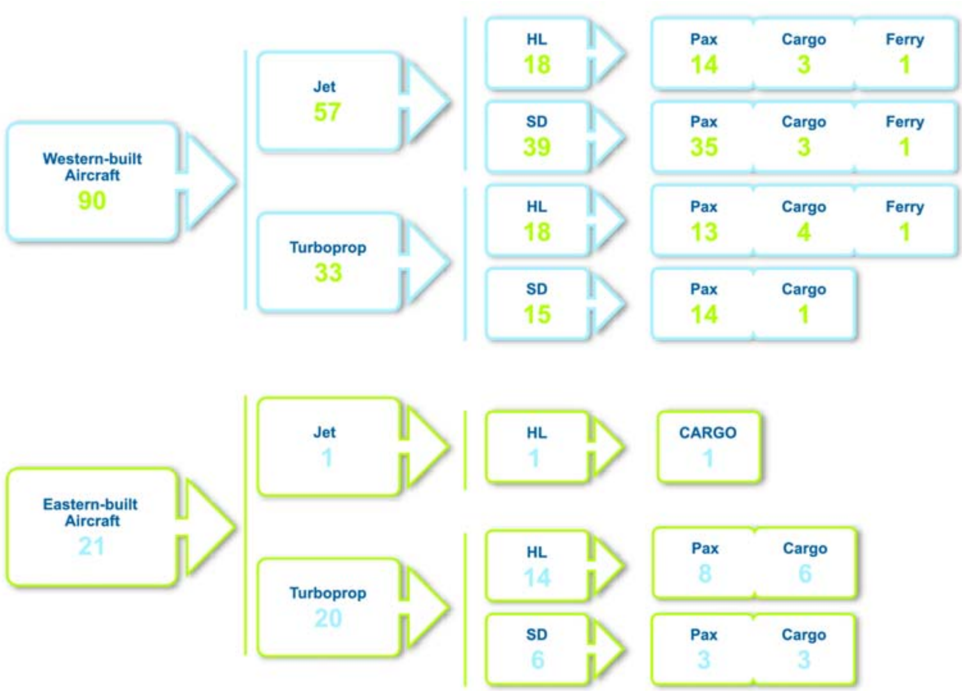
3 YEAR 2005 IN REVIEW

The objective of this chapter is to present the global accident statistics for the year 2005. The primary safety issues arising from 2005 are highlighted in this chapter. The analysis will cover both Western and Eastern-built Jet and Turboprop aircraft. However, the accidents involving Western-built aircraft will be the main focus of the analysis.

3.1 DATA ANALYSIS

The ACTF classified a total of 111 accidents in 2005. The breakdown of accidents is shown in Figure 3.1. The operational Jet and Turboprop aircraft Hull Loss (HL) and Substantial Damage (SD) accidents that occurred in 2005 are the primary focus of the Safety Report. Throughout this analysis, it should be assumed that only operational accidents are being reviewed unless specifically stated otherwise. An operational accident is one that occurred during normal revenue operations or positioning flights. The chart presented below therefore excludes ground events where there was no intention of flight and does not encompass deliberate acts of violence.

Figure 3.1
Distribution of 2005 Accidents



3.1.1 Accident Summaries

There were a total of 90 Western-built aircraft (36 HL and 54 SD) and 21 Eastern-built aircraft (15 HL and 6 SD) involved in an accident in 2005. Descriptions of Jet and Turboprop airline operational Hull Loss and Substantial Damage accidents and certain other losses are presented at **Appendix A** on the CD-ROM.

3.1.2 Fleet Size, Hours and Sectors Flown

There is sufficient data to prove a reasonable estimate of the numbers of hours and sectors flown in 2005 for Western and Eastern-built Jet and Turboprop aircraft. This allows for a common metric to be used when comparing between the Jet and Turboprop fleets. Table 3.1 presents the world fleet, hours and sectors flown in 2005.

TABLE 3.1
Fleet Size, Hours and Sectors Flown in 2005

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
World Fleet (end of year)	17,505	4,598	1,903	1,898
Hours Flown (millions)	44.33	6.78	1.35	0.66
Sectors (landings) (millions)	23.69	8.26	0.64	0.46

The hours and sectors flown continue to increase in the year 2005 for the Western-built aircraft. In contrast, the Eastern-built aircraft hours and sectors flown are decreasing since the previous years. Also, the numbers of Western-built fleets have decreased from 17,779 in 2004 to 17,505 in 2005 for the Jet fleets and from 5,587 in 2004 to 4,598 in 2005 for the Turboprop fleets.

3.1.3 Operational Accidents

Operational accidents are divided into two categories: Hull Loss and Substantial Damage. Table 3.2 illustrates the operational accidents in 2005 for Western and Eastern-built Jet and Turboprop aircraft.

TABLE 3.2
Operational Accidents in 2005

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
Hull Loss (HL):	18	18	1	14
Substantial Damage (SD):	39	15	0	6
Total Accidents:	57	33	1	20

The Western-built Jet aircraft total accidents slightly increased 10% since last year, rising from 52 in 2004 to 57 accidents in 2005. However, the total accidents for the Western-built Turboprop aircraft remain unchanged since 2004 with a total of 33 accidents. The Eastern-built Jet aircraft total accidents reduced in 2005, decreasing from 6 in 2004 to 1 accident in 2005. However, the total accidents for the Eastern-built Turboprop aircraft increased by 8 since 2004 for a total of 20 accidents.

3.1.4 Operational Hull Loss Rates

For the first time since data collection, there is sufficient data to calculate Eastern-built operational Hull Loss rates on a per million sectors and per million hours basis. The Hull Loss rates for Western and Eastern-built Jet and Turboprop aircraft are shown in Table 3.3.

TABLE 3.3
Operational Hull Loss Rates in 2005

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
Hull Losses per million sectors:	0.76	2.18	1.56	30.43
Hull Losses per million hours:	0.41	2.65	0.74	21.21

The Western-built Jet and Turboprop aircraft and the Eastern-built Jet aircraft Hull Loss rates per million sectors and per million hours flown have decreased in 2005 compared to last year's results. In the case of Western-built Turboprop aircraft there is an important decrease of approximately 34% for the Hull Loss rates per million sectors compared to 2004, decreasing from 3.29 per million sectors in 2004 to 2.18 per million sectors in 2005. On the contrary, the Eastern-built Turboprop aircraft Hull Loss rates per million sectors and per million hours almost doubled in 2005.

3.1.5 Passengers Carried, Fatal Accidents and Fatalities

The number of passengers carried for the Eastern-built aircraft is not available in this analysis. Table 3.4 presents the number of passengers carried in Western-built aircraft and the number of fatal accidents for the Western and Eastern-built Jet and Turboprop aircraft in 2005.

TABLE 3.4
Operational Hull Loss Rates in 2005

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
Passengers Carried (millions):	2,166	122	—	—
Estimated Change Since the Previous Year:	+8%	-2%	—	—
Total Fatal Accidents:	8	5	1	12

As shown in Table 3.4, there was an increase in the estimated number of passengers carried for the Western-built Jet aircraft compared to last year. Concerning the Western-built Turboprop aircraft, the estimated number of passengers carried decreased since 2004.

Of the 57 operational accidents (18 HL and 39 SD) for the Western-built Jet aircraft, 8 (14%) resulted in passenger and/or crew fatalities. Figure 3.2 illustrates the Western-built Jet aircraft fatal vs. non-fatal accidents in 2005. Also, of the 33 operational accidents (18 HL and 15 SD) for the Western-built Turboprop aircraft, 5 (15%) resulted in passenger and/or crew fatalities.

In total, there were 26 fatal accidents that occurred in 2005. Overall, the fatal accidents and fatalities by occurrence region in 2005 are shown in Table 3.5.

Figure 3.2
Western-built Jet Aircraft Fatal vs. Non-fatal Accidents

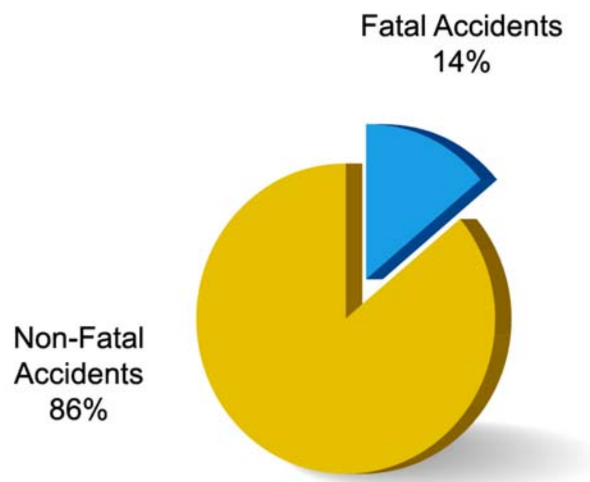


TABLE 3.5
Aircraft Accidents, Fatal Accidents and Fatalities by Occurrence Region

	AFI	EUR	ASPAC	LATCAR	MENA	NAM	NASIA
Total Accidents:	20	18	20	15	11	25	2
Total Fatal Accidents:	9	6	5	3	2	1	0
Total Fatalities (crew and passengers):	363	193	242	207	10	20	0

As shown in Table 3.5, Africa has the highest number of fatal accidents and fatalities compared to the other regions in 2005.

Passenger fatalities and crew fatalities for Western and Eastern-built Jet and Turboprop aircraft for the year 2005 are presented in Table 3.6.

TABLE 3.6
Operational Hull Loss Rates in 2005

	Western-built Aircraft		Eastern-built Aircraft	
	Jet	Turboprop	Jet	Turboprop
Passenger Fatalities on board Revenue Passenger Flights:	713	60	0	133
Cargo Flights:	0	0	2	23
Crew Fatalities:	448	10	6	44
Total Fatalities:	757	70	8	200

In 2005, there were a total of 1035 fatalities (crew and passengers). The Passenger Fatality Rate was 0.33 passenger-fatalities per million passengers for the Western-built Jet aircraft and 0.49 passenger-fatalities per million passengers for the Western-built Turboprop aircraft during 2005. Figure 3.3, illustrates the Western-built Jet aircraft accident survivability in 2005.

Figure 3.3
Western-built Jet Aircraft Accident Survivability

3.2 SUMMARY ASSESSEMENT OF WESTERN-BUILT AIRCRAFT

3.2.1 Western-built Aircraft

In 2005, amongst the Western-built Jet and Turboprop fleets there were 90 accidents (HL plus SD). The Western-built Jet category total was 57 accidents, 5 more than in 2004. The Western-built Turboprop category experienced 33 accidents, which is equivalent to last year.

There were 18 Western-built Jet aircraft Hull Loss accidents. Compared with 2004 the number of Hull Losses has not changed, however, the increase in the number of sectors flown in 2005 versus 2004 has caused the rate to decrease. Concerning the Western-built Turboprop aircraft accidents, 18 were Hull Losses and 15 aircraft were Substantially Damaged. Therefore, compared with 2004, the number of accidents experienced by the Turboprop fleet has stabilised.

3.2.2 Hull Loss Rates

The Hull Loss rates per million sectors for Western-built Jet aircraft were reduced from 0.78 per million sectors in 2004 to 0.76 per million sectors in 2005. The rate when compared over the past decade has had a notable decrease, and the loss rate has been on the decline for the last seven years running.

The Hull Loss rates for Western-built Turboprop aircraft were reduced from 3.79 Hull Losses per million sectors in 2004 to 2.18 Hull Losses per million sectors in 2005.

3.2.3 Fatal Accidents and Fatalities

Amongst Western-built fleets, there were 8 fatal accidents involving Western-built Jet aircraft and 5 fatal accidents involving Western-built Turboprop aircraft. In terms of fatal accidents in 2005, the Western-built Jet aircraft had 3 more fatal accidents in 2005 than in 2004. However, the Western-built Turboprop aircraft had 3 fewer fatal accidents in 2005 than in 2004.

Prior to 2005, the Turboprop fleet has enjoyed a steady decline over the decade in the number of fatal accidents up until 2001 when only 7 occurred. This trend was interrupted by the 12 fatal accidents occurring in 2002. Since then, a cyclical pattern has emerged with alternating higher and lower number of fatal accidents each year. The 2005 fatal accidents total of 5 represents the best result performance of the decade.

In 2005, there were in total 757 fatalities involving Western-built Jet aircraft and 70 involving Western-built Turboprop aircraft. Therefore, compared with 2004, the number of fatalities has increased.

3.3 SUMMARY ASSESSMENT OF EASTERN-BUILT AIRCRAFT

3.3.1 Eastern-built Aircraft

There were 21 Eastern-built Jet and Turboprop aircraft accidents (HL plus SD) during 2005. The Eastern-built Jet category total of 1 accident is 5 less than in 2004. In 2005, the Eastern-built Turboprop category experienced 20 accidents, which is a significant increase of 8 accidents since 2004.

There was 1 Eastern-built Jet aircraft Hull Loss accident representing a decrease of 2 compared with 2004. Concerning the Eastern-built Turboprop aircraft accidents, 14 were Hull Losses and 6 aircraft were Substantially Damaged. Therefore, compared with 2004, the number of accidents experienced by the Eastern-built Turboprop fleet has increased.

3.3.2 Hull Loss Rates

The Hull Loss rates per million sectors for Eastern-built Jet aircraft were reduced from 2.73 per million sectors in 2004 to 1.56 per million sectors in 2005. The Hull Loss rates for Eastern-built Turboprop aircraft almost doubled from 16.00 Hull Losses per million sectors in 2004 to 30.43 Hull Losses per million sectors in 2005.

3.3.3 Fatal Accidents and Fatalities

Amongst Eastern-built fleets, there was 1 fatal accident involving Jet aircraft and 12 fatal accidents involving Turboprop aircraft. In terms of fatal accidents in 2005, the Eastern-built Jet aircraft had 3 fewer fatal accidents in 2005 than in 2004. However, the Eastern-built Turboprop aircraft had 8 more fatal accidents in 2005 than in 2004.

In 2005, there were 8 fatalities involving Eastern-built Jet aircraft and 200 fatalities involving Eastern-built Turboprop aircraft, which is an increase since last year.

3.4 AIRCRAFT ACCIDENTS BY REGION

3.4.1 All Accidents By Occurrence Region

The global picture of the accident scene for 2005 is shown in Figure 3.4, which indicates the occurrence region of all the Western and Eastern-built Jet aircraft accidents addressed in this report.

Figure 3.4
Accident Review By Occurrence Region in 2005

- Western-built Jet Hull Loss
- Western-built Jet Substantial Damage
- Eastern-built Jet Hull Loss
- Eastern-built Jet Substantial Damage

This map provides a quick visual overview of where most of the accidents were concentrated in 2005. A detailed breakdown of accident locations can be found in the summary table in Annex 2.

3.4.2 Western-built Aircraft Accidents By Operator Region

Even with proper sector and flying hour data for Western-built Jet fleets some estimation and approximation has been applied, but it may be assumed accurate within 2%. The 2005 data for Western-built Jet aircraft utilisation spans 23.69 million sectors broken down as follows:

Africa (AFI)	0.43 million sectors
Asia Pacific (ASPAC)	3.01 million sectors
Europe (EUR)	6.02 million sectors
Latin American Caribbean (LATCAR)	1.55 million sectors
Middle East, North Africa (MENA)	0.78 million sectors
North America (NAM)	10.7 million sectors
North Asia (NASIA)	1.22 million sectors

Also, sufficiently accurate exposure data for Western-built Turboprop aircraft is available, and IATA has seized on this opportunity to establish a common safety metric between the Jet and Turboprop fleets. The following figures show the best possible picture of the accidents by Region of Operator. The Western-built Jet aircraft and Western-built Turboprop aircraft loss rate by operator region in 2005 are presented in Figure 3.5 and Figure 3.6 respectively. As presented previously in Table 3.3, the global Hull Loss rate was 0.76 Hull Losses per million sectors flown for the Western-built Jet aircraft and 2.18 Hull Losses per million sectors flown for the Western-built Turboprop aircraft in 2005.

Figure 3.5
Western-built Jet Aircraft Loss Rate by Operator Region

The Western-built Jet aircraft loss rate by operator region in 2005 is presented in Figure 3.5.

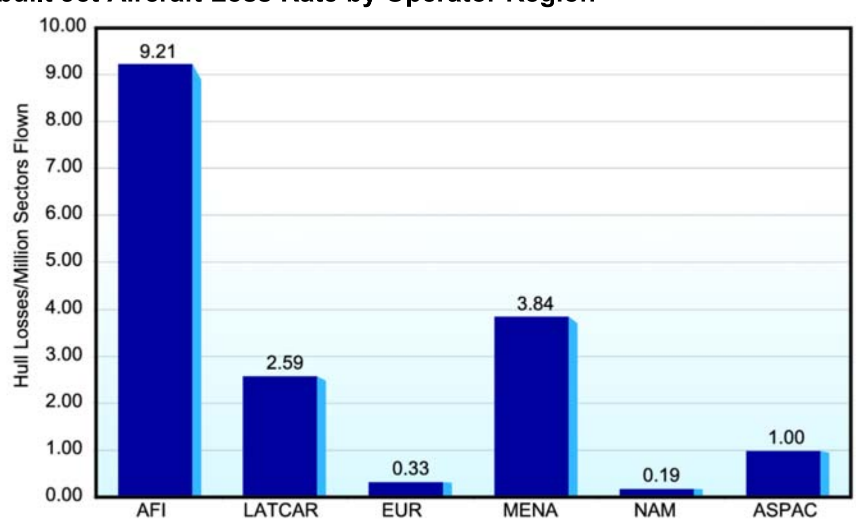
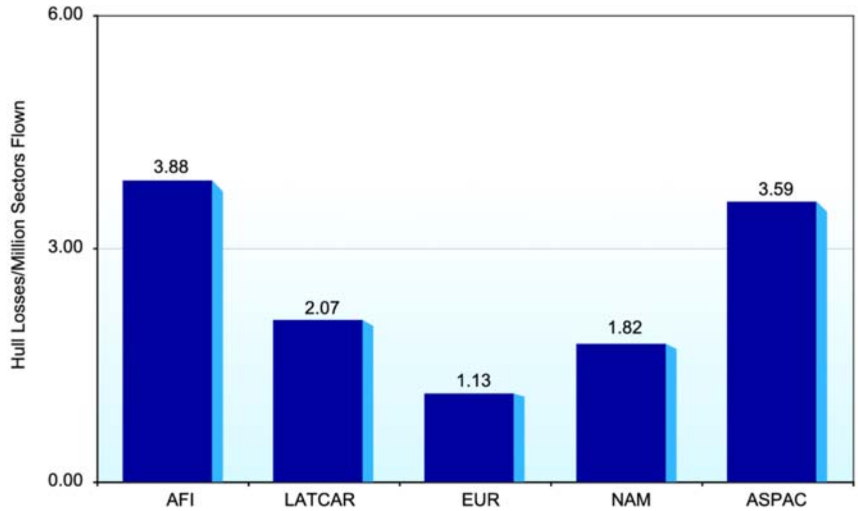


Figure 3.6
Western-built Turboprop Aircraft Loss Rate by Operator Region

The Western-built Turboprop aircraft loss rate by operator region in 2005 is presented in Figure 3.6

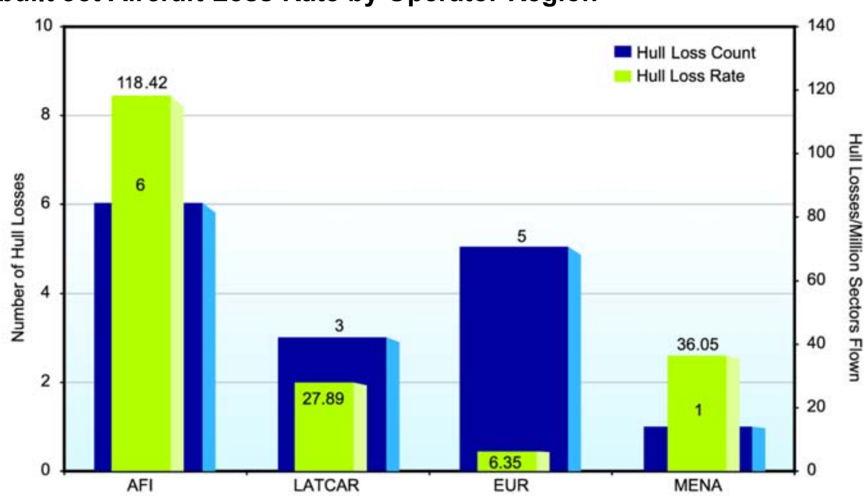


3.4.3 Eastern-built Aircraft Accidents By Operator Region

IATA has also obtained exposure data for the Eastern-built fleets, and the regional accident loss rate breakdown by operator region is presented in Figure 3.7.

Figure 3.7
Eastern-built Jet Aircraft Loss Rate by Operator Region

The regional accident loss rate breakdown by operator region is presented in Figure 3.7.



3.5 REGIONAL ACCIDENT ANALYSIS

3.5.1 AFI Region

In terms of Hull Loss rates by operator region for 2005, Africa has had, with respect to Western-built Jets, 9.21 Hull Losses per million sectors. This represents the highest rate of Hull Losses per million sectors of all operator regions. This continuing aspect is seen as a key safety concern for the immediate future.

A total of 20 accidents occurred in the region, which represents 18% of all the accidents in 2005. Of the 20 accidents that occured in AFI, a total of 6 accidents were Western-built Jet aircraft, 5 were Western-built Turboprop aircraft, 1 was Eastern-built Jet aircraft and 8 were Eastern-built Turboprop aircraft. Africa is an area that accounted for only 4.2% of all sectors flown for all fleets (Eastern and Western) in 2005. Also of note is that 9 of the 26 fatal accidents occurred in Africa, this is an increase from 24% in 2004 to 35% in 2005. The fatalities also increased in Africa for a total of 363 in 2005.

3.5.2 NAM and LATCAR Regions

The Hull Loss rates by operator region for Western-built Jet aircraft in North America are 0.19 Hull Losses per million sectors. The NAM region continues to have one of the lowest accident rates for Western-built Jet aircraft, and recorded only 2 Jet Hull Losses in 2005. This region recorded 25 aircraft accidents and 1 fatal accident was reported, which represents 4% of all the fatal accidents.

The Latin American Caribbean region has a rate by operator region of 2.59 Hull Losses per million sectors for Western-built Jet aircraft. There were a total of 15 aircraft accidents in 2005 for the LATCAR region, of which 3 were fatal accidents.

3.5.3 EUR and MENA Regions

Europe has a low Hull Loss rate by operator region for Western-built Jet aircraft of 0.33 Hull Losses per million sectors. Also, 18 accidents occurred in this region and 6 of these accidents were fatal in 2005.

The Middle East and North Africa region has the second highest Hull Loss rate by operator region after Africa with 3.84 Hull Losses per million sectors for the Western-built Jet aircraft. However, MENA recorded only 1 Jet Hull Loss in 2005. A total of 11 aircraft accidents occurred in the MENA region in 2005, of which 2 were fatal.

3.5.4 ASPAC and NASIA Regions

The Hull Loss rates by operator region for Western-built Jets in Asia Pacific are 1.00 Hull Losses per million sectors. The ASPAC region recorded 4 Jet Hull Losses in 2005. Also, 20 accidents occurred in this region and 5 of these accidents were fatal in 2005. The fatalities in this region is the second highest after AFI with 242 in 2005.

The North Asia region has no Hull Losses in 2005. There were a total of 2 aircraft accidents and no fatal accident was recorded for the NASIA region in 2005. This region has the lowest accident rate in 2005.

3.6 AIR CARGO ACCIDENT ANALYSIS (DEDICATED FREIGHTER AIRCRAFT)

The world's Jet cargo fleet size has increased from 1,687 in 2004 to 1,752 in 2005. The Turboprop fleet shows slight growth, with 794 aircraft in 2005 versus 822 in 2004. A total of 21 accidents involved cargo aircraft of Eastern and Western origin in 2005, representing 19% of all accidents in 2005, a decrease compared with the 2004 percentage (33%).

Focusing on Western-built Jet aircraft, 6 accidents occurred to cargo aircraft and 3 of the Western-built Jet aircraft Hull Loss accidents involved cargo operators. Table 3.7 presents cargo vs. passenger operations for Western-built Jet aircraft in 2005.

TABLE 3.7
Cargo vs. Passenger Operations for Western-built Jet Aircraft

	Fleet Size End of 2005	HL	HL per 1000 Aircraft	SD	Total	Operational Accidents per 1000 Aircraft
Cargo:	1752	3	1.71	3	6	3.42
Passenger:	15753	15	0.95	36	51	3.24
Total:	17505	18	1.03	36	57	3.26

Concerning the Western-built Turboprop aircraft, 5 accidents occurred to cargo aircraft and 4 of the Western-built Turboprop aircraft Hull Loss accidents are related to cargo operators. The cargo vs. passenger operations for Western-built Turboprop aircraft in 2005 is presented in Table 3.8.

TABLE 3.8
Cargo vs. Passenger Operations for Western-built Turboprop Aircraft

	Fleet Size End of 2005	HL	HL per 1000 Aircraft	SD	Total	Operational Accidents per 1000 Aircraft
Cargo:	794	4	5.04	1	5	6.30
Passenger:	3804	14	3.68	14	28	7.36
Total:	4598	18	3.91	15	33	7.18

3.7 FERRY FLIGHT ACCIDENT ANALYSIS

A total of 3 accidents occurred while ferrying aircraft in 2005, representing 2.7% of all accidents and down from 4.1% in 2004. The ferry accident distribution is 2 Western-built Jet aircraft accidents and 1 Western-built Turboprop aircraft accidents in 2005. None of the ferry accidents were fatal accidents.

3.8 OVERVIEW OF THE ANALYTICAL FINDINGS

- In 2005, the Hull Loss rate per million sectors for Western-built Jet aircraft fell from 0.78 per million sectors in 2004 to 0.76 per million sectors in 2005. The rate has been on a declining trend for the past 7 years.
- Among Western-built fleets, there were 8 fatal accidents involving Jet aircraft and 5 fatal accidents involving Turboprop aircraft. These accounted for 757 fatalities on board Jet aircraft and 70 on board Turboprop aircraft.
- Among Eastern-built fleets, there was 1 fatal accident involving Jet aircraft and 12 fatal accidents involving Turboprop aircraft. These accounted for 8 fatalities on board Jet aircraft and 200 on board Turboprop aircraft.
- There were 90 Western-built aircraft accidents (36 HL and 54 SD) and 21 Eastern-built aircraft accidents (15 HL and 6 SD).
- In Africa, the accident rate for Western-built aircraft was 9.2%, with 20 accidents, 9 of which were fatal.
- In Africa, 35% of the accidents involving Western and Eastern-built aircraft were fatal.
- In NASIA, there were only 2 accidents and no fatal aircraft accidents occurred.
- There were 21 accidents involving cargo aircraft (Western and Eastern-built), representing almost 20% of all the year’s accidents.
- A total of 3 accidents occurred while ferrying aircraft in 2005, which is an improvement of 2 over 2004.

4 ACCIDENT ANALYSIS 2005

4.1 DATA COLLECTION AND CLASSIFICATION

IATA collects accident data from official sources. The Accident Classification Task Force (ACTF) is composed of safety experts, accident investigators, aircraft manufacturers and other specialists who meet to classify operational accidents that occur during a given year.

In order to permit the classification of accidents, based on the data available at the time of the meeting, IATA has developed a classification system, which highlights contributing factors. These factors are grouped into four broad categories: human, organisational, environmental and technical. Each of the categories is subdivided into more concise contributing factors. Accidents are generally the result of a combination of factors. Therefore, one accident may be attributed several factors from various categories.

The assignment of the classifications is based on a subjective assessment of the contributing factors that are believed to have played a contributing role in an accident. The early classification of accidents, prior to the release of the accident investigation report, can help identify threats in the aviation industry and help develop prevention strategies to avoid their reoccurrence.

Every year, the ACTF comes across reports, which contain little or no information regarding an accident. Reporting cultures in certain areas of the world, or in certain types of operations continue to be deficient or non-existent. This impedes the classification process and prevents the industry from learning lessons from an event. If an accident contains insufficient information, the contributing factors cannot be assessed. In this type of scenario, the ACTF assigns the event the code "insufficient data".

4.1.1 Application of the Threat and Error Management Model

The Human Factors Research Project at The University of Texas at Austin developed the Threat and Error Management (TEM) framework as one approach to interpret data obtained from both normal and abnormal operations. IATA has worked closely with The University of Texas at Austin Human Factors Research Team and the International Civil Aviation Organisation (ICAO) to apply TEM to IATA's safety activities.

The TEM framework helps to underline the classification system used by IATA to determine contributing factors in accidents. These factors can be viewed as threats or as errors depending on their nature. Figure 4.1 illustrates the TEM framework.

Figure 4.1
Threat and Error Management Framework

Threats are situations external to the flight deck that must be managed by flight crews in everyday operations. These threats can endanger flight safety and increase the complexity of operations. Threats can be expected or unexpected. Foreseen adverse weather can be an expected threat; a landing gear malfunction can be an unexpected one. Thus, contributing factors in the environmental, organisational and technical categories are all threats because they occur outside the flight deck control but must be managed by the flight crew.

The human factors category, on the other hand, defines errors committed by the flight crew. An error is defined as an action taken by the operating flight crew, or lack thereof, which leads to deviations from their expectations or intentions, or from those of the organisation. IATA's system for assigning contributing human factors is based on the TEM framework. The new subcategories are believed to better assess flight crew performance and to allow a deeper understanding of the human elements that contribute to an accident. The human factors category is now subdivided into five subcategories, tagged H1 through H5: intentional non-compliance, proficiency errors, procedural errors, communication errors, and fatigue / pilot incapacitation. The definitions of the new human factors categories are presented in Annex 1.

If a crew manages a threat, it can alleviate an undesired situation and render the threat inconsequential. However, if the situation is mismanaged, the flight crew may commit errors. Depending on the flight crew's response following an error, the situation may be resolved, further errors may be produced or the aircraft may be placed in an undesired state. An undesired aircraft state occurs when the flight crew's actions or inactions place the aircraft in a situation in which margins of safety are reduced. It should be noted that not all threats or errors set-off chain reactions that result in an accident.

4.1.2 Accident Data and the Analysis of Contributing Factors

IATA's analysis of preliminary accident data and of the contributing factors attributed to each event allows the unveiling of areas of concern that pose a risk to the safe operation of aircraft. The early identification of operational threats and flight crew errors can assist to adequately develop prevention strategies in hope of diminishing the accident rate.

The following section presents the findings from the 2005 accidents analysed by the ACTF. The data analysed is presented under Jet and Turboprop aircraft, regardless of the origin of the manufacturer.

4.1.3 Breakdown into Operating Categories

In order to better understand particular safety issues and target recommendations towards specific types of operators, the ACTF decided to break down the accidents of 2005 by operating categories.

The group classified the operators according to the criteria presented in Table 4.1.

TABLE 4.1
Operating Categories Breakdown

Legacy Carrier	Conventional, scheduled operator, typically a flag carrier or network carrier. Provides services such as connecting flights, booking via travel agency, or at the airline, etc. Typically Part 121 operator or equivalent.
On behalf	Operator under the code / in livery of a larger airline. Can be an affiliate or subsidiary. Also, an airline owned 100% by some other operator.
Low Cost / Charter	No-frill airline / Low Cost Airline - typically, no transfer services. No external reservation system through travel agencies, or Charter Airline.
Air Taxi or Part 135 Commuters	Self-explanatory.
Cargo Carrier - Part 121 Operation or equivalent	Self-explanatory.
Cargo Carrier - Part 135 Operation or equivalent	Self-explanatory.
Other	None of the above / not assignable.

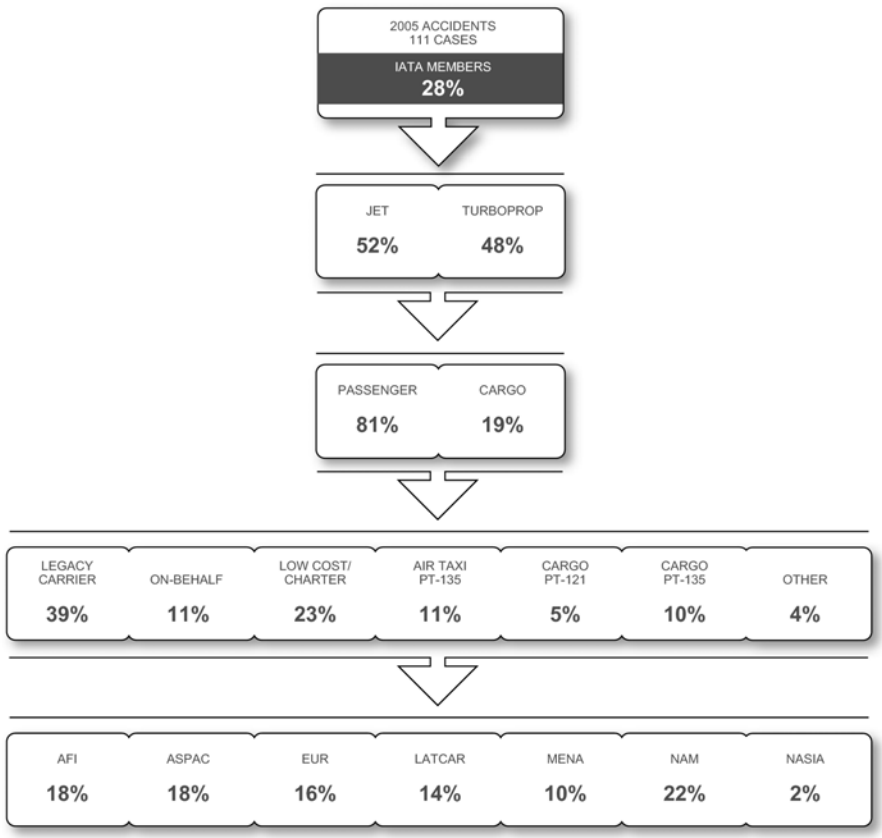
Note:
A cargo operation acting on behalf of another operator is (by definition) classified as an on-behalf operation.

4.2 OVERVIEW OF THE 2005 ACCIDENTS

In 2005, 52% of accidents involved Jet aircraft, 16% were fatal and 33% resulted in a Hull Loss. In contrast, 48% of accidents involved Turboprop aircraft, 32% were fatal and 60% resulted in a Hull Loss. However, it would be wrong to draw the conclusion that jets are less safe compared to turboprops, considering the much higher number of jet aircraft operating today.

The following diagram illustrates the overall Jet and Turboprop aircraft events (Figure 4.2). The top box presents the number of carriers involved in the accidents, including what percentage involved IATA Member Airlines.

Figure 4.2
2005 Accidents Diagram



Accidents rarely occur as a result of one single factor. They are generally the result of several contributing factors that can combine to create an accident sequence. To determine how factors interact and develop adequate prevention strategies, the ACTF has analysed correlations with the purpose of establishing the relationship between human, organisational, environmental and technical factors that contributed to the accidents of 2005.

Note:
The classification breakdown has changed over the years. Therefore, the 2005 data should not be compared to the data in the previous reports.

For this section of the report, the ACTF analysed contributing factors based on positive correlations and correlations. These are defined as follows:

- Positive Correlation: factors were present in over 50% of cases analysed.
- Correlation: factors were present in less than 50% of cases analysed.

4.2.1 Accidents Involving Jet Aircraft

Most significant factor(s) in Jet aircraft events:

- Flight crew proficiency issues: 38%
- Flight crew training deficiencies: 34%
- Deficient flight crew communication: 31%
- Adverse weather: 29%
- Deficient airport facilities: 17%

Correlation between:

- Flight crew proficiency issues, flight crew training deficiencies and adverse weather. Also a positive correlation between these factors and Legacy carriers.
- Flight crew proficiency errors and poor standards and checking.
- Deficient flight crew communication, adverse weather and inadequate airport facilities.
- Deficient airline safety management and poor regulatory oversight.

4.2.2 Accidents Involving Turboprop Aircraft

Most significant factor(s) in Turboprop aircraft events:

- Flight crew proficiency issues: 36%
- Flight crew training deficiencies: 30%
- Adverse weather: 30%
- Procedural errors by flight crew: 25%
- Poor standards and checking: 25%

Correlation between:

- Positive correlation between poor safety management and weak regulatory oversight.
- Flight crew proficiency issues, flight crew training deficiencies and adverse weather.
- Flight crew proficiency errors, poor standards and checking and weak regulatory oversight.
- Deficient flight crew communication, flight crew training deficiencies and adverse weather.

The most frequently noted contributor in accidents involving both Jet and Turboprop aircraft in 2005 was deficient flight crew proficiency. Proficiency issues relate to flight crew performance failures due to deficient knowledge or skills (e.g. inappropriate handling of the aircraft). This may be exacerbated by lack of experience, knowledge or training.

Flight crew training systems deficiencies were also noted in over a third of accidents involving Jet aircraft and 30% of Turboprop accidents. This factor refers to omitted or inadequate training, language skills deficiencies, qualifications and experience of flight crews, operational needs leading to training reductions, insufficient assessment of training, and inadequate training resources such as manuals or Computer-based Training (CBT) devices.

Flight crew communication issues were highlighted in almost a third of Jet aircraft accidents. These issues include miscommunication, misinterpretation or failure to communicate pertinent information within the flight crew or between the flight crew and an external agent (e.g. Air Traffic Control or ground operations). Crew Resource Management (CRM) issues typically fall under this category. Examples include failures in monitoring and cross-checking, misunderstanding a clearance, or failure to convey relevant operational information.

Adverse weather was among the top five contributing factors in both Jet and Turboprop aircraft accidents, noted in over a quarter of events. This factor includes windshear, jet upset, atmospheric turbulence, icing, wake turbulence (aircraft spacing), volcanic ash, sand, precipitation, lightning, poor visibility and poor runway condition reporting.

Deficient airport facilities, such as inadequate aerodrome support, failure to eliminate runway hazards and inadequate or misleading airport marking or information were also noted among the top five contributing factors in Jet aircraft accidents in 2005.

Procedural errors by flight crewmembers were cited in a quarter of Turboprop accidents. Procedural errors involve an unintentional deviation in the execution of operator procedures and/or regulations. The flight crew has the necessary knowledge and skills, the intention is correct, but the execution is flawed. It may also include situations where flight crews forget or omit relevant appropriate action. Examples include a flight crew dialling a wrong altitude into a mode control panel or a flight crew failing to dial an altitude in a mode control panel. In contrast, procedural errors did not feature in the top five contributing factors for Jet aircraft accidents.

Poor standards and checking also featured in a quarter of the Turboprop aircraft accidents. This factor includes: inadequate, incorrect, unclear 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. This factor was not among the top five for Jet aircraft accidents.

In 36% of events where flight crew proficiency issues were noted, inadequate training of these flight crews and adverse weather were also contributing factors. The same correlation was noted in Turboprop events. Half of the events on Jet aircraft, which featured a combination of these three factors, involved legacy carriers.

In a third of Jet events that comprised flight crew proficiency errors, poor standards and checking by the operator were also noted. This correlation was also noted in Turboprop accidents.

Analysis also determined a link between accidents that involved deficient airline safety management and poor regulatory oversight by the State of the operator for both Jet and Turboprop accidents.

Note:
9% of the Jet aircraft accidents and 21% of the Turboprop accidents could not be classified due to insufficient information.

4.2.3 Accidents by Phase of Flight

Figure 4.3 presents the 2005 operational accidents by phase of flight for both Jet and Turboprop aircraft. Overall, landing was the predominant phase when accidents occurred. The majority of accidents resulting in a Hull Loss or Substantial Damage also took place during landing.

Figure 4.3
Operational Accidents by Phase of Flight

Figure 4.3 presents the 2005 operational accidents by phase of flight for both Jet and Turboprop aircraft.

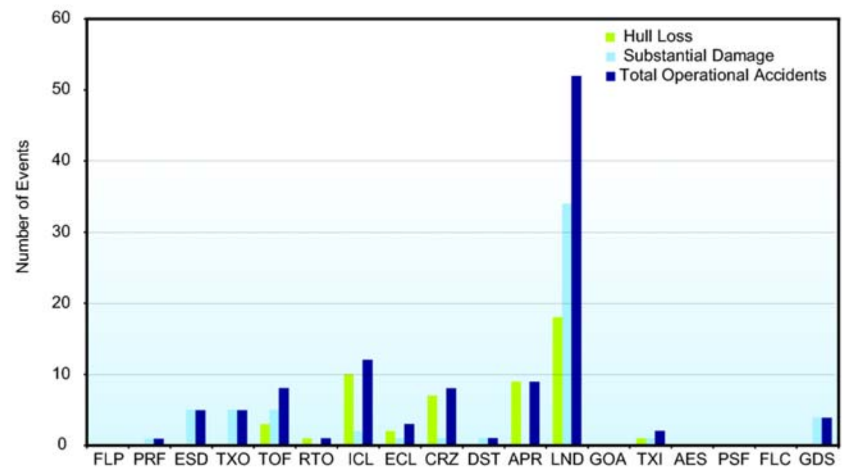
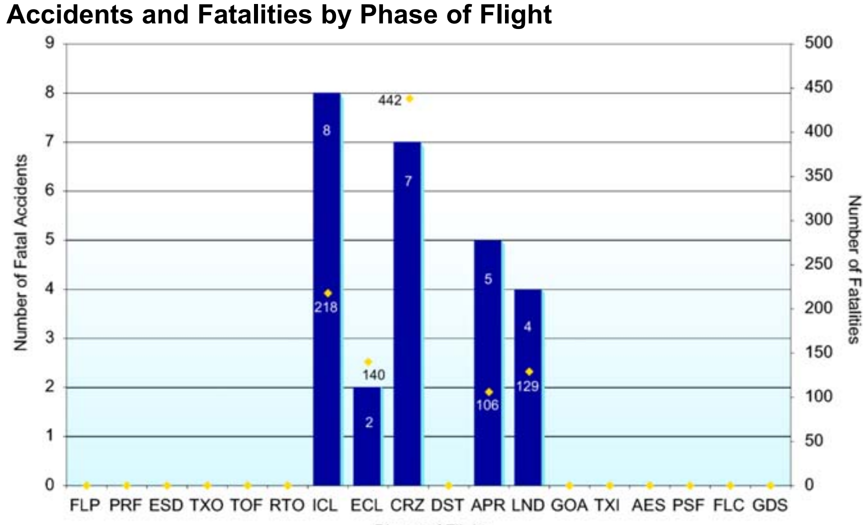


Figure 4.4 illustrates fatal accidents and fatalities by phase of flight for all Jet and Turboprop aircraft. The majority of fatal accidents occurred during initial climb and cruise. The greatest number of fatalities occurred during cruise.

Figure 4.4
Fatal Accidents and Fatalities by Phase of Flight

Figure 4.4 illustrates fatal accidents and fatalities by phase of flight for all Jet and Turboprop aircraft.



4.3 IN-DEPTH ANALYSIS OF EVENTS

4.3.1 Accident Families

This section presents an in-depth analysis of the 2005 events by accident families. The term "accident families" refers to a generic classification of accidents, as presented in Figure 4.5. Table 4.2 illustrates the breakdown of families in relation to severity and probability of occurrence.

Figure 4.5
Accident Families

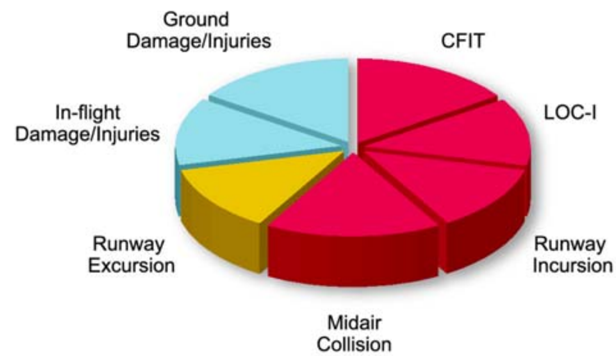


TABLE 4.2
Classification of Accident Families

Accident Family	Description
Controlled Flight into Terrain (CFIT)	Generally a Total Loss (aircraft & occupants) ● Maximum severity ● Low probability
Loss of Control In-flight (LOC-I)	
Runway Incursion	
Midair Collision	
Runway Excursion	Possible Hull Loss and historically few fatalities ● Low severity ● Higher probability
In-flight Damage / Injuries	High costs (remote fatalities) ● Low (high) severity ● Higher probability
Ground Damage / Injuries	

Referring to these families helps an operator to:

- Structure its safety activities and set priorities.
- Avoid “forgetting” key risk areas, when a type of accident does not occur in a given year.
- Mobilise concerned people around well-identified prevention opportunities.
- Be more proactive by creating links in databases between safety reports and generic accident families.
- Address systematically and continuously these accidents in the airline’s annual prevention programme.

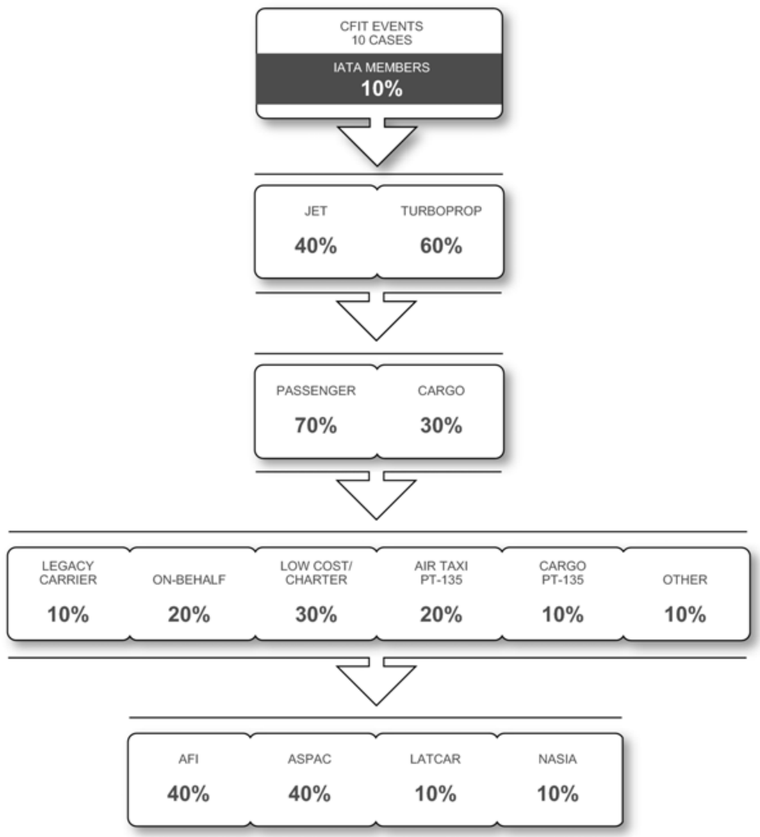
Although some families may not have appeared in the 2005 accidents, operators should not dismiss efforts needed to prevent these types of events as they may reoccur if work to develop awareness and prevention strategies is weakened.

Each of the accident families presented in this section contains a breakdown of the most significant contributing factors, as well as the correlations established between the predominant contributors.

4.3.2 Controlled Flight Into Terrain

In 2005, 9% of all accidents involved a Controlled Flight Into Terrain (CFIT). In total, 70% were fatal and 90% resulted in a Hull Loss. The majority (60%) of events involved Turboprop aircraft. The following diagram illustrates the CFIT events (Figure 4.6).

Figure 4.6
CFIT Diagram



Most significant factor(s) in CFIT events:

- Adverse weather: 70%
- Flight crew proficiency issues: 50%
- Deficient flight crew communication: 50%
- Flight crew intentional non-compliance: 40%
- Absence of technology / equipment: 40%

Positive correlation between:

- Absence of technology and equipment on board aircraft and adverse weather.
- Flight crew intentional non-compliance and deficient airline safety management.
- Flight crew proficiency issues, absence of technology and equipment on board aircraft and adverse weather.
- Deficient flight crew communication, inadequate training systems at the airline and adverse weather.
- Absence of technology / equipment on board aircraft and poor regulatory oversight.
- Correlation between deficient flight crew proficiency, inadequate standards and checking at the airline and poor regulatory oversight.

Adverse weather played a contributing role in the majority of CFIT events. All the CFIT accidents involving aircraft that were not equipped with adequate technology or equipment (e.g. E-GPWS) occurred in adverse weather conditions.

Flight crew proficiency issues were noted in half of the CFIT events. In 60% of accidents where flight crew proficiency played a role, adverse weather conditions and the absence of technology or equipment on board aircraft were also noted as contributing factors. The correlation between deficient flight crew proficiency and the absence of technology was predominant in accidents involving low cost / charter operators.

Overall, proficiency issues were also linked to poor standards and checking amongst operators of States where regulatory oversight is weak. Poor oversight by the State of the operator was also associated to the majority of CFIT accidents involving aircraft without adequate technology / equipment, such as E-GPWS.

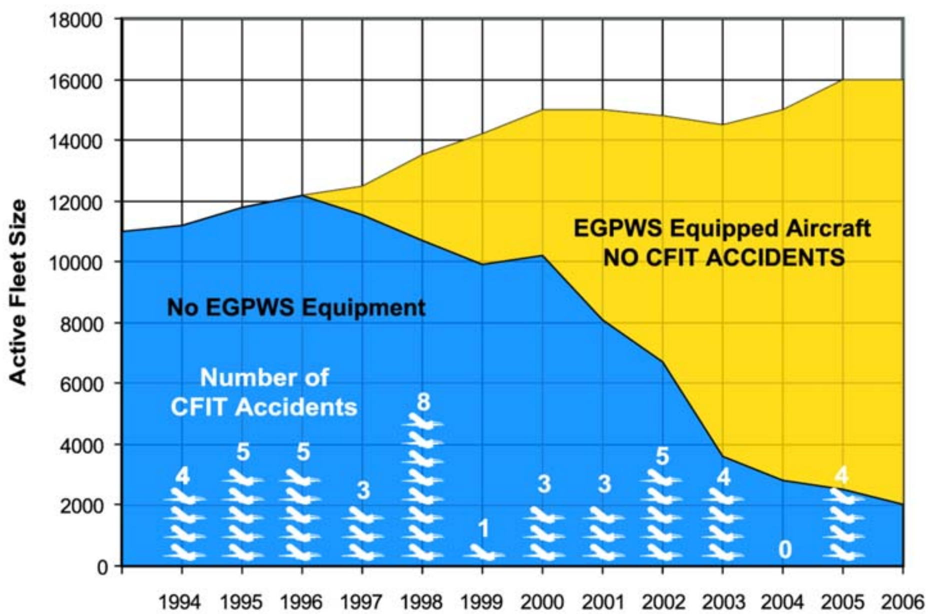
Note:
20% of CFIT accidents could not be classified due to insufficient information.

4.3.2.1 Enhanced-Ground Proximity Warning System (E-GPWS)

Since E-GPWS equipment was first installed in 1996, the World's fleet fitted with E-GPWS has grown to 81% of the fleet with over 300,000,000 departures and no CFIT accident yet.

Since 1996, approximately 30 large commercial jet aircraft have been involved in CFIT accidents, none fitted with E-GPWS, as shown in Figure 4.7.

Figure 4.7
GPWS Versus E-GPWS Active World's Large Commercial Jet Fleet



Ground Proximity Warning Systems (GPWS) have been widely fitted on commercial transport aircraft for a considerable time and are successful in preventing many Controlled Flight Into Terrain (CFIT) accidents. A major drawback of GPWS is that it is based on aircraft radio altimeters and gives very little warning of approaching terrain. Furthermore, it is inhibited in the landing configuration (i.e. gear down and flaps selected).

E-GPWS has been designed to overcome these limitations providing flight crews with more warning of approaching terrain in time for them to take corrective action. The system consists of a global terrain database; a data feed from the aircraft air data computers, a Global Positioning System (GPS) input from the aircraft GPS, or an internal GPS in the E-GPWS computer itself. Another choice is to use data from the Flight Management System (FMS).

The E-GPWS unit combines the aircraft current position with the terrain database and presents the information to the crew on the navigation display, giving a picture of terrain relative to the aircraft. 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 gives the flight crew visual and aural warnings of proximity to terrain. When a hazardous condition occurs, a nominal of 60 seconds of alert is given by an aural “terrain” message, followed with a nominal 30 seconds of warning to “pull up”.

The latest information regarding E-GPWS (provided by Honeywell) is presented in Table 4.3.

TABLE 4.3
E-GPWS Information, as of March 2005

Aircraft Fitted and Flying with E-GPWS	35,000 +	
Worldwide Large Commercial Jets	13,500 + of 16,000 aircraft	84%
Europe	3,500 aircraft	100%
USA	6,300 aircraft **	100%
Regional USA	1,500 aircraft	100%
Air Taxi-Cargo Part-135	1,000 of 1,500 aircraft	65%
Business / Corporate / Other	9,000 of 10,000 * aircraft	90%
Delivered E-GPWS Computers	40,000 +	
Flight Sectors Flown	Exceeds 300,000,000	
Audited Flight Sectors	Exceeds 6,800,000	
* includes approx. 2500 + TAWS provided by other manufacturers		
** 1,100 with no GPS		

Figure 4.7 indicates the increase in the number of aircraft fitted with E-GPWS and the related decrease in the number of CFIT accidents. In fact, no aircraft equipped with E-GPWS has had a CFIT accident. 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 is kept up to date. This is leading to a growing concern that there may eventually be a CFIT accident to an aircraft capable of avoiding a CFIT accident because an E-GPWS with outdated information provides a mislead-ing sense of comfort. To get the most CFIT risk reduction from E-GPWS, the airline needs to provide GPS position to the E-GPWS unite and use the latest software and database.

GPS: There are approximately 6,333 aircraft using a GPS engine internal to E-GPWS. The airline needs to pin up by means of a rear jumper Geometric Altitude (Airbus only) obstacles, and peaks. Every E-GPWS has these safety functions built-in and they are available free from Honeywell.

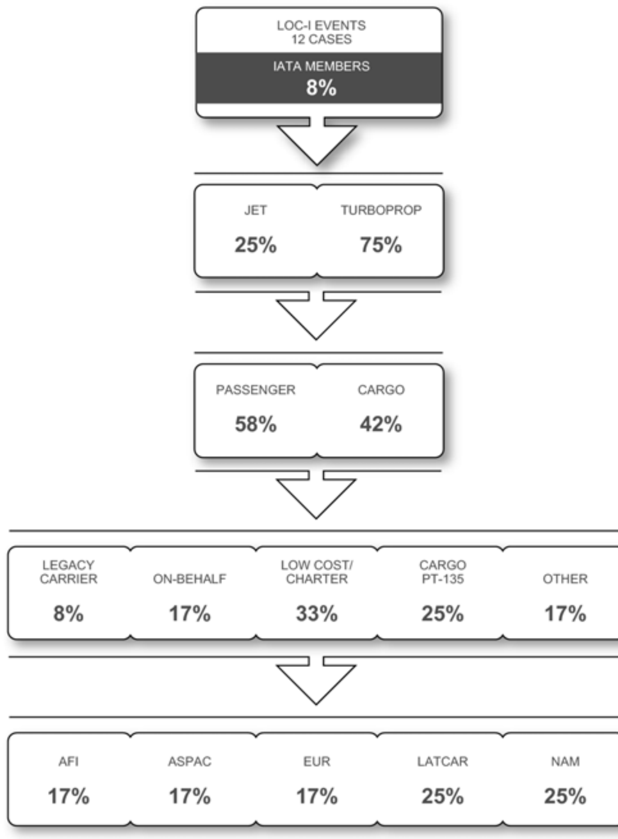
Software: The software is also free, but needs to be updated by a PCMCIA card. Unfortunately, if the airline received the E-GPWS installed by Airbus or Boeing, they have to coordinate with them, unless the airline uses an E-GPWS that was installed using an amended Supplemental Type Certificates.

Database: It is discouraging to learn that many airlines have never updated their E-GPWS database since they first installed the E-GPWS equipment. It is important to keep the Terrain / Obstacle / Runway WGS-84 data-base current. It is provided free of charge from Honey-well and can be downloaded from their website www.egpws.com with a simple arrangement or on a PCMCIA card from Honeywell. Airlines can also sign up to receive email notifications when new databases are released. The PCMCIA card is inserted into the front of the E-GPWS computer (power on) installed on the aircraft and the front panel button pressed and the database is loaded within 30 minutes.

4.3.3 Loss of Control In-flight

During 2005, 11% of the accidents involved a Loss of Control In-flight (LOC-I), 75% of these were fatal and all resulted in a Hull Loss. The following diagram illustrates the LOC-I events (Figure 4.8).

Figure 4.8
LOC-I Diagram



Most significant factor(s) in LOC-I events:

- Flight crew proficiency issues: 67%
- Flight crew training deficiencies: 58%
- Poor standards and checking: 50%
- Deficient flight crew communication: 42%
- Poor regulatory oversight: 42%

Positive correlation between:

- Engine failure, flight crew proficiency issues and training deficiencies.
- Poor standards and checking, weak regulatory oversight by State of the operator.
- Inadequate flight crew selection systems and poor regulatory oversight by the State of operator.
- Deficient flight crew communication and training issues.
- Inadequate selection systems and low cost carriers.

Flight crew proficiency issues and deficient training systems were the main contributing factors in LOC-I events. These were generally associated with one another. Deficient communication on the part of the flight crew was also linked to inadequate training on the part of the operator.

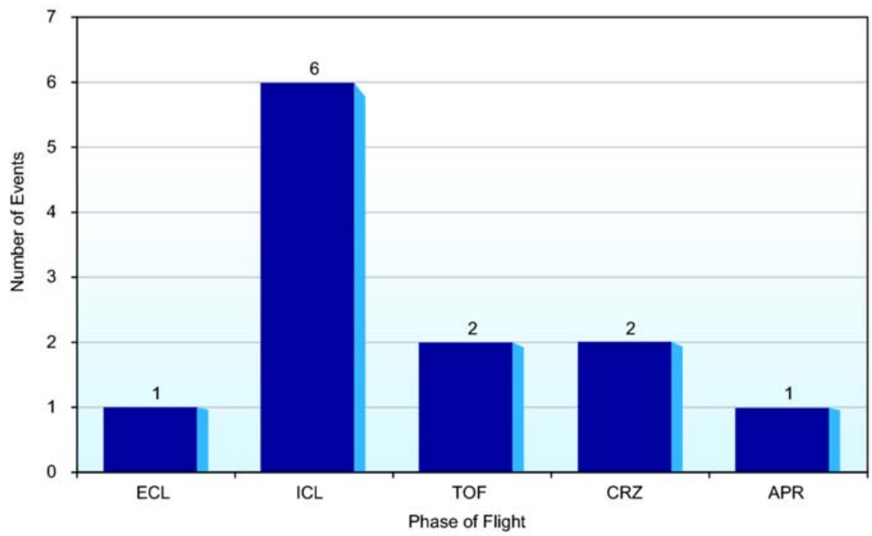
Poor flight crew training and the proficiency issues were noted in the majority of cases (67%) where an engine failure occurred. Based on the data analysis and discussions of the TF, there seems to be a misconception among pilots when handling an aircraft at slow speeds close to stall or in a stall. A fully stalled aircraft might not recover when techniques from approach to stall-recoveries are applied. Also, there seems to be a misconception among training departments about the capabilities of level "D" simulators. Simulators typically are not representative at the extremes of the flight envelope. When stall training is conducted at extrapolated airspeed-altitude combinations, the simulator might not be representative of the real aircraft.

Weak regulatory oversight by the State of the operator was noted in over 40% of LOC-I events. Accidents involving airlines that had poor standards and checking and inadequate selection systems for their flight crewmembers were associated to poor oversight by the State of the operator. The combination of these factors was predominant amongst low cost / charter airlines.

None of the top contributing factors cited in LOC-I events were of a technical nature.

Initial climb was the main phase of flight during which loss of control occurred. Overall, 50% of LOC-I events took place during this phase. Figure 4.9 illustrates LOC-I events by phase of flight.

Figure 4.9
LOC-I Events by Phase of Flight



4.3.4 Runway Excursions

During 2005, 24% of the accidents involved a Runway Excursion (RE), of which 8% were fatal and 42% resulted in a Hull Loss.

The majority of RE events (89%) occurred during landing. The remaining events occurred during other phases (e.g. Rejected take-off). The following diagram illustrates the RE events (Figure 4.10).

Figure 4.10
RE Diagram

Most significant factor(s) in RE events:

- Adverse weather: 38%
- Flight crew proficiency issues: 35%
- Procedural errors by flight crew: 35%
- Flight crew training deficiencies: 27%
- Deficient airport facilities: 27%

Positive correlation between:

- Flight crew proficiency issues, training deficiencies and legacy carriers.
- Deficient flight crew communication, training deficiencies and adverse weather.

Correlation between:

- Flight crew procedural errors, adverse weather and deficient airport facilities.
- Flight crew procedural errors, poor standards and checking and adverse weather and legacy carriers.
- Flight crew proficiency issues, training deficiencies and adverse weather.

In many cases, a combination of adverse weather, flight crew proficiency issues and inadequate training contributed to runway excursions. Likewise, communication issues between flight crewmembers or between them and an external agent (e.g. ATC) combined with poor training and meteorological factors resulted in runway excursions.

In a third of the accidents involving flight crew procedural errors, poor standards and checking at the airline and adverse weather were also cited. A correlation was also noted between procedural errors, adverse weather and inadequate airport facilities. Inadequate airport facilities included, for example, hazardous overrun areas that contributed to the severity of the excursion or fatalities on board the aircraft.

The majority of these correlations were apparent amongst legacy carriers. Overall, 38% of RE events involved this type of operation.

Deficient cabin operations were noted as contributing factors in certain RE events. In these cases, the mismanagement of the evacuation by the cabin crew following the excursion was linked to the subsequent fatalities. For example, cabin crew used emergency exits without assessing exterior conditions. This led to passengers exiting into water or debris, which resulted in their deaths.

On the other hand, the proper use of oral commands (e.g. bracing during the skid as the aircraft departed the runway) and the efficient evacuation of passengers through usable exits were noted as a key factors that prevented fatalities in certain runway excursions.

Note:
31% of runway excursion accidents could not be analysed due to insufficient information.

4.3.5 Runway Incursions

One event involving a runway incursion took place in 2005. An aircraft landed on a runway being blocked by another aircraft that had performed an emergency landing some short time prior to the accident. Inadequate instructions by Air Traffic Control, flight crew communication errors as well as training and standards and checking issues at the airline were all cited as contributing factors in the event.

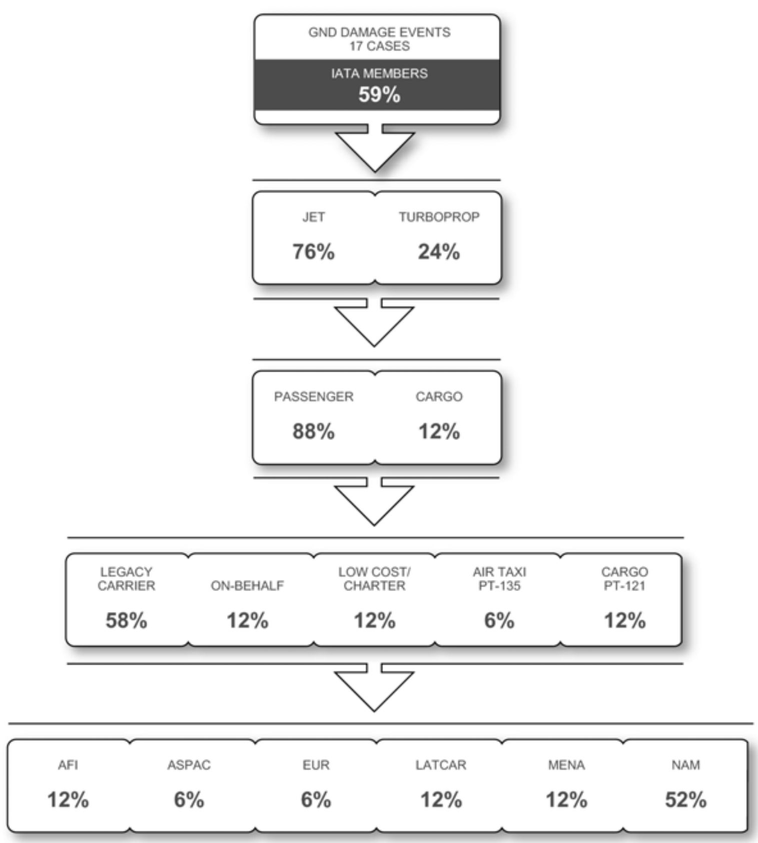
4.3.6 Midair Collisions

There were no events involving a midair collision between aircraft in 2005.

4.3.7 Ground Damage

In 2005, 15% of accidents involved ground damage from collisions between aircraft or with service vehicles or structures. None of these events resulted in on board fatalities. However, 6% of accidents resulted in a Hull Loss. The following diagram illustrates the ground damage events (Figure 4.11).

Figure 4.11
Ground Damage Diagram



Most significant factor(s) in ground damage events:

- Deficient ground operations: 41%
- Inadequate air traffic services: 18%
- Inadequate oversight of change: 12%
- Engine failure / malfunction / fire warning: 12%
- Deficient airport facilities: 12%

Correlation between:

- Positive correlation between deficient ground operations and legacy carriers.
- Correlation between ground damage events and North American airports.

The majority of ground damage events involved deficiencies relating to ground operations. Inadequate oversight of change by the operator was cited in 12% of ground damage events. In these cases, the operator recently outsourced ground handling services that were previously a part of its operation and ground crew proficiency issues played a contributing role in the accident.

Inadequate air traffic services (e.g. misleading instructions) contributed to ground collision events. Deficiencies in airport facilities, such as inadequate aerodrome support, failure to eliminate runway hazards, inadequate or misleading airport marking or information also played a role in ground accidents.

Some of the ground events involved a loss of control on the ground, which resulted from engine failures / malfunctions.

Overall, legacy carriers were the main type of operators involved in ground damage events. It should also be noted that this accident family affected IATA Member Airlines in particular. The majority of ground damage events occurred at North American airports.

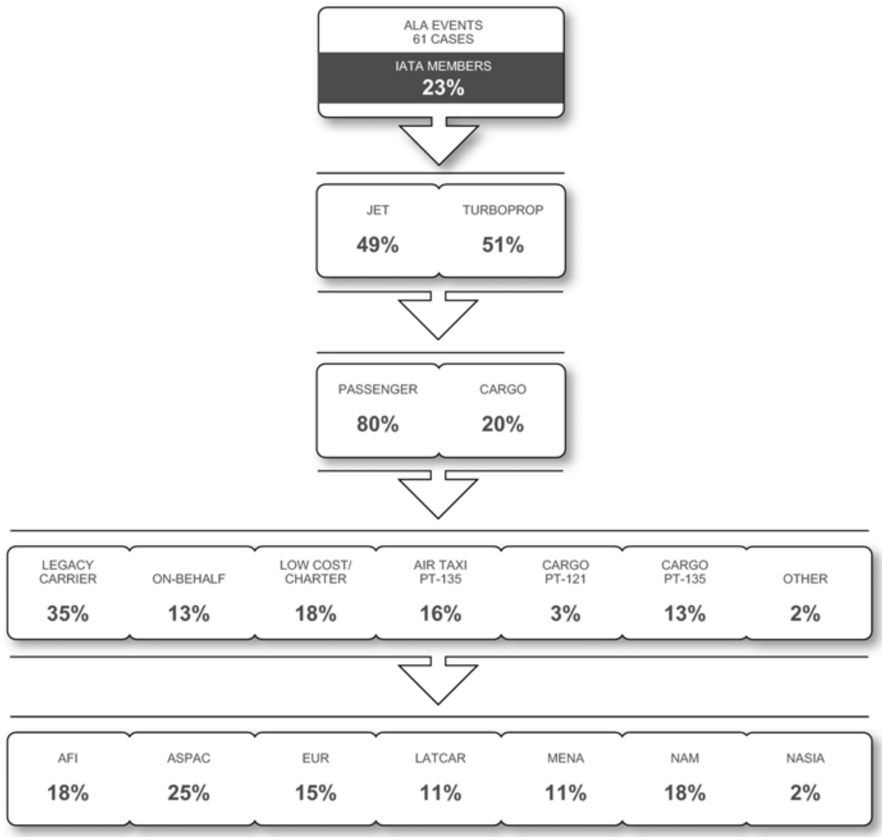
A further analysis of Ground Damage incidents derived from STEADES is included on the CD-ROM enclosed at the end of this report.

4.4 OTHER AREAS OF INTEREST

4.4.1 Approach and Landing Accidents

During 2005, 55% of the accidents occurred during the approach and landing phases of flight. Overall, 15% of the Approach and Landing Accidents (ALA) were fatal and 44% resulted in a Hull Loss. The following diagram illustrates the ALA events (Figure 4.12).

Figure 4.12
ALA Diagram



Most significant factor(s) in ALA events:

- Flight crew proficiency issues: 46%
- Adverse weather: 46%
- Flight crew training deficiencies: 41%
- Deficient flight crew communication: 31%
- Procedural errors by flight crew: 30%

Correlation between:

- Flight crew proficiency issues, deficient training and adverse weather.
- Also between these factors and Legacy carriers.
- Flight crew procedural errors, poor standards and checking and adverse weather.
- Flight crew proficiency errors, adverse weather and deficient airport facilities.
- Deficient flight crew communication, inadequate training and poor regulatory oversight.

A breakdown of runway excursion events demonstrated that in 43% of accidents featuring flight crew proficiency issues, deficient training on behalf of the operator and adverse weather conditions also played a contributing role. These factors were apparent in accidents where flight crews overestimated the stopping performance of aircraft in contaminated runway environments. In certain situations where weather quickly deteriorated, flight crews did not have in their possession the most recent update on runway conditions.

As seen in section 4.3.4, there were multiple runway excursions in 2005. Several landing accidents occurred following a touchdown well outside the touchdown limit under difficult situations (e.g. in adverse weather). It seems that on long runways touchdowns outside of the touchdown zone, the perception of flight crews is that a long touchdown is not critical to safety. Such a mindset, however, could create a wrong perception and trigger a chain of events under challenging conditions, such as heavy rain, a contaminated runway, shifting wind conditions, etc., that result in an accident on landing. In 44% of the cases where flight crew proficiency errors where cited, poor standards and checking on the part of the operator and adverse weather were also contributing factors to the accident chain. Findings from accident analysis reflect the findings of incident analysis conducted from reports in the STEADES database. The third issue of the 2005 STEADES Report featured an article on high energy / unstable approaches. Adverse weather was cited as a contributing factor in many of the incidents. A complete version of the article is presented in the CD-ROM enclosed at the end of this report.

Aircraft departing the runway jeopardised the safety of the passengers and crew when they entered unsuitable overrun areas. Unsuitable overrun areas included uneven terrain, trenches or obstacles (e.g. concrete structures). In a third of the cases where flight crew proficiency errors (e.g. touchdown outside the touchdown zone) where cited, adverse weather and deficient airport facilities (e.g. inadequate overrun areas) were also contributing factors to the accident chain.

A special case of go-arounds is the rejected landing (discontinuing the landing when already below decision altitude). Analysis of the ALA events showed that accidents could have been prevented had the flight cew decided to initiate a go-around below MDA or even after touchdown, before reverse thrust was selected.

The third issue of the 2005 STEADES Report featured an article that discussed the results of an IATA survey on go-around policies. A complete version of the article is presented in the CD-ROM enclosed at the end of this report.

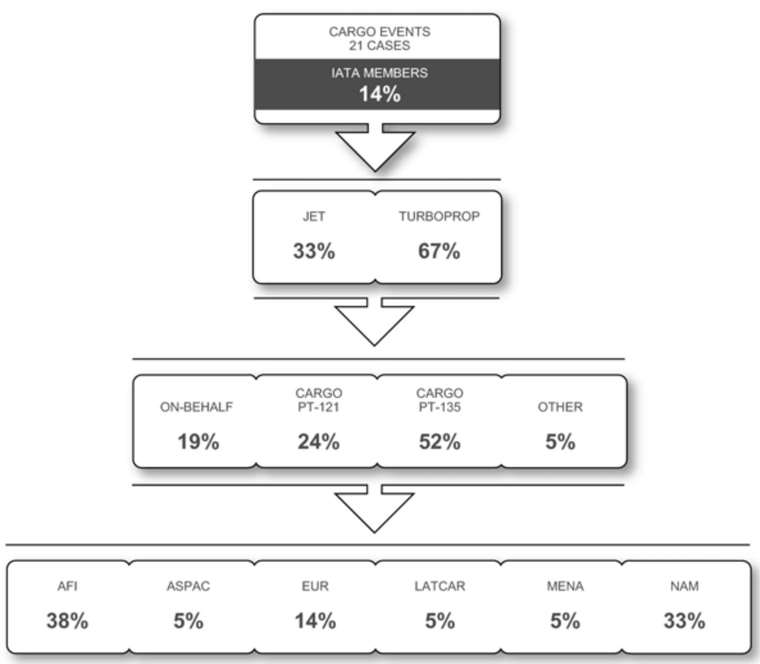
Training by the operator should not limit itself to aircraft handling. It should also focus on the decision-making process, which the task force feels is crucial to prevent ALA accidents. Simulator training where the simulator instructor initiates a go-around by a "go-around" callout or where the situation seems obvious (such as the presence of a vehicle on an active runway) has benefit with respect to aircraft handling but does not allow flight crewmembers to develop appropriate decision-making skills necessary on the line.

Note:
15% of ALA accidents could not be analysed due to insufficient information.

4.4.2 Cargo Operations

In 2005, 19% of the accidents involved cargo operators, of which 38% were fatal and 67% resulted in a Hull Loss. Overall, 14% of cargo accidents involved a CFIT. The following diagram illustrates the cargo operations events (Figure 4.13).

Figure 4.13
Cargo Operations Diagram



Most significant factor(s) in cargo events:

- Flight crew training deficiencies: 48%
- Poor standards and checking: 43%
- Flight crew proficiency issues: 38%
- Adverse weather: 38%
- Deficient flight crew communication: 33%
- Procedural errors by flight crew: 33%

Positive correlation between:

- Flight crew proficiency issues, deficient training and adverse weather. Also between these factors and Cargo 135 carriers.
- Flight crew procedural errors and deficient standards and checking at the airline. Also a positive correlation

between these two contributing factors and poor regulatory oversight. Also, between flight crew procedural errors, deficient standards and cargo 135 operators.

- Lack of safety management, poor regulatory oversight and cargo 135 operators involved in cargo accidents in 2005.

Correlation between:

- Flight crew proficiency issues, selection systems at the operator and cargo 135 operators.

Flight crew proficiency issues were linked to deficient training and adverse weather in over half (63%) of cargo accidents. This correlation was predominant amongst Part 135 (or equivalent) cargo operators. Overall, 60% of accidents that featured these three factors combined involved this type of operation.

In 71% of cases where flight crew procedural errors where cited, poor standards / checking at the airline was also considered a contributing factor. The combination of these two factors was mainly observed in States where regulatory oversight was considered unsatisfactory.

Once again, flight crew procedural errors and inadequate standards and checking were mostly noted (80%) amongst Part 135 (or equivalent) cargo operators. Overall, 52% of all the cargo accidents involved Part 135 (or equivalent) cargo operators.

From an organisational perspective, the application of poor selection systems when recruiting flight crewmembers was linked to proficiency issues on the part of the operating crews involved in cargo accidents, particularly amongst Part 135 (or equivalent) cargo operators.

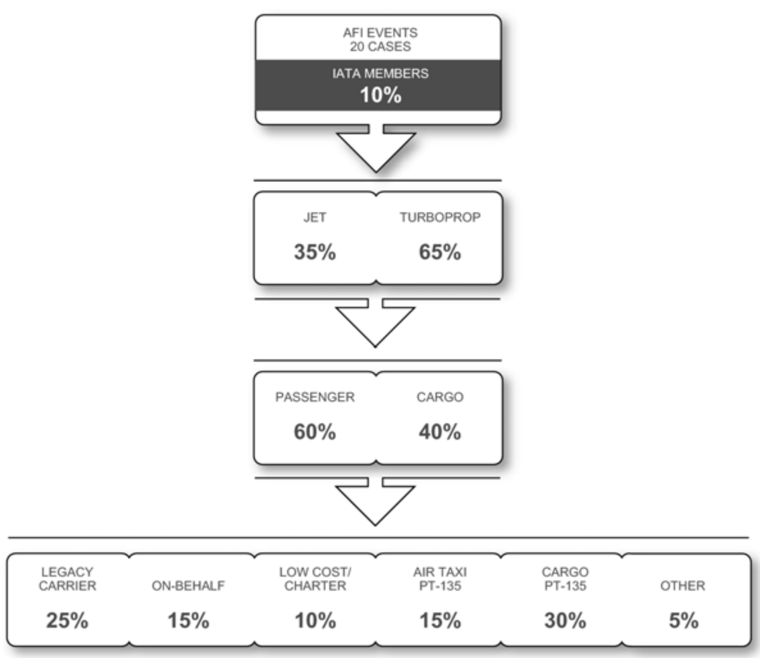
Training issues or poor standards and checking were often associated with the inadequate management of safety at the airline. In 67% of cases where poor safety management was cited, weak regulatory oversight by the State of the operator was also a contributing factor. Half of the cargo accidents that featured these two factors combined involved cargo 135 (or equivalent) operators.

Note:
24% of cargo accidents could not be analysed due to insufficient information.

4.4.3 Focus on Accidents in the African Region

During 2005, 18% of the accidents occurred in the African region, of which 45% were fatal and 70% resulted in a Hull Loss. The following diagram illustrates the AFI events (Figure 4.14).

Figure 4.14
AFI Diagram



Most significant factor(s) in African events:

- Intentional non-compliance: 25%
- Flight crew training deficiencies: 25%
- Standards and checking: 25%
- Deficient flight crew communication: 20%
- Inadequate safety management: 15%
- Poor regulatory oversight: 15%

Correlation between:

- Positive correlation between flight crew communication issues and inadequate training systems.
- Correlation between flight crew intentional non-compliance, poor safety management and weak regulatory oversight.
- Correlation between flight crew intentional non-compliance, poor standards and checking and weak regulatory oversight.

Organisational factors were predominant in accidents that occurred in Africa. These factors often paired up with human, environmental and technical factors to trigger a series of events that resulted in accidents. Deficiencies in training and poor or absent standards and checking on the part of the operators were linked to cases where flight crewmembers deliberately deviated from operator procedures and/or regulations or to communication issues on the flight deck that contributed to an accident.

Errors by the flight crews were tied into both the organisational culture of the operator and the regulation of the operating environment. In 40% of accidents featuring flight crew intentional non-compliance errors, poor safety management within the airline and weak regulatory oversight by the State of the operator were also cited as contributing factors. Likewise, 40% of flight crew intentional non-compliance errors where linked to inadequate or absent standards and checking at the airline and weak regulatory oversight.

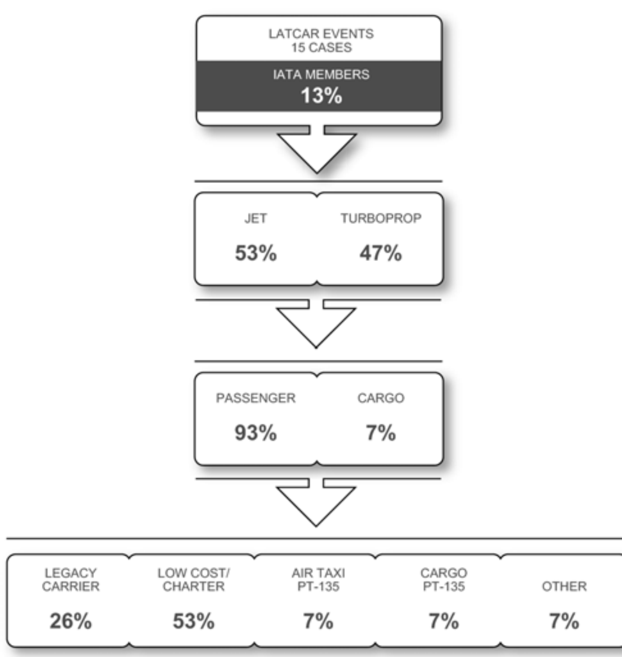
Technical factors were noted in 15% of accidents that occurred in Africa.

Note:
45% of accidents that occurred in Africa (9 cases) could not be analysed due to insufficient information.

4.4.4 Focus on Accidents in the Latin American and Caribbean Region

During 2005, 14% of the accidents occurred in the Latin American and Caribbean region, of which 20% were fatal and 60% resulted in a Hull Loss. The following diagram illustrates the LATCAR events (Figure 4.15).

Figure 4.15
LATCAR Diagram



Most significant factor(s) in Latin American and Caribbean events:

- Flight crew proficiency issues: 67%
- Flight crew training deficiencies: 40%
- Poor regulatory oversight: 33%
- Deficient flight crew communication: 27%
- Engine failure / malfunction / fire warning: 27%

Correlation between:

- Flight crew proficiency issues and training deficiencies.
- Events with engine malfunctions and flight crew proficiency issues.
- Flight crew communication issues and training deficiencies.
- Flight crew proficiency issues, inadequate training and low cost / charter carriers.
- Correlation between inadequate training and poor regulatory oversight.

Flight crew proficiency issues were predominant in accidents in the Latin American and Caribbean region. In 60% of cases featuring proficiency issues, training deficiencies at the airline were also noted. All the accidents involving flight crew mismanagement of engine failures were linked to proficiency issues.

Inadequate training systems were cited in 75% of cases that involved miscommunication on the flight deck. Weak regulatory oversight played a role in a third of the accidents where training deficiencies were cited.

Flight crew proficiency and training issues were particularly noted amongst low cost / charter operators in the region. Over half (53%) of the all accidents in the region involved this type of operation. It should be noted that the majority (93%) of accidents involved passenger flights.

4.5 Overview of the Analytical Findings

In total, 111 accidents occurred in 2005, 28% of these involved IATA Member Airlines. Overall, 23% of the year's accidents were fatal and 46% resulted in a Hull Loss. Jet aircraft were involved in 52% of all the events in the past year.

Passenger operations accounted for 81% of accidents, the remaining 19% involved cargo flights. Legacy carriers were involved in over a third (36%) of all accidents; low cost / charter operators accounted for almost a quarter (23%) of the events.

Almost a quarter (22%) of all the accidents took place in North America. Africa and Asia Pacific were second, accounting for 18% of events, respectively. These figures do not take into account the number of sectors flown in each region.

Lack of flight crew proficiency was the most frequently noted contributor in accidents involving both Jet and Turboprop aircraft. Poor flight crew training systems were also noted in approximately a third of all accidents. Adverse weather was among the top five contributing factors noted in over a quarter of the year's events.Half of the events on Jet aircraft, which featured a combination of these three factors, involved legacy carriers.

In general, flight crew proficiency errors were tied to poor standards and checking by the operator. Analysis also determined a link between accidents that involved deficient airline safety management and poor regulatory oversight by the State of the operator.

Landing was the predominant phase of flight when accidents occurred. The majority of accidents resulting in material damage took place during this phase. In contrast, the majority of fatal accidents happened during initial climb and cruise. The greatest number of fatalities occurred during cruise.

Approach and landing accidents represented over half (55%) of all the year's events. Almost a quarter of these accidents involved IATA Member Airlines. Overall, 24% of the year's accidents involved a runway excursion. A breakdown demonstrated that flight crew proficiency issues, deficient training on behalf of the operator and adverse weather conditions all played a contributing role in the majority of runway excursion events. In certain situations were weather quickly deteriorated; flight crews did not have in their possession the most recent update on runway conditions. Unsuitable overrun areas, including uneven terrain, featuring trenches or obstacles, contributed to the severity of landing accidents involving a runway excursion.

Events involving a loss of Control In-flight (LOC-I) accounted for 11% of the accidents in 2005, 75% of which were fatal. Flight crew proficiency issues and deficient training systems were the main contributing factors in LOC-I events. Initial climb was the main phase of flight during which loss of control occurred. Overall, 50% of LOC-I events took place during this phase. None of the top contributing factors cited in LOC-I events was of a technical nature.

In total, 9% of all accidents involved a Controlled Flight Into Terrain (CFIT). Out of these events, 70% were fatal and the majority (60%) involved Turboprop aircraft. Adverse weather played a contributing role in the majority of CFIT events. All the CFIT accidents involving aircraft that were not equipped with adequate technology or equipment (e.g. E-GPWS) occurred in adverse weather conditions.

Damage to aircraft incurred on the ground accounted for 15% of all the accidents in 2005. This accident family affected IATA Member Airlines more than any other. The majority of ground damage events were tied to deficiencies in ground operations.

One event involving a runway incursion took place in 2005. Inadequate instructions by Air Traffic Control, flight crew communication errors as well as training and standards and checking issues at the airline were all cited as contributing factors in the event.

Cargo operators accounted for 19% of all of the year's accidents, of which 38% were fatal. Flight crew proficiency issues were linked to deficient training and adverse weather in over half of all cargo accident. This correlation was predominant amongst Part 135 (or equivalent) cargo operators.

During 2005, 18% of the accidents occurred in the African region, of which 45% were fatal. Errors by the flight crews were tied into both the organisational culture of the operator and the regulation of the operating environment. Almost half of accidents that occurred in Africa could not be analysed due to insufficient information or lack of proper investigation by the State of occurrence.

The Latin American and Caribbean region accounted for 14% of all accidents, of which 20% were fatal. Flight crew proficiency issues were predominant in accidents in the region, particularly amongst low cost / charter operators. Weak regulatory oversight played a role in a third of the accidents where training deficiencies were cited.

5 INTEGRATED ACCIDENT PREVENTION PROGRAMME

5.1 IATA SAFETY STRATEGY

5.1.1 2005 IATA Safety Priorities & Achievements

Every year, IATA's Board of Governors and its Operations Committee (OPC) define priorities and set goals, which shape IATA's Safety activities. For the year 2005, the Board established the following two priorities:

- Accident rate reduction: Despite the increase in fatal accidents in the third quarter of 2005, the accident rate at the end of 2005 is estimated at 0.76 Western-built Jet Hull Losses per million sectors flown.
- Six-point Safety Programme: The detailed activities relating to this programme will be covered in section 5.1.3.

In order to achieve the goals set by the Board of Governors, the OPC sets specific objectives for IATA's Safety, Operations and Infrastructure division. The table below illustrates the safety objectives set by OPC and their respective achievements.

2005 OPC Safety Objectives	Achievements
Safety Data Management and Analysis (SDMA) – Make IATA Safety data-driven	2004 Safety Report (SR) was distributed industry wide in April. Safety Trend Evaluation, Analysis and Data Exchange System (STEADES) experienced highest growth and safety analysis output. Flight Data Analysis (FDA) service launched 1 May .
Regional Safety – Improve safety through regional seminars	African Safety Enhancement Team (ASET) Summit held in February in Nairobi. IATA Interactive Safety Seminar held in Turkey in September. Another edition took place in China in December 2005.
Cargo Safety – Reduce Cargo carrier accident rate, especially in Africa.	Threat analyses of all cargo accidents has been completed and report published. IOSA for cargo operators implemented. Quantitative goals have been determined for 2006 to resource project.
Safety and Operational Efficiency – Launch 3 Projects	Ground Damage Prevention Programme (GDPP) launched. Surveillance/intervention program underway – projected savings $400M in 2005. Cabin Operations Safety toolkit delivered – projected savings $4M in 2005. Flight Data Analysis Service for medium and small airlines established, saving each airline member one third of cost of operation.
Safety Management Systems (SMS) – Implement SMS with Quality System	Senior Managers Guide to implementation of SMS with Quality and Security components published.

5.1.2 2004 Safety Report Findings: Status of IATA's Action Plan

Following the analysis of the 2004 accidents, IATA and the airlines identified the need to act on the following findings and prevention strategies. This section provides a description of the issues that arose from the accident analysis of 2004 events, the prevention strategies and a status report of IATA's actions to counter these issues.

Finding	Issue	Prevention Strategy	Status
Cargo operations	Accounted for a third of the year's accidents. In over a quarter of events, flight crews intentionally disregarded procedures. Deficiencies in safety management and standards and checking were also contributors in many events. Weak regulatory oversight was noted in many accidents as well.	*IATA has developed a comprehensive Cargo Safety Programme that targets issues in this field and will expand its IOSA Programme to create a safety audit specific to dedicated cargo carriers.*	IOSA for Cargo Operators launched in 2005. Audits are planned to begin in 2006.
Safety in Africa	Almost a quarter of all the year's accidents occurred in Africa. Deficiencies in safety management, training systems and flight crew proficiency issues were the top contributing factors.	*IATA will actively participate in the safety campaign in Africa by taking a primary role in the African and Indian Ocean Safety Enhancement Team (ASET).*	IATA Partnership for Safety Programme launched in Africa. Five seminars have been completed, seven airline gap analysis audits have been conducted, and five more are scheduled for the first half of 2006.
Ground damage	Ground damage accidents cost the airline industry over USD $4 billion last year. The majority of events involved large Jet aircraft, occurred primarily in Europe during scheduled operations and resulted in major damage. Airport facilities played a contributing role in many cases.	*IATA will implement its Ground Damage Prevention Programme (GDPP) to reduce ground incidents and accidents and cut ground damage costs by 10% in 2005.*	All GDPP participating airlines have a current action plan in place to improve Airside Safety during Ground Operations.
Approach and landing accidents	Almost half of all the accidents occurred during the Approach and Landing phases of flight. Organisational issues, such as deficiencies in safety management and training systems were among the top contributing factors in these events. Flight crew proficiency issues were also noted.	*IATA will deploy its Flight Data Analysis (FDA) capabilities to help airlines track and prevent unstable approaches and promote non-punitive go-around policies.*	FDA service launched in 2005. Safety Group has formed a Task Force that is looking into the issue of Approach and Landing and will provide an action plan in 2006.
Flight crew training and proficiency	Flight crew proficiency was called into question in many of the 2004 accidents. This problem was usually linked to organisational issues, such as deficiencies in safety management, training systems and standards and checking. Flight crew communication issues were also highlighted and often related to inadequate training.	*IATA will continue to implement the IOSA Programme in 2005, which addresses deficiencies at the organisational and flight operations levels, to ensure airlines that are audited apply corrective actions regarding these issues.*	The IOSA programme has continued to grow. By the end of 2005, approximately 140 audits were conducted and over 80 airlines have been listed on the IOSA registry. The airlines audited to date account for almost 70% of total scheduled traffic.

5.1.3 2006 IATA Six-point Safety Programme

Goal: reduce accident rate for Western-built Jet aircraft by a further 25% by the end of 2006 (from 0.76 to 0.65 Western-built Jet Hull Losses/Million sectors flown).

In order to attain its goal, the Six-point Safety Programme is divided into the following segments. Each segment has a precise goal and allows IATA to provide specific solutions to the industry. This is represented in Table 5.1.

TABLE 5.1
Six-point Safety Programme Goals and Solutions

Segment	Goal	Aviation Solutions
Safety Auditing	Expansion of IOSA for dedicated cargo carriers and Eastern-built fleets in 2006. Focus on IOSA in AFI and SA.	– IOSA – Partnership for Safety
Infrastructure Safety	Improve Air Traffic Management (ATM) and ground safety.	– IATA-ICAO Runway Incursions Prevention Toolkit – Ground Damage Prevention Programme
Safety Data Management & Analysis (SDMA)	Safety data sources, together with data from IOSA make IATA data-driven for proactive approach to safety.	– Safety Report — Accident Analysis – STEADES — Incident Analysis – FDA — Normal Operations Flight Data Analysis
Flying Operations	Focus on approach and landing accidents as well as other areas that impact on the safe operation of aircraft (e.g. cabin operations & maintenance).	– Cabin Operations Toolkit – Aviation English Solution
Safety Management Systems (SMS)	Develop interactive tools embracing Quality and Security Management Systems.	– SMS: The Senior Airline Manager's Implementation Guide.
Cargo Safety	Reduce the accident rate among dedicated cargo operators.	– IOSA for dedicated cargo carriers – Cargo Safety Report — Cargo Accident Analysis.

5.2 SAFETY AUDITING: The IATA Operational Safety Audit (IOSA)

5.2.1 IOSA Programme

The IATA Operational Safety Audit (IOSA) programme is an internationally recognised and accepted evaluation system designed to assess the operational management and control systems of an airline.

IOSA uses internationally recognised quality audit principles that are applied in a standardised and consistent manner.

IOSA has two simple aims:

- Improve safety.
- Eliminate redundant audits.

IATA oversees the accreditation of audit and training organisations, ensures continuous development of the IOSA Standards and Recommended Practices (ISARPs) and manages the central database of IOSA audit reports. IATA also implements effective quality assurance to guarantee overall programme standardisation and ensures that the programme is meeting airline needs as effectively as possible.

5.2.2 Programme Status Report: 2005 Year End

Since the first audits began in September 2003, the IOSA programme has continued to grow. By the end of 2005, approximately 140 audits were conducted and over 80 airlines have been listed on the IOSA registry. The airlines audited to date account for almost 70% of total scheduled traffic.

At the end of the 2005 calendar year, the programme stood as follows:

- Over 130 IOSA audits performed.
- Over 160 duplicate audits avoided.

Figure 5.1 illustrates the audits completed and audits saved from September 2003 to November 2005.

Figure 5.1
Audits Completed & Audits Saved

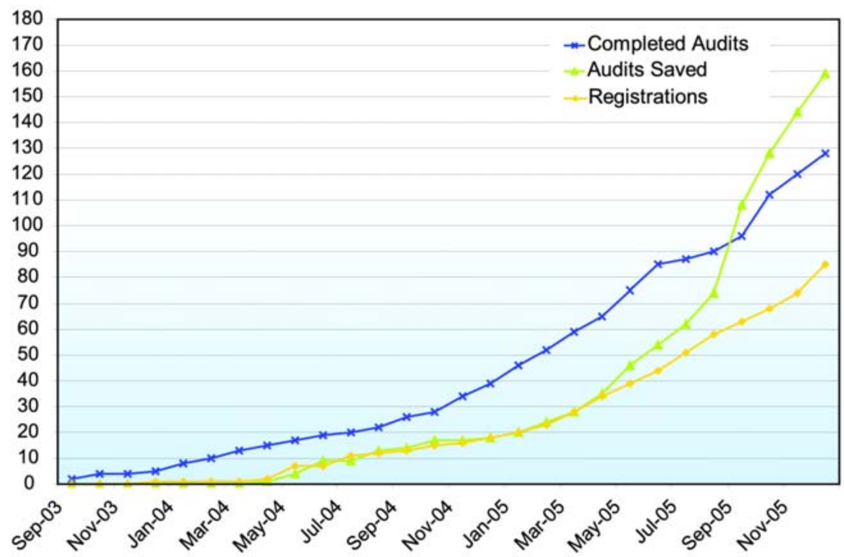


Figure 5.1 illustrates the audits completed and audits saved from September 2003 to November 2005.

The IOSA programme now benefits from two years of operating experience. In a process of continual improvement, each of the main programme elements will move towards a greater level of stability and consistency in the coming two-year period.

Documentation System: the IOSA Standards Manual (ISM) will be completely revised (Second Edition) by mid-year 2006. A JAR-OPS comparison exercise is scheduled for completion in early 2006; harmonisation with ICAO standards is being resolved progressively. The IOSA Programme Manual (IPM) second edition will be updated again by late 2006. The Auditor Handbook will also be revised and reissued in 2006, as a result of the extensive feedback from past audits.

Endorsed Training Organisations (ETOs): Two ETOs will likely expand to three in 2006. This meets the needs of training IOSA auditors, as well as training programmes under the IOSA Partnership For Safety (PfS) Programme, which will be later discussed. The existing IOSA Auditor Training course will be completely overhauled in early 2006, based on experience and feedback.

Audit Organisations (AOs): Six AOs have expanded to seven in 2005. This number is numerically sufficient to handle the projected annual audit load of over 150 IOSA audits.

5.2.3 IOSA and Quality Assurance

IOSA is a standardised global airline safety audit programme. Airlines and other agencies (such as Regulators) use IOSA audit reports. Therefore, it is essential that IATA guarantee that all audit reports are equal, no matter which AO conducted the audit.

Feedback from AOs, airlines, and other programme participants is constantly incorporated as IOSA strives for continuous improvement.

The IOSA Programme has now been audited successfully under the provisions of ISO 9001:2000. The ISO standard requires implementation of a quality management system in order to give assurance of quality in products and services, enhancement of customer satisfaction, and a basis of continuous improvement. The ISO certification provides an external validation of the quality management principles of IOSA, and gives further momentum to the programme.

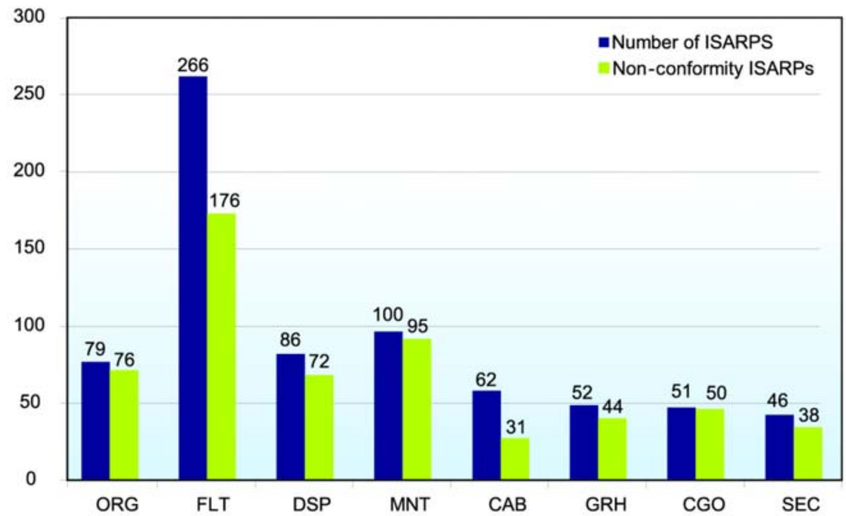
5.2.4 IOSA Audits Findings: Key Messages for Accident Prevention

IOSA is data rich and allows IATA to look into the following issues and provide results and trends based of analytical findings:

- Which sections of the ISM generate most findings?
- Which standards generate most findings?
- What are the reasons for non-conformities?
- Are there regional differences?
- Which standards are subject to misinterpretation?

Figure 5.2
Number of non-conformity's ISARPs vs. number of ISARPs in each section

Main ISARPs per IOSA section that had findings requiring correction are presented in Figure 5.2.



Analysing de-identified, pooled IOSA data allows IATA to generate recommendations based of analytical findings and provide the following:

- Feedback to airlines, general as well as on specific issues that need to be addressed to enhance safety.
- Update auditor training.
- Compare findings with those of accident data analysis (Safety Report) and incident data analysis (STEADES) that are also available to IATA to ensure a proactive approach is taken. By triangulating the data, IATA can determine deficiencies that could be precursors to serious incidents / accidents and develop prevention strategies to counter them.
- Publish recommendations for industry use to improve safety. [1]

Based on a 64 IOSA Audit Reports (IARs), IATA calculated the number of IAR non-conformity IOSA Standards and Recommended Best Practices (ISARPs) per section of the IOSA Standards Manual (ISM) versus number of individual ISARPs that have been recorded as non-conformity at least once in IAR's. The results are presented in Figure 5.2.

Main ISARPs per IOSA section that had findings requiring correction:

- 98% of ISARPs in Cargo Operations (CGO).
- 96% of ISARPs under Corporate Organisation and Management Systems (ORG). The ORG section includes safety management standards.
- 95% of ISARPs in Aircraft Engineering & Maintenance (MNT).
- 85% of ISARPs in Aircraft Ground Handling (GRH).
- 84% of ISARPs in Operational Control – Flight Dispatch (DSP).
- 66% of ISARPs in Flight Operations (FLT). Flight operations include training requirements.

Issues relating to organisation management systems and flight operations featured among the top findings in IOSA audit results. This reflects the 2005 accident findings, where deficiencies at the organisational level (particularly in safety management) and flight operations issues (predominantly flight crew training & proficiency) were frequently noted contributing factors. Detailed findings from accident analysis are presented in Chapter 4.

[1] Jun 04 ISM has been used as the reference for these statistics, as it is the latest version and the biggest numbers of IARs, as a group, are based on this ISM.

5.2.5 IOSA & The Partnership for Safety Programme

Using its global field resources, IATA has identified up to 85 Member Airlines that will likely face significant hurdles in upgrading their operational safety capability. These airlines need certain levels of guidance, assistance and support. Some will need the full programme while others will need less. To respond to this need, IATA has created the Partnership for Safety (PfS) programme. The PfS is built on practicality. At all times, responsibility for executing the necessary improvements must remain with the operator itself. However, IATA through its PfS programme provides support in the following areas:

- Training and awareness seminars.
- Gap analysis audits.
- Assistance to airlines, to acquire necessary resources for improvement.
- Ongoing assistance / guidance in the implementation stage, leading up to an IOSA audit.

The programme has been launched initially in Africa. Five seminars have been completed, seven airline gap analysis audits have been conducted, and five more are scheduled for the first half of 2006. IATA's resources are use to fund the programme to date, and a number of industry partners have now been approached to provide additional funding and support in particular for individual airline improvement programmes.

Over the medium term, IATA will expand this programme to other developing regions suffering from higher accident rates. For example, efforts have commenced in Latin America and Asia Pacific early in 2006.

5.2.6 IOSA & Benefits to States

States can request access to IOSA Audit Reports. The information can enhance and help focus States' oversight activities. In this sense, IOSA provides a great advantage in times of diminishing State resources since it is a comprehensive, global programme that can complement existing and proposed regional / State initiatives. More topics from IOSA are included on the CD-ROM enclosed at the end of this report.

5.3 INFRASTRUCTURE SAFETY: AIR TRAFFIC MANAGEMENT SAFETY

5.3.1 Current Infrastructure

IATA Member Airlines interact with ATS Providers in 188 ICAO States in the course of their operations. The current global infrastructure is a fragmented and ever expanding collection of different technologies, systems, concepts and services. To halt this proliferation IATA is leading industry and working closely with ICAO to establish globally harmonised and interoperable systems to enhance the safe and efficient operation of air transport.

5.3.2 Harmonisation and Interoperability

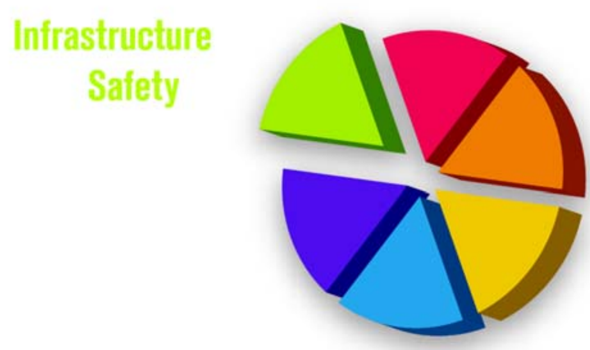
Following on from the success of the Global ATM Transition Roadmap, IATA is at the forefront of work to introduce navigation procedures based on the Global Navigation Satellite System (GNSS). [2]

The global application of GNSS will help support a standardisation of operational procedures and cockpit displays that will help mitigate the potential for human error in the cockpit. [3]

In addition, the application of advanced technology in the cockpit (i.e. vertical guidance on the approach and moving map navigational displays) provides the crew with enhanced situational awareness that enhances safety especially during the arrival and departure phase of flight.

5.3.3 Performance Based Navigation

IATA is instrumental in ensuring that the navigational capabilities of modern air transport aircraft are utilised to increase efficiency, capacity and accessibility whilst at the same time enhancing safety. Future navigation concepts and applications will be based on performance based navigation standards rather than differing technologies and equipage requirements. Performance based navigation concepts include Area Navigation (RNAV) and Required Navigation Performance (RNP).



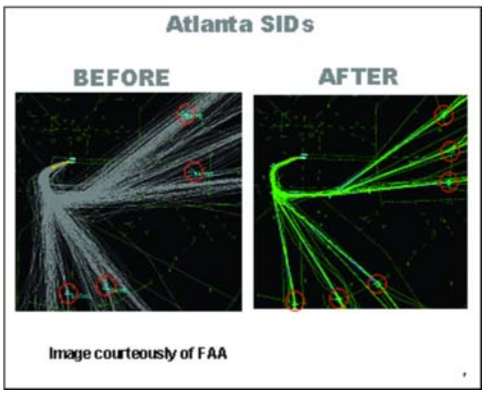
RNP incorporates on board functionality to monitor and alert the crew of the actual navigational performance.

[2] The IATA Global ATM Transition Roadmap has been adopted by ICAO as their Global Plan.

[3] GNSS operations are already in use in certain regions. However, a co-coordinated global application is required to fully exploit the available benefits.

This introduces an additional level of safety mitigation to ensure correct separation between aircraft/aircraft and aircraft/obstacles. Additional benefits enabled by RNAV and RNP includes a more systemised and standardised ATC route structure. This reduces ATC complexity, with commensurate safety benefits. Figure 5.3 shows the route dispersion of aircraft flying Standard Instrument Departure (SID) procedures from Atlanta in the USA before and after the introduction of RNAV. The introduction of performance based navigation allows a more autonomous operation of the aircraft leading to reductions in RT and allowing better predictability and accuracy of traffic movement.

Figure 5.3
Atlanta RNAV SIDs



5.3.4 Approaches with Vertical Guidance

The application of RNAV and RNP provides significant operational benefits. In particular reducing the risk of controlled flight into terrain by providing vertical guidance on approach procedures where currently no guidance exists. BaroVNAV (using Aircraft Based Augmentation Systems) is the most cost effective and quickest way of implementing Approaches with Vertical guidance (APV) as most of today's civil transport aircraft have navigation equipment on board that is able to support this type of approach. IATA is managing and supporting the introduction of APV BaroVNAV around the world to ultimately eliminate traditional step-down approaches.

5.3.5 Exploiting Technology to Reduce Level Busts

IATA supports and promotes the introduction of technology to address acknowledged safety issues. In December 2005, National Air Traffic Services (NATS) in the UK introduced Mode S technology into the London Terminal Area. Mode S enables specific parameters to be down-linked directly from the cockpit to the ground. One such parameter is the altitude selected by the crew in the aircrafts Mode Control Panel (MCP) or Flight Control Unit (FCU). This is called the "Mode S Selected Altitude". The Selected Altitude, of suitably equipped aircraft, is now being displayed on all London Terminal Control sectors and provides the potential to reduce level busts as the controller can now see the vertical intention of the aircraft.

Figure 5.3 shows the Target Label of BMA3XF. The Mode C (altitude) readout and intention (or destination) code is shown in line two as today (LL represents a flight inbound to Heathrow). The MCP/FCU Selected Altitude is displayed in line two in the dark orange colour. In Figure 5.4 BMA 3XF has selected 15000 feet and is passing Flight Level 165.

Figure 5.4
Display of Mode S Selected Altitude in the ATC label

Due to technical and human limitations the display of Selected Altitude is not the solution to level busts. However, this achievement is a significant step forward to enhance the safety operation of air transport in one of the most complex and busy airspace environments in the world. [4]

5.3.6 Runway Incursion Prevention

Incident reporting and recent accidents have been a constant reminder of the threat related to runway incursions. There is an urgent need to not only raise awareness among pilots, air traffic controllers, airport vehicle operators and airport managers, but also disseminate practices developed worldwide, which can enhance safety and prevent future occurrences.

The Runway Incursions Prevention Toolkit, comprising two CD-ROMs developed by ICAO and IATA, which are complementary in nature, results from extensive research and covers a wide range of worldwide procedures and best practices in a user friendly and natural sequence. The Toolkit is being distributed industry-wide.

[4] More information on Mode S and Level Busts in UK airspace can be found on the NATS "Level Best" website at www.levelbust.com.

5.4 INFRASTRUCTURE SAFETY: GROUND DAMAGE PREVENTION PROGRAMME

Ground aircraft damage: damage to aircraft during ground operations costs the airline industry over USD $4 billion per year. The Ground Damage Prevention Programme (GDPP) is a worldwide initiative launched in early 2005 to reduce ground damage to aircrafts. GDPP is a part of IATA's Six-point Safety Programme and complementary to the IOSA programme.

GDPP main objectives:

- Reduce ground damage by 10% by end of 2005 and 50% by 2010.
- Enable airlines to identify the costs of ground damage to ensure quick recovery.

5.4.1 Background on the Main Issues

Safety Management Systems (SMS): SMS are more and more widely accepted and implemented across the industry, however many companies either do not have a Safety Management System in place or do not use it to its full extent.

Certification Programme: At the present time no current international standards for ground operations exist. A certification programme for Ground Handling companies and Ground Services providers, similar to IOSA for airlines, does not exist.

Data Collection & Intelligence: At present, ground damage data is collected in an uncoordinated and non-uniform way, rendering impossible any precise intelligence gathering and making it difficult and laborious to create analytical reports within reasonable timelines, making the data almost obsolete once finally available.

Training: Airside Safety Training is currently not used to its full extent and in some cases is not conducted at all.

5.4.2 Description of GDPP Initiatives

Prevention of ground damage is an integral part of global aviation safety. GDPP aims to reduce events through risk assessment, increased awareness, the implementation of SMS, real time reporting and analysis of events and proactively seek solutions to prevent the recurrence of incidents and accidents. To address the points mentioned above, the long-term initiatives lead by the GDPP aim to develop the following:

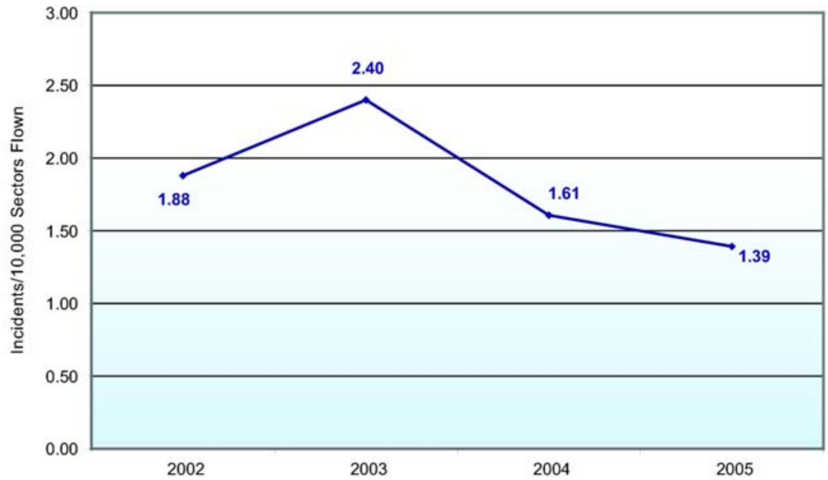
- The implementation of Safety Management Systems across the industry and especially amongst Ground Services Providers (GSPs).
- A Real Time, Central Database to capture anonymous information regarding events (near miss ground incidents), incidents and accidents which will provide reliable, objective, unidentified statistics on damage to aircraft during ground operations.
- A certification scheme for ground service providers in line with IOSA.
- Establishing guidelines and standards to improve airside safety management by airlines, airports and ground service providers.
- Implementation of a training programme to certify / qualify auditors performing Ground Operations Safety Certification & Audit Programme in line with IOSA.
- Development of a training programme for SMS implementation.

5.4.3 Ground Damage Threat Assessment

A Ground Damage Threat Assessment analysis has been conducted based on STEADES data. STEADES Ground Damage Threat Analysis can be found on the CD-ROM. The number of events per flown sectors for STEADES members was used to extrapolate this same ratio industry-wide. These numbers are estimates based on the data available to IATA at the time of the analysis. The results are presented in Figure 5.5.

Figure 5.5
Rate of Ground Damage Events Industry-wide (2002-2005)

Ground damage threat assessment analysis results are presented in Figure 5.5.



The analysis of all ground occurrences in STEADES (2002-2005) shows that ground events are now in a downward trend, in spite of the increase in air traffic.

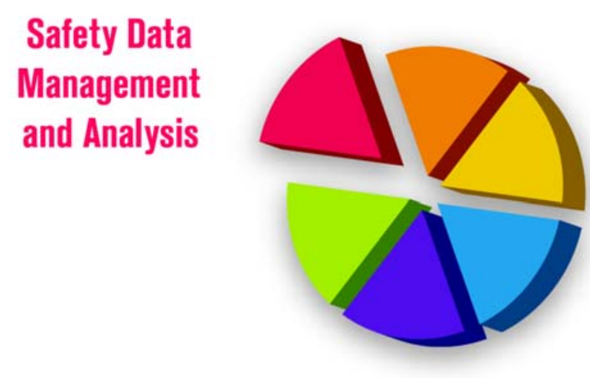
According to a threat analysis conducted on collisions between aircraft and vehicles / equipment on the ground, the following findings were highlighted:

- Baggage loading equipment was the predominant type of vehicle / equipment causing damage to aircraft.
- Handling errors on the part of ground crew were the main contributor to damage events (manoeuvring, velocity, etc.).
- Equipment malfunctions or failures (e.g. defective braking systems) were also a leading contributor to ground damage events.
- In almost 25% of incidents reported, aircraft were withdrawn from service due to the extent of the damage.

A complete version of the Ground Damage Threat Analysis is available on the Safety Report CD-ROM.

5.5 Safety Data Management and Analysis Programme

IATA's Safety Data Management and Analysis (SDMA) programme is a holistic programme designed to cover the entire spectrum of airline and industry data requirements, from the few accidents to the multitude of normal operations occurrences.



At one end of the spectrum, the Safety Report takes advantage of accident reporting to share the lessons learned among all aviation stakeholders. IATA has compiled, classified and analysed accident data for over 40 years under the Annual IATA Safety Report. However, IATA is well into the transition from the reactive nature of looking at what went wrong in an accident and learning to avoid such recurrences, to identifying accident precursors by using incident data in the IATA's Safety Trend Evaluation, Analysis and Data Exchanges System (STEADES). IATA is now moving toward becoming more proactive and diagnostic by looking at safety data from "normal operations." IATA's new Flight Data Analysis (FDA) Service allows airlines to submit flight data to IATA, have it analysed, then receive information and summary results on their normal operations. Combined, these three elements form IATA's comprehensive SDMA programme covering the entire spectrum of safety data analysis.

5.5.1 Incident Analysis & The STEADES Programme

The STEADES programme is continually gaining momentum. Not only is the number of non-BASIS using members expanding, but with 10 new members joining in 2005, STEADES achieved the highest membership growth rate since the programme first launched in 2001. Of course, more data-subscribing members results in an expanded database to query when conducting analysis, meaning that the content and quality of the STEADES report is improving all the time. The STEADES database has grown to encompass over 300,000 air safety reports from airlines, and is now a representative sample of the industry with approximately 12% of all sectors flown in the world. There has also been a steady increase in the quality of the data, achieved through the IATA Descriptor Classification System, with the number of airline records classified exceeding 92% in 2005, an increase of 3% over 2004.

In responding to issues raised in the Safety Report as well as predominant categories featuring in the global trend analysis, STEADES endeavours to unearth precursors to accidents through analysis of incidents. The main topics of research pursued in STEADES in 2005 were:

STEADES topics in 2005 *	Edition
Go-around Events	2005-1
Birdstrikes	2005-1
On board Fire-related Events	2005-1
Runway Incursions	2005-1
Ageing Aircraft	2005-2
Ground Damage **	2005-2
Turbulence Related Injuries	2005-2
De-Icing/ Anti-Icing	2005-2
High Energy / Unstable Approaches **	2005-3
Low Level Windshear	2005-3
Go-around Web Survey Results **	2005-3
Inadvertent Slide Deployments	2005-3
Automation Errors	2005-4
Load and Balance Incidents	2005-4
On board Medical Events	2005-4
Engine Failures	2005-4

** STEADES members can view all archived STEADES Safety Trend Analysis Reports on the members website at www.iata.org/steades.*

*** These articles are included on the CD-ROM enclosed at the end of this report.*

In order to for STEADES to remain current and continue to respond to the needs of the industry, IATA is examining the possibilities of launching an interactive capability with STEADES through an online data management tool that can supplement existing Safety Data Management Programmes. This will also provide a comprehensive solution to airlines requiring an Aviation Safety Reporting system.

5.5.2 Flight Data Analysis

In May 2005, IATA launched a web-based Flight Data Analysis (FDA) Service that brings together a comprehensive suite of tools and expertise to unlock the value of airlines' flight data. This saves airlines from having to recruit internal flight data expertise and purchase associated systems by providing direct access to the very best analysts and methodologies available today. The value of FDA will be further enhanced by IATA's unique ability to share lessons learned across the airline community to increase global industry safety levels.

IATA's FDA Service is powered by Flightscape technology. Seven months after the launch of the service there are already 11 airlines participating. In addition to providing regular ongoing analysis, the IATA and Flightscape team provides 'investigative' analysis support for incidents.

IATA is looking toward expanding the FDA service in two distinct areas: international trending and sharing across airlines of lessons learned, and operational efficiency to including fuel savings, aircraft performance, etc.

IATA is working toward developing a global data sharing model, so that FDA can benefit from "sharing the lessons learned" and building on IATA's experience with incident and accident data sharing. There are wide ranging challenges in this area, but IATA is well placed to serve as a liaison between industry stakeholders in driving forward the development of FDA standards. IATA maintains regular communication with many of these stakeholders and, with the launch of our new FDA Service, we are poised to reach out to newcomers in FDA.

There is much value in aligning FDA and incident analysis, where one system could serve to corroborate, compare or complement the lessons learned from the other. A partnership of stakeholders must be formed to drive forward the implementation. Many of the same issues that have been addressed in data sharing through STEADES will apply to flight data sharing, with opportunities for alignment between both these systems. There is a paper included on the CD-ROM enclosed at the end of this report entitled "Airline Flight Data Analysis - The Next Generation", which explores the issues related to sharing the safety intelligence gained from airline FDA and considers how this might be done in the next generation of FDA programmes.

With analysis of flight data comes the opportunity to identify areas for increased operational efficiencies. IATA intends to expand the FDA Service to include an Operational Efficiency service that would enable airlines to identify operational areas for improvement enabling potentially large savings.

5.6 FLYING OPERATIONS SAFETY

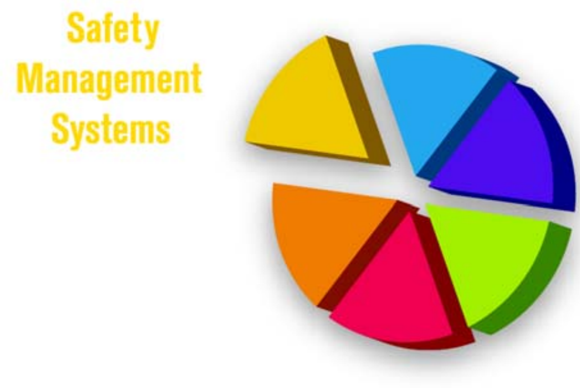
With approach and landing accidents continuing to feature strongly in the 2005 statistics the IATA Safety Group is anxious to contribute more to mitigating the threats in this area. A new segment has therefore been included in the Six-point Safety Programme for 2006 entitled Flying Operations Safety. This segment targets safety issues relating to flight operations and addresses the go-around decision, flight crew interaction with automation, monitoring skills and distraction both amongst flight and ground crews. This thinking, which embraces the very broad topic of loss of situational awareness, interacts with other areas that impact on the safe operation of aircraft, such as ground and cabin operations, maintenance, and dispatch.

A task force has been convened to address these aspects with the aim of developing training tools, which can help to mitigate the threats identified. IATA is mindful of the need to take account of research already undertaken in these areas and in particular of the benefits of working with the Flight Safety Foundation (FSF) in the CFIT / ALAR and safety system technology arena. Likewise, in taking this forward there will be great benefit in coordinating with the FAA Commercial Aviation Safety Team (CAST) with regard to automation. A data-driven approach will be taken by the Task Force, make full use of STEADES incident data, normal operations flight data, and other line operational safety audit information.

5.7 SAFETY MANAGEMENT SYSTEMS

5.7.1 Overview

Safety Management is defined as the systematic management of the risks associated with flight operations, related ground operations and aircraft engineering or maintenance activities to achieve high levels of safety performance.



A Safety Management System (SMS) is an explicit element of the corporate management responsibility that is supported by the safety, quality and security functions of an organisation. It sets out a company's safety policy and its intent to manage risk as an integral part of its overall business.

An SMS is a business-like approach, with the realisation that an acceptable level of safety is the result of successful management techniques. As with any business plan, goals must be set, levels of authority and clear accountabilities established, and provision made for the SMS to attract at least the same focus as that of airline's financial management system, and become part of the corporate organisational framework. Ultimately, the SMS will become woven into the fabric of the organisation becoming and integral part of the airline's corporate culture.

An SMS includes a quality management element, which assures consistent and acceptable system performance in meeting specified goals and producing desired outcomes. Quality management must be utilised to ensure that all policies are clearly defined, with procedures and processes in place to detail how such policies are to be implemented and managed. As a result, airlines can proactively identify safety issues through continuous improvement of the SMS.

The IATA Operational Safety Audit (IOSA) programme is an internationally recognised and accepted evaluation system designed to assess the operational management and control systems of an airline. IOSA uses internationally recognised quality audit principles, and is designed so that audits are conducted in a standardised and consistent manner.

The goal of IOSA is to provide a structured system for the sharing of audit results in order to help improve operations and reduce the number of audits in the industry. An SMS forms part of the IOSA Standards and Recommended Practices, and the IATA SMS Senior Airline Manager's Implementation Guide has been compiled to conform to these standards. Implementation of the principles of SMS in this guide will therefore constitute part of the IOSA Standards. The IATA SMS Guide v1 can be found on the CD-ROM.

5.7.2 Components of a Safety Management System

The elements of an SMS may vary according to the size and complexity of an aviation organisation, and its aims and objectives. Various civil aviation regulatory authorities have produced guidance for aviation organisations on the elements that make up an effective SMS. Whilst there is no complete agreement, the suggested elements are generally complementary and similar. The guidance on SMS elements contained in these regulatory documents was used to develop this guidance material to airlines on the implementation of an effective SMS.

The primary requirement is a general commitment from the highest level of management. The separate elements of an SMS are not stand-alone and unique; the elements inter-react and support each other. All components of an SMS should be reviewed on a regular basis to ensure that they remain current and relevant to the organisation.

The following components, as a minimum, should be included in an SMS:

A Policy Statement by the Accountable Executive, containing senior management's commitment to safety, quality and security as fundamental priorities throughout the organisation.

A Statement of Accountabilities that clearly defines safety responsibilities of managers and employees at different levels in the organisation, with effective deputation of responsibilities established for operationally critical areas when principal office holders are absent.

An Accident Prevention Programme, which ensures the capture, analysis and dissemination of information that, can be used to identify operational hazards, and raise awareness throughout the organisation.

A Risk Management Programme comprises three essential elements; hazard identification, risk assessment and risk control.

Audits and management reviews to assure the quality of the SMS. The Accountable Executive is responsible for periodic evaluation of the Safety, Security and Quality management components to confirm that the SMS remains effective. The reviews may be performed by persons within the organisation or by external means (e.g. IOSA audit).

An Emergency Response Programme, which includes contingency plans to ensure the proper response demanded of different parts of an organisation when an emergency arises. This may not necessarily involve an actual aircraft accident, but should include a "business continuity contingency plan".

5.7.3 Implementing an SMS

IATA developed the SMS Senior Airline Manager's Implementation Guide, published October 2005.

An examination of the safety systems in place in the organisation is a necessary first step. No two companies are exactly alike in their organisation and goals, and all will be seeking to tailor their SMS to their own needs.

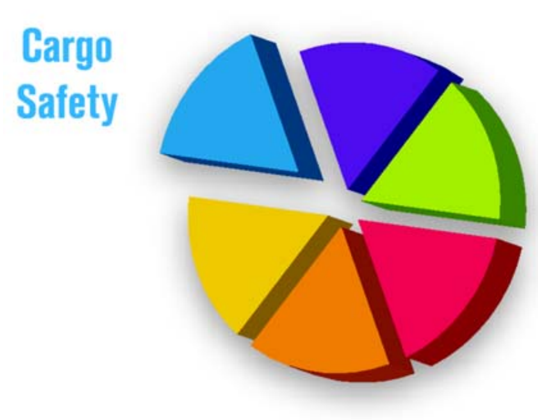
The aim of the IATA SMS guide is to provide airlines with assistance in implementing an SMS to build a safer and more efficient operation. The implementation of a successful Safety Management System can contribute to making safety practices proactive rather than the more traditional reactive approach, and that the adoption of SMS will provide better and more uniform safety standards throughout the industry.

The main role of this guide is to provide guidance to airlines on the development of an effective and comprehensive safety system. It follows the standards of the IATA Operational Safety Audit (IOSA) programme, Quality Management/ISO 9001:2000 and System Safety principles and can be cross-referenced to Safety Management Systems for Airports and Ground Handling set out in the IATA Airport Handling Manual (AHM) and the IATA Security Manual, and Safety Management Systems for Air Navigation Service Providers.

The SMS Senior Airline Manager's Implementation Guide is available in its entirety in the IATA Interactive Safety Toolkit 2005, available at the end of this Safety Report.

IATA also offers SMS training courses for both airlines and regulators. These are covered in Section 5.11.

5.8 CARGO SAFETY



5.8.1 Cargo Operations

The overall operational conditions of cargo flights are very different from passenger flights, with more night flights, lights within high risk countries, a high level of cargo charter flights and a high number of non-IATA operators.

Even though cargo flights are operated under different commercial conditions as enumerated, the causes of cargo accidents are not generally related to the mis-handling of shipments or cargo loading issues, but to aircraft and/or flying conditions, or to similar causes as found for passenger aircraft accidents.

Photo courtesy of Boeing

The civil aviation authorities and airline operators have to be conscious of the importance of safety in cargo transportation. What is done for passenger transportation safety should also be implemented in the cargo world. We must create one unique level of safety, where cargo flights must be treated the same as passenger flights in terms of safety. It is necessary to understand all the specificities of the air cargo environment in order to make the right decisions with respect to staff training, better work environment, improvement of small airport infrastructures, maintenance issues with cargo aircrafts and better air traffic control in countries where it is an issue. Thus, measures must be taken in agreement with the government, airports and airlines.

With a view of constantly improving the air safety of the industry, the cargo division in IATA will develop a stronger industry voice in air cargo safety and security issues. Therefore, the new Director, Cargo Safety & Standards will be working closely with the SO&I safety team and the cargo airline communities to implement these initiatives:

- Educate cargo operators of the benefits of IOSA and to broaden the scope of IOSA standards and recommended practices applicable to air cargo operations.
- Coordinate efforts with ICAO to address regulatory issues that have an adverse effect on cargo safety, including a lack of oversight of cargo operations, and "flag of convenience" registration provided by countries suspected of having minimal oversight capabilities.
- Integrate provisions specific to cargo operations into the Global Roadmap for Aviation Safety being developed by IATA in conjunction with leading industry and regulatory stakeholders.

5.8.2 Cargo Safety Objectives

In collaboration with the Cargo Committee and the Safety team of SO&I, the following objectives have been identified and will be implemented in 2006:

- Initiate and complete eight (8) IOSA audits of cargo operators by December 2006.
- Establish a programme for the collection and analysis of incident data for a minimum of eight (8) cargo operators.
- Achieve a 10% reduction in the hull loss rate of all African commercial operations (pax & cargo) involving Western and Eastern-built aircraft by 2007.
- Achieve a 25% reduction in the hull loss rate in North American cargo operations involving Western-built aircraft by 2007.
- Achieve a 10% reduction in the number of non-commercial cargo accidents (humanitarian and relief flights) involving Eastern-built Turboprops and Jet aircraft in African countries where IATA and ICAO have sufficient influence by 2007.

5.8.3 Supporting the Regulations

The IATA Dangerous Goods Board (DGB) supported by the IATA Secretariat ensures that the DGR accurately reflects the international regulations and also incorporates additional operational requirements to facilitate the safe transport of dangerous goods by air. The 46th edition, 2006, reflects the latest requirements for the classification and transport of infectious substances as well as a new Appendix that provides advance information to shippers and others on the changes that will come into effect in 2007.

In addition to the production of the DGR, other initiatives in 2005 were:

- The annual DG by Air Conference & Exhibition, this year in Los Angeles, which incorporated a one-day seminar on infectious substances;
- Expanded the DGR Quick Reference, which was launched last year, to include DGR Quick Reference in French, German and Spanish;
- Continued to expand the information available on the IATA dangerous goods website;
- Provided resources to support the DG Hotline. In 2005 the team answered in excess of 3,700 emails and telephone enquiries answering questions from shippers, freight forwarders, operators and other industry groups on the application of the DGR.

Photo courtesy of Airbus

5.9 IATA Cabin Operations Safety Toolkit

The mission of the IATA Cabin Operations Safety Programme is to contribute to the reduction of incidents and accidents as well as the costs to airlines associated with the operation of commercial passenger aircraft. In July 2005, the first edition of the IATA Cabin Operations Safety Toolkit was launched.

5.9.1 Why did IATA Create this Toolkit?

IATA Member Airlines have expressed the need to target two areas in order to improve safety and efficiency in cabin operations:

- Cabin crew turbulence-related injuries.
- Inadvertent slide deployments.

These issues pose a safety risk and cost the airline industry millions of dollars every year.

The IATA Cabin Operations Safety Toolkit is the product of work carried out by IATA's Cabin Operations Safety Task Force, established in 2004, which brings together safety experts from our Member Airlines, aeronautical manufacturers and industry associations.

5.9.2 Facts on Turbulence-related Injuries

Safety & the Cost of Injuries:

- Turbulence is the leading cause of injury in non-fatal accidents;
- Cabin crew account for majority of serious injuries;
- IATA estimates that turbulence-related injuries to cabin crew cost the airline industry over $60 million USD per year.

Impact on Operations:

- Overall, 25% of serious injuries in turbulence result in diversions;
- Injured cabin crewmembers are unable to continue working on a pairing if the injury is serious;
- Scheduling must find other cabin crew to work on remaining flight legs or pairing, which can result in flight delays and additional costs.

Negative Public Perception:

- Turbulence events attract media attention. Negative impact on passengers' view of the airline's safety record.

Aircraft Interior Damage:

- Turbulence can cause damage to cabin interior. Unrestrained equipment can damage panels, seats and other equipment.

Safety & Injuries:

- Inadvertent slide deployments can result in serious or fatal injury;
- Cabin crewmembers cause over half of the inadvertent slide deployments;
- They cost the airline industry over $20 million USD per year.

Cost of Replacing a Slide:

- New slide can cost $20,000 to $45,000 USD (depending on type: single or double lane and slide or slide-raft);
- Other costs include: maintenance labor, refitting deployed slide / recharging bottles, and recertification of slide.

Cost of Unusable Exits:

- As required per Minimum Equipment List (MEL), seats across entire cabin, halfway to the next exit must be blocked when an exit is unusable. Blocking seats results in off-boarding passengers, loss of revenue and negative image.

Cost of Ground Delays:

- On average, 90 minute ground delay from the time slide is deployed to the time door closes. Every minute of delay costs operator $70 USD. Ground delay alone costs an average $6,300 USD.

The Toolkit will help the airlines and IATA achieve the following goals:

- Reduce the cabin crew turbulence-related injury rate by 50% by 2008.
- Reduce the rate of cabin crew inadvertent slide deployments by 50% by 2008.

5.9.3 What is Included in the Toolkit?

Safety officers' tools: guidance material to redefine current procedures, incident / accident analysis tools, statistics for benchmarking and other means to diagnose and correct specific issues within an airline.

Training material: complete course content with case studies, workshops, instructor's notes, supporting documentation and presentations that can be integrated into current training courses or used as stand-alone lesson plans.

Management briefings: action plans and cost analysis templates to help determine cost savings, as well as presentations, statistics and other material to brief airline management and obtain the support needed to implement change.

Other useful documents: IOSA Cabin Standards, information on the IATA Six-point Safety Programme as well as other useful material.

5.9.4 Implementing an Action Plan

The financial impact of both turbulence-related injuries and inadvertent slide deployments is significant. Establishing an action plan with precise objectives can help the operator determine the potential long-term savings associated with the implementation of a prevention strategy. The Toolkit provides information on how the industry can achieve a cost reduction by developing a 5-year plan, which includes annual objectives for turbulence injury and slide deployment reductions and their associated savings.

Reducing cabin crew turbulence injuries by 50% equals an estimated savings of $33 Million USD Industry-wide. Reducing cabin crew inadvertent slide deployments by 50% equals an estimated savings of $10 Million USD Industry-wide.

Airlines can use the Toolkit to target the following areas:

- Analyse the airline's recent incidents / accidents (learn from past problems).
- Revise / amend to current safety and service procedures (for these two specific issues).
- Enhance current training course content relating to turbulence and door operation.
- Awareness campaign targeted at cabin crew.

5.9.5 Applying SMS to Cabin Operations

A Safety Management System (SMS) is:

- The systematic management of the risks associated with flight operations (including cabin), related ground operations, and aircraft engineering or maintenance activities to achieve high levels of safety performance.
- A business-like approach, with realisation of an acceptable level of safety being the result of successful management techniques.

SMS can be applied to cabin operations and help airlines reduce the number of turbulence-related injuries, inadvertent slide deployments and other safety issues. This can be achieved through the integration of the different components of an SMS to cabin safety-related activities.

All these components and their application to cabin safety-related activities are addressed in the second edition of the IATA Cabin Operations Safety Toolkit.

5.9.6 Sharing the Expertise Industry-wide

Developed in collaboration with safety experts from IATA Member Airlines, aeronautical manufacturers and industry associations, the Toolkit combines the knowledge of experts and the know-how of airlines that have had problems with turbulence and slide deployments and have managed to correct them.

This Toolkit enables IATA to transfer this knowledge and experience to the Aviation Industry. Since this project can enhance safety and impact significantly on the operational efficiency of the Industry, IATA has decided to offer it free of charge.

The Toolkit can be downloaded from the IATA website: www.iata.org/whatwedo/cabin_safety/toolkit

5.10 FOCUS ON: AVIATION ENGLISH LANGUAGE TRAINING

According to the International Civil Aviation Organization (ICAO), more than 1,100 airline passengers and crew lost their lives between 1976 and 2001 in accidents in which investigators found that Air Traffic Control (ATC) communications played a significant role. Numerous other incidents involving the language of the air, English, continue to be reported annually. Given that 70% of verbal exchanges in English are taking place among speakers who use English as a second language, the potential for miscommunications leading to accidents is significant.

5.10.1 ICAO's Position

In order to reduce the impact of inadequate language proficiency on air safety, ICAO decided in 1998 to review its language requirements, with the objective to strengthen provisions related to the use of the English language for radiotelephony communications. In 2003, new Standards And Recommended Practices (SARPs) concerning language proficiency requirements were adopted. In addition to strengthening the provisions related to language use in radiotelephone communications, ICAO achieved the following:

1. Introduce an ICAO language proficiency rating scale applicable to both native and non-native speakers.
   The rating scale developed by ICAO delineates six levels of language proficiency ranging from Pre-elementary (Level 1) to Expert (Level 6) across six areas of linguistic description: pronunciation, structure, vocabulary, fluency, comprehension and interactions. Raters use this scale as a frame of reference to determine the proficiency level of air traffic controllers and pilots involved in international operations, whether they are native speakers or not.
2. Establish minimum skill level requirements for language proficiency for flight crews and air traffic controllers.
   It was decided that the minimum acceptable level required for air traffic controllers and pilots involved in international operations shall be Operational (Level 4). In order to receive a Level 4 rating, an individual must demonstrate Level 4 proficiency across all six areas, also called holistic descriptors. For example, an air traffic controller rated as a Level 3 in pronunciation but a Level 4 in all other areas would be rated as a Level 3 overall, for safety reasons.
3. Clarify the requirement for the use of both plan language and phraseologies.
   With its new requirements, ICAO has officially recognised the need for plain language proficiency as a fundamental component of radiotelephony communications. This does not suggest that plain language can suffice instead of ICAO phraseologies that should always be used in the first instance. Phraseologies shall be used whenever possible but there is sometimes no practical alternative to the use of plain language for the full range of aeronautical communication, especially when emergencies or unusual situations occur.
4. Standardise the use of ICAO phraseologies.
   ICAO has clarified the use of phraseologies by recommending that all States and individuals ensure their use of phraseology conforms to ICAO standards. The current use of different phraseologies in different geographical areas of the world increases the likelihood of communications being misunderstood. Any deviation from ICAO standardised phraseologies presents an obstacle to the best possible communication.
5. Recommend a testing schedule to demonstrate language proficiency.
   The deadline to comply with ICAO's language proficiency requirements is March 5th, 2008. Personnel who demonstrate language proficiency below Expert (Level 6) on the ICAO Rating Scale at their first test must be formally evaluated at regular intervals. Recurrent testing requirements have indeed been put in place since experience and practical observation show that language loss occurs over time, especially when a second or foreign language is not used for a long period.
6. Provide for service provider oversight of personnel compliance.
   The responsibility for ensuring that air traffic controllers and pilots meet proficiency requirements has been allocated to ATS providers and airline operators. Proficiency must be demonstrated as required by the State Regulator.

5.10.2 IATA's Solution

In order to help the aviation industry comply with the strengthened ICAO language proficiency requirements, IATA has partnered with Berlitz, the world-renowned language services provider, to develop a complete Aviation English Solution in compliance with ICAO's requirements. The IATA solution includes three components:

1. Assessment Service
   IATA and Berlitz have set up an assessment service, the purpose of which is to determine the current proficiency level and the training requirements of air traffic controllers and pilots, according to the ICAO proficiency scale. In order to be evaluated, air traffic controllers and pilots call into a testing centre to complete an oral assessment of their English pronunciation, structure, vocabulary, fluency, comprehension and interactions. A professional rater leads a 15-minute interview by asking various aviation-related questions. Upon completion of the interview, each candidate is given a report outlining the amount of training that will be needed in order to reach the ICAO Level 4 proficiency standard. The number of training hours required would vary from nearly 300 hours for a candidate rated as a Level 1 down to about 100 hours for a candidate that is very close to Level 4.
   So far, IATA has performed assessments with air traffic controllers and pilots from Chile, Colombia, Mexico, Poland, Russia and Ukraine, China, the Philippines and Thailand.
2. Language Training
   Once the assessment is completed, aviation English language training can be delivered in a variety of methods:
   - Semi-private lessons (for two to three candidates).
   - In-company group lessons (for four to ten candidates).
   - Group immersion in an English-speaking country (for four to ten candidates).
   - Virtual classroom (for two to six candidates): candidates simply log on to a dedicated website for scheduled lessons and converse with an instructor in real time. Course materials are combined with joint internet browsing to ensure

that lessons are always stimulating and up-to-date. This method eliminates travel time and expenses associated with traditional instruction.

The IATA-Berlitz training modules are tailored to reflect the working environment of air traffic controllers and pilots. The topics covered in the modules are geography, weather conditions, aircraft maintenance, cargo and dangerous goods, flight planning and dispatch, airway clearance, en route and position reports, maneuvers in flight, descent and landing, in-flight safety and first aid and medical assistance. Candidates learn how to communicate effectively in English in a variety of aviation-related situations. The programme allows for practice of both plain language and standard ICAO phraseology.

3. Proficiency Testing
   Once the training programme is completed, air traffic controllers and pilots are once again tested to confirm whether they meet or exceed the ICAO Level 4 proficiency standard.

Photo courtesy of Embraer

5.10.4 State of the Industry

So far, a very limited number of civil aviation authorities have regulated in order to implement the new ICAO language provisions in their country. A sense of urgency seems to be lacking despite the critical role played by proper communications in the improvement of air transport safety.

A major problem with English proficiency is that individuals tend to think of themselves as being better in English than they really are. Radiotelephony in routine situations requires a limited vocabulary (mainly phraseology-related) that most individuals involved in international operations are comfortable with. Problems however arise when non-routine or emergency situations occur: these situations require a much more elaborate command of the English language, which is often lacking.

In order to create a greater sense of urgency, ICAO has been organising regional language symposiums to explain the proficiency requirements and provide guidance on their implementation. IATA has on the other hand contacted airline and CAA representatives around the world urging them to take action. Bringing air traffic controllers up to ICAO Level 4 can easily take several months of training, depending on their current proficiency and the training intensity. As the March 2008 deadline is fast approaching, IATA is hoping that a growing number of ANS providers will assess the proficiency level of their air traffic controllers and delineate an action plan for all staff to be trained and tested before the deadline.

5.11 SAFETY TRAINING

In order to improve air transport safety, IATA sets annual priorities to meet airline needs with special focus on safety training. IATA's safety training programme focuses on areas such as safety management systems, airside management, flight operations, quality assurance, auditing and emergency response planning.

IATA recently revised its three-day Crew Resource Management (CRM) / Threat and Error Management (TEM) course to focus on training instructors, enabling them to deliver this course in their own organisation. This course will help to better understand and implement TEM within the operator's training course curriculum.

Safety Management Systems (SMS) is a five-day course that all safety and operational personnel need to take to effectively manage a realistic balance between safety, productivity and costs. The process for achieving this balance is called SMS. In this course, airline personnel will be able to apply what they have learned in training by developing their own SMS to manage and improve their current system.

Airside Safety Awareness is a five-day course that helps ground operators and airline safety officers create and maintain safety in the airside area. The course focuses on providing personnel with the safety tools they will need to safely off-load and load an aircraft, conduct an airside investigation and complete a ramp inspection.

Training is conducted in IATA's regional training centres or can be customised and delivered locally as in-company training. A complete list of training courses is available at www.iata.org/training

5.11.1 IATA Diploma in Safety Management

For cargo, airline and civil aviation personnel, this diploma is recognised by the University of Newcastle, Australia, for entry to its online Master of Aviation Management Programme. A total of four courses must be taken, within a period of three years, to receive your diploma. Safety Management Systems is the required course as well as three elective courses. You are taught the skills and knowledge to ensure the effectiveness and integrity of your organisation's management and control systems. The topics range from awareness and prevention, to auditing and quality management, to emergency planning and response. www.iata.org/training/diploma_programme

5.12 Security Management Systems (SEMS)

5.12.1 Definition

A Security Management Systems (SEMS) is a performance-based approach to aviation security. Based on threat assessment, the most effective and cost efficient security measures and procedures are implemented in the environment applicable.

It had been decided by the SEMS Task Force and endorsed by the Security Committee at the IATA Security Forum (SEF/1) that IATA Member Airlines would be mandated to integrate the SEMS concepts as part of their operational security programme no later than 1 July 2007. Compliance to this mandate would be ensured through the IOSA audit. This would be made possible by incorporating the SEMS principles into the IOSA Standards Manual Security Standards section (Section 8).

5.12.2 2005 Accomplishments

A three-phase implementation strategy (SEMSIS '07) was developed in order to facilitate the successful implementation of SEMS across the IATA membership.

The three phases had the following overall objective:

- Phase 1 (June 2005-December 2005) — Design and Development
- Phase 2 (January 2006-June 2007) — Awareness and Implementation
- Phase 3 (July 2007 and beyond) — Monitoring and Oversight

Despite the fact that a SEMS Template had been previously produced and revised by the IATA Security Department, there was a need for a thorough review of the SEMS template, to ensure that it provided the necessary Guidance Material to Members in order for them to in compliance with the SEMS requirements found within IOSA. With the help of a Task Force made up of 14 Member Airlines and 1 Strategic Partner, Version 3.0 the SEMS template was finalised and approved in October of 2005.

Further to that, the air cargo carriers members of the SEMS Task Force requested that a separate document be created for cargo security operations. Cargo operations are very unique and particular. Further to that, there is currently a spotlight on the processes used to secure air cargo. The Cargo Security Addendum to SEMS was finalised and approved in September 2005 and is currently being used by IATA as its proposed guidance material for security of the air cargo process.

5.12.3 2006 Work Plan

2006 marks the beginning of Phase 2 of SEMSIS '07 where the focus will be on facilitating the implementation of SEMS by IATA Member Airlines as well as promoting the SEMS principles not only within the airline community but also across all Stakeholders. There are five main objectives for the 2006 SEMS work plan.

SEMS needs to be formally incorporated into IOSA Standards and Recommended Practices. The IOSA Programme Office will be re-drafting its IOSA Standards Manual (ISM) in the first half of 2006. Section 8 (Operational Security) of the ISM is being completely re-written and will now include a section on Management Control where the majority of the SEMS principles along with the appropriate guidance material will be found. The 2nd Edition of the ISM is expected to be published in June 2006 which would give Members approximately 12 months to familiarise themselves and institute the necessary changes before SEMS is mandated and audited.

There is a need to provide our Members with additional tools that will facilitate the implementation of SEMS in their operations. For SEMS to be effective within an organisation it needs to rely on regular and accurate threat assessments. IATA will look at how best to help Members integrate threat assessments as part of their security operations.

Further to that, tools such as compliance checklist and a mechanism where Members can communicate and share ideas into how to best implement SEMS will be developed during phase 2. The IATA Security department will constantly be listening to the demand of its Members to ensure that integration of SEMS principles can be done in an efficient manner without causing disruption to operations.

A key component of both creating awareness and ensuring implementation is educating the aviation community about the benefits of SEMS and how to move towards having SEMS as an integral part of its operational security. IATA will be offering training for the implementation of Security Management Systems beginning in the second half of 2006 and beyond. Training will be offered both as part of the IATA training curriculum where classes will be open for all to join but also as training sessions in specific countries where the goal will be to have regulators, airports and airline representatives of a specific State or region all working together to try and develop their own SEMS that will then be adopted at the national level.

Generally, IATA Members are very supportive of the SEMS initiative and have a strong belief that it can lead more efficient use of their security resources. When SEMS is adopted solely by an air carrier, they will see some improved efficiency and cost effectiveness. But the true benefits of SEMS can only become reality when regulators adopt SEMS and regulate through the use of performance-based requirements and when all the stakeholders buy into the SEMS concept.

For that reason, a large part of the awareness and promotional activities will be with regulators, airport authorities and other aviation stakeholders. IATA will work with ICAO to ensure that SEMS guidance material can be found in both the ICAO Security Manual and the ICAO Security Audit Reference Manual. Also, IATA will work with various States and regional organisation in order to get SEMS adopted at the State or regional level.

In cooperation with the Safety and Operations departments, we will be working towards harmonising SEMS with the Safety Management Systems (SMS) and Operations Management Systems initiatives. The Task Force will be led by the safety department and will be comprise of members from safety, security and operations. Through this cooperative initiative, IATA hopes to be able to have a unified approach to air carrier operational management which would lead to a seamless system that when integrated within an air carrier will lead to improved efficiency and cost effectiveness of all facets of daily operations.

Additional information on Security Management Systems can be found by visiting SEMS website:

www.iata.org/whatwedo/security_issues/sems

5.13 A Global Strategy for Aviation Safety

Leadership in safety requires an understanding of the situation, an acceptance of responsibility, a commitment to action, and clear strategies and targets. For Governments and States, safety leadership must involve taking the issue from the margins to the mainstream to help guide policy and action. For industry, it must reach beyond the design and technology and penetrate the management and culture of aviation. The attainment of a safe system is the highest priority in aviation. The moral imperative for action to reduce the accident rate still further is self-evident, the operational benefit is immense, and the business case highly compelling.

Ultimately, however, the acceptable or tolerable accident rate is determined by the perception of safety needs by society and the international community. Acceptable safety risk is related to the trust attributed to the aviation safety system, which is undermined every time an accident occurs. Therefore, the challenge is to drive an already low accident rate even lower. To achieve the next major breakthrough in that rate, there is a need to move beyond the traditional government-industry model, with its adversarial role-playing of regulator versus the regulated. An action plan of global dimension is required that clearly identifies the roles played by the regulatory and industry elements, while emphasising their complementary nature. The plan should also enable global leadership and coordination that is currently lacking in aviation safety.

The industry at large currently lacks global leadership in safety and a clear strategy for the near and medium-term. Therefore, from its strong safety platform IATA has seized the opportunity to lead the industry in the development of a strategic action plan (a Safety Roadmap) for aviation safety prepared jointly by Airports Council International (ACI), Airbus, Boeing, Commercial Air Navigation Service Organisation (CANSO), Flight Safety Foundation (FSF), IATA and International Federation of Air Line Pilots Associations (IFALPA) for ICAO. This group is known as the Industry Safety Strategy Group (ISSG).

Without such a Safety Roadmap, and industry-wide commitment to it, there will continue to be much duplication of effort and poor alignment of stakeholder initiatives. Additionally, the institutions' and stakeholders' reluctance to invest in safety, operational and infrastructure programmes will persist. A fundamental impact of the Safety Roadmap in both the near and medium-term will be to improve the safety and risk management systems employed by States and airlines. It also:

- Provides for a much more proactive, business-like approach to safety and risk management through a common frame of reference for all stakeholders.
- Drives the need for State commitment to provide truly independent, adequately funded and effective civil aviation Regulators.
- Widens the opportunity for deployment of safety tools such as IOSA, STEADES, FDA and the global application of IATA SMS interactive tools and training.
- Positions IATA as a leader in the development of safety strategy enhancing our image in the industry as a safety committed, quality organisation.

The Roadmap contains elements that are directed at ICAO and States, and others that are directed at industry. There is a necessity for the Air Navigation Commission of ICAO to review the Roadmap and assess the need to incorporate elements of the Roadmap within ICAO Strategic Objective A – Safety. Some elements of the Roadmap directed at industry are not under the direct purview of ICAO, thus the ISSG is determined to follow up on their implementation. There is therefore a need to coordinate future development with ICAO.

- At the meeting held on 3 February 2006, the ANC agreed to establish a Working Group made of Commissioners, tasked with:
  1. Reviewing the Roadmap;
  2. Seeing how the components of the Roadmap directed to ICAO can be integrated in the business plan supporting ICAO Strategic Objective on Safety; and
  3. Propose ways to coordinate future ICAO action on the Roadmap with the continuing work of the ISSG.

  The membership of the group was to be decided by the President of the ANC, and its first meeting would take place before the next meeting of the ISSG planned for 1 and 2 March 2006 in Montreal.
- The Roadmap will also be of interest for the Director's General of Civil Aviation Conference (DGCA/2006) on a Global Strategy for Aviation Safety as a major development in the aviation safety arena. It has been agreed by the Commission that the Roadmap should be part of the documentation for DGCA/2006 as an informal paper that would also reflect the initial action taken by the Commission.
- The ISSG will therefore continue to work with ICAO and other stakeholders to encourage States and industry to accept responsibility for the implementation of all elements of the Roadmap in order to achieve a reduction in the global accident risk within commercial aviation.
- As a priority, the ISSG should develop strategies for regional implementation, with the emphasis on those regions where assistance will clearly be needed. Regional strategies shall make use of funding, expertise and resources from other States or from sources such as the World Bank.
- The ISSG should prepare Part 2 of the Global Aviation Safety Roadmap detailing lower level implementation by 31 October 2006.

In this way, the IATA Safety Programme will align with ICAO and industry to achieve maximum effectiveness in the global campaign to reduce accidents. The Global Aviation Safety Roadmap is included on the CD-ROM enclosed at the end of this report.

6 REGIONAL ACCIDENT PREVENTION PROGRAMMES

The global picture of the accident scene for 2005 was presented in chapter 4. IATA has formulated regional strategies and plans to prevent accidents with a programme that is fully aligned with the Six-point Safety Plan.

6.1 Africa

Poor regulatory oversight by the civil aviation authorities was a common contributing factor in many accidents throughout Africa. Consequently, the lack of safety management or quality systems among airline operations resulted in maintenance, flight / ground incidents and personnel training not being systematically recorded and analysed.

Cargo operations contributed to a large portion of the 2005 accidents.

Safety in Africa remained an issue for African carriers, where few outside operators contributed to region's accidents in 2005.

Based on the limited information of the accidents, it is apparent that the infrastructure has not been a preponderant contributing factor, contrary to expectations. Substandard infrastructure played a significant role in severe incidents and disrupted operations in several occurrences. Infrastructure deficiencies are likely to become a major player in the years to come. For example, the lack of appropriate aerodrome maintenance (especially with regards to runways) has already contributed to serious incidents. Airport fencing is very often deficient, which is a big threat not only due to security breaches but also wildlife wandering within the airport perimeter. Obvious degradation of the ground infrastructure can be observed in some places and could lead to a potential accident.

In the enroute phase, quality of air traffic services is often below global standards and communication is sometimes impossible. An example includes crews often claim that they have crossed entire FIRs without any radio contact with air traffic services. Although this scenario was not the cause of the accident thanks to ACAS and the widespread use of the IFBP frequency, the constant growth in traffic delineates that this situation should not be tolerated. ICAO and IATA are addressing these deficiencies under the RVSM implementation process and the national safety plans developed by States in this context.

With respect to operators in the region, the IATA Operational Safety Audit (IOSA) is gaining momentum and 4 airlines in Africa obtained their registration in 2005. It is expected this effort will continue in 2006, thus playing a crucial role to the projected enhanced safety oversight activities by national administrations.

6.2 Asia Pacific

In 2005, IATA's regional safety office for Asia Pacific gained unreserved support from the International Federation of Airline Pilot Associations (IFALPA) and the Association of Asia Pacific Airlines (AAPA) to address the issue of the unsafe location of the Mumbai air traffic control tower at Mumbai airport in India, which was built too close to runway 14/32.

IATA also provided the audit team to complete several operational quality standard (OQS) audits for membership and an auditor resource to the IOSA quality assurance programme.

Active participation was held in the ICAO Regional Air Space Safety Monitoring Advisory Group (RASMAG), the ICAO cooperative development of operational safety and continuing airworthiness programme in Asia (COSCAP) and the Regional Coordinating Group (RCG).

Guidance was provided on the correct signage for the initial and future parallel runways at Thailand's new Suvarnabhumi Airport.

Working with ICAO, the regional office promoted a trilateral meeting between China, Japan and Korea to address safety concerns and the inefficient routes over East China Sea and Myanmar.

A communications survey was carried out across Bay of Bengal and Arabian Sea to confront India's poor air/ground communication service. Safety concerns were also addressed with regards to irregularities in the Afghanistan Aeronautical Information Publication.

IATA's safety initiatives and programmes were presented at the Safeskies 2005 conference held in Canberra.

In 2006, the regional office will send a report card to each State in the region advising them of reported incidents within their area of responsibility.

It will use ATS Pilot Surveys (as determined in consultation with RCG) to identify other shortcomings and deficiencies to be included in the ASPAC Shortcoming & Deficiency Plan. Once identified, it will contact States and ICAO, and depending on the issue, follow up with a meeting with ATS Providers and Regulators.

The regional team will continue to address the safety hazard problem of the Mumbai Control Tower and ensure that Thailand's new Suvarnabhumi Airport is safe in all operational respects before opening it to international airline operations.

IATA will also provide value-added advice to the Regional Coordinating Group (RCG) on operational safety matters.

6.3 Europe

6.3.1 Level Bust (LB)

The Action Plan for the prevention of level bust has been in place for more than one year and the monitoring of its application and identification of possible new causal factors is ongoing. Successful common work has been established between IATA's European Safety, Operations and Infrastructure (EUR SO&I) office and UKNATS in order to reduce the number of LB and to improve the safety situation.

All airline safety managers have been kept informed and asked to contribute to the reduction of LBs in the UK.

6.3.2 Air / Ground Communication

54 airlines worldwide participated to the Eurocontrol-IATA workshop in September 2005. The main identified problems are related to radio discipline, call-sign confusion, prolonged loss of communication, interference, blocked transmission, etc. The work on all identified elements is ongoing. EUR SO&I is specifically involved in the work on similar call-sign confusion and its prevention. It is expected that the European Action Plan for the prevention of the air / ground communication problems will be finalised by October 2006 when another workshop will be organised.

6.3.3 Madrid and Moscow Safety Groups

EUR SO&I safety working groups with Madrid and Moscow TWR / TMA / ACC continue with their activities focusing on issues such as the lack of traffic information, inadequate separation minimums in approach, radar vectoring techniques, English language, level bust, air traffic controllers rate for licensing, lack of regulation, etc.

6.3.4 European Strategic Safety Action Plan (SSAP)

EUR SO&I, together with Eurocontrol and its member states, participates in the implementation of the European SSAP, ensuring improvement of the overall European safety. SSAP covers safety-related human resources in ATM, incident reporting and data sharing, Airborne Collision Avoidance System (ACAS) ground-based safety nets, runways and runway safety, Enforcement of Eurocontrol Safety Regulatory Requirement (ESARRs) and the monitoring of their implementation, awareness of safety matters and safety research & development.

6.3.5 Safety Data Reporting and Data Flow

EUR SO&I participated in the Eurocontrol Task Force related to the Safety data reporting and data flow since it has been identified as the weakest point within the European Strategic Safety Action Plan (SSAP). The report, which emphasised the need for all stakeholders to work together, has been agreed and the Eurocontrol Provisional Council supported the Task Force's recommendations, which among legal issues, identified just culture and safety key performance indicators as some of the main issues requiring further work and having impact on the improvement of the safety data reporting and data flow.

6.3.6 Safety Regulation Commission (SRC) / European Commission (EC) Regulatory Activities

EUR SO&I participates in Eurocontrol and European Commission (EC) activities on the harmonisation of safety regulatory framework. Full support is given to the transposition of Eurocontrol Safety Regulatory Requirements (ESARRs) into community law in accordance with the EC regulations and needs of the future Single European Sky (SES).

Special importance is given to the ESARR 1 - ATM safety oversight, which provides an operating baseline for ATM safety regulatory bodies to conduct safety oversight, and to the ESARR 2 - incident data reporting and analysis as the prerequisite to identify the main safety concerns and their improvements.

6.3.7 Runway Safety

The European Action Plan for the Prevention of Runway Incursions has been actively promoting paying awareness-raising visits to the established Local Runway Safety Teams at the European airports. These teams consist of operational representatives of the local airport operator, pilots, air traffic controllers, ground handlers and the Regulator.

The Action Plan calls for the implementation of 56 recommendations to prevent runway incursions. Every Stakeholder has to fulfill its own assigned recommendations. A survey done by EUR SO&I among the IATA Member Airlines revealed that on average 80% of the recommendations for aircraft operators have been fulfilled.

In 2005, the following airports were visited: Amsterdam, Copenhagen, Frankfurt, Munich, Brussels, Prague, Barcelona, Madrid, Ljubljana, Bucharest, Sofia, Dublin, Malaga, Malta, Bologna, Venice, Zurich, Helsinki and Lisbon.

Good progress on the implementation of the Action Plan could be reported from the Local Runway Safety Teams.

Special runway safety meetings were organised in Paris Charles de Gaulle (CDG) and Barcelona airports, which were attended by many airline representatives.

Photo courtesy of Bombardier

6.3.8 Pilot / Junior ATCO English ATC Training Course at CDG

IATA Member Airlines, in cooperation with CDG Air Traffic Service Provider, have volunteered to provide native English speaking pilots to attend one-day ATC training course. The aim is to bring together pilots and junior student Air Traffic Controllers (ATCOs) for a one-day session. The junior ATCOs are in their final phase of training on approach and departure frequencies. North West Airlines, Delta Airlines, Fedex and UPS participated in 2005 and reported good results. The 5 sessions held in 2005 included discussions on operating procedures at CDG on which airlines might have questions, piloting aspects on which the junior ATCOs have questions, and a visit to the control tower cab and approach room.

Expected results for the ATCO students are to speak as much English as possible in relation to their job, to become familiar with a correct phraseology and to better understand the pilot’s position. In addition, this will promote the use of English R/T as a common language. This has been vigorously advocated by the airlines as a safety feature in raising awareness. The use of English in a busy and complicated environment was proven as a best practice and should be encouraged as a standard, and IATA pursues this at every opportunity. Expected results for Member Airlines are that they become more familiar with the ATC personnel and with the environment at CDG, including the situation with taxiing and the inherent danger of runway incursions.

6.3.9 Communication Loss

Communications loss between Air Traffic Control and aircraft in Europe is investigated under both the safety and security domains. It becomes a security issue when after a certain length of time passes, based on judgment and location, the civil controllers alert the NATO commanders.

As well as the work being done in the safety domain, IATA is also working within the security domain, which is a NATO and Eurocontrol joint undertaking. The achievements for 2005 were to build a close working relationship with the military and civil units concerned with communication loss incidents and to follow up with the pilots concerned for their viewpoint on the factors that led to communication loss. The feedback is then collated and shared with appropriate authorities for analysis. In addition some of the report summaries have been de-identified regarding airlines concerned, and shared with the VP Ops level in Member Airlines as part of an awareness campaign. Many airlines have updated their procedures and emphasised the problem for their pilots.

For 2006, Eurocontrol is planning a common database of communication loss incidents to be shared between safety and security with the aim to avoid duplication in efforts. EUR SO&I has been asked to participate in designing and populating the database and in the follow up work that will aim to considerably reduce the number of incidents in Europe.

Apart from the safety and security issues, an important element is the loss of valuable airspace capacity during an incident. This is often in very dense traffic areas, where there is a financial impact.

6.4 Latin America / Caribbean

A great deal of progress was achieved in the safety arena, through the execution of technical missions, airport operational assessments, resolution of airline operational requests, development of RNAV/RNP procedures and industry-wide regional consolidation of safety programmes.

Operational improvements have been aggressively pursued across the region, in particular, with the development and implementation of RNAV/RNP terminal procedures. These procedures enhance safety to aircraft operations by providing more accurate aircraft position awareness via moving map displays and stabilised descents. The adoption of these procedures combined minimise the potential for Controlled Flight Into Terrain (CFIT) and Approach and Landing Accidents (ALA), which typically occur during the approach phase and have been a main cause of the accidents in Latin America. GNSS/RNAV procedures were implemented in Cayanne and Punta del Este Airports during the year. Significant development work was also carried out in Bogota, Medellin, Quito and Santiago and the expectation is for these sites to implement the procedures during 2006.

Safety-oriented technical missions were conducted in 8 airports: Peru, Brazil, Honduras, Nicaragua, Guatemala, Colombia, Mexico, and Ecuador. The results of these visits produced corrective actions for serious deficiencies in the air traffic management, airport infrastructure, aeronautical information and meteorology areas, all of which represent safety and operating benefits to the airlines. Significant improvements were observed at Sao Paulo's Guarulhos obstacles, Guatemala City, Mexico City runway, Manta ARFF services and Lima airport infrastructure.

ATC incident / airprox reports continue to be a matter of concern. A total of 69 reports from 14 airlines were received in 2005. However, since the majority of the reports received continue to come from a limited number of airlines, it is assumed that the actual frequency of incidents is much higher. Many of the incidents occurred in the enroute and the approach segments of flight.

A total of 212 urgent deficiencies affecting air navigation services were corrected by States and validated by IATA. Unfortunately, the region continues to suffer from a high number (over 250) of unresolved deficiencies and shortcomings affecting airline operations. The need for States to implement programmes for their elimination is a matter of constant concern and of high priority for IATA and Member Airlines. In the infrastructure area there are many deficiencies that impact operations, for example, the lack of radar coverage, poor communications, NavAids reliability, outdated terminal instrument procedures and airports with marginal airside conditions. Those safety deficiencies are basically caused by the lack of funding, even though airlines are charged heavily for flights, landing fees and taxes.

One activity, which is crucial for improving regional safety, is the role of the Civil Aviation Authorities in the regulatory oversight. The lack of this activity has been severely criticised and penalised by the U.S. Federal Aviation Authority (FAA) by downgrading many states in the region to Category 2, which imposes economical and operational consequences for them and their own carriers. 12 States from the region do not meet ICAO standards and are in the FAA IASA Category 2.

Many airlines are facing significant hurdles in upgrading their operational safety capability. Safety initiatives have been launched to improve government oversight, but until now, there has been no systematic programme aimed directly at airlines. IATA has teamed up with AITAL to jointly launch the Partnership for Safety Initiative with the intent to provide regional airlines that are members of both organisations with tailored, practical assistance to successfully pass IOSA.

This initiative helps airlines with limited resources to identify and bridge gaps to meet IOSA's rigorous standards. The programme provides safety improvements at every step, from initial exposure to industry best practices to the identification of airline specific problem areas and monitored improvement programmes. The ultimate phase, being audited under IOSA, will demonstrate full operational safety capability.

The Latin America & Caribbean Strategic Safety Action Plan for 2006 – 2008 covers the following:

- Develop and launch the Partnership for Safety Initiative with PAAST, airlines and regulators.
- Hold Regional Safety Seminaries / Conferences / Workshops: these local events sponsored by regional airline / state / associations / industry will promote safety awareness in the region.
- The IOSA programme is gaining international recognition among airlines and regulators. IATA will encourage regional airlines to commit to IOSA by the end of 2006.
- Safety Management System: promote airline and ATS implementation through training in local language.
- ATS / AIRPROX Incidents: ensure consistent safety occurrences reporting. The regional office will aim at assisting in the reduction of events by encouraging airline good reporting cultures and focus on improving the response and feedback provided by ATS authorities. ATS / AIRPROX incident table / template will be available on the IATA web page and the ATS / AIRPROX Task Force will help identify casual factors and promote corrective actions.
- Safety Reporting: encourage non-punitive / voluntary incident reporting system amongst regional airlines and for Air Traffic Management.
- English Language Proficiency: monitor and encourage State awareness. Implement a plan to improve proficiency in line with the new ICAO provisions.
- Pan American Aviation Safety Team (PAAST): develop intervention strategies.
- The regional team will increase involvement of Action Team Leaders (airlines) and support of stakeholders (industry, associations, organisations).
- ALAR / CFIT: the regional team will assist with airline training implementation (questionnaire / survey to be circulated to Member Airlines) to address step-down

approaches. Work will also be conducted on GNSS / RNAV procedure development and other issues.

- ATS Quality Assurance: coordinate with ICAO and PAAST. Assist in ATC training and the development of best practices.
- Airline Safety Initiative Sharing (ASIS): share information about safety issues (meetings, conference calls, chat rooms, emails) and align work programmes.
- LATAM/CAR Deficiency List: review / update list and press authorities for corrective action. Conduct technical missions in the region.
- Birdstrikes: gather information and press States to implement animal prevention measures at their airports.

6.5 Middle East / North Africa

The 2005 achievements in the Middle East and North African region are as follows:

- Promoted IATA Operational Safety Audits (IOSA) and secured completion of seven audits with one partial audit.
- Promoted Safety Trend Evaluation, Analysis & Data Exchange System (STEADES) and Flight Data Analysis within operators in the region.
- Encouraged regulators and airlines to mandate the implementation of an effective Safety Management System and received positive feedback.
- Version 4 Runway Incursion Prevention Programme (RIPP) toolkit was handed to AOP participating State and to local operators.
- Two Operational Quality Standards (OQS) audits were conducted.
- 114 Airlines Operational Requests (AORs) were received.
- An increase in number of air miss reports was noted; this was mainly observed in Syria, Algeria and Sudan. 68% have been attended to and investigated by the concerned CAA authorities.
- As a result of the regional team's intense intervention and follow up with CAA authorities, three deficiencies have been rectified. A major success was the replacement of ILS in Cairo.

The 2006 objectives in the Middle East and North African region are as follows:

- Continue implementing the Six-point Safety Programme to assist the industry in achieving a 25% reduction in the accident rate:
  1. Promote IOSA at every opportunity among MID airlines and CAA authorities.
  2. States visit to promote the IATA Safety activities.
  3. Secure two additional STEADES membership.
  4. Continue with the promotion of FDA Service to secure one membership.
  5. Promoting IOSA, STEADES and FDA Service at the IATA day.
  6. Encourage regulators / operators to mandate the implementation of an effective Safety Management System.
- Regional deficiencies: press States and ICAO to implement corrective action plans to resolve operational deficiencies:
  1. Submit all reported deficiencies to all participating States at ICAO meetings.
  2. Coordinate with RCG to exert effort on their State authorities to rectify reported deficiencies.
  3. Communicate all deficiencies to relevant States and follow up in order to obtain rectification.
  4. Conduct missions to States (Sudan, Syria and Algeria) Airport Operational Assessment.
- Define regional safety strategy in coordination with regional associations (ACAC).

6.6 North Atlantic & North America

6.6.1 "Hot Spots"

A term typically used to define an area of complex or confusing taxiway/taxiway or taxiway/runway intersections. The area of increased risk has either a history of, or the potential for runway incursions or surface incidents, due to a variety of causes, such as but not limited to: airport layout; traffic flow; airport marking, signage and lighting; situational awareness, and training. Following a few successful site trials, the FAA will now produce major US airport charts depicting "hot-spots" as open-circles designated as "HS-1", "HS-2", etc. This depiction provides pilots with enhanced situational awareness for intuitive and easily recognisable known problem areas.

6.6.2 Volcanic Ash Contingency Plan

The eruption of "Grimsvotn", a sub-glacial volcano in central Iceland on November 1, 2004 rapidly sent ash plumes and smoke up to 40,000 feet in a few hours. Over the next few days the ash cloud had drifted over Scandinavia and across the Black Sea over Turkey. The impact on the airlines was significant causing multiple flight cancellations or re-routes. Airlines, States and air service providers quickly realised and agreed that developing and implementing a robust regional contingency plan is vital in managing such events as they happen in a safe and efficient manner. ICAO and IATA along with other stakeholders are collaborating to develop and test a comprehensive Air Traffic Management (ATM) Contingency Plan covering the North Atlantic and Europe.

6.6.3 Non-standard Air Traffic Phraseology

The ATC clearance"taxi-into-position-and-hold" is commonly used in North America and equally well understood by North American pilots. This specific phrase has, however, been a major cause for several runway incursions. This is especially seen in operations outside North America where taxi instructions could be misinterpreted, where an additional controller clearance is required prior to entering a live runway. North American crews have been prone to enter live runways when issued with ICAO-type taxi instructions. The FAA has since restricted the use of TIPH clearances. IATA is working closely with Transport Canada and Nav Canada to adopt harmonised ICAO phraseology.

6.6.4 Safety Monitoring Activity in the North Atlantic

There are over 1200 flights that fly across the north Atlantic every day. The traffic patterns are dense with approximately 40% of the flights that would try to squeeze into a 3 to 4 hour window. With dense traffic and volume and a sustained average traffic growth of 7%, maintaining if not improving the level of safety is critical. IATA is an active participant in the ICAO regional safety management programmes. Over 150 individual safety incidents are collected and followed up annually with each airline. Audio-visual familiarisation aids in the form of the "Keeping Track" DVD have been developed and distributed to users. A "quick-reference" checklist is being developed to provide pilots with an easy reference to specific North Atlantic procedures. This is a major collaborative effort involving all system users, regulatory agencies, ICAO and Air Navigation System service providers to provide a tangible decrease in safety incidents from pilots and ATC alike.

6.6.5 Aerodrome Construction in New York

Aerodrome construction activity by the Port Authority of NY and NJ has been ongoing for over 1 year now and expected to continue through 2008. This has resulted in a significant disruption and degradation to the service provided by the FAA. Extensive ground and air-delay programmes have resulted, causing system congestion and other restrictions. IATA has been working closely with both agencies to ensure disruptions are minimised, work schedules adhered to and airlines informed in a timely manner.

6.7 North Asia

The 2005 achievements in the North Asian region are as follows:

IOSA development: overall, 8 airlines completed IOSA audits in the region, among them 5 airlines have now been registered. An additional 4 airlines have signed contracts with audit organisations, and will conduct formal audits in early 2006. The regional team coordinated with the IATA Training and Development Institute to organise IOSA training seminars for the China National Aviation Holding Company.

The regional team established relations with aviation safety office of the General Administration of Civil Aviation of China (CAAC) and organised a meeting with the new Director General of aviation safety office of CAAC. CAAC is going to implement SMS across the whole industry nation-wide with the assistance of IATA.

IATA also maintained good contact with CAAC ATMB for voicing airline concerns on all ATC related safety issues:

- Delivered airlines ASRs to ATMB for fact-finding and investigation.
- Provided results and explanations / feedback received from ATMB to the pertinent airlines.

A close relationship was maintained with the airlines in the region and two meetings with the participants from safety and operations departments of the airlines in the region were held to raise awareness on the IATA safety strategy.

In 2006, the North Asia office will focus on promoting IOSA and providing training to local operators. With the development and completion of IOSA for Eastern-built aircraft, more carriers will be able to contract an audit. The regional team will also continue strengthening the relationship with the aviation safety office of CAAC and airlines in the region.

7 FLIGHT OPERATIONS

Safety and operational efficiency have long been recognised by IATA as complementary to one another. IATA identifies and develops solutions for industry concerns related to flight operations. This includes analysis of flight operations data, formulation and promotion of IATA operational strategies, quality assurance matters, maintenance of our airline operational information exchange and specific actions to improve operational efficiency while maintaining and enhancing safety.

IATA focuses on ensuring a reliable and optimally priced supply of quality jet fuel at airports worldwide. IATA seeks at every turn to oppose taxation of aviation fuel and to ensure that fuel throughput charges are reasonable. The Fuel Action Campaign is one of IATA's initiatives to help its Members lower their fuel costs, reduce fuel consumption and diminish environmental impact.

7.1 Fuel Action Campaign

To assist airlines combat the severe burden of rising fuel prices, IATA has launched a Fuel Action Campaign to supplement its existing fuel activities.

While IATA cannot influence the commodity price of oil, it can take measures to reduce the amount of fuel consumed, simplify business practises, reduce duties, fees and taxes, improve market conditions and lower the costs associated with fuel hedging.

IATA is working with industry partners worldwide to reduce the industry's fuel requirements and associated environmental emissions. In addition, work is being conducted with individual airlines to ensure they have a robust internal "fuel conservation programme" in place.

Opening of new, more direct routes, realignment of inefficient routes and improved ground traffic flows can reduce industry costs by $2.5 billion per year.

Airlines individual efforts to improve their own operating efficiencies can yield significant savings. Each 1% improvement in fuel efficiency across the industry can lower fuel costs by $700 million per year industry wide.

Greater priority is being given to ongoing initiatives to increase competition among fuel suppliers at local levels and to challenge unreasonable and potentially illegal duties, fees and taxes where they exist.

To simplify the business, IATA is working with airlines and industry partners to establish and adopt industry data standards, make fuel management technology more effective, affordable and easier to deploy, and take advantage of shared services where permissible.

To help airlines better control fuel costs IATA is working with leading global banks to expand credit and reduce costs associated with hedging activities.

7.1.1 Fuel Conservation

After labour, fuel represents the largest cost component in airlines operations. An effective and efficient way of reducing costs is to use less fuel. Work is being carried out with individual airlines to ensure they have a robust internal "fuel conservation programme" in place.

7.1.2 "Save 1 Minute" Initiative

On average airlines spend approximately $100 per minute/flight in total operating costs (labour, fuel, maintenance, etc.). IATA is working with air navigation service providers (ANSPs), air traffic controllers (ATCs), airlines and other key stakeholders to save 1 minute per flight through better airspace design, procedures and management. If successful, this initiative could reduce total industry operating costs by over $1 billion per year and significantly reduce environmental emissions.

7.1.3 Route Optimisation

Opening new more direct flight routes and re-aligning others to reduce fuel requirements can save the industry $1 billion per year and reduce harmful environmental emissions. Notable achievements by area include European Civil Aviation Conference (ECAC) states, North Atlantic / North America (NATNAM) and the Middle East. A breakthrough has been achieved in China where Authorities have authorised flexible flight planning in terms of 3 entry points into Chinese airspace to support cross-polar tracks. True flexible planning in China is now within sight and is expected to bring significant savings. Additional priorities include new routes over Russia, India and reduced delays in Europe.

Photo courtesy of Bombardier

7.1.4 Improved Airport Traffic Flows

Improvements to ground, departure & arrival traffic flows and rationalisation of existing Noise Abatement Departure Procedures (NADPs) can further reduce fuel consumption, lowering industry costs by $530 million per year. Initial work has begun with airport authorities at HKG and MEX, while other opportunities are being identified and prioritised.

7.1.5 Efficient Operating Procedures

A 1% improvement in fuel efficiency across the industry can lower fuel costs by $700 million per year. Refinements to existing operating procedures can help achieve this. We are compiling industry best practices, publishing guidance material and establishing training programs for member airlines to improve existing fuel conservation measures. A comprehensive checklist on fuel efficiency best practice has been sent to member airlines to enable them to assess their operations in this regard.

7.1.6 Technical Activities

Through the Technical Fuel Group (TFG) and the IATA Fuel Quality Pool (IFQP), IATA works with industry suppliers and service providers to ensure a reliable supply of safe and quality jet fuel. From the refinery process through the delivery of fuel into-plane, IATA establishes and publishes industry recognised standards & procedures.

7.1.7 IATA Fuel Quality Pool (IFQP)

Aviation regulatory authorities require airlines to monitor compliance of fuel services and the supply, storage and distribution of fuel at airports according to international safety standards. The IFQP is a cooperative effort among participating member airlines that have recognised the benefits of standardising procedures & checklists for fuel audits, inspections of airports, and the sharing of reports for the benefit of all pool participants. This combination raises safety levels while reducing costs.

The Pool uses the highest quality standards available in the industry and has developed its own set of procedures and checklists for conducting airfield fuel inspections and audits.

Although ensuring the safety of aircraft operations is the primary objective of the IFQP programme, participating airlines derive important financial benefits in terms of drastically reduced airport inspection workloads and associated costs. Participation in the IFQP is open to any IATA Member Airline.

IFQP member airlines must perform their allocated audit inspections by IFQP Accredited Inspectors. To become an IFQP Accredited Inspector, prospective inspectors must go through a rigorous process of classroom and airport training followed by completing a check-ride with an existing IFQP Accredited Supervisor. The first step in this process is attending (and passing) the IFQP Training Course. Conducted at the IFQP Training Centre in Brussels, the course provides a comprehensive training programme to develop and enhance the skills of prospective IFQP inspectors.

7.1.8 IATA Fuel Efficiency Gap Analysis & Go Teams

The Operations Department launched the Fuel Efficiency Gap Analysis program in 2005 to assist member airlines in the identification and implementation of fuel conservation initiatives. The Gap Analyses are performed by Go Teams, which assess the airlines' policies and procedures in the areas of maintenance & engineering, flight operations and dispatch that affect fuel consumption. Comprised of industry experts in these respective disciplines, the Go Teams focus on fuel conservation methods that enhance efficiency without having an adverse effect on operational safety. Through their experience, the Go Teams are able to provide airlines with information on industry best practices in the area of fuel conservation highlighting measurable savings. Offered as a free service to member airlines, over forty Gap Analyses have been scheduled for member airlines during 2006. Once completed, IATA is able to follow up with consulting services that assist airlines in the implementation of recommended fuel conservation programmes.

7.1.9 Training Courses

IATA offers a variety of courses on the topic of fuel, including:

- Aviation Fuel Management
- Jet Fuel Price Risk Management
- Fuel Efficiency and Conservation Training

Participants to the course can develop a holistic approach to Jet fuel management, understand the different factors that impact the Jet fuel market, reduce your costs, understand the range of pricing and supply options, gain insight into the manufacturing, distribution and handling of Jet fuel, and gain awareness in quality and safety issues. The courses also help suppliers better understand their customers' requirements.

Further information on these and other courses can be obtained on line at: www.iata.org/ps/training/

7.1.10 Commercial Activities

Through the Commercial Fuel Group (CFG), IATA addresses commercial areas of concern. Objectives of the CFG include ensuring open and competitive markets, eliminating unnecessary duties, fees & taxes, and fostering relationships with industry suppliers to attack areas of common interest.

IATA also works to facilitate trade between airlines and interested counterparties, highlighted by Aviation Fuel Forum meetings hosted by IATA twice per year.

7.2 PROLIFERATION OF OPERATIONS SPECIFICATIONS

IATA urges all States to refrain from requiring operations specifications for operators of other States, when alternative means exist of ensuring the operator meets ICAO minimum standards, such as:

- Recognition that the State of the operator has adequate oversight capability, through collaboration between States, inter-State audits (such as FAA IASAP) or State audits according to ICAO's USOAP provisions; or
- Demonstration of acceptable standards by the operator (e.g. IOSA registry), etc; or
- Through bilateral or multi-lateral aviation safety agreements (e.g. EU-USA).

IATA recognises that, when minimum operating standards cannot be ensured, States may impose additional conditions, such as Operations Specifications, for those operators concerned, on condition that:

- A State only introduces a requirement for operations specifications if necessary to ensure the standards of a specific foreign operator meet the minimum ICAO standards, and provided it relates to ICAO Standards that are widely implemented by ICAO Member States.
- The reasons and necessity of requiring such operations specifications are reviewed by the State at regular intervals and are agreed with the State responsible for oversight of the airline operator concerned.

In case operations specifications are required, IATA supports the harmonisation of foreign operations specifications on condition that:

- Deviations from the operator Standard Operating Procedures, resulting from operations specifications, are avoided;
- Simple and harmonised processes, for which guidelines would eventually be published by ICAO, are used to apply for Operations Specifications; and
- published by ICAO, are used to apply for operations specifications; and operational flexibility and efficiency are not compromised.

IATA recognises that "certificates of airworthiness and certificates of competency and licences issued or rendered valid by the contracting State in which the aircraft is registered, shall be recognised as valid by the other contracting States, provided that the requirements under which such certificates or licenses were issued or rendered valid are equal to or above the minimum standards which may be established from time to time pursuant to this convention". IATA supports the extension of article 33 of the Chicago Convention to certificates issued by the State of the operator, such as the Air Operator Certificate.

Airlines should be relieved of foreign operations specifications requirement if the State of the operator provides sufficient oversight or if the operator demonstrates compliance with international standards through an established programme (such as being IOSA registered) or if a bilateral aviation safety agreement is signed between the concerned States.

IATA supports the higher reliance to meet safety and efficiency of air transportation by means of a quality assurance and oversight process. USOAP for States and IOSA for airlines are among such methods currently available.

If applied to all foreign operators without relief as described in the paragraph above, proliferation of operations specifications requirements leads to an administrative burden (both to the airlines and the Authorities) that restricts international air transport, greatly impeding flexibility and efficiency, with minimum safety benefit.

Failing sufficient State of the operator oversight or demonstration of compliance with international standards or a bilateral safety agreement, the concept of foreign operator operations specifications may be valid, aiming at ensuring that an affected airline achieves minimum operating standards, until such time as the operator demonstrates adequate standards.

The need for each contracting State to keep its regulations uniform to the greatest possible extent is of critical importance to safe and efficient air carrier operations.

To enable air carriers to meet this objective, collaboration between States is required to secure the "highest practicable degree of uniformity in regulations, standards, procedures and organisation in relation to aircraft, personnel, airways and auxiliary services in all matters in which uniformity will facilitate and improve air navigation".

Operations specifications, which define the operating parameters, should not conflict with the operator Standard Operating Procedures, for safety reasons. For example, weather minimums, en-route, and approach procedures should not be affected except for such procedures that are State specific.

State "differences" filed by States with ICAO and that are communicated to all other States by the ICAO Council should be given due recognition in the issuance of AOCs by each State. Special State procedures, such as LAHSO, PRM, etc., may require specific training or approval for the operator, which should be obtained in the most expedient way (e.g. simple notification of compliance).

It must be recognised that non-harmonised operations specifications create unnecessary additional training requirement for flight crews and result in added costs to operations.

Application processes for operations specifications and the resulting authorisation should be internationally harmonised, to reduce complexity when applications are made to several States. The administrative burden, with its resulting costs to the State and the operator, should be minimised, both in terms of application or amendment processes and in term of response time.

The need for flexibility, especially in case of partial airspace closure or for special flights, must be recognised by the State, which should consider, on a temporary basis, permitting over-flight or technical stops without requirement for foreign operations specifications, should such operations specifications be required in other circumstances.

7.3 MAINTENANCE COST REDUCTION

IATA is committed to achieving the Maintenance Cost Reduction objective by implementing the gathering of airline maintenance cost data. A specific web based portal will be available for the activity by mid-2006. By the end of June, received maintenance cost data will be consolidated, analysed and the annual report will available by end of 2006.

IATA has established a structured approach to provide major concrete cost savings for airlines by the identification of significant cost drivers and cost reduction potentials. The data collection process through IATA will secure confidentiality during the benchmark process. The approach involves a provision of an initial data collection tool for on-site testing. IATA seeks to facilitate the maintenance cost process and training sessions, based on airline needs. Coordination of the final definition of tool functionality following user feedback is also provisioned in this approach along side a test run with the cooperation from the airlines and OEM's. IATA will establish a portal for data exchange and operation by April 2006.

Restructuring was performed to enable IATA to provide enhanced collaboration with the airlines, identifying new campaigns/issues jointly with them. This is achieved by an intensified collaboration through regular teleconference calls and a fixed meeting schedule with the Engineering and Maintenance Group, the Maintenance Cost Task Force and its Steering Committee (EMG/MCTF/SC) as well as enhanced communications (Improved Website and New Data Portal) and transparency.

IATA will place a major focus on delivering cost reductions including a structured monitoring of achieved cost results, on new prioritised initiatives and campaigns and on strengthening its team with qualified and experienced staff.

8 FINDINGS AND PREVENTION STRATEGIES

This chapter of the Safety Report presents the outcomes of the discussions held at the Accident Classification Task Force (ACTF) meeting and the top findings based on the analysis of the accidents that occurred in the year 2005.

The prevention strategies developed by IATA and the ACTF are presented in this section of the Report. Prevention strategies were divided according to the parties concerned.

Photo courtesy of Embraer

8.1 Regulators or International Bodies

8.1.1 Investigations in Accordance with Annex 13

Several accidents occurring in 2005 could not be analysed since the State of manufacturing was not accredited by the State of occurrence. Conducting an accident investigation without the inclusion of all accredited representatives and their technical advisors can very likely compromise the credibility of conclusions drawn and lessons learned.

In addition, multiple aircraft accident sites were looted in 2005. In such instances, it is often the case that by the time the accident team arrives, evidence is often missing, damaged or destroyed. Beyond the risk of drawing wrong or incomplete conclusions, there is a chance that unauthorised aircraft parts are re-introduced into the distribution channels.

Prevention strategy: IATA takes to bring to the attention of ICAO the need for States to conduct accident investigations according to Annex 13.

8.1.2 Preliminary Factual Information in a Timely Manner

Accident data had to be based in part on very limited information. The report from a detailed accident investigation typically takes several years to be completed. This time span does not support a timely implementation of prevention strategies. Typically, data is not released prior to the completion of the report.

Prevention strategy: ICAO should ensure that a minimum amount of factual information is distributed in a standardised form, in a timely manner according to Annex 13.

8.1.3 STC without Referring to Manufacturer

This year, as well as in the past, there were multiple events where aircraft were operated under a Supplemental Type Certificate (STC) that was approved by an official body without consultation with the manufacturer. This resulted in aircraft being operated outside the operating envelope approved by the manufacturer.

Prevention strategy: Official bodies should consult the relevant manufacturers prior to approving a STC.

8.1.4 Regulatory Oversight

In certain areas of the world, the regulatory oversight of aircraft operations is either poor or absent.

Prevention strategy: ICAO should continuously identify areas with marginal regulatory oversight as part of the ICAO Safety Oversight Programme.

8.1.5 Coordination with ICAO

Following an accident, a significant number of cargo operators shut down operations and resume business in another country or under a new Air Operator's Certificate.

Prevention strategy: IATA should coordinate efforts with cargo operators and ICAO to address regulatory issues that have an adverse effect on cargo safety, including a lack of regulatory oversight of cargo operations and "flags of convenience" registration provided by countries suspected of having minimal oversight capabilities.

Note:
Flags of convenience are being presently addressed – Article 21 of the Chicago Convention – and discussed at the Directors General Civil Aviation Conference to be held in Montreal in March 2006.

8.2 Operators

8.2.1 Airline-specific Normal Procedures Affecting Non-normal Operations.

Under today's financial pressures, there is a tendency for operators to establish "normal procedures" that deviate from recommendations given by the airframe manufacturer, in an attempt to cut costs. Accident statistics show that application of such airline normal operating procedures during non-normal events could cause significant damage and endanger life. In the opinion of the ACTF, the issue revolves around the fact that not all possible, perceivable scenarios / combination of events are considered when revised procedures are implemented.

Prevention strategy: When deviating from manufacturers procedures, operators should be aware of the consequences that the application of such revised procedure might have under non-normal situations. Any modification to the SOPs provided by a manufacturer should be verified with that manufacturer before implementation.

8.2.2 Role of Cabin Crew in Accident Prevention

Certain accidents in 2005 could have been avoided by cabin crewmembers informing the flight crew about a non-normal situation in the cabin.

Prevention strategy: It is recommended that IATA's Safety Programme reinforce, as necessary, the role of cabin crew as safety personnel. As interim measure, recurrent training accident scenarios should be used to train cabin crew to communicate with the flight crew in a timely fashion during non-normal situations.

8.2.3 Loss of Control In-flight

Based on the data of 2005 accidents, there seems to be a misunderstanding among pilots when handling an aircraft at slow speeds close to stall or in a stall. A fully stalled aircraft might not recover when techniques from approach to stall-recoveries are applied. Also, there seems to be a misconception among training departments about the capabilities of level D simulators. Simulators typically are not representative at the extremes of the flight envelope. When stall training is conducted at extrapolated airspeed altitude combinations, the simulator might not be representative of the real aircraft. Consequently, use of simulators outside of the flight envelope is not advisable, due to its high potential for negative training.

Prevention strategy: IATA should develop material to assist training departments to point out the difference in recovery between a fully stalled aircraft versus approach to stall. As a minimum, training should also include the intrinsic features of the aerodynamics of the respective airframe and refresh basic aerodynamics. Manufacturers could provide IATA information to develop material to assist training departments to obtain insight into the limitations of the aerodynamic model used in their flight simulators.

8.2.4 Mandating Touchdown in the Touchdown Zone

The majority of the overruns occurred when the touchdown was well outside the touchdown limit, under difficult situations. Flight crews may not appreciate the need to touchdown in the touchdown zone when conducting operations to airports with long runways. Such a mindset, however, could create a wrong perception and trigger a chain of events under challenging conditions, such as heavy rain, contaminated runway, wind shift, etc.

Prevention strategy: Operators should review their operating, training and checking procedures and ensure that a touchdown in the prescribed touchdown zone is mandated, and enforce this through proper monitoring and checking.

Prevention strategy: Operators should review their operating procedures, training and checking procedures to detect a tendency for pilots to undershoot the approach path, and enforce this through proper monitoring and checking. Flight Data Analysis can aslo be a valuable tool to monitor this issue.

8.2.5 Implementation of a Go-around Minded Culture

Multiple events could have been avoided by a timely decision of the flight crewmember to perform a timely go-around. It is emphasised that the airline culture should allow any flight crewmember to call for a go-around, independent of his function as flying pilot or non-flying pilot (assisting).

Prevention strategy: Operators should publish an explicit statement, signed by the highest possible authority, on the go-around policy.

8.2.6 Rejected Landing (Go-around below MDA)

Analysis of ALA events showed that accidents could have been prevented had the flight crews decided to initiate a go-around after descending below the MDA or DH, or even after touchdown before the selection of reverse thrust in certain situations. Training by the operator should not limit itself to aircraft handling. It should also focus on the decision-making process, which the group feels is crucial to prevent ALA accidents. Simulator training where the simulator instructor initiates a go-around by a "go-around" callout or where the situation seems obvious (such as the presence of a vehicle on an active runway) has benefit with respect to aircraft handling but does not allow flight crewmembers to develop appropriate decision-making skills necessary on the line.

Prevention strategy: It is recommended that operators tailor simulator scenarios so that the flight crew solely undergoes the decision-making process. Training decision-making and real life decision-making are quite different.

8.2.7 Ground Events

With the economic pressure of airlines, an increase in outsourcing functions such as ground operations could be observed. Service providers / vendors may not have a just safety culture, a safety management system may not be installed and there may be no reporting culture. The airline is responsible to ensure compatible vendor safety culture when outsourcing any activities that impact on operational safety.

Prevention strategy: It is recommended that the safety officer / quality manager of the respective airline brief upper management about the risks associated when contracting out services. A proper SMS would address this issue.

8.2.8 Data Exchange Between Operators and Manufacturers

Better exchange of data between Manufacturers and Operators would enhance the analysis of incidents and accidents. It seems that there is a tendency that the sharing of data between operators and manufacturers (and vice-versa) is restricted.

Prevention strategy: Operators should support manufacturers by sharing data of incidents and vice-versa.

8.3 Cargo Operators

Cargo operations have shown a significantly higher accident rate per million sectors than passenger ones. This unfortunate trend has continued over the past years. The lack of the safety management system according to JAR-OPS 1 and AC 120 seems to have contributed to this situation.

Prevention strategy: Cargo operators should apply prevention strategies for passenger operations, mainly the implementation of a Safety Management System, and equip the aircraft with modern technology, such as EGPWS.

Prevention strategy: IATA should encourage cargo operators to actively participate in its safety activities.

Prevention strategy: IATA should educate cargo operators of the benefits of IOSA and its Standards and Recommended Practices applicable to air cargo operations.

8.4 Airports

8.4.1 Contaminated Runway Data

Accident analysis shows that pilots overestimated the stopping performance of their aircraft in contaminated runway environments. In situations were weather quickly deteriorated, flight crews did not have a most recent update on runway conditions. Manufacturers put clear statements as to the extent of flight-testing on contaminated runways.

Prevention strategy: IATA to raise awareness of flight crews regarding how surface conditions can deteriorate from one landing to the other and encourage the distribution of timely and accurate weather update and runway surface conditions.

8.4.2 Runway Surface Integrity

Accident analysis determined that, with the application of thrust, pieces of the runway surface broke loose and propelled into the airframe. The structural integrity was not only ompromised, but there is a high risk of loosing the aircraft due to flight control breakage.

Prevention strategy: IATA to monitor airports where such events have occurred in the past and inform operators about the risk hazard.

8.4.3 Protection of Overrun Areas

There were multiple runway excursions in 2005. Aircraft overshooting runways jeopardised the safety of the passengers and crew when their aircraft entered unsuitable overrun areas. These areas included uneven terrain, trenches or even obstacles such as concrete structures.

Prevention strategy: Overrun areas should comply with ICAO Annex 14. The task force recommends that IATA collects data on airport overrun areas that do not meet the ICAO Annex 14 and lists these airports / respective runways in an appropriate means of publication.

8.5 Manufacturers

8.5.1 Tailstrike Avoidance

In 2005, tailstrikes caused operational irregularities. Tailstrikes can compromise the structural integrity of the airframe and are therefore considered safety hazards. On some aircraft, a tailstrike can be difficult to detect. With today's technology, it seems possible to develop systems that can help prevent tailstrikes during takeoff and landing. In addition there are systems under development that help to indicate an earlier tailstrike.

Prevention strategy: Operators, IATA and regulators should encourage the development of Tailstrike Prevention Systems and Tailstrike Indicator Systems.

8.5.2 Limitations of Simulator Training

While full flight simulators have proved to be extremely valuable tools in training and checking of flight crews over the past decades, when comparing a typical simulator scenario with a "real world", in-flight non-normal situation, a couple of discrepancies can be observed. This holds true, even though the technology of simulators has improved tremendously and new training concepts (such as line oriented flight training) have been introduced. While there is no solution on the horizon, in the opinion of the task force, flight instructors should be made aware of the following and research institutions should be pushed to come up with solutions to the following:

Typically, the check airmen / simulator instructors not only operate the simulator and overlook the flight crews action, they also play the role of Air Traffic Control and simulate the presence of a cabin crewmember. Air Traffic communication can be very distracting during in-flight emergencies, both because several flights communicate on one frequency and secondly because the controller will not know that his transmission will interrupt the checklist work of the aircrew.

Since the instructor pilot is "in the loop" by directly observing the flight crew, he will time his instructions so as not to interfere with the crew tasks. The consequence is a sequential action rather than multi-tasking with frequent interruptions.

Flight Simulators make use of aero-models that are not typically able to represent the flight characteristics outside the edge of the operating envelope, such as stalled flight at high altitudes or the dynamic behaviour in upset situations. A simulator will not reproduce the behaviour of an aircraft in areas where the aircraft has not been flight-tested.

Simulator training sessions typically concentrate on technical systems failures, and the regulator forces operators to cover all systems in three years, whereas many non-normal situations are not triggered by technical problems. Very often, operational pressures and social / human factors are dominant.

In summary, while (mainly) incident statistics show that almost every flight encounters numerous threats (outside factors), simulators (except for weather and technical threats) are not ideal in recreating those threats.

Prevention strategy: IATA should conduct research with the goal to provide more realistic training scenarios that include workload / automation management, human factors and Crew Ressource Management.

8.6 Summary of Main Findings and IATA Prevention Strategies

Despite the increase in the fatality rate in 2005, the Western-built Jet Hull Loss rate showed a continued decrease to 0.76 Hull Losses per million sectors flown.

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

Passenger fatalities & the accident rate: Despite the reduction in the accident rate in 2005, the public perception of safety was distorted by a series of fatal accidents. Less than a quarter of all the year's accidents accounted for the majority of all fatalities. Over half of all fatal passenger flights involved low cost / charter operators. Flight crew proficiency issues relating to inadequate training and standards / checking were highlighted in accidents involving this type of operation.

Prevention Strategy: From 2006 onward, any airline wanting to join IATA will pass an IOSA audit first; all IATA existing members will have to be IOSA accredited by the end of 2007 to maintain IATA membership. This will enable all types of operators to implement internationally recognised standards and an accepted evaluation system designed to assess their operational management and control systems, particularly useful for start up or small-size airlines.

Approach and landing accidents (ALA) & runway excursions: Over half of all the accidents in 2005 occurred during the approach and landing phases of flight. Notably, almost half of ALA accidents involved a runway excursion. Flight crew proficiency issues, deficient training on behalf of the operator and adverse weather conditions all played a contributing role in the majority of events. Unsuitable overrun areas also contributed to the severity of landing accidents and the subsequent fatalities.

Prevention Strategy: IATA and its Safety Group have created a new section of the Six-point Safety Pro-

gramme that will address flying operations issues, including approach and landing accidents.

Cargo operations & Part 135 carriers: Cargo operations represented almost 20% of the year's accidents. Over half of all cargo accidents involved Part 135 operators, or equivalent. Flight crew proficiency issues, linked to deficient training and adverse weather, played a contributing role in over half of cargo accidents.

Prevention Strategy: IATA will promote the implementation of a safety management system amongst cargo operators and launch IOSA for dedicated cargo carriers to ensure they meet international safety standards.

Safety in Africa: In 2005, 18% of the accidents occurred in the African region, of which almost half were fatal. Events involving flight crew errors were tied to both the deficient organisational safety culture of the operator and the poor regulation of the operating environment.

Prevention Strategy: IATA will continue to implement the Partnership for Safety Programme to enable operators to improve their operational safety through the use of internationally recognised quality audit principles.

Ground damage: These accidents resulted in significant costs to the industry and affected particularly IATA Member Airlines, which were involved in over half of these events. The majority of ground damage accidents related to deficient ground operations.

Prevention Strategy: IATA will continue to implement its Ground Damage Prevention Programme to reduce ground accidents and their associated costs by 10% in 2006.

Annex 1 – Definitions

Aircraft-years: means, for 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.

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 or seriously 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, accidents are classified as either operational or non-operational.

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

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

Air Traffic Service unit: means an involved Air Traffic Service (ATS) unit, as defined in applicable ATS, Search and Rescue, and overflight regulations.

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

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

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

Controlled Flight into Terrain (CFIT): (From CAST-ICAO Common Taxonomy Team Occurrence Categories, refer to supporting documents on CD-ROM).

In-flight collision or near collision with terrain, water, or obstacle without indication of loss of control:

- CFIT is used only for occurrences during airborne phases of flight;
- CFIT includes collisions with those objects extending above the surface (for example: towers);

- CFIT can occur during either Instrument Meteorological Conditions (IMC) or Visual Meteorological Conditions (VMC);
- This category includes instances when the cockpit crew is affected by visual illusions (e.g. black hole approaches) that result in the aircraft being flown under control into terrain, water, or obstacles;
- If control of the aircraft is lost (induced by crew, weather or equipment failure), do not use this category; use Loss of Control — In-flight (LOC-I) instead;
- For an occurrence involving intentional low altitude operations (e.g. crop dusting) use the Low Altitude Operations (LALT) code instead of CFIT;
- Do not use this category for occurrences involving intentional flight into / toward terrain. Code all suicides under Security Related (SEC) events;
- Do not use this category for occurrences involving runway undershoot / overshoot, which are classified as Undershoot / Overshoot (USOS).

Crewmember: means 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: The main types in current service and considered in this Safety Report are the An-72, Il-62, Il-76, Il-86, Tu-134, Tu-154, Yak-40 and Yak-42.

Eastern-built Turboprop aircraft: The main types in current service and considered in this Safety Report are An-12, An-24, An-26, An-28, An-32, L-410 and Y-12.

Fatal accident: A fatal accident is one 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.

Most fatal accidents also result in the aircraft becoming a hull loss but this is not necessarily always the case and there have been a number of substantial damage accidents where deaths have occurred.

Fatality: A fatality is 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 generally excluded, however, one or two cases where death came later but could reasonably be shown to have been a direct result of injuries sustained in the original accident, are included (this does not conform to the ICAO Annex 13 definition but, in this context, is thought to be more meaningful).

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: IATA's accident classification system comprises five categories: human, technical, environmental, organisational, and insufficient data. Each category (excepting the last) is further subdivided into detailed contributing factors.

Human Factors (HUM): The human factors category relates only to the involved flight crew.

CODE	DESCRIPTION	EXAMPLE EVENT(S)
H1	Intentional non-compliance	**Deliberate and premeditated** deviation from operator procedures and/or regulations. Examples include intentional disregard of operational limitations or SOPs.
H2	Proficiency	Flight crew performance failures due to deficient knowledge or skills. This may be exacerbated by lack of experience, knowledge or training. Examples include inappropriate handling of the aircraft, such as flying within established approach parameters, or of systems, such as the inability to correctly programme a flight management computer.
H3	Communication	Miscommunication, misinterpretation or failure to communicate pertinent information within the flight crew or between the flight crew and an external agent (e.g. ATC or ground operations). CRM issues typically fall under this category. Examples include: failures in monitoring and cross-checking, misunderstanding a clearance or failure to convey relevant operational information.

CODE	DESCRIPTION	EXAMPLE EVENT(S)
H4	Procedural	Unintentional deviation in the execution of operator procedures and/or regulations. The flight crew has the necessary knowledge and skills, the intention is correct, but the execution is flawed. It may also include situations where flight crews forget or omit relevant appropriate action. Examples include a flight crew dialling a wrong altitude into a mode control panel or a flight crew failing to dial an altitude in a mode control panel.
H5	Incapacitation / Fatigue	Flight crewmember unable to perform duties due to physical or psychological impairment.

Technical Factors (TEC): The technical factors category relates specifically to systems and components of the involved aircraft and their airworthiness and/or serviceability.

CODE	DESCRIPTION	EXAMPLE EVENT(S)
T1	Extensive engine failure, uncontained engine fire	Damage due to non-containment.
T2	Engine failure, malfunction, fire warning	Engine overheat, propeller failure.
T3	Gear and tire	Failure affecting parking, taxi, take-off and landing.
T4	Flight controls	Failure affecting aircraft controllability.
T5	Structural failure	Failure due to flutter, overload, corrosion / fatigue; engine separation.
T6	Fire, smoke (cockpit, cabin, cargo)	Post-crash fire, fire due to aircraft systems, fire other cause(s).
T7	Unapproved modification / bogus parts	Self-explanatory.
T8	Avionics	All avionics except autopilot and FMS.
T9	Design, manufacturer	Design shortcomings, manufacturing defect.
T10	Autopilot / FMS	Self-explanatory.
T11	Hydraulic system failure	Self-explanatory.
T12	Other	Not clearly falling within another technical category.

Environmental Factors (ENV): The environmental factors category relates to the physical world in which the involved aircraft operated and the infrastructural resources (excluding corporate) required for successful performance.

CODE	DESCRIPTION	EXAMPLE EVENT(S)
E1	Meteorology (MET)	Windshear, jet upset, atmospheric turbulence, icing, wake turbulence (aircraft spacing), volcanic ash, sand, precipitation, lightning. Poor visibility, poor runway condition reporting.
E2	Air Traffic Services (ATS) /Communications (COM) / conflicting traffic	Incorrect, inadequate or misleading instruction or advice, misunderstood / missed communication, failure to provide separation (air), failure to provide separation (ground).
E3	Birds / Foreign Object Damage (FOD)	Self-explanatory.
E4	Airport facilities	Inadequate aerodrome support (crash, rescue capability, snow removal, sanding); failure to eliminate runway hazards; inadequate, improper, or misleading airport marking or information.
E5	Navaids	Ground navigation aid malfunction, lack or unavailability.
E6	Security	Inadequate security measures; breach of security procedures.
E7	Regulatory oversight	Failure by cognisant authority to exercise regulatory oversight or lack thereof.
E8	Other	Not clearly falling within another environmental category.

Organisational Factors (ORG): The organisational factors category relates to the corporate environment in which flight crews operate, including management aspects.

CODE	DESCRIPTION	EXAMPLE EVENT(S)
O1	Safety management	Inadequate or absent SMS such as: ineffective or absent safety officer, inadequate or absent accident/incident prevention programme, inadequate or absent voluntary confidential reporting system.
O2	Training systems	Omitted or inadequate training; language skills deficiencies; qualifications and experience of flight crews, operational needs leading to training reductions, insufficient assessment of training, inadequate training resources such as manuals or CBT devices.
O3	Standards and checking	Inadequate, incorrect, unclear 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.
O4	Cabin operations	The management of cabin operations. Examples include: unruly passenger management, failure to perform by cabin crew.
O5	Ground operations	The management of ground operations. Examples include: ground support procedures and training, loading errors, incorrect pushback procedures, failure in ground tug, de-icing, or marshalling.
O6	Technology and equipment	Available safety equipment not installed (EGPWS, predictive wind-shear, TCAS / ACAS, etc.).
O7	Operational planning and scheduling	Crew rostering and staffing practices, flight and duty time limitations, health and welfare issues.
O8	Change management	Inadequate oversight of change. Failure to address operational needs created by, for example: expansion, or downsising. Failure to evaluate, integrate and/or monitor changes to established organisational practices or procedures. Consequences of mergers and acquisitions.
O9	Selection systems	Inadequate or absent selection standards.
O10	Maintenance operations	The management of maintenance activities. Examples include failure to complete maintenance, maintenance or repair error / oversight / inadequacy, unrecorded maintenance, deficiencies in technical documentation, deficiencies in trouble shooting.
O11	Dangerous goods	Carriage of articles or substances capable of posing a significant risk to health, safety or property when transported by air.
O12	Dispatch	Self-explanatory.
O13	Other	Not clearly falling within another organisational category.

Insufficient Data (I): The insufficient data category is used to describe accidents for which classification is not possible without further information.

CODE	DESCRIPTION	EXAMPLE EVENT(S)
I	Insufficient data to make any classification	Self-explanatory.

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

Level of safety: means 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: means 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 such as sabotage, war, etc., and (an IATA constraint) accidents which occur during crew training, demonstration and test flights (sabotage, etc., 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 operation).

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

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

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

Passenger: means 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: means 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 were, and continue to be, developed by the ATA Flight Operations Working Group. The following is an excerpt from the Flight Operations Information Data Interchange — Phase of Flight Specification, ATA iSpec2200 (ATA POF Spec). Further information on iSpec2200 may be obtained from www.airlines.org.

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 energize 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 cruise; it ends with the aircraft established at a predetermined constant initial cruise altitude at a defined speed or by the crew initiating an “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”).

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 an “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 of 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.*

Sky Marshal: see In-flight Security Personnel.

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

Risk: means the combination of the probability, or frequency of occurrence of a defined hazard and the magnitude of the consequences of the occurrence.

Safety: means freedom from unacceptable risk of harm.

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

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).

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;
- Results in a fracture of any bone (except simple fractures of fingers, toes or nose);
- 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.

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. *Engine failure (damage limited to an engine), bent fairing or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, minor damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wing tips are not considered "substantial damage" for 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.*

Threat and Error Management (TEM) model: This section presents definitions for the components of the TEM model and illustrates examples for the classifications used for Integrated Threat Analysis (ITA). Lists of examples are not exhaustive.

Threats Events that occur **outside the influence of the flight crew,** or errors by **others than the flight crew,** that increase complexity of the flight, and require flight crew attention and management to maintain the margins of safety.

Mismanaged Threat A threat that is linked to, or induces flight crew error.

Environmental Threats

- *Weather:* thunderstorms, turbulence, icing, wind shear, cross/tailwind, very low/high temperatures.
ATC: traffic congestion, TCAS RA / TA, ATC command, ATC error, ATC language difficulty, ATC non-standard phraseology, ATC runway change, ATIS communication, units of measurement (QFE/meters).*Airport:* contaminated / short runway, contaminated taxiway, lack of / confusing / faded signage / markings, birds, aids U/S, complex surface navigation procedures, airport constructions.*Terrain:* High ground, slope, lack of references, "black hole", volcano.*Other:* similar call-signs.

Airline Threats

- *Airline operational pressure:* delays, late arrivals, equipment changes.
Aircraft: aircraft malfunction, automation event / anomaly, MEL/CDL.*Cabin:* cabin crew error, cabin event distraction, interruption, cabin door security.*Maintenance:* maintenance event / error.*Ground:* ground handling event, de-icing, ground crew error.*Dispatch:* dispatch paperwork event / error.*Documentation:* manual error, chart error.*Other:* crew scheduling event.

Errors

Observed actions or inactions by the flight crew, that lead to a deviation from flight crew or organisational intentions or expectations.

Mismanaged Error
An error that is linked to or induces additional errors, or an undesired aircraft state.

Errors

Proficiency Errors

- *Manual handling / flight controls:* vertical / lateral and/or speed deviations, incorrect flaps / speedbrakes, thrust reverser or power settings.

Automation: incorrect altitude, speed, heading, autothrottle settings, incorrect mode executed, or incorrect entries.*Systems / radio / instruments:* incorrect packs, incorrect anti-icing, incorrect altimeter, incorrect fuel switches settings, incorrect speed bug, incorrect radio frequency dialled.*Ground navigation:* attempting to turn down wrong taxiway/runway, taxi too fast, failure to hold short, missed taxiway/runway.

Procedural Errors

- *SOPs:* failure to cross-verify automation inputs.

Checklists: wrong challenge and response; items missed, checklist performed late or at the wrong time.*Callouts:* omitted / incorrect callouts.*Briefings:* omitted briefings; items missed.*Documentation:* wrong weight and balance, fuel information, ATIS, or clearance information recorded, misinterpreted items on paperwork, incorrect logbook entries, incorrect application of MEL procedures.

Communication Errors

- *Crew to external:* missed calls, misinterpretations of instructions, incorrect read-back, wrong clearance, taxiway, gate or runway communicated.

Pilot to pilot: within crew miscommunication or misinterpretation.

Intentional Non-compliance
Wilful deviation from rules, regulation, SOPs.

Undesired Aircraft States Flight crew-induced aircraft states (deviations or incorrect configurations) associated with a clear reduction in safety margins; a safety-compromising situation that results from ineffective error management.

Mismanaged Undesired Aircraft State An Undesired Aircraft State that is linked to, or induces additional error / Undesired Aircraft State, an incident or accident.

Aircraft Handling

- Aircraft control (attitude).

Vertical, lateral or speed deviations.Unnecessary weather penetration.Unauthorised airspace penetration.Operation outside aircraft limitations.Unstable approach.Continued landing after unstable approach.Long, floated, firm or off-centreline landing.

Ground Navigation

- Proceeding towards wrong taxiway / runway.

Wrong taxiway, ramp, gate or hold spot.

Incorrect Aircraft Configurations

- Incorrect systems configuration.

Incorrect flight controls configuration. Incorrect automation configuration.Incorrect engine configuration. Incorrect weight and balance configuration.

Western-built Jet: Commercial Jet transport aeroplane with a maximum certificated takeoff mass of more than 15,000 kg, designed and manufactured in the western world countries.

Western-built Turboprop: Commercial Turboprop transport aeroplane with a maximum certificated takeoff mass of more than 3900 kg, designed and manufactured in the western world countries.

Annex 2 – 2005 Accident Summary

Date	Manufacturer	Aircraft	Operator	Location	Phase	Service	Origin	Jet/ Turboprop	Severity	Summary
6-Jan-05	Bombardier	CRJ-200	Air Sahara	Dabolim Airport Goa-Intl AP (VAGO), India	LND	DXF	Western-built	Jet	Substantial Damage	Undercarriage collapsed on landing
6-Jan-05	Let	L-410 UVP-E	Cabo Verde Express	Amilcar Cabral Int AP Sal, CV	GDS	DNP	Eastern-built	Turboprop	Substantial Damage	Battery acid liquid caused extensive damage to aircraft
8-Jan-05	Boeing	MD-83	Aerorepublica	Cali-Intl AP (SKCL), Colombia	LND	DSP	Western-built	Jet	Hull Loss	Runway overrun on landing
8-Jan-05	Antonov	An-12	Sevice Air	Bukalaza / Entebbe area (HUEN), Uganda	ICL	INC	Eastern-built	Turboprop	Hull Loss	Aircraft crashed in wooded area
12-Jan-05	Fokker	F28-4000	Myanma Aiways	Myeik AP (VYME), Myanmar	LND	DSP	Western-built	Jet	Substantial Damage	Nose gear collapsed on landing roll
13-Jan-05	Embraer	EMB 110P1 Bandeirante	AirNow	Dillant Hopkins Airport (EEN), Swanzey, New Hampshire., United States	APR	DNC	Western-built	Turboprop	Hull Loss	Crashed in final stage of an ILS approach
17-Jan-05	Boeing	B737-200	Delta Air Lines	Cincinnati-Intl AP (KCVG) / KY, United States	PRF	DSP	Western-built	Jet	Substantial Damage	Collision with ground vehicle parked on ramp
18-Jan-05	Airbus	A321	Novair	Sharm-El-Sheikh, EG, Egypt	LND	INP	Western-built	Jet	Substantial Damage	Hard landing resulting in tailstrike
23-Jan-05	Boeing	MD-83	Spanair	Asturias, ES, Spain	LND	DSP	Western-built	Jet	Substantial Damage	Hard landing
24-Jan-05	Boeing	B747-200SF	Atlas Air (ops for Emirates Sky Cargo)	Duesseldorf-Intl AP (EDDL), Germany	LND	ISC	Western-built	Jet	Substantial Damage	Runway overrun on landing
25-Jan-05	Fokker	F100	Montenegro Airlines	Podgorica-Intl AP (LYPG), Montenegro	LND	DSP	Western-built	Jet	Substantial Damage	Loss of visual contact with runway on landing, runway excursion
27-Jan-05	Let	L-410 UVP-E	Farnair Hungary	Iasi AP (LRIA), Romania	LND	ISC	Eastern-built	Turboprop	Hull Loss	Undershot on second landing approach
27-Jan-05	Bombardier	DHC-6 Twin Otter	ERA Aviation	Toksook Bay, US	LND	DSP	Western-built	Turboprop	Substantial Damage	Runway excursion on landing, nose gear collapsed
3-Feb-05	Boeing	B737-200	Phoenix Aviation (ops for Kam Air)	20 km SE of Kabul, Afghanistan	CRZ	DSP	Western-built	Jet	Hull Loss	Crashed in mountainous area (CFIT)
6-Feb-05	Bombardier	DHC-8	Air Senegal International	Tambacounda AP (GOTT), Senegal	LND	DSP	Western-built	Turboprop	Substantial Damage	Runway excursion after hard landing
22-Feb-05	General Dynamics	Convair 580	Transportes Aereos Militar	(near) Airport Trinidad, Bolivia, Bolivia	TOF	DNP	Western-built	Turboprop	Hull Loss	Crashed in flooded ground area due to engine failure
23-Feb-05	Bombardier	DHC-6 Twin Otter	GT Air	Enarotali, ID, Indonesia	LND	DNP	Western-built	Turboprop	Substantial Damage	Loss of control on landing in gusty conditions
2-Mar-05	Boeing	B777-200ER	Continental Airlines	Liberty International Airport, Newark, New Jersey, United States	TOF	ISP	Western-built	Jet	Substantial Damage	Tailstrike on takeoff
6-Mar-05	Airbus	A310-300	Air Transat	Varadero-Intl AP (MUVR), Cuba	CRZ	INP	Western-built	Jet	Substantial Damage	Control problems due to missing rudder
7-Mar-05	Airbus	A310-300	Mahan Air	Mehrabad International Airport, Iran	LND	ISP	Western-built	Jet	Substantial Damage	Runway excursion on landing
9-Mar-05	Antonov	An-12BP	Vega Airlines	Baghdad-Intl AP (ORBS), Iraq	LND	INC	Eastern-built	Turboprop	Substantial Damage	Impacted ground on landing in strong crosswinds
11-Mar-05	Bombardier	CRJ	Pinnacle Airlines	Milwaukee-Intl AP (KMKE) / WI, United States	LND	DSP	Western-built	Jet	Substantial Damage	Runway excursion on landing
15-Mar-05	Antonov	An-26	ATSA - Aero Transporte SA	Lima-Intl AP (SPIM), Peru	LND	DNC	Eastern-built	Turboprop	Substantial Damage	Undercarriage retracted on landing
16-Mar-05	Antonov	An-24	Regional Airlines	Varandei AP area / Nenetsk Region, Russia	APR	DSP	Eastern-built	Turboprop	Hull Loss	Undershot on approach
19-Mar-05	Boeing	B707-300	Race Cargo Airlines (ops for Ethiopian Airlines)	Lake Victoria / Kigungu area (HUEN), Uganda	LND	INC	Western-built	Jet	Hull Loss	Undershot on second landing approach
23-Mar-05	Illyushin	Il-76TD	Airline Transport	Lake Victoria, off Mwanza-Intl AP (HTMW), Tanzania	ICL	INC	Eastern-built	Jet	Hull Loss	Crashed in lake after takeoff
26-Mar-05	Let	L-410 UVP-E	West Caribbean Airways	Aguadulce, Providencia area (SKPV), Colombia	ICL	DSP	Eastern-built	Turboprop	Hull Loss	Crashed in hillside after takeoff
28-Mar-05	Illyushin	IL-18	Aerocaribbean	Caracas-Maiquetia Intl AP (SVMI), Venezuela	RTO	INP	Eastern-built	Turboprop	Hull Loss	Undercarriage collapsed after rejected takeoff due to engine problems
28-Mar-05	Boeing	B767-200	Avianca Airlines	Bogota-Intl AP (SKBO), Colombia	TXO	ISP	Western-built	Jet	Substantial Damage	Collision with other aircraft on taxiway
28-Mar-05	Boeing	B767-300	LAN Airline	Bogota-Intl AP (SKBO), Colombia	TXO	ISP	Western-built	Jet	Substantial Damage	Collision with other aircraft on taxiway

Date	Manufacturer	Aircraft	Operator	Location	Phase	Service	Origin	Jet/ Turboprop	Severity	Summary
7-Apr-05	Fokker	F-28	Icaro Air	Coca Airport (SECO), Ecuador	APR	DSP	Western-built	Jet	Hull Loss	Undershot on final approach, undercarriage collapsed
12-Apr-05	Bombardier	DHC-6 Twin Otter	GT Air	Enarotali area, Indonesia	APR	DSP	Western-built	Turboprop	Hull Loss	Crashed on approach into mountainside
14-Apr-05	Boeing	B737-200	Merpati Nusantara Airlines	Makassar - Ujung Pandang, ID, Indonesia	LND	DSP	Western-built	Jet	Substantial Damage	Runway excursion, undercarriage collapsed
18-Apr-05	ATR	ATR-72	Olympic Airlines	Mikonos, GR, Greece	LND	DSP	Western-built	Turboprop	Substantial Damage	Hard landing and bounce on second approach
20-Apr-05	Boeing	B707-300C	Saha Air	Tehran-Intl AP (OIII), Iran	LND	DSP	Western-built	Jet	Hull Loss	Runway excursion on landing
1-May-05	Bombardier	DHC-8	Wideroe	Hammerfest AP (ENHF), Norway	LND	DSP	Western-built	Turboprop	Hull Loss	Hard landing, undercarriage collapsed
3-May-05	Fairchild	Metro III	Air Post	6 km E of Stratford, New Zealand	CRZ	DNC	Western-built	Turboprop	Hull Loss	Crashed after loss of control in gusty conditions
4-May-05	Antonov	An-26	Kisangani Airlift	30km SE Kisangani, Congo, Republic of the	APR	DNC	Eastern-built	Turboprop	Hull Loss	Collision with trees on forced landing
4-May-05	Airbus	A321	Lufthansa	Ataturk Intl AP, Istanbul, Turkey	TOF	ISP	Western-built	Jet	Substantial Damage	FOD damage
7-May-05	Fairchild	Metro 23	Aero-Tropics Air Services	South Pap Ridge, Lockhart River, Australia	LND	DSP	Western-built	Turboprop	Hull Loss	Crashed in forested area in gusty conditions
9-May-05	Boeing	B727-2M7	Iran Air	Tehran, Iraq, Iraq	ESD	DNP	Western-built	Jet	Substantial Damage	Collision with ground vehicle after push back and engine start up
10-May-05	Swearigen	Metro 2	Perimeter Airlines	Thompson Municipal Airport, Thompson, MB, CA, Canada	LND	DSP	Western-built	Turboprop	Substantial Damage	Hard landing after turbulence and fluctuating airspeed
10-May-05	Boeing	DC-9-51	Northwest Airlines	Minneapolis (KMSP), United States	TXI	DSP	Western-built	Jet	Hull Loss	Collision with other aircraft during push back from gate
10-May-05	Airbus	A319	Northwest Airlines	Minneapolis, MN, USA, United States	GDS	DSP	Western-built	Jet	Substantial Damage	Collision with other aircraft on stand
13-May-05	Boeing	MD-88	Delta Air Lines	Denver, CO, USA, United States	ICL	DSP	Western-built	Jet	Substantial Damage	Nose gear actuator rod penetrated the forward pressure bulkhead, uneventful landing
22-May-05	Boeing	B767-300ER	Skyservice Airlines	Punta Cana AP (MDPC), Dominican Republic	LND	INP	Western-built	Jet	Substantial Damage	Hard landing forward fuselage damaged
25-May-05	Antonov	An-12	Victoria Air	(near) Bitale, ZR, Congo, Republic of the	CRZ	DNP	Eastern-built	Turboprop	Hull Loss	Crashed after takeoff in mountainous area
31-May-05	Boeing	B737-400	Adam Air	Soekarno Hatta International Airport, Jakarta, ID	LND	DSP	Western-built	Jet	Substantial Damage	Aircarft substantially damaged when right main undercarriage collapsed on landing
1-Jun-05	Airbus	A320	Armavia	Vnukovo Airport, Moscow, Russia, Russia	LND	ISP	Western-built	Jet	Substantial Damage	Runway excursion on landing
2-Jun-05	Let	L-410 Turbolet	Transportes Aereos Guatemaltecos	Zacapa Airport, Guatemala	ICL	DNP	Eastern-built	Turboprop	Hull Loss	Crashed during forced landing, loss of engine power on takeoff
2-Jun-05	Antonov	An-24	Marsland Aviation	Khartoum Airport, Sudan	ICL	DNP	Eastern-built	Turboprop	Hull Loss	Crashed on takeoff after an engine fire
7-Jun-05	Boeing	MD-11F	United Parcel Service Co	Louisville Intl AP (KSDF), United States	LND	DNC	Western-built	Jet	Substantial Damage	Undercarriage collapsed on landing
8-Jun-05	SAAB	340	Shuttle America (ops for United Express)	Washington Dulles Intl AP (IAD), United States	LND	DSP	Western-built	Turboprop	Substantial Damage	Undercarriage collapsed, runway excursion
10-Jun-05	Bae	HS-748	748 Air Services	Lokichogio AP (HKLK), Kenya	LND	IXF	Western-built	Turboprop	Hull Loss	Undercarriage retracted on landing
11-Jun-05	Bae	Jetstream 41	SA Airlink	Durban Intl AP (FAFN)	LND	DSP	Western-built	Turboprop	Substantial Damage	Emergency landing after nose undercarriage did not deploy
15-Jun-05	Aéspatiale/Aeritalia	ATR-42-300F	Northern Air Cargo	32nm N of ANC, United States	DST	DNC	Western-built	Turboprop	Substantial Damage	Lightning strike resulting in substantial damage to aileron
19-Jun-05	Boeing	B707-320C	Mahfooz Aviation obo Ethiopian Airlines	Addis Ababa- Intl AP (HAAB), Ethiopia	LND	FRY	Western-built	Jet	Hull Loss	Hard landing, undercarriage collapsed
27-Jun-05	Boeing	B727-200	Capital Cargo International	San Diego International Airport, United States	ESD	DNP	Western-built	Jet	Substantial Damage	Lunged into a ground vehicle during engine start
29-Jun-05	Antonov	An-26	Mango Mat	Goma, Zaire	LND	DNC	Eastern-built	Turboprop	Substantial Damage	Runway excursion, undercarriage collapsed
30-Jun-05	Dornier	Dornier Do-228	Ghorka Airlines	Lukla AP (VNLK), Nepal	APR	DSP	Western-built	Turboprop	Hull Loss	Undershoot while landing in adverse weather
1-Jul-05	Boeing	DC-10-30ER	Biman Bangladesh Airlines	Chittagong-Intl AP (VGEG), India	LND	INP	Western-built	Jet	Hull Loss	Runway excursion on landing, undercarriage collapsed
6-Jul-05	Fairchild	Metro III	Bearskin Airlines	Thunder Bay, CA, Canada	LND	DSP	Western-built	Turboprop	Substantial Damage	Landing with nose undercarriage retracted
8-Jul-05	Boeing	B737-700	Southwest Airlines	Midway International Airport, Chicago, United States	ESD	DSP	Western-built	Jet	Substantial Damage	Collision with ground vehicle

Date	Manufacturer	Aircraft	Operator	Location	Phase	Service	Origin	Jet/ Turboprop	Severity	Summary
12-Jul-05	Boeing	B737-800	Kibris Turkish Airlines	Antalya, TR, Turkey	TOF	INP	Western-built	Jet	Substantial Damage	Failure to liftoff, tailstrike runway
16-Jul-05	Antonov	An-24	Equatair	Baney area / 18 miles S of Malabo, Equatorial Guinea	ICL	DNP	Eastern-built	Turboprop	Hull Loss	Crashed in thick forest after takeoff
2-Aug-05	Boeing	B737-300	Aerosvit Airlines	Minhad Air Force Base (near) Dubai, United Arab Emirates	TOF	ISP	Western-built	Jet	Substantial Damage	Wheel struck metal barrier on take-off severing a hydraulic line
2-Aug-05	Airbus	A340-313X	Air France	Toronto-Intl AP (CYYZ) / Ontario, Canada	LND	ISP	Western-built	Jet	Hull Loss	Runway excursion in gusty conditions, fire broke out destroying aircraft
6-Aug-05	ATR	ATR-72	Tuninter	Mediterranean Sea / 30 km off Cap Gallo / Sicily Island, Italy	CRZ	ISP	Western-built	Turboprop	Hull Loss	Crashed in sea after loss of power engine
9-Aug-05	Boeing	MD-90	Saudi Arabian Airlines	Cairo-Intl AP (HECA), Egypt	TXI	ISP	Western-built	Jet	Substantial Damage	Engine fire on landing
12-Aug-05	Antonov	An-140	Safiran Airlines	Araak, Iran, Iran	LND	DSP	Eastern-built	Turboprop	Substantial Damage	Runway excursion after engine power loss
14-Aug-05	Boeing	B737-300	Helios Airways	near Grammatikos (Greece), Greece	CRZ	ISP	Western-built	Jet	Hull Loss	Crashed after pressurisation failure, double pilot incapacitation
16-Aug-05	Boeing	MD-82	West Caribbean Airways	near Machiques (Venezuela), Venezuela	CRZ	INP	Western-built	Jet	Hull Loss	Crashed in open country after engine problems
19-Aug-05	Boeing	B747-200	Northwest Airlines	Agana-Intl AP (PGUM) / Guam, Guam	LND	ISP	Western-built	Jet	Hull Loss	Undercarriage retracted on landing
20-Aug-05	Boeing	B757-223	Excel Airways	near (Palma) Spain, Spain	ICL	INP	Western-built	Jet	Substantial Damage	Encountered hail storm after takeoff
23-Aug-05	Boeing	B737-200	TANS Peru	3 km (1.9 mls) from Pucallpa-Capitan Rolden Airport (PCL) (Peru), Peru	APR	DSP	Western-built	Jet	Hull Loss	Crashed on final approach in gusty conditions
24-Aug-05	Airbus	A340-310	SAS	Pudong Airport Shangai, China	TOF	ISP	Western-built	Jet	Substantial Damage	Tailstrike on takeoff
29-Aug-05	Bombardier	DHC-8	Horizon Air	Portland International Airport, United States	GDS	DSP	Western-built	Turboprop	Substantial Damage	Collision with other aircraft on taxiway
29-Aug-05	ATR	ATR-42-500	Airlinair (opf Air France)	Lyon-Intl AP (LFLL), France	LND	DNP	Western-built	Turboprop	Substantial Damage	Hard landing
5-Sep-05	Antonov	An-26	Kavatshi airlines	Matari Airport, Isiro, ZR, Congo, Republic of the	APR	DNC	Eastern-built	Turboprop	Hull Loss	Collision with trees on approach, landed short of runway
5-Sep-05	Boeing	B737-200	Mandala Airlines	Polonia Airport, Medan, ID, Indonesia	ICL	DSP	Western-built	Jet	Hull Loss	Crashed after takeoff, aircraft failed to climb
8-Sep-05	Bombardier	DHC-6 Twin Otter	TMK Air Commuter	(near) Goma, Congo (ZR), Congo, Republic of the	ICL	DSP	Western-built	Turboprop	Hull Loss	Engines lost power shortly after takeoff
9-Sep-05	Antonov	An-26	Air Kasai	30 NM north of Brazaville (FCBB), Congo, Republic of the	CRZ	INP	Eastern-built	Turboprop	Hull Loss	Impacted terrain and broke apart
10-Sep-05	Airbus	A340-313X	LAN Airline	Auckland, New Zealand	ESD	ISP	Western-built	Jet	Substantial Damage	Collision with ground vehicle during push back from gate
11-Sep-05	NAMC	YS-11	Phuket Air	Mae Sot AP, Thailand, Thailand	LND	DSP	Western-built	Turboprop	Hull Loss	Runway overrun in gusty conditions
19-Sep-05	Swearigen	SA-227	Dynamic Air	Rotterdam, Netherlands, Netherlands	TOF	INP	Western-built	Turboprop	Hull Loss	Runway excursion, undercarriage collapsed
7-Oct-05	Bombardier	DHC-8	British Airways	Dyce Airport, Aberdeen, GB, United Kingdom	TXO	DSP	Western-built	Turboprop	Substantial Damage	Collision with ground vehicle following engine start up
9-Oct-05	Boeing	737-400	Air Sahara	Mumbai Intl AP, India	LND	DSP	Western-built	Jet	Substantial Damage	Runway overrun
12-Oct-05	Boeing	B737-300	Southwest Airlines	Phoenix Sky Harbor International Airport. Phoenix, Arizona., United States	TXO	DSP	Western-built	Jet	Substantial Damage	Collision with other aircraft
22-Oct-05	Boeing	737-200	Bellview Airlines	Lissa area / 30 km N of Lagos, Nigeria	ECL	DSP	Western-built	Jet	Hull Loss	Crashed after takeoff
24-Oct-05	ATR	ATR-42-300F	TACV Cabo Verde Airlines	Leopold Sedar Senghor, Dakar, Senegal	TXO	ISP	Western-built	Turboprop	Substantial Damage	Undercarriage failed and collapsed on taxiway
30-Oct-05	Let	L-410 Turbolet	Trade Air (obo DHL)	Bergamo AP area (LIME), Italy	ICL	ISC	Eastern-built	Turboprop	Hull Loss	Crashed after takeoff
31-Oct-05	Boeing	B727	MIBA Aviation	Kindu International Airport, Kindu, ZR, Congo, Republic of the	LND	DNC	Western-built	Jet	Hull Loss	Runway overrun on landing in heavy rain
1-Nov-05	Bombardier	Shorts 360	Associated Aviation Ltd	Lagos	LND	DNP	Western-built	Turboprop	Substantial Damage	Aircraft veered of runway, undercarriage collapsed
7-Nov-05	Fairchild	Dornier 328JET	Hainan Airlines	Korla Airport, China	LND	DNP	Western-built	Jet	Substantial Damage	Collision with cables during final approach
8-Nov-05	Embraer	EMB 110P1	Business Air (Ops for Air Now)	Manchester Airport (MHT), United States	TOF	DSC	Western-built	Turboprop	Hull Loss	Impacted a building after takeoff

Date	Manufacturer	Aircraft	Operator	Location	Phase	Service	Origin	Jet/ Turboprop	Severity	Summary
14-Nov-05	Bombardier	DHC-6 Twin Otter	Solenta Aviation	Akon Airport, SD, Sudan	LND	DNP	Western-built	Turboprop	Substantial Damage	Undershot during landing, undercarriage collapsed
14-Nov-05	Bae	Bae 146	Asian Spirit AL	Catarman, Philippines, Philippines	LND	DSP	Western-built	Jet	Substantial Damage	Runway overrun
20-Nov-05	Boeing	B737-800	Miami Air International	University Park Airport State College, US, United States	LND	DNP	Western-built	Jet	Substantial Damage	Tailstrike on landing
21-Nov-05	Xian	Y-7 100C	Royal Phnom Penh Airways	Raranakiri	LND	DSP	Eastern-built	Turboprop	Substantial Damage	Hard landing, right main undercarriage subsequently failed
30-Nov-05	Indonesian Aerospace	CASA 212	Sabang Merauke Raya	Sinabang	LND	DNP	Western-built	Turboprop	Substantial Damage	Runway overrun, 60m beyond end of runway
1-Dec-05	Boeing	B767-300	Skymark Airlines	Kagoshima-Intl AP (RJFK), Japan	ECL	DSP	Western-built	Jet	Substantial Damage	Uncontained engine failure, aircraft returned to land
7-Dec-05	Boeing	DC-9	WDA - Wimbi Dira Airways	Kinshasa-Intl AP (FZAA), Congo, Republic of the	LND	DSP	Western-built	Jet	Substantial Damage	Runway excursion, undercarriage collapsed
8-Dec-05	Boeing	B737-700	Southwest Airlines	Chicago-Midway Airport, IL (MDW), United States	LND	DSP	Western-built	Jet	Substantial Damage	Runway overrun upon landing, aircraft went through a barrier fence and onto a roadway
9-Dec-05	Embraer	EMB 110P1 Bandeirante	AirNow	(near) Orangeburg, US, United States	LND	DNC	Western-built	Turboprop	Hull Loss	Crashed in wooded area during final stage of visual approach
10-Dec-05	Boeing	DC-9-30	Sosoliso Airlines	Port Harcourt Airport (PHC) (Nigeria), Nigeria	LND	DSP	Western-built	Jet	Hull Loss	Runway overrun after landing and caught fire
14-Dec-05	Boeing	B727-200F	Fed Ex	Memphis International Airport, Memphis, Tennessee	ESD	DNC	Western-built	Jet	Substantial Damage	Collision with ground vehicle during pushback
15-Dec-05	Bombardier	DHC-7	Conviasa	Porlamar	LND	DSP	Western-built	Turboprop	Substantial Damage	Aircraft substantially damaged on landing, right main undercarriage retracted
16-Dec-05	Bombardier	DHC-6 Twin Otter	NatureAir	2 km from Tamarindo Airport (Costa Rica), Costa Rica	APR	DSP	Western-built	Turboprop	Hull Loss	Crashed in wooded area
19-Dec-05	Grumman	G-73T Mallard	Chalk"s Ocean Airways	Miami Beach	ICL	DSP	Western-built	Turboprop	Hull Loss	Crashed into sea shortly after take-off, right wing seperated in flight
23-Dec-05	Antonov	An-140	Azerbaijan Airlines	Kyurdakhani beach /15 km N of Baku	ECL	ISP	Eastern-built	Turboprop	Hull Loss	Crashed on the shore of the Caspian Sea shortly after take-off
26-Dec-05	Boeing	MD-83	Alaska Airlines	Seattle Tacoma	GDS	DSP	Western-built	Jet	Substantial Damage	Cabin depressurisation during climb out